

# 'YELLOW FEVER'

A PROSPECT OF THE HISTORY  
AND  
CULTURE OF DAFFODILS



DAVID WILLIS

**‘YELLOW FEVER’**

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(The cover illustration shows the cultivar ‘Best Friend’ (3Y-YYO), Clive Postles, 2001.)

To look at a daffodil flower and have not only its grace and beauty flash upon the eyes, but also the secrets of its history flash upon the mind, is a wonderful experience. It gives one an appreciation of the patience, dedication and love that has gone into the creation of these lovely garden plants together with a powerful reminder of their fragility and the need to do everything in our means to ensure their continued survival in all their great diversity. This has been my privilege and my vision.

David Willis, May 2012  
Sherriff Hutton, York

“I doubt whether any flower has a more interesting or romantic history than the Daffodil, or has filled the lives of so many well-known garden lovers with pleasure.”

Peter R. Barr, 1933

## **DEDICATION**

This work is dedicated to the memory of Barbara Fry who loved daffodils.

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The idea for this book developed from a research thesis completed in the early 1980s, the inspiration for which came from the 'daffodilly' environment of Northern Ireland where I lived at that time. Ireland is steeped in daffodil history and has given birth to some of the flower's greatest advocates in Hartland, Wilson and the Richardsons. I firmly believe that it was an echo from this daffodil history, following a visit to Wilson's old home at The Knockan, linked to the joy of working with his daffodils during my curatorship of the Guy L. Wilson Daffodil Garden at The (New) University of Ulster that was designated a National Collection and a Heritage Garden, which provided the initial spur. In this garden were to be found the aspirations and achievements of several of Ireland's greatest plant breeders whose work has revolutionised our concept of daffodil cultivars.

But, of course, people around me at that time also played a part in this story. Professor Alan Sharp, with whom I first discussed the idea, gave much encouragement, and Professor Peter Roebuck, Professor Brian S. Rushton and Joseph Leckey from The (New) University of Ulster helped mould the idea into reality. Dick de Jager loaned the complete set of Guy Wilson's breeding records and notes and, later, I had access to those that logged Lionel Richardson's half-century of progress and also those of Brian Duncan.

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and Kate Reade), the Daffodil Society archive and my own collection. Other photographs were taken from material in the collection of paintings, drawings and letters held at Trinity College, Dublin.

In 1985, I left Northern Ireland and settled in Yorkshire and soon discovered that the echo of the past history of daffodils was still with me there in the unforgettable wild daffodils of Farndale, planted by monks many centuries before. It was in Yorkshire that Richard Anthony Salisbury, secretary to the Horticultural Society of London from 1805-1816, saw the enigmatic *Narcissus triandrus* var. *pulchellus* growing during the late 18th century. It was Yorkshire that gave birth to A.H. Haworth who wrote the first monograph on daffodils in 1831. At the village of Spofforth, near Harrogate, the Revd William Herbert experimented with hybridising species daffodils and raised what was probably the first man-made hybrid, appropriately named *Narcissus* 'Spofforthiae'. The little market town of Thirsk gave rise to the great Kew taxonomist J.G. Baker who did so much to popularise the daffodil during the late 19th century.

So the echoes from the past and the inspiration that they provide continue to follow me and will, as time passes, afflict others with the delightful condition known as 'Yellow Fever'.

My sincere thanks are due to the Stanley Smith Horticultural Trust, which through its then Director, the late Sir George Taylor supported the initial research without which this project would not have begun. More recently, the Trust, through its current Director, Dr James Cullen, has supported the conversion of the rough typed draft into a digital format.

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**David Willis, May 2012**

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## FOREWORD

I wish to draw the reader's attention to two points in the text which follows.

The first concerns the revised colour coding of cultivars which appeared in the *International Daffodil Register*, 1998. In this, the colour coding of many cultivars was modified, in most cases only marginally, from what had gone before. The vast majority of the cultivars referred to in *Yellow Fever* use the 1998 coding. I found it impossible, however, to convince myself that 'Apricot' is now a 1W-Y and not a 1W-P by which I have known it throughout my life working with daffodils. I also find the 1998 coding for 'Beauty of Radnor' extremely testing as a 2W-YYO. It was described in early catalogues as having a large white cup with a wide band of pinkish apricot. The clincher for me is Guy Wilson's description in the 1920s when he said it had a "unique colour". Would he have said this about a 2W-YYO? I think not. It should be remembered that Wilson had been the dyeing expert at the family cloth mill and was widely regarded as having a wonderful eye for colour.

The second point concerns chemicals, especially pesticides, referred to in Chapters 22, 23, 25 and 26. Since these chapters were first considered, the number of pesticides available and the regulations governing their use has changed rapidly and is in a continuous state of flux. Recommendations which were approved a mere decade ago are now history and as this book is concerned in part with horticultural history it has been decided to leave these recommendations in to give a picture of the last 20 years of the 20th century or even earlier. There is no danger of these past recommendations being misinterpreted as current, as many of the chemicals have now been withdrawn from use on the grounds of user or environmental safety. To avoid any confusion a section is devoted to the current situation (2011) and how to obtain information relative to pesticide use in the years ahead.

David Willis, May 2012

## CHAPTER 1 INTRODUCTION

“I doubt whether any flower has a more interesting or romantic history than the Daffodil, or has filled the lives of so many well known garden lovers with pleasure.”<sup>(1)</sup>

This book sets out to trace the history of a plant often described as the most extensively grown ornamental in the British Isles. Commercially, it is indisputably the most important bulb crop in the United Kingdom, which is the world's largest producer, accommodating about half the global total area. About 29% of the crop is forced and 28% grown outdoors for flower production, the latter predominantly in the south-west. The remaining 43% is grown for dry bulb production, much of which is exported in a trade worth several million £stg a year<sup>(2)</sup>. In addition, the results of pioneering work in breeding new cultivars have been distributed all over the temperate world.

The daffodil became inextricably linked with these islands through the writings of Shakespeare, Herrick, Wordsworth and others, although its links in nature may be more tenuous than the numerous literary references suggest. In the wild, daffodils are most widely found in southern Europe from Spain and Portugal eastwards to Greece, but some extend northwards in Europe, southwards across the Mediterranean into North Africa, and beyond Greece into Asia. There, they are to be found in a relatively narrow latitudinal band running from Turkey to Japan, although in many of these areas they are doubtfully native.

The daffodil immortalised by Wordsworth is the most northerly branch of the genus and it has been claimed that it is native in Britain, although it is more likely to have been long naturalised. Its botanical name is *Narcissus pseudonarcissus* but its once common name, the English Lent Lily, indicates its long association with England. One might expect neighbouring Wales to possess a stronger link with the daffodil, the country's national flower. Surprisingly, this is not the case, the only daffodil found growing there in a semi-wild state being the Tenby Daffodil (*Narcissus obvallaris*). It was so named because of its discovery in a single colony near Tenby, Dyfed, but its true origin is uncertain and the Welsh stock is also thought to have arisen through naturalisation. Scotland has had some important daffodil connections, firstly through the Glaswegian, Peter Barr, who scoured southern Europe for new species during the late 19th century. He brought these back to England where they grew in his nursery alongside the numerous new cultivars becoming available at that time. Scotland's second claim to daffodil fame came in the form of the northern laird, the Brodie of Brodie, a hybridist of considerable importance during the first half of the 20th century.

In these islands, perhaps the strongest daffodil links are in Ireland, especially through work in the first half of the 20th century: for it was there that many of the important early advances took place. These led to considerable improvement and diversification within the genus. The work began in the late 19th century on the arrival in Dublin in 1879 of F.W. Burbidge, who was already recognised as an international authority on daffodils following the publication in 1875 of his *The Narcissus: its history and culture*<sup>(3)</sup>. Enthusiasm for the flower quickly spread to several others, none more so than to William Baylor Hartland, a nurseryman at Mallow in Co. Cork. He was succeeded in the early years of the 20th century by two giants in the history of daffodil breeding: Guy L. Wilson in Co. Antrim and J. Lionel Richardson in Waterford. For almost 50 years until the early 1960s, they indisputably led the world in daffodil breeding and, in due course, they acquired a circle of young followers who have continued to this day to keep Ireland at the forefront. Other countries have also played their part. The Netherlands has been involved since the late 19th century, Australia and New Zealand since the early 20th century, while the USA, though late on the scene, now plays an increasingly significant role.

Whilst daffodil species have been cultivated since well before the birth of Christ and featured significantly in the cultures of several ancient civilisations, current garden varieties (cultivars) are the products of the past 200 years. Owing to this relatively recent evolution, the history of daffodil improvement has been well researched and documented, facilitating analysis of the development of this most popular garden plant. The extent

of this improvement is all the more remarkable because, predominantly, it was achieved by a relatively small number of dedicated, amateur hybridists. Among their ranks were several eccentrics and many ‘characters’, whose successes emerged from a combination of dedication and persistence, tinged occasionally with a little luck.

The improvements of the past 200 years have come about through an increase in the number of polyploids within the daffodil population, especially of the optimal ploidy form for *Narcissus*, the tetraploid. Selection of such plants followed careful observation of their growth and floral characteristics. Initially, improvements were the result of natural hybridisation, while those selected somewhat later came from deliberate hybridisations. Hartland, for example, selected and named natural hybrids when he toured the old estates and monastic sites of Ireland in the late 19th century, whereas Richardson’s selected improvements had their origins in deliberate hybridisation carried out during the 20th century. Selection by observation was based largely on the recognition of improved vigour and other desirable characteristics, and early realisation that such improvements could be captured forever through the process of vegetative reproduction. Only recently has the science behind these improvements been understood. The establishment of ‘official’ breeding programmes, set up to complement the efforts of amateur enthusiasts, is even more recent. While the history of the daffodil is largely immutable, aspects of its culture such as propagation, pest, disease and weed control are constantly changing as knowledge increases. Every effort is made below to provide up-to-date information on these aspects of growing.

It is hoped that the story of the daffodil contained in these pages will in some way help in its conservation – while there is still time and while many of the older cultivars still exist, albeit several rather tenuously. The genus *Narcissus* is unique in its completeness: from the species, through the early cultivars, to those of the present day. Almost all the major stepping-stones in the process of improvement, spanning 200 years, are present and evident, and every effort should be made to ensure that they remain so. For plants are fragile things and, once lost, can never be replaced or recreated. Here, in this single genus, is a considerable resource that should be preserved as a living memorial to those it has inspired in gardens, literature, religions and civilisations over hundreds of years. Existing cultivars have characteristics with a potential for imparting disease resistance to their offspring, thus facilitating the continued development of the genus. The daffodil also possesses considerable educational value through demonstrating the types of change and improvement that have occurred in plants since man began to grow them for his own use. And what a potential for tourism, perhaps in the form of a complete collection, sited in an area such as the English Lake District, already famed for its native or long naturalised daffodils.

Growers and breeders of daffodils become increasingly restive as the short days of winter gradually lengthen into spring. A few warm days lead to that first exciting glimpse of some early cultivar such as ‘February Gold’. Then a pause during March as the cold winds keep the swollen buds tightly closed, followed by the headlong rush into the delights of April. New seedlings throw forth their first flowers and the air is full of expectancy and promise, the daffodil enthusiast being completely overcome by ‘Yellow Fever’. It is hoped that in reading through the pages that follow many others will be overcome by this blissful condition. Furthermore, in view of the burgeoning interest in garden history and plant conservation, this book may recommend itself not only to the specialist but also to the general reader: for the development of the daffodil is a microcosm of the development over the past 9,500 years of all cultivated plants used and improved by man, and on which we all depend for our material and spiritual wellbeing. The prophet Mohammed obviously regarded these last two general considerations as of equal importance when he wrote: “If you have two loaves, sell one and buy the white flowers of the narcissus.”<sup>(4)</sup>

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## CHAPTER 2 THE DAFFODIL IN HISTORY

### Ancient Greece and Egypt

The daffodil has been an important constituent of gardens since earliest times, when man first cast off the role of hunter-gatherer and settled to cultivate plants.

Initially, the beauty of the daffodil flowers was of secondary importance, their chief significance being medicinal; they may have also played a part in the religious ceremonies of ancient civilisations. The aesthetic and spiritually uplifting qualities of daffodils have, however, been appreciated by man for very many centuries and certainly predate the establishment of ornamental gardens.

The story begins in Greece, the home of the ‘Poets’ daffodil, where its cultivation was recorded by Theophrastus of Eresus well before the birth of Christ. He referred to the gathering of *Narcissus* seed and the division and planting of the large, round, fleshy roots.

The name *Narcissus* itself is of Greek origin, perhaps used in honour of the legendary youth of that name. There are a number of variations of the story, all of them involving his death as he gazed, entranced, at his own reflection in a pool of water – a daffodil grew where he died. Another possible derivation, and one which certainly alludes to the medicinal properties of *Narcissus*, is from the Greek word *narkao* (ναρκάω), from which comes narcotic, indicating the stupefying effects of daffodil sap which can, in large quantities, prove lethal.

In Ancient Egypt, the flowers of another type of daffodil, *N. tazetta*, held a place in religious ceremonies and are known to have been associated with funerals and burials. *N. tazetta* has long been a naturalised plant in Egypt and has been cultivated for its delightful scent for almost as long. In 1888, W. Flinders Petrie unearthed several wreaths composed of flowers of *N. tazetta* while carrying out archaeological excavations in the cemetery at Hawara. These perfectly preserved wreaths, thought to have been made two thousand years before their discovery, may in fact have been the work of Greeks resident in Egypt rather than of Egyptians themselves. Nevertheless, it is known that Egyptians have held *N. tazetta* in high regard over many centuries as a personal adornment.

### The Mughals and Islam

*N. tazetta* is thought to have originated in the southern parts of the Iberian Peninsula and the adjacent areas of present-day North Africa at a time when these two areas were land-linked. Some authorities hold that the natural distribution of *N. tazetta* is much wider than this, for it is found along both northern and southern Mediterranean shores, from Spain to the Middle East and onwards through Afghanistan, India and parts of Central Asia to China and Japan. This distribution is, however, more likely to have resulted from movements of man, especially the eastward movement of the Mughals from Persia (modern-day Iran) during the 15th century.

The form of *N. tazetta* found in India is most likely to have arrived there with the Mughal Emperor Babur (1483-1530) who had become familiar with the splendours of Persian gardens during his early formative years. Later, Babur established gardens at Kabul in modern Afghanistan, and at Agra, site of the famous Taj Mahal in India. There are many references to his colourful gardens in his memoirs, the Babur-nama, and these are beautifully illustrated in later manuscripts produced during the reign of Akbar (1556-1605)<sup>(1)</sup>.

It is surprising to learn that flowers played such an important, decorative role in the gardens of Islam some considerable time before they assumed a similar role in the gardens of Europe. Yet it was reported that spring had barely arrived before bulbs were in flower in the gardens of Afghanistan and northern India, Narcissi featuring prominently among them. Their decorative popularity in gardens was copied on to carpets, clothes and other items of everyday use and wear. The most likely type of daffodil to be found in this region was *N. tazetta*

and the earliest known reference to it in India is to be found in the *Ain-i Akbari* (1596) of Abu L-Fazil<sup>(2)</sup> that is an historical treatise on the Mughal period. In addition to its widespread use in Mughal gardens in the 15th and 16th centuries, *N. tazetta*, with its strongly scented flowers, has been cultivated in Kashmir for hundreds of years, as it has been in China where it is known as the Sacred Chinese Lily. This is *N. tazetta* var. *chinensis*, which is similar to those found in Kashmir, Japan and areas of central Asia such as Uzbekistan. All are triploids containing 30 chromosomes ( $x = 10$ ).

The daffodil has been known in the gardens of Turkey as long as it has been in those of Persia (modern-day Iran), Afghanistan and India, there being a link between all these countries through the Islamic religion. In the whole of this area, it was *N. tazetta* that predominated. It is not surprising, therefore, that in Turkey during the 16th century Ebussad Efendi, head of the Islamic faith for 22 years during the reign of Soliman the Magnificent, grew both yellow and white daffodils in his famous gardens at Karaagac. During the 1700s, Narcissi were widely grown on a field scale in Turkey and it became a leisure pastime to visit areas where the flowers grew in profusion. One such hillside became so famous for its daffodils that even today it is known as “the field of the daffodils”<sup>(3)</sup>.

By the 18th century, daffodils had become so popular and developed to such a degree that no fewer than 269 distinct types were recorded in the *Netayieu el Ezhar* (Floral Summary) of Ubeydi<sup>(4)</sup>, among which seven double sorts were listed. As in Ancient Egypt, the daffodil was associated with burial and was frequently found engraved on the tombstones of followers of Islam. The daffodil was, in fact, a symbol of eternity and the promise of paradise in the after-life. A ‘Hadis’ of Mohammed stated that persons who pass on to paradise live eternally in the company of those they loved most on earth. There is a record of Hasan Efendi, a great lover of daffodils and other flowers, officiating in his mosque when a member of the congregation asked: “Is there a man on earth who bears the sign that Paradise will be his destiny?” Looking around Hasan Efendi saw a gardener in the congregation whom he asked to stand up; and pointing to him said: “Here is one, because lovers of flowers will always have a place in Paradise.”<sup>(5)</sup>

## China and its Sacred Lily

The variety of *N. tazetta* known as *chinensis* has been grown and revered in China since time immemorial. Known as the Sacred Lily of China it is the symbol of the Chinese spring.

Its origins are chronicled in ancient folklore in the story of Sung Li. As a young man, he journeyed westwards to see the world and whilst in the Middle East was set upon, robbed and left for dead. He was found by a hermit, who nursed him back to health. When the following spring arrived, Sung Li was enchanted by the masses of beautiful scented flowers that appeared along the sides of the creek close to the hermit’s home. When fully recovered, Sung Li dug up some of the bulbs and set off for China where he planted them on the small, barren plot of land that his father had left him. The daffodils thrived in the poor soil and multiplied to such an extent that Sung Li was able to sell bulbs and thus earn a living. *N. tazetta* var. *chinensis* is to be found in Chinese art dating back to the 11th century. One painting, entitled New Year’s Day, shows daffodils growing by a streamside. They are also illustrated on pottery of the Sung Dynasty from the 13th century. In addition to being known as the Sacred Lily, they were also referred to by other names, such as the Water Fairy Flower and the New Year Lily. The former name alluded to a common method of culture in China in which the bulbs were placed in bowls filled with pebbles stood in water. Using this method, the daffodils were forced into flower for the Chinese New Year in January.

## Into Northern Europe

The earliest species to be moved northwards by man was *N. poeticus*. This movement is thought to have taken place at the time of the expansion of the Roman Empire. The reason for this assumption is that the favourite poet of the period was Ovid (43 BC-17 AD) and he is known to have been a great admirer of the *Narcissus*. The works of Ovid were so popular with the Romans that many of their villas were decorated with tiles depicting

scenes from his poems and stories. What therefore would have been more natural than for colonising Romans to take with them one of his favourite flowers, to plant wherever they settled.

*Narcissus pseudonarcissus*, the daffodil of Wordsworth's 'golden host', occurs over a large area of Europe from England in the north-west to Romania in the south-east. In the past, some authorities (e.g. F.W. Burbidge) have regarded it as native to England, but this is now generally accepted as just one station of its widespread naturalisation throughout Europe, its true home being France and Iberia. It and some of its white variants (e.g. *N. moschatus*) are thought to have been brought north by monks travelling between monasteries in southern Europe and those of similar orders in Britain and Ireland. This connection was first noted by W.B. Hartland in Ireland, who found several types of white trumpet daffodil growing in the vicinity of monastic establishments during his searches for 'new' daffodils during the late 19th century.

In England, two of the important sites for *N. pseudonarcissus* are the Lake District in Cumbria and Farndale in North Yorkshire. Their origins at these sites are shrouded in the mists of time but there is a monastic connection between these two areas. Local folklore in North Yorkshire has it that the Farndale daffodils came from a religious house in neighbouring Rosedale. Little survives of this 12th century nunnery, but it is possible that its former inhabitants were instrumental in bringing daffodils to Farndale. There is, however, a much more intriguing connection between Rosedale and the Lake District. In the mid-13th century, the monks from the Abbey of Byland secured a grant to work iron ore in Rosedale, which they continued to do until the early 16th century. The monks who founded Byland Abbey in 1177 originated from Furness Abbey in Cumbria. Byland became one of the major monastic establishments in the north, being larger than the better known Fountains and Rievaulx. Most fascinating of all, Farndale is on a direct line between Byland and Rosedale and, therefore, possibly on the route taken by monks travelling to the iron workings. Evidence that monks were both growing and moving daffodils is seen in the presence today of *N. pseudonarcissus* at other sites in north Yorkshire temporarily occupied by them before finally settling at Byland.

## **Flemish Weavers and Huguenot Refugees**

The first to arrive in England were the Flemish weavers, imported for their skills, during the reign of Edward III (1327-1377). The Flemings were also noted for their horticultural prowess and are known to have brought several types of garden plant with them, although whether they brought Narcissi is not known. During the 16th century, Protestant Huguenot refugees fled to England from the Continent, bringing with them the skills in gardening for which the French, Dutch, Flemings and Walloons had for many years been famous. A considerable number of these refugees landed in 1561 and settled in and around the coastal towns of Kent, Sussex and East Anglia as far north as Norfolk. It was the Flemings who had the strongest influence on Elizabethan horticulture. They settled in Sandwich, once an important town and one of the Cinque Ports, but by the second half of the 16th century it had largely decayed and was all but deserted. The soil around Sandwich proved ideally suited to their gardening skills. The quality of their produce quickly became known, the demand for it in London being such that some of them moved to Battersea, Bermondsey and Wandsworth. This group of Flemings were instrumental in establishing the seed trade in England and by the late 16th century were including daffodil bulbs among their merchandise.

One daffodil that may have been introduced during the 16th century was the *tazetta* daffodil 'Soleil d'Or', known to have been grown in the Isles of Scilly before the dissolution of the monasteries in 1534. Some of the earliest reports of *N. poeticus* are of it growing in Kent and Norfolk sites common to both the Huguenots and the Romans before them. Huguenots also settled in Ireland, though over a century after they arrived in England, the first entry in the register of the French Church at Portarlinton being made in 1694. Another possible Huguenot connection involved the Tenby Daffodil that was reported to have been introduced to that part of Wales by Flemings. A similar daffodil was also reported from another Flemish settlement in Co. Wexford, Ireland.

Although the connections between Wales and the Tenby Daffodil go back several centuries, only in relatively recent times (1911) was it officially adopted as the National Flower of Wales – during the investiture of Prince Edward as Prince of Wales. The significance of the daffodil (and the leek), however, go back much further



in Welsh history to the time of Henry Tudor in the 15th century. Henry's grandmother was Catherine de Valois who had been married to Henry V of England, and after his death became the wife of Owen Tudor in 1425. Subsequently, Owen adopted the de Valois family colours of green and white. The Welsh bards had long prophesied that the English invaders would be driven from the country, which would again be ruled by someone of Welsh ancestry. Knowing of this prophecy and of his Welsh connections, Henry determined to make the forecast come true and landed secretly in South Wales in 1485. During the ensuing struggle, the de Valois colours of green and white became a symbol among patriots, who used both daffodil and leek to indicate their allegiance.

## In the Gardens of Mainland Europe

A good number of species, together with the natural hybrids derived from them, were cultivated in European gardens over several centuries. *N. jonquilla*, *N. juncifolius* (now known as *N. assoanus*) and *N. triandrus*, for example, have been grown there since the 16th century, records dating from about the 1560s onwards. Around the same time, the double form of *N. italicus*, known as the Double Roman, was introduced into the Netherlands from Constantinople (now Istanbul). This daffodil was a close relative of *N. tazetta*, of which another form, *N. papyraceus*, the 'Paper White', had been cultivated in Italy for centuries. In fact, *tazetta* daffodils were so popular in gardens and as cut flowers on the Continent that by 1800 between 200 and 300 distinct types had been developed and named. Several types of white trumpet daffodil have also been grown in Continental gardens since the 1500s, two (*N. moschatus* and *N. tortuosus*) being found in the gardens of France since that time although, over the last century, *N. tortuosus* has almost disappeared. The yellow *N. pseudonarcissus* subsp. *major*, which is now known as *N. hispanicus*, has been grown in northern Europe for a similar period and its outstanding form, 'Maximus', was recognised before 1576. Another early arrival was *N. 'Eystettensis'* (Queen Anne's Double Daffodil) that was known in 1601.

One of the most widely grown types of daffodil originated from the hybridisation of *N. poeticus* and *N. pseudonarcissus*, previously known under a myriad of names but now simply as *N. × incomparabilis*. These hybrids were described in the *Hortus Floridus* of 1614<sup>(6)</sup>, the earliest European book to deal with the ornamental uses of plants. By the late 17th century, daffodils were in ornamental use throughout Europe and were planted extensively by the famous landscaper, Le Notre, at Trianon<sup>(7)</sup>.

## Gerard, Tradescant and Parkinson

During the late 16th and early 17th centuries, three men who championed garden plants, including the daffodil, lived in England.

The first of these was John Gerard (1545-1612), born in Nantwich, Cheshire. In 1562, he went to live in London, where he became apprenticed to a barber-surgeon. Owing to the close links between plants and medicine at that time, he established a herbal garden at Holborn where he lived, the actual site probably being in Fetter Lane. His Physic Garden quickly became famous for the quantity of the plants that it contained giving him an unrivalled opportunity to become familiar with those grown in gardens at that time among which daffodils featured prominently. In addition to attending to his own garden, he also supervised the gardens at the London home of Lord Burghley in the Strand, and those at his country seat, Theobalds, in Hertfordshire. Today, Gerard is chiefly remembered for his *Herball* published in 1597<sup>(8)</sup> and dedicated to Lord Burghley, although whether it was entirely his own work is debatable, much of its content probably coming from the *Pemptades* (1583) of Dodoens<sup>(9)</sup>. The *Herball* did, however, contain considerable information about the daffodils grown at that time. Gerard also published two lists, in 1596<sup>(10)</sup> and 1599<sup>(11)</sup>, of plants that he was actually growing in his Physic Garden, and these reveal plants in cultivation in English gardens at that time.

The origins of John Tradescant (c. 1570-1638) are shrouded in mystery, little being known of his early life. It was rumoured that he was a Fleming and he may possibly have been the son of a family of Huguenot refugees. He first came to notice at Meopham in Kent where his double Great Rose Daffodil is said to have grown. He took part in several overseas tours, some military in nature and others to acquire new plants for his aristocratic employers, who included the Earl of Salisbury, Lord Wotton and the Duke of Buckingham. In 1611, he travelled to the Continent in search of seeds and bulbs. At Haarlem, still the centre of the bulb trade in the

Netherlands, he acquired a considerable quantity of daffodil bulbs that he brought back to England. In 1618, he visited Russia where he plant-hunted extensively in the Archangel region, producing the earliest known records of the Russian flora. Two years later, Tradescant went on an expedition to Algiers, ostensibly against the Corsairs, but the true purpose was to obtain a type of apricot zealously guarded by the inhabitants of that region. He also accompanied the Duke of Buckingham on his unsuccessful attempt to relieve La Rochelle.

John Parkinson (1567-1650) was by profession an apothecary who gained considerable distinction through his involvement in the foundation of the Society of Apothecaries in 1617, of which he became Warden three years later. He was also Apothecary to King James I. As a result of his fascination with plants, he decided to retire from his profession in 1622 to devote his whole time to his garden, which was situated in Long Acre, London. This became well known for the large stock of plants it contained, many of them rarities.

In 1629, he published the *Paradisi in Sole Paradisus Terrestris*<sup>(12)</sup>, the title being a Latin pun, Park-in-Sun, on his own name. The *Paradisus Terrestris* was the first English book to be concerned with the ornamental rather than the medicinal use of plants. Included were almost 100 distinct types of daffodil and it was this particular aspect of the work that first aroused Peter Barr's interest in these flowers over 200 years later. Why, wondered Barr, had most of these old types of daffodil disappeared? His curiosity led to an intense search for these old varieties, which stimulated a revival in the daffodil's fortunes during the late 19th century that culminated in the Daffodil Conference of 1884. The *Paradisus Terrestris* was dedicated to Queen Henrietta Maria and, shortly after its publication, Parkinson was appointed Botanist to King Charles I.

The prominence given to daffodils was remarkable at a time when the tulip was the most important bulbous flower: its stately appearance fitted in well with the strict formalism of Elizabethan and Stuart gardens. The much less rigid, swaying and dancing daffodil seemed ill at ease among geometrical symmetry. Yet there is little doubt of its popularity both as a garden plant and as a cut flower in the early 17th century, for Mr Wilmer's Double Daffodil was one of the best known florists' flowers at that time. Nowadays better known as 'Van Sion', and found along hedgerows and in woodland, it is widely naturalised in Britain and Ireland.

## 19th Century Daffodil Hunters

The enthusiastic daffodil hunters of the late 19th century were of two types – those who searched old gardens and estates in their own country and those who journeyed overseas. The former were intent on discovering the remnants of populations introduced many years earlier, together with any hybrids that may have arisen from them. Those who went abroad sought to discover new species or to reintroduce old ones to cultivation. Prominent among the former group was William Baylor Hartland of Cork, while Peter Barr figured importantly among the latter. He travelled widely in France, Spain and Portugal in search of wild daffodils that for many years he had longed to see growing in their natural habitats.

Inspired by what he saw and read in the *Paradisus Terrestris*, Barr was determined to locate and re-introduce as many of these daffodils as possible. He had many successes, his best known being the vigorous form of *N. triandrus* var. *albus* known as Angels Tears. He also discovered 'Queen of Spain', which is a form of *N. × johnstonii*, now known as *N. × taitii*. While on Mount Perdu in the Spanish Pyrenees, he found *N. moschatus* and visited the more westerly habitats of *N. minimus* and *N. cyclamineus*. He also travelled to the Îsles of Glénan off the south-west coast of Brittany where he saw *N. triandrus* var. *loiseleurii*.

A great friend of Barr's was the wine merchant and plant collector, Alfred Tait, Baron de Southellino, who lived in Portugal and was a friend of Professor Henriques of Coimbra, one of the foremost daffodil authorities at that time. In 1886, Tait discovered a daffodil in Portugal, which he wished to name in honour of Henriques. He sent two bulbs to the Revd Charles Wolley-Dod in England, who subsequently wrote to F.W. Burbidge saying that Tait hoped that he (Wolley-Dod) would be able to get it named as *N. henriquesii* at the next meeting of the Daffodil Committee<sup>(13)</sup>. Wolley-Dod referred to daffodils illustrated in Parkinson's *Paradisus Terrestris* and *Theatrum Florae* (1633)<sup>(14)</sup>, which he thought were called *N. cyclamineus* by Haworth. In a further letter, Wolley-Dod wrote of Tait's "most interesting daffodils" which "were found in Portugal, a large number growing together and in a spot near which neither *N. triandrus* nor *N. pseudonarcissus* grew. Mr Tait wishes me

to communicate with you at once as he is very anxious to have it named after his friend Don Henriques.”<sup>(15)</sup> In another letter to Burbidge, Wolley-Dod wrote: “What if this plant should be the same as *N. cyclamineus* of Haworth ... if this is the case Don Henriques will have to give way.”<sup>(16)</sup> This he thought would be regrettable as “both he [Henriques] and Mr. Tait are doing such excellent work in the field of daffodils”.

In a letter dated 25 August 1886<sup>(17)</sup> sent to Burbidge from 115 Entre Quintas, Oporto, Tait referred to the most interesting *N. triandrus* var. *pulchellus*. Known since the time of Parkinson (*Narcissus juncifolius chalice albo reflexis foliis luteis*) and the most common form of *N. triandrus* in gardens of the late 19th and early 20th centuries, it now appears to have vanished from cultivation. This daffodil was unusual in two respects: it was the only form of any species that was a reverse bicolor, with white corona and yellow perianth, and the literature distinctly lacked any reference to it as a truly wild plant. Yet in his letter to Burbidge, Tait wrote:

“The variety which goes under this name [*pulchellus*] was I think sent by my friend, the late Mr. W.S. Crawford, to Mr. Barr. I often accompanied him on his botanical excursions and I can assure you that all his *N. triandrus* were collected near Oporto in the same localities where I have obtained plants.”

It has been suggested that *pulchellus* may be a hybrid between the two varieties of *triandrus* known as *concolor* and *cernuus* (now subsp. *pallidulus*), perhaps on no more substantial grounds than its noticeable vigour compared with other *triandrus* varieties. It is, however, a diploid like other varieties of this species and therefore its vigorous nature is not the result of the polyploidy so often associated with hybrids. If Tait’s recollections in his letter of 25 August are correct, then the status of *pulchellus* as a variety of *triandrus* may well be correct.

The Revd Charles Wolley-Dod, most avid of all the late 19th century daffodil correspondents, was also a daffodil collector in mainland Europe. He was responsible for the re-introduction of *N. pallidiflorus* in 1882, although it had been recorded as being in cultivation as far back as 1629. He also reintroduced *N. triandrus* var. *loiseleurii* (*calathinus*) from the Îsles of Glénan at about the same time, it having first been introduced in the early 19th century.

## The Daffodil in the Landscape

It has been seen that the daffodil first became a popular decorative garden plant in the early 1600s. In terms of contemporary landscape style, this popularity is difficult to understand, for the Elizabethan period was characterised by a strictly formal approach to design, almost bordering on the artificial. The daffodil did not fit easily into this context, being a much too natural a flower to grace such a formal setting. With its unbending stateliness, the tulip was much more apposite. A formality of design was even evident in some of the plants found in this landscape, a good example being a pleached lime tree at Cobham Hall, described by Parkinson in the *Paradisus Terrestris*:

“This particular tree was a lime whose branches were plashed to form an arbour. Then, after a further space of eight feet [2.5 m] up the trunk, its branches were bent yet again round about so orderly, as if it were done by art.”<sup>(18)</sup>

Yet among this artificiality, there can be little doubt of the daffodil’s widespread popularity, for the new types that had filtered northwards and westwards through Europe during the previous 100 years still possessed a certain novelty value. In such arbiters of garden taste as Tradescant and Parkinson, the daffodil had staunch allies ready to espouse its cause. If the number of different types grown correlate with its popularity then it certainly was a popular plant, more than 100 variants being described in the *Paradisus Terrestris*. Between the 1600s and the late 19th century, however, the number of available types fell dramatically. The reasons are not fully understood, for it enjoyed a period of great popularity during the second half of the 18th century. Garden formality did re-appear, however, during the early Victorian period when many new, exotic genera were introduced from which exciting hybrids were raised. Many of these introductions were the early forms of the ‘bedding’ plants with which we are familiar today and, thus, were ideally suited to the formal beds of the Victorian garden. There may have been other causes for the daffodils’ apparent decline, for example, attacks by

pathogens such as the Stem and Bulb Eelworm or the Basal Rot fungus, known to have been responsible for the decimation of daffodil populations in more recent times.

It was this seemingly inexplicable decline that initially stimulated Peter Barr's interest in daffodils. How could it be that the hundred sorts described by Parkinson in 1629 had dwindled to a mere handful in a period of little over 250 years? The curiosity that this state of affairs aroused in Barr led to an important series of events, including his journeys of daffodil discovery and re-discovery in southern Europe and the organisation of the first Daffodil Conference in 1884. In 1875, F.W. Burbidge did a service to the cause of the daffodil similar to that performed by Parkinson in 1629, when he published *The Narcissus: its history and culture*<sup>(19)</sup>. This greatly stimulated interest in the flower, and when he went to Ireland in 1879 and sparked the interest of Cork nurseryman W. Baylour Hartland, the flagging fortunes of the daffodil were set for revival.

Thus, in the relatively short space of two and a half centuries, landscape design had undergone major changes that had influenced the fortunes and popularity of the daffodil. At the start of this period the design was formal and the daffodil was both numerous and varied in its forms. The first significant change occurred early in the 18th century. It was fostered by the landscape paintings of Claude Lorraine (1600-1682) and Gaspard Dughet, also known as Gaspard Poussin (1615-1675), together with writers like Francis Bacon (1561-1626), who first suggested "a natural wildness"<sup>(20)</sup> and Alexander Pope (1688-1744), who wrote of "the amiable simplicity of unadorned nature"<sup>(21)</sup>. This artistic revolution was accompanied by greater freedom of travel, many of means and influence undertaking the 'Grand Tour' on which they saw, in real life, the subjects of the paintings of Claude Lorraine and Gaspard Poussin. More or less simultaneously, changes occurred in hunting, the deer being superseded by the fox as the main quarry. So, in addition to the artistic pressure for landscape change, there was also a very practical reason for it to be altered, for good fox hunting demanded a more irregular, open type of landscape, interspersed with thick copse cover. This was in contrast to the long, straight runs required for deer hunting, so admirably provided by the radiating avenues of trees prevalent in the earlier style.

This new style of irregularity found early expression at Studley Royal near Ripon, north Yorkshire around 1715 when John Aislabie, a former Chancellor of the Exchequer, began work on the family estate to which he was banished in disgrace following the South Sea Bubble scandal. Others were quick to follow in similar style: William Kent at Rousham in 1738, and Hoare and Flitcroft at Stourhead a few years later. This style of landscape gardening reached its zenith with the work of 'Capability' Brown (1715-1783) and Humphry Repton (1752-1818), and it is in several of the landscapes created by the former that daffodils are found in their ideal, natural setting. At no other time since their introduction, largely in the 16th century, had daffodils found a setting so closely akin to their native habitats, and in sympathy with their informal nature, as they did in the 18th century landscape.

This period of the daffodil's supremacy was short-lived, as a more formal approach to landscape design was adopted during the early Victorian period, encouraged by the development of bedding plants. In Ireland, some landscaped estates did not undergo such an intentional change in style, their main problem being one of neglect owing to absentee landlords, particularly after the Act of Union in 1800.

Records of scenes of desolation to be found on their estates are frequently found in Irish chronicles of the period, as graphically captured in Lady Morgan's description of the decaying seat of the Fitzadlem family:

"The massive stone pillars on either side, overgrown with lichens, still exhibited some vestiges of handsome sculpture . . . Two lodges mouldered on either side in absolute ruin, and the intended improvement of a Greek portico to one, never finished was still obvious in the scattered fragments of friezes and entablatures which lay choked amidst heaps of nettles, furze bushes and long rye grass. The precipitous declivities which swept down from the rocky foundation of the house to the river had been cut into terrace gardens, a fashion still observable at the seats of the ancient nobility in Munster: and it was melancholy to observe the stunted rose tree and other once cultivated but now degenerate

shrubs and flowers, raising their heads amongst nettles, briars and long grass and withered potato stalks.”<sup>(22)</sup>

Perhaps some of the ‘degenerate flowers’ were daffodils for it was in such neglected demesnes that W.B. Hartland made many of this daffodil discoveries during the 1880s.

The scene of desolation described by Lady Morgan was not a lone occurrence for the writer and gardener James Fraser had this to say of the decay at Rathfarnham Castle, Co. Dublin: “Not a solitary instance, but one out of many where a magnificent greenhouse, on the same plan as those at Hampton Court and Kew, has been turned into a cow shed and the fine old Dutch garden is now in total ruin.”<sup>(23)</sup> Here then is another example of the type of estate that Hartland explored to good effect. Possibly the old Dutch garden contained daffodils, for they were first cultivated in mainland Europe by the Dutch; and the Dutch introduced many types into the British Isles when, as Protestant refugees, they fled their own country during the 16th century.

In addition to formalism, bedding plants and neglect, other factors were at work in threatening the popularity of the daffodil. The Victorian period, for example, saw a spate of new plant introductions in addition to bedding plants, many of them coming from the previously neglected, hotter countries of South America and the Far East. For the first time plants from these areas could be successfully tended in glasshouses constructed of wrought iron, as long as there was good light transmission. These houses were heated using pipes of a new material, cast iron, to the optimum temperature required by these exotic newcomers. Orchids were perfectly suited to this newly achievable environment and a garden aristocracy of orchid devotees sprang up, plants being exchanged for vast sums of money.

Earlier, humbler plant introductions were neglected by all but a few enthusiasts, and it was to such a group that the continued survival of the daffodil was due. Its members belonged mainly to the middle-class and included several members of the clergy. They were not affluent enough to join the orchid craze but were aware of the breeding potential of the daffodil in all its forms, as illustrated by the work of the Revd William Herbert, who raised the first hybrids at Spofforth in north Yorkshire. There were also a few botanists, mostly amateur and members of middle-class professions such as banking. One particularly strong and influential advocate of the daffodil was the well known garden writer, William Robinson (1838-1935), who ridiculed the return to formalism and promoted the idea of the ‘wild garden’. In his book *The English Flower Garden*, first published in 1883, he described his alternative, which was a natural style of gardening using permanent plantings of hardy trees, shrubs and herbaceous plants: these, he felt, created an environment into which the daffodil fitted with ease. In his view “no garden should be without the best of the lovely varieties now known” and that “they are to spring what roses are to summer”<sup>(24)</sup>.

Thus, the scene was set for the great daffodil revival and, within a year of the publication of *The English Flower Garden*, Barr, Burbidge, Hartland and others organised the first Daffodil Conference. The key, initial step in the development of the modern daffodil had taken place. This event was followed in 1898 by the founding of the Midland Daffodil Society in Birmingham. Subsequently named the Daffodil Society, it became the national organisation that has ever since lent encouragement to the appreciation and development of this lovely genus.

## The Spread of Interest Overseas

Many of the earliest daffodil introductions had reached the British Isles during the 14th, 16th and 17th centuries from northern Europe. However, during the 19th century the revival of interest in daffodils and the breeding of new garden hybrids began in England. During the initial stages of this work, the leading figures were William Herbert, Edward Leeds and William Backhouse.

In the later years of the century, the first of the great Dutch nurseries commenced daffodil breeding – de Graaff at Noordwijk in 1872, Johan Segers at Lisse, and van der Schoot and van Waveren at Hillegom in 1890. Peter Barr, W.B. Hartland and F.W. Burbidge all formed ties with the Dutch nurserymen and, in particular, with Simon Adrian de Graaff who pioneered daffodil hybridisation in the Netherlands.

In the 20th century, links developed between the Dutch firm of G. Zandbergen-Terwegen and the Irish hybridists. Matthew Zandbergen, whose father managed one of de Graaff's bulb farms, first made contact at the home of P.D. Williams, where he was introduced to Guy L. Wilson. He was invited to visit Wilson at Broughshane to see the seedling stocks growing there. Subsequently, Zandbergen visited Ireland on several occasions and regularly purchased cultivars from both Wilson and Richardson for introduction into the Netherlands. A similar liaison was also formed with P.D. Williams, following a visit to the Netherlands in the 1920s to see Zandbergen's daffodil collection; at that stage, the collection contained some 1,500 cultivars. Thereafter, Zandbergen acted as agent for Williams, introducing his cultivars to Dutch growers.

## **Australia and New Zealand**

First contacts were made here prior to 1900, when Sir Heaton Rhodes of Otahuna, Tai Tapu, New Zealand bought bulbs from W.B. Hartland. Robert Gibson of Manaia did likewise. At this juncture, Hartland's nursery was, to him at least, "the true home of Daffodils"<sup>(25)</sup>, a veritable "Haarlem in south Cork"<sup>(26)</sup>. Both Australia and New Zealand have National Daffodil Societies, the latter being formed in 1926, shortly before a visit by Guy Wilson that did much to stimulate interest in both showing and hybridisation. The Australian hybridists played an especially important part in the early development of pink crowned daffodils during the 1920s and 1930s until Richardson challenged them from Ireland in 1937 with 'Rose of Tralee'.

## **United States of America**

The first links between the United States and Britain occurred considerably later than those with either the Netherlands or Australasia. The earliest development of any significance was the importation of a collection of bulbs by Miss M. Beirne of Ashland, Virginia, shortly after World War I. As a result of her enthusiasm, the Garden Club of Virginia formed a Daffodil Committee and established a Test Garden in 1930. In subsequent years, the Club was responsible for the distribution of many cultivars of British and Irish origin to other garden clubs across the States. At about the same time as Miss Beirne was beginning her daffodil collection, a Hardy Gardening Club was formed in Maryland in 1919 which, following a successful show, went on to form the Maryland Daffodil Society. Its members purchased bulbs almost exclusively from Ireland and on the advice of Guy Wilson, who remained guide and mentor to the Society until his death.

The biggest single event to influence daffodil growing in the States was undoubtedly the extension of The Plant Quarantine Act of 1919 to cover the importation of daffodil bulbs. The year was 1926. This Act had originally been implemented as the result of the introduction of several serious pests and diseases on plant material from other countries. These included the San Jose Scale, the Japanese Beetle and the disease Chestnut Blight. Strangely enough, daffodil importation was not restricted by the original Act, even though, shortly before it came into effect, large quantities of bulbs in the British Isles and the Netherlands had been destroyed by Stem and Bulb Eelworm. The extension of the Act in 1926 to cover daffodils did not become effective, however, before word leaked out about it. There was then a mad rush to import the most recent, sensational British cultivars especially 'Fortune' and 'Beersheba' before the barriers finally came down.

The effect of the ban was twofold. It isolated the United States from the significant advances then taking place elsewhere; and it stimulated American enthusiasts to take up hybridisation in order to fill the gap. Best known among these was Jan de Graaff who established Oregon Bulb Farms in 1926 at Portland. Others who started daffodil breeding about the same time included E.C. Powell of Silver Spring, Maryland, the raiser of 'Hiawassee', and S.B. Mitchell of Berkeley, California. The most illustrious of the United States hybridists was Grant E. Mitsch, who raised daffodils at Canby, Oregon from 1934 until the 1980s, when his breeding work was continued by Elise and Richard Havens.

Their national organisation, the American Daffodil Society, established in 1955, is of relatively recent origin. However, in its short life, it has achieved significant success in promoting interest in daffodils and creating computer databases that contain the parentage and much other data concerning many thousands of daffodils.

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### CHAPTER 3

## THE DAFFODIL IN LITERATURE AND ITS INFLUENCE ON THE VICTORIAN HYBRIDISTS

“The great glory of the woods are, of course, the daffodils.”<sup>(1)</sup>

Some of the physical and botanical factors that influenced the daffodil renaissance during the 19th century have already been discussed in Chapter Two. Other influences were at work, however, in the minds of those who became most involved in the daffodil’s revival at that time. These influences included classical and contemporary poetry and prose, the writings of those favouring a more naturalistic approach to the garden landscape and the horticultural and botanical literature of the time.

The classical literature on the subject is well known, having been quoted to varying degrees in earlier works. The original reference to *Narcissus*, of course, is in the myths of Ancient Greece; there are several versions of the life story of Narcissus but a popular one runs something like this. Narcissus was the son of the blue nymph, Liriope, and the river-god, Cephisus. Narcissus was an especially handsome youth whose path, from an early age, was strewn with heartlessly rejected lovers. Among these was the nymph, Echo, whose final rejection drove her to a life of solitude in lonely glens, where she pined away for love until only her voice remained. At Donacon in Thespia, Narcissus came upon a spring so clear that it shone like silver. He cast himself down on the grass beside the spring to slake his thirst, falling in love with his own reflection. Presently he recognised this as being himself and, realising that he could both possess yet never possess the beautiful reflection, was overwhelmed with grief finally plunging a dagger into his heart. The first daffodil – a beautiful white *Narcissus* with blood-red corolla – sprang from the spot where his blood had soaked into the earth.

Homer, who lived in Greece during the 11th century BC, extolled the virtues of that country’s native daffodil in the *Hymn to Demeter*:

“The Narcissus wondrously glittering, a noble sight for all, whether immortal gods or mortal men; from whose root a hundred heads springeth forth and at the fragrant odour thereof all the broad heaven above and all the earth laughed.”<sup>(2)</sup>

In more modern times, William Shakespeare (1564-1616) wrote of:

“... daffodils,  
That come before the swallow dares, and take  
The winds of March with beauty ...”<sup>(3)</sup>

Robert Herrick (1591-1674) was noted for his pastoral lyrics of outstanding simplicity and tenderness and as F.W. Burbidge said of Herrick’s *To Daffodils*<sup>(4)</sup> there was “a moral pathos of the most touching kind”<sup>(5)</sup>:

“Fair Daffodils we weep to see  
You haste away so soon;  
As yet the early rising sun  
Has not attained his noon.  
Stay, stay,  
Until the hasting day  
Has run  
But to the even-song;  
And having prayed together, we  
Will go with you along.

We have short time to stay, as you,



We have as short a spring;  
As quick a growth to meet decay,  
As you, or anything.  
We die  
As your hours do, and dry  
Away,  
Like to the summer's rain;  
Or as the pearls of morning dew,  
Ne'er to be found again."

While John Keats (1795-1821) alluded to the Greek myth concerning Narcissus, it was his contemporary, Percy Bysshe Shelley (1792-1822), who next wrote about the daffodil in verse:

"The beautiful wild plants and the Tulip tall,  
And Narcissi, the fairest among them all,  
Who gaze their eyes in the stream's recess,  
Till they die of their own dear loveliness."<sup>(6)</sup>

Without doubt, the most influential advocates for the daffodil in Britain during the early 19th century were Dorothy (1771-1855) and William Wordsworth (1770-1850). In her *Grasmere Journal* 1800-1803<sup>(7)</sup>, Dorothy's entry for 15 April 1802 ran as follows:

"When we were in the woods beyond Gowbarrow Park we saw a few daffodils close to the water side. We fancied that the lake had floated a few seeds ashore and that the little colony had so sprung up. But as we went along there were more and yet more and at last, under the boughs of the trees, we saw that there was a long belt of them along the shore about the breadth of a country turnpike road. I never saw daffodils so beautiful. They grew among the mossy stones about and about them some rested their heads upon the stones, as on a pillow, for weariness; and the rest tossed and reeled and danced and seemed as if they verily laughed with the wind that blew upon them over the lake; they looked so gay, ever glancing, ever changing."

William had accompanied Dorothy on this walk as they made their way back from Eusemere Hill, the home of the anti-slave trade campaigner Thomas Clarkson, along the western shore of Ullswater to Grasmere. This experience had a profound effect on Wordsworth who, two years later, with the help of Dorothy's journal entry of the event, wrote one of the best known poems in the English language: a glowing tribute to one of our best loved flowers and the glory of an English spring. It was entitled *I wandered lonely as a cloud*:

"I wandered lonely as a cloud  
That floats on high o'er vales and hills  
When all at once I saw a crowd  
A host of dancing daffodils;  
Along the lake, beneath the trees,  
Ten thousand dancing in the breeze.

The waves beside them danced, but they  
Outdid the sparkling waves in glee:-  
A Poet could not but be gay  
In such a laughing company:  
I gaz'd – and gaz'd – but little thought  
What wealth the shew to me had brought:

For oft when on my couch I lie  
In vacant or in pensive mood,  
They flash upon the inward eye

Which is the bliss of solitude,  
And then my heart with pleasure fills,  
And dances with the daffodils.”

This was the form in which the poem was first published in 1807 in *Poems in Two Volumes*<sup>(8)</sup>. The revised form known today was first seen in *Poems* in 1815<sup>(9)</sup>. The original three stanzas were slightly altered and a fourth stanza inserted between the first and second of the original. It reads:

“Continuous as the stars that shine  
And twinkle on the milky way,  
They stretched in never-ending line  
Along the margin of the bay:  
Ten thousand saw I at a glance,  
Tossing their heads in a sprightly dance.”

It is obvious when reading both the Journal entry and poem that William gleaned scenes from the former, for example, “under the boughs”, “beneath the trees”, “along the shore” and “along the margin of the bay”. William’s construction, however, produced a pastoral masterpiece in which perhaps the most telling lines are:

“I gaz’d – and gaz’d – but little thought  
What wealth to me the shew had brought”.

What influence could the poem *I wandered lonely as a cloud* have possibly had on those early Victorians who rekindled interest in the daffodil as a garden plant? Perhaps none. William Wordsworth and his poetry were very well known, however, during this period, indeed he was quite famous. In 1832, the English novelist, Elizabeth Gaskell (1810-1865), moved to Manchester where she became very familiar and concerned with the appalling poverty especially among weavers. In 1838 she wrote, perhaps significantly, that: “The Poetry of Humble Life ... even in a town, is met with on every hand.”<sup>(10)</sup> She was referring to the poetry of William Wordsworth, which was well known and appreciated by the working classes, even under the desperate conditions in which they lived. And where was one of the earliest strongholds of daffodil interest? It was in none other than Manchester, where John Horsefield (1793-1854), a poor weaver, Edward Leeds (1802-1877) and the Revd William Herbert (1778-1847) all spent at least part of their lives. Other influential people were also on the scene during this period: their writings either espoused the beauties of the daffodil or advocated a form of landscape gardening in which it could flourish. Important among them were John Claudius Loudon (1783-1843), John Ruskin (1819-1900) and William Robinson (1838-1935).

From a Scottish farming background, Loudon continued to farm after coming south to England. The proceeds of this enterprise were invested in a tour of northern Europe that was planned to terminate in Moscow. This, however, proved disastrous, coinciding with the aftermath of Napoleon’s Russian campaign. His London investments failed during his absence abroad and so he returned virtually a ruined man. Not dismayed by this turn of events, Loudon immediately began to rebuild his career and his fortune. His initial venture, the *Encyclopaedia of Gardening* (1822)<sup>(11)</sup>, was aimed at the expanding middle classes, who were thirsting for knowledge of the cultivation of the ‘new’ plant imports to grow in the gardens of their new villas. On his travels, accompanied by his wife Jane (1808-1858), he had seen the escalating importance of “gardens and grounds attached to houses in streets” which, he said, belonged predominantly to “amateurs, clerks and journeymen”<sup>(12)</sup>. In one such garden, belonging to a Mr Clarke of Birmingham they saw “a selection of hardy shrubs and plants which quite astonished us”. Loudon became an arbiter of taste in matters of landscape design, opposing the contrived and pretentious schemes being laid out in various parts of England at that time.

His views mirrored those expressed later by Ruskin and Robinson, both of whom were opposed to the formality and rigidity found in many Victorian gardens. Ruskin was interested in plants from an early age and had an earnest love of natural beauty. After settling at Brantwood on the shores of Lake Coniston, he put his ideas into practice, creating a large informal garden with a decided air of ‘wildness’ about it. William Robinson had a profound and lasting influence on concepts of horticultural and landscape practice and, reputedly, was responsible

for a revolution in English garden design. In his book *The Wild Garden*<sup>(13)</sup>, first published in 1870, he was unstinting in his advocacy of the use of daffodils naturalised in grass, plantations and woods. In his view: “Of all the planting I have ever made, the planting of these [daffodils] in grass has given the greatest pleasure and the most lasting.”<sup>(14)</sup> He also recommended the Poet’s Narcissus, which being “such a distinctly beautiful plant should be in every garden”.

Some extremely influential hortico-botanical works were published during the first half of the 19th century. These helped to polarise the emerging interest in daffodils. Pre-eminent among them were A.H. Haworth’s *Narcissorum Revisio* of 1819<sup>(15)</sup> and his later *Narcissinearum Monographia* (1831)<sup>(16)</sup> and the Revd William Herbert’s *Amaryllidaceae* (1837)<sup>(17)</sup>. One of the earliest books on bulb culture was that by van Campen, entitled *The Dutch Florist: or a true method of managing all sorts of flowers with bulbous roots*<sup>(18)</sup>. It was published in the Netherlands in 1764, being later translated from the Dutch. In 1816, J. Salter wrote *A Treatise upon Bulbous Roots*<sup>(19)</sup>, and this was followed in 1841 by Jane Loudon’s book *The Ladies Flower Garden of Ornamental Bulbous Plants*<sup>(20)</sup>. In 1843, there was another Continental contribution by C. Lemaire, entitled *Essais sur l’Histoire et la Culture des Plantes Bulbeuses*<sup>(21)</sup>. Towards the end of the period which saw the establishment of the daffodil’s revival came a transatlantic contribution from E.S. Rand, entitled *Bulbs: a treatise on hardy and tender bulbs and tubers*<sup>(22)</sup>. It was published in Boston in 1866.

Although the 19th century literature on bulb culture was extensive, indeed probably wider than for any other group of decorative plants, it was mostly published towards the end of the century. The writer whose work did most to maximise interest at that time was F.W. Burbidge, whose *The Narcissus: its history and culture* (1875)<sup>(23)</sup> remained the standard work on the subject for many years. Together with the author’s presence in Ireland, it stimulated the considerable early interest there during the 1880s that was responsible, in part, for the organisation of the Daffodil Conferences of 1884 and 1890.

It is impossible to measure the influences of these individuals on the awakening, establishment and proliferation of interest in daffodils during the 19th century. They probably all played a part, however small. A few undoubtedly stood out as major players, such as Wordsworth, famous and familiar to large sections of the populace. Significantly, pioneering hybridising work with daffodils was taking place in the English Lake District within a short time of his death (Plate 1.1). Then there was Loudon, prolific writer and arbiter of good garden taste, who, through his publications *The Gardener’s Magazine*<sup>(24)</sup> and the *Encyclopaedia of Gardening*<sup>(25)</sup>, brought for the first time to the rapidly expanding, garden-owning, middle classes cheap, illustrated and easily accessible garden literature. Ruskin also played a major role, being a giant among Victorian commentators on an exceptionally wide range of subjects. Among the purely hortico-botanical writers we find Haworth and Herbert doing much to stimulate the classification, growing and breeding of daffodils at the start of the century, while those exerting most influence later in the century were Robinson and Burbidge providing a firm foundation for the extensive interest and breeding work conducted during the 20th century.

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## CHAPTER 4 DAFFODIL CLASSIFICATION

All daffodils, those found in the wild and those that have arisen in cultivation, were categorised into twelve divisions between 1969 and 1998, increasing to 13 divisions post-1998. It is therefore useful to have an understanding of this system of classification and to appreciate how it has developed over the years. The genus *Narcissus* consists of two types of daffodil – those that are wild plants and consisting mainly of species, but also including some natural hybrids, and those that have arisen in cultivation chiefly as a result of planned hybridisation but occasionally as sports.

The naming procedure for wild daffodils is governed by the rules of the International Code of Botanical Nomenclature. The system uses two names in order to distinguish one type from another. The first of these names is always *Narcissus* and is termed the generic name as it indicates the genus. The second or specific name or specific epithet denotes the species and in order to indicate difference, it obviously has to change for each species, e.g. *Narcissus pseudonarcissus*, *N. poeticus*, *N. tazetta* and *N. triandrus*. This system of nomenclature is known as the binomial (two-name) system and is used for all plants. It was originated by Johann Bauhin (1541-1613) but was actually put into practice by Carl von Linné (Linnaeus, 1707-1778) following the publication of the *Species Plantarum* in 1753<sup>(1)</sup>. Subspecific or varietal names may follow the generic name and specific epithet and are used to differentiate within a species those that show minor variations.

Daffodils were known in Europe, however, for a considerable period prior to the establishment of the binomial system in the 18th century and, inevitably, attempts were made to name and classify these. One of the earliest attempts at classification was made by John Parkinson, in 1629, who divided them into Narcissos or True Daffodils and Pseudonarcissos or Bastard Daffodils, in a system based on the relative lengths of the corona and perianth segments. Parkinson's classification chiefly concerned species daffodils although some hybrids and mutants were described, such as the several double-flowered forms common in the early 17th century. Interestingly, one of the double forms described by Parkinson forms the earliest record of a daffodil cultivar, originating from seed sown by him in his own garden, and it was referred to as the Double Spanish Bastard Daffodil. Parkinson wrote of it in the *Paradisus Terrestris*: "None ever had this kind before myself nor did I myself ever see it before the year 1618 for it is of my own raising, and flowering first in my garden." Later he wrote: "It is risen from the seed of the Great Spanish single kinde, which I sowed in mine own garden and cherished it until it gave such a flower as is described."<sup>(2)</sup> The next major re-classification in England occurred in 1831 with the publication of the *Narcissinearum Monographia* by A.H. Haworth<sup>(3)</sup>, also issued as a supplement to Sweet's *The British Flower Garden* (2nd Series, I)<sup>(4)</sup> in the same year. Haworth was a notorious 'splitter' who managed to divide the wild daffodils into 16 separate genera. In 1910, the Revd Joseph Jacob wrote that: "What Haworth understood as a species most botanists would regard as a garden variety."<sup>(5)</sup> Haworth's 16 genera are listed below. Many were named after legendary characters of Ancient Greece; other names were descriptive of the flower.

*Corbularia* (after corbula – little basket). It contained the present day forms of *N. bulbocodium*, the Hoop Petticoat Daffodil.

*Ajax* (after the Greek hero in the Trojan Wars). These are the true trumpet daffodils nowadays covered by *N. pseudonarcissus*.

*Oileus* (poetic diminutive form of Ajax). It contained the clipped trunk sorts of Ajax such as *N. abscissus*.

*Assaracus* (a brother of Ganymedes). It included two forms of *N. calathinus* (syn. *N. triandrus* var. *loiseleurii*).

*Illus* (another brother of Ganymedes), contained *N. triandrus* itself and *N. triandrus* var. *cernuus* (now named *N. triandrus* subsp. *pallidulus*).

*Ganymedes* (the cup bearer to the gods of Ancient Greece). It included the remaining forms of *N. triandrus*.

*Diomedes* (a brave Greek at the siege of Troy). This genus actually consisted of three forms of the modern *N. × macleayi*, a hybrid of unknown parentage.

*Tros* (father of Ganymedes) contained only *N. montanus* (syn. *N. × poculiformis*) and *N. × poculiformis* ‘*Galanthiflorus*’ (syn. *N. galanthiflorus*), a hybrid of *N. dubius* and *N. moschatus*.

*Queltia* (after Nicholas le Quelt). This contained seven forms of *N. × incomparabilis*.

*Schizanthos* (schizo, to cut; anthos, a flower – the flower being split). Its only member was the split-crowned ‘*Orientalis*’ form of *N. tazetta*.

*Philogyne* (phileo, to love; gyne, a woman) included many forms of *N. × odorus*, a hybrid of *N. jonquilla* and *N. pseudonarcissus*.

*Jonquilla* (juncus, a rush), the leaves being similar in both form and colour to those of rushes. It included four types of the Common Jonquil.

*Chloraster* (chloros, green; aster, a star), the flowers being very star-like and a true green colour. It consisted of the sole green flowered species, *N. viridiflorus*, which is unlike any other daffodil.

*Hermione* (daughter of Menelaus and Helena) contained the innumerable forms of *N. tazetta* including some of its natural hybrids and totalled 54 types in all.

*Helena* (mother of Hermione) contained a very mixed group including *N. × gracilis* (now *N. × tenuior*) from *N. jonquilla* × *N. poeticus*, along with forms of *N. juncifolius* (now *N. assoanus*) and a small type of *N. poeticus*.

*Narcissus* (son of Cephisus and Liriope) included the vast majority of forms of *N. poeticus* and some of its hybrids.

In 1837, William Herbert, a confirmed ‘lumper’, reduced Haworth’s 16 genera to six in his *Amaryllidaceae*<sup>(6)</sup>. The names which he utilised were six used earlier by Haworth, namely *Ajax* (Trumpet Daffodils), *Corbularia* (all *N. bulbocodium*), *Ganymedes* (all *N. triandrus*), *Hermione* (all *N. tazetta*), *Narcissus* (all *N. poeticus*) and finally *Queltia* which consisted of large-cupped daffodils that had arisen through hybridisation, either in the wild, i.e. *N. × incomparabilis*, or in gardens although very few of the latter existed in 1837.

F.W. Burbidge published *The Narcissus: its history and culture*<sup>(7)</sup> in 1875 that included a ‘Review of the Genus *Narcissus*’ by J.G. Baker, the Kew taxonomist, the scheme for which he had first published in the *Gardener’s Chronicle* in 1869<sup>(8)</sup>. As can be guessed from the title, Baker had reduced Herbert’s six genera to one, only *Narcissus* being retained. Baker split this single genus into three great groups, the Magnicoronatae (Group 1), the Mediocoronatae (Group 2) and the Parvicoronatae (Group 3). Each of these groups had its constituent members determined by the relationship between the length of the corona and that of the perianth segments, the three groups corresponding to the current Divisions 1, 2 and 3 (trumpet, large-cupped and small-cupped daffodils). The only difference was that Baker’s three groups consisted solely of species, whereas nowadays Divisions 1-3 relate to cultivars. Subsequently, Baker made minor modifications to his classification scheme during the proceedings of the RHS Daffodil Conference in 1884 and reported in *The Garden* on 3rd May of that year<sup>(9)</sup>, the final version appearing in his *Handbook of the Amaryllidaceae* in 1888<sup>(10)</sup>. By this time, daffodil breeding was well under way and, for the first time, garden hybrids were given a place in the scheme of things. A summary of Baker’s earlier scheme, together with the later modifications, is given in Table 4.1.

Baker’s earlier classification schemes covered only species but, with the increase in cultivar numbers during the late 19th century, new sub-group names were coined, chiefly by Peter Barr and his son Peter Rudolf Barr in consultation with F.W. Burbidge, to cover the new groups of hybrids then appearing. Many of these names honoured daffodil breeders and enthusiasts.

In 1908, the Royal Horticultural Society brought out a classification for show purposes which, although adopted by the important Midland Daffodil Society and also by the Brecon and Devon Societies, soon fell into disuse. It was superseded two years later (1910) by the first of the Royal Horticultural Society’s classifications to resemble the current divisions. It consisted of:

#### Division 1 – Trumpet daffodils

- In these, the corona was as long as or longer than the perianth segments. There were three sub-divisions:
- a. Cultivars with yellow or lemon coronas and perianth of similar or lighter colour but not white.
  - b. Cultivars with white flowers.

c. Bicolors with white perianth and corona in a shade of yellow.

#### Division 2 – Incomparabilis

Corona not less than 1/3 but less than equal to the length of the perianth segments. There were two sub-divisions:

- a. Yellow shades with or without red colouring in the corona.
- b. Bicolors with white perianths and yellow, red-stained or red coronas.

#### Division 3 – Barrii (incorporating Burbidgei)

The corona is always less than 1/3 the length of the perianth segments. There were two sub-divisions:

- a. Yellow shades with or without red colouring in the corona.
- b. Bicolor varieties with white perianths and yellow, red-stained or red coronas.

#### Division 4 – Leedsii

Flowers in this division have white perianth segments and white, cream or citron coronas. The Leedsii daffodils may have the dimensions of both Division 2 and Division 3 flowers.

#### Division 5 – Triandrus hybrids

This division contained all varieties obviously containing *N. triandrus* 'blood', examples being 'Countess Grey' and 'Moonstone'.

#### Division 6 – Cyclamineus hybrids

Daffodils in this division had to possess the characteristics of *N. cyclamineus*.

#### Division 7 – Jonquilla hybrids

The hybrids of Division 7 were all varieties of *N. jonquilla* parentage, an example being 'Buttercup'.

#### Division 8 – Tazetta hybrids

The possession of the characteristics of *N. tazetta* was essential to the hybrids of this division.

#### Division 9 – Poeticus hybrids

With these hybrids, the possession of the sparkling white perianth, the typical scent and the red corona colour of *N. poeticus* were all essential attributes.

#### Division 10 – Double varieties

This division included not only the double cultivars, of which there were precious few at that time, but also the double forms of the species. Thus, we find all of the *N. poeticus* listed as being in Division 9, with the exception of *N. poeticus* 'Flore Pleno' that was placed in Division 10. Similarly *N. pseudonarcissus* appeared in Division 1 but the double *N. pseudonarcissus* 'Plenus' was in Division 10.

#### Division 11 – Various

This division contained many of the species including *N. bulbocodium*, *N. assoanus* and *N. viridiflorus*. Several other species, which had their own hybrid divisions, were also included in Division 11, these being *N. cyclamineus*, *N. triandrus*, *N. jonquilla* and *N. tazetta*. As mentioned above, however, *N. poeticus* and *N. pseudonarcissus* were included elsewhere.

This classification is interesting in that it pre-dates by several decades the reverse bicolor cultivars and also the split corona daffodils which now have their own Division 11. It does recognise, however, the increasing numbers of species hybrids (Divisions 5-9) present in 1910. It gives an indication of the scarcity of double daffodils for they were included almost as an after-thought as Division 10, while today they occupy the much more prominent Division 4. Then there was a peculiar group, the Leedsii (Division 4), which actually spanned two other divisions, namely the Incomparabilis and Barrii or, more specifically, the pale coloured forms that occurred within these divisions.

This classification system remained essentially unaltered between 1910 and 1947 when on 18 March 1947 the Narcissus and Tulip Committee of the Royal Horticultural Society, after consultation with the Bulb Growers Society of Haarlem, decided to implement changes. These were to come into force on 1 January 1950 but in fact the new system appeared in the *Classified List of Daffodil Names* (1948)<sup>(11)</sup>. The major changes adopted were as follows:

- a. The Leedsii Division disappeared, its former contents being absorbed into Divisions 2 and 3.

- b. Divisions 2 and 3 were re-named, the terms *Incomparabilis* and *Barrii* being discarded. A sub-division ‘c’ was added to both for the white or whitish cultivars formerly in the *Leedsii* Division.
- c. A sub-division ‘d’ was added to Divisions 1, 2 and 3 for flowers with colour combinations not covered by the existing sub-divisions ‘a’, ‘b’ or ‘c’ such as the reverse bicolors.
- d. Changes in the colour specification in sub-divisions ‘a’ and ‘c’ of Divisions 1, 2 and 3 were made to accommodate existing pink cupped cultivars and those with red trumpets that were predicted.
- e. Division 4, vacated by the demise of the *Leedsii*s, was filled by the now important and numerous doubles.
- f. Species and wild forms such as, for example, those of *N. poeticus* were all included in a species division. This was Division 10 formerly occupied by the double daffodils.
- g. Miscellaneous daffodils were included within a new Division 11.

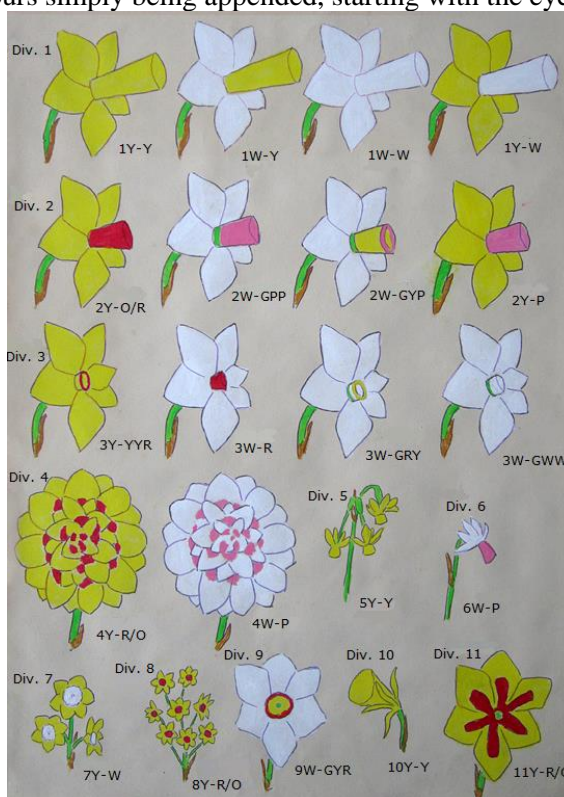
By 1969, split corona daffodils had become much more common and were allocated Division 11 at that time, the species daffodils formerly in this division being moved to a new Division 12. This scheme of twelve divisions was detailed in the Royal Horticultural Society’s *Classified List and International Register of Daffodil Names* (1969)<sup>(12)</sup>. The major drawback to the RHS scheme was the ambiguity of the coding system. A 3b daffodil, for example, had a white perianth but all its code signified about the corona was that it was coloured, giving no indication as to the precise colour or colours. The idea of a new classification system was discussed in the *American Daffodil Society Journal* in an article by D.T. Throckmorton entitled ‘A proposal of marriage’<sup>(13)</sup> and a modification to the 1969 classification proposed by the ADS was accepted by the RHS in 1975. Its aim was simplification together with a more realistic interpretation of flower colour. Initially the new colour coding was restricted to the coronas of daffodils in Divisions 1 to 3. The corona was divided into three zones, an inner region or eye, a central area and a rim. As the perianth colour was already clearly indicated under the earlier RHS system, this was not altered, the appropriate colours simply being appended, starting with the eye region.

Thus 2bRRY referred to a large-cupped daffodil with a white perianth and a predominantly red corona with a yellow rim.

In 1977, however, a further modification was made which dispensed with the old sub-division letter, the earlier example 2bRRY becoming 2W-RRY (Plate 4.1). The ADS colour code system uses six letters corresponding to the six predominant colours:

- W – white or whitish
- G – green
- Y – yellow
- P – pink
- O – orange
- R – red

**Plate 4.1.** The great diversity of the cultivar divisions.



From the time of the ‘official’ start of the 19th century daffodil revival in 1884, marked by the calling of the first Daffodil Conference and Peter Barr’s additions to Baker’s classification, the number of cultivars has increased dramatically. The term cultivar simply means what most gardeners would refer to as a variety. It is in fact a garden variety or a plant that has arisen in cultivation. In order that each may be clearly



recognised, cultivar names are given, each being registered by the International Cultivar Registration Authority for the genus, which is the RHS. Such cultivar names are always obvious as such, being enclosed within a single set of inverted commas thus – ‘King Alfred’. The naming of plants that arise in cultivation is governed by a set of rules similar to those used in the naming of wild plants, these being known as the International Code of Nomenclature for Cultivated Plants.

How many daffodil cultivars have been raised and registered over the past 150 years? This question is almost impossible to answer with any certainty but the total is probably close to 27,000.

In the 1955 edition of the *Classified List and International Register of Daffodil Names*<sup>(14)</sup>, 4,000 cultivars that had been listed in earlier editions were deleted as they were thought to no longer exist. Between 1965 and 1969, more than 850 new cultivars were registered, appearing in the 1969 edition of the *Classified List*. In size, the *List* increased from 112 pages in 1927 to 374 in 1969. The number of species and cultivar names stored in the American Daffodil Society’s *Data Bank* (1984)<sup>(15)</sup> (now succeeded by the Daffseek.org website) was 11,896. A summary of the revised system of daffodil classification as it appeared in 1977 is shown in Table 4.2 and illustrated for Divisions 1 to 3 in Plate 4.2.

A further revision of daffodil classification took place in 1998, the Centenary Year of The Daffodil Society. While the 1977 classification was mainly concerned with the means for defining flower colour that of 1998 was chiefly concerned with the creation of new divisions and sub-divisions and the re-allocation of already existing ones. Divisions 1 to 9 remained basically as before with some revision of the text for Divisions 5 to 9 in order to more strongly stress the characteristics of the species from which the cultivars in 5 to 9 have or are said to have arisen. Division 10, which formerly held the species, wild forms and hybrids was given over to cultivars of *N. bulbocodium*, the numbers of which merited a division of their own.

The split corona daffodils of Division 11 were divided into two sub-divisions containing the Collar Daffodils and Papillon Daffodils. In the former, the normal three flower whorls overlie each other and consist of six corona segments in two whorls of three and the single whorl of perianth segments. In the Papillons, the corona segments are usually in a single whorl of six, alternating with the six perianth segments. Division 12, as before, contained miscellaneous daffodil cultivars not catered for in other divisions. Division 13 was newly created and contained those daffodils distinguished solely by a botanical name.

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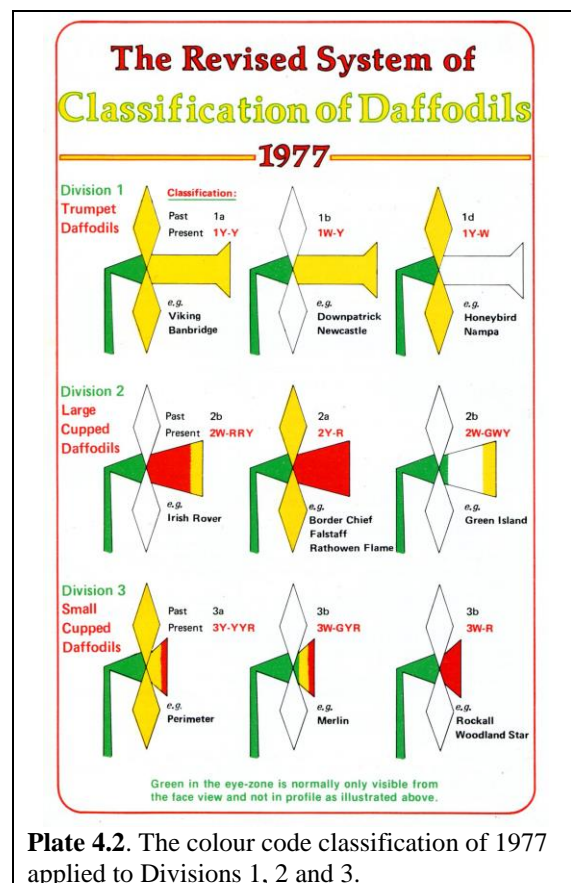


Plate 4.2. The colour code classification of 1977 applied to Divisions 1, 2 and 3.

alternating with the six perianth segments. Division 12, as before, contained miscellaneous daffodil cultivars not catered for in other divisions. Division 13 was newly created and contained those daffodils distinguished solely by a botanical name.

## The Classified List of Daffodil Names and the International Register

Towards the end of the 19th century, it became plain that some system of naming and recording of new cultivars was required due to the increasing interest in hybridisation and the collection and naming of natural hybrids from old garden sites.

At the time of the 1884 Daffodil Conference it was agreed that varietal (cultivar) names, as they were known then, should be exclusively fancy names and should not be Latinized forms which may be confused with specific epithets. Because of this decision in 1884 very few Latinized cultivar names were to be found among the daffodils, although they were widespread among other genera. In order to eliminate confusion the International Code for the Nomenclature of Cultivated Plants has, as one of its basic tenets, the acceptance of only fancy names as being appropriate for cultivars and since 1980 Latinized forms have been systematically replaced.

Lists of daffodil names have been logged in a systematic fashion for over 100 years, the first *Classified List of Daffodil Names* being issued by the RHS in 1908, although a list had been issued by the RHS in the previous year. The *Classified List* has been up-dated and reissued on a regular basis ever since and from 1955 when the RHS became the international registration authority for the genus has added the words International Register to its title. With each updated version has come an ever-increasing volume and content of information. For example, in the 1923 issue, the need for a classified list was clearly stated on the first page as being “the enormous increase in the number of named daffodils and the crossing and inter-crossing of the once fairly distinct classes”<sup>(16)</sup>. This volume contained about 84 pages of cultivars, listed in alphabetical order together with the breeders name and indication of the cultivar division to which each belonged. A formal system for the registration of new cultivars was in place, with standard registration forms available from the Hon. Secretary of the *Narcissus* Committee with whom registration could be effected on payment of the fee of 1s (5p). Registration of new cultivars was confirmed by exhibiting the flower before the Committee. By 1927, the volume of names had increased to 103 pages as had the content, information on Awards of Merit and First Class Certificates also being included. In the 1929 edition, there were 120 pages of cultivar names, 600 new cultivars being registered in the interval between this and the preceding edition. It was in the 1929 edition that the actual registration date for all varieties (cultivars) registered since 1927 were given. With all pre-1927 cultivars the date shown was that in which reference to it was found in RHS publications.

This system persisted until recently. In the 1998 issue, it was decided that all registration dates logged between 1927 and 1955, when the RHS became the International Registration Authority, should be shown as pre-the formerly stated registration date. Thus ‘Evening’ previously shown as being registered in 1935 now appeared as being registered pre-1935. While the need for such a change is not obvious, the need for change with regard to the older cultivars is immediately apparent. ‘Weardale Perfection’ provides a good example of the need for change, for in 1969 its date was given as 1894 while in 1998 it was shown much more realistically as pre-1869, the year in which its raiser, William Backhouse, died. From an historical perspective, the dates have some significance as they should give an indication of the time sequence in which cultivars appeared. If the dates logged between 1927 and 1955 are in fact the real registration dates they are the ones which should be quoted as it is these dates that tend to appear in literature prior to 1998 and for the sake of consistency it is those dates that will be found in this text. Where the pre-1998 date is clearly shown to be wide of the mark, as in the above example, a more realistic date has been used for this too is important in mapping daffodil progress. ‘Madame de Graaff’, dated pre-1887, was until very recently thought to be the earliest known tetraploid cultivar, but it is now known that ‘Weardale Perfection’ which appeared as a seedling in 1866 or 1867 was perhaps, though not necessarily, 15 to 20 years ahead of it. Because of the importance of tetraploidy in the improvement of many cultivar divisions and the known widespread use of ‘Weardale Perfection’ by early hybridists an attempt at realistic dating could be important.

The *International Register and Classified Lists* issued in 1998<sup>(17)</sup> and 2008<sup>(18)</sup> are massive works of over 1000 pages each and contain a vast amount of information, including names, chromosome status and parentage where known, classification, colour coding, along with the hybridists name. With over 27000 cultivars listed the need for the 1000 pages will be quickly realised and it can only be described as a work of considerable significance and help to all who wish to follow the history of daffodil development. No longer is the registration process completed by acquiring a form from the Hon. Secretary of the *Narcissus* Committee and the payment of one shilling, for the genus has attained such a status that an International Registrar is required.

## Awards to Daffodils

Awards to daffodils have been made since the end of the 19th century in order to confirm some aspect of excellence. They are made by the Royal Horticultural Society and by the Koninklijke Âlgemeene Vereeniging voor Bloembollencultuur (Royal General Bulb Growers Society) of Haarlem, the Netherlands. The main awards and categories from each are as follows:

RHS	Award of Merit First Class Certificate AM/FCC (c) for cutting AM/FCC (e) for exhibition AM/FCC (f) for forcing AM/FCC (g) for garden decoration AM/FCC (m) market cultivar
Haarlem	Award of Merit First Class Certificate (both the above indicate a cultivar's suitability as a commercial cut flower) Forcing Award (FA) First Class Forcing Award (FCFA) Early Forcing Award (EFA) First Class Early Forcing Award (FCEFA)

The Award of Garden Merit (AGM) has now replaced the AM/FCC (g) shown above. Its award is made following trials that must show that the selected plant is of outstanding excellence for garden decoration, must not be particularly susceptible to any pest or disease, and should have a good and stable constitution.

Classification of daffodils has thus pursued a complex and protracted course of many decades as experts have sought to bring order to the bewildering variety of types of daffodil; and, albeit somewhat disconcerting, it will not be surprising if further such changes lie ahead. The flowers, of course, have not been affected by any of this but have simply 'got on' with the task of blooming beautifully each year!

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**Table 4.1.** J.G. Baker's daffodil classification (with later additions by Peter Barr).

Group 1 – Magnicoronatae

Earlier classification (Baker): *N. bulbocodium*, *N. pseudonarcissus*,  
*N. calathinus* – including subspp. and vars

Later additions (Barr): Ajax (Trumpet Daffodils): a. white ('Madame de  
Graaff'); b. yellow ('Emperor'); c. bicolor  
(('Empress'); d. doubles ('Telamonius Plenus')  
Johnstonii (hybrids of *triandrus*)  
*N. cyclamineus*  
Backhousei (Ajax × *tazetta*)  
Tridymus (*tazetta* × Ajax)

Group 2 – Mediocoronatae

Earlier classification (Baker): *N. triandrus*, *N. poculiformis*, *N. macleayi*,  
*N. incomparabilis*, *N. odorus*, *N. juncifolius*,  
*N. dubius*

Later additions (Barr): Incomparabilis (cultivars): a. single ('Sir Watkin');  
b. double ('Orange Phoenix')  
Barrii (e.g. 'Barrii Conspicuus')  
Leedsii (e.g. 'Mrs Langtry')  
Bernardii (e.g. 'H.E. Buxton')  
Nelsonii (e.g. 'Nelsonii Major')  
Odorus Plenus (e.g. Queen Anne's Double Jonquil)

Group 3 – Parvicoronatae

Earlier classification (Baker): *N. tazetta*, *N. gracilis*, *N. intermedius*, *N. pachybolbus*,  
*N. jonquilla*, *N. biflorus*, *N. poeticus*, *N. viridiflorus*,  
*N. elegans*, *N. serotinus*, *N. broussonetii*

Later additions (Barr): Burbidgei (e.g. 'John Bain')  
Engleheartii (e.g. 'Cirlet')  
*Poeticus*, Double (e.g. 'Double White')  
Poetaz (*poeticus* × *tazetta*)

Notes: Incomparabilis – corona length 1/3 to 3/4 perianth segment length  
Barrii – corona length 1/4 to 1/3 perianth segment length  
Leedsii – white and pale citron forms of Incomparabilis and Barrii, all  
having pure white perianths  
Bernardii – hybrids of *N. abscissus* and *N. poeticus*, the distinguishing  
feature being the sharply cut-off corona  
Nelsonii – distinguishing characteristics include long, straight corona and  
pure white perianth  
Burbidgei – these had longer cups than true *N. poeticus*  
Engleheartii – these had large disc-like coronas

- Division 1 – Trumpet daffodils of garden origin, e.g. ‘Downpatrick’ 1W-Y  
Division 2 – Large-cupped daffodils of garden origin, e.g. ‘Falstaff’ 2Y-O  
Division 3 – Small-cupped daffodils of garden origin, e.g. ‘Merlin’ 3W-YYR  
Division 4 – Double daffodils of garden origin, e.g. ‘Mary Copeland’ 4W-O  
Division 5 – Triandrus daffodils of garden origin, e.g. ‘April Tears’ 5Y-Y  
Division 6 – Cyclamineus daffodils of garden origin, e.g. ‘Foundling’ 6W-P  
Division 7 – Jonquilla daffodils of garden origin, e.g. ‘Sweetness’ 7Y-Y  
Division 8 – Tazetta daffodils of garden origin, e.g. ‘Kingcraft’ 8W-O  
Division 9 – Poeticus daffodils of garden origin, e.g. ‘Cantabile’ 9W-GYR  
Division 10 – Species and wild forms and wild hybrids, e.g. *N. cantabricus* 10W-W  
Division 11 – Split corona daffodils of garden origin, e.g. ‘Orangery’ 11aW-OOY  
Division 12 – Miscellaneous (all daffodils not falling into one of the foregoing divisions), e.g. ‘Bittern’ 12Y-O

(The colour codes shown above are those adopted in 1998, some being modified since 1977.)

## CHAPTER 5

### WILD DAFFODILS AND THEIR ROLE IN CREATING CULTIVARS

A definitive classification of any group of plants is, and always has been, difficult, ever since attempts at systematic classification began in earnest during the 18th century. Greater standardisation has been possible over time through improvements in scientific knowledge, such as the recent use of DNA analysis<sup>(1)</sup>. Hopefully, the time of the ‘lumpers’ and the ‘splitters’ is coming to an end as the use of such techniques will once and for all determine species, subspecies and variety boundaries, and their relationships. Currently, the number of species in the *Narcissus* genus is 85, many of which are sub-divided into numerous subspecies and varieties. There are also ten sectional hybrids and 63 intersectional hybrids. These numbers are based on the classification of Fernandes (1968)<sup>(2)</sup>, amended to take account of new daffodils discovered since that date, and also on a re-assessment of the rank of some recognised at that time, for example some former subspecies now classified as species in the 2008 revision of *The International Daffodil Register and Classified List*<sup>(3)</sup>.

When the origins of the major cultivar groups (Divisions 1 to 4) are considered, it is clear that only relatively few species were utilised in their breeding: those that readily spring to mind are the trumpets and *poeticus*, which gave rise to the large- and the small-cupped cultivars, the former being the most substantial divisions in terms of numbers. The species particularly involved were *N. pseudonarcissus*, *N. hispanicus* (formerly *N. pseudonarcissus* subsp. *major*), and especially its form known as ‘Maximus’, together with the species, subspecies and varieties of the Section *Narcissus*, chiefly *N. poeticus*. Hybrids from crosses made between these two groups of species gave rise to Division 2 (large-cupped) cultivars; and when these were back-crossed with *N. poeticus*, Division 3 (small-cupped) cultivars came into being. The trumpet species already mentioned are yellow and it was these, along with the white trumpet species such as *N. moschatius* and *N. alpestris*, and the white and yellow *N. bicolor*, which produced the Division 1 (trumpet) cultivars.

These species not only gave rise to cultivars in their own image or cultivars of intermediate character but also bestowed additional qualities on the newly arising cultivars. *N. bicolor*, for example, one of the few polyploid species, added a degree of hybrid vigour to some 19th century cultivars. *N. poeticus*, with red pigment in its corona, gave the promise of strong oranges and reds in cultivars and, more intriguingly, to the possibility of pink when combined with white trumpet species.

The increase in vigour and other desirable improvements following the use of *N. bicolor* must have seemed like a miracle to the early hybridists – for chromosomes were unheard of and the desirability of the tetraploid state in daffodils was unknown. Yet it is now clear that these internal, unseen characters are intimately linked to many desirable external ones; it was the latter that the early hybridists were selecting for, thereby unwittingly increasing the number of polyploid cultivars available for use in further breeding. William Backhouse was well aware of the link between *N. bicolor* and cultivar improvement. He testified in 1865 that “from crosses of other daffodils with it [*N. bicolor*] I have raised some of the largest and finest in the class”<sup>(4)</sup>.

Hybridisation has led to a massive increase in the number of cultivars since this process began in the mid-19th century and can best be appreciated by the actual number of recorded cultivars at any given time. There were five in 1880, 27 in 1884, 51 in 1890 and just under 100 in 1900<sup>(5)</sup>. This figure had risen to almost 27,000 by 2008<sup>(6)</sup>. The ‘explosion’ in cultivar numbers was achieved through the efforts of relatively few breeders many of whom were amateurs and this is probably unique in the history of horticulture. These breeders frequently kept immaculate records of their work: consequently, the timing of significant, indeed of most, daffodil developments resulting from hybridisation, is known. Work on chromosomes in cultivars since the mid-20th century has tied the significant external changes noted by breeders to internal changes involving chromosome numbers. It has also provided a clear picture of what has been taking place since breeding began in the mid-19th century. The predominantly diploid species gave rise to diploid cultivars but the input of the polyploid *N. bicolor* began to give rise to triploid cultivars. These were more vigorous than the diploids and, therefore, stood out, and were selected by their raisers, who used them in future breeding.

Although triploids are not very fertile, they are not sterile and produce a certain number of viable gametes, particularly male gametes through pollen. Sometimes, owing to faulty separation at meiosis, or rather lack of it, large triploid pollen grains formed that, when fertilising a haploid egg cell, resulted in vigorous tetraploid offspring. Analysis has shown that the numbers of triploid cultivars gradually increased between approximately 1865 and 1905 and that the tetraploid cultivars resulting from the process described above began to appear in the final years of the 19th century. Between then and about 1925, the number of tetraploids showed a slow but steady rise, but since 1925 there has been a rapid increase in the number of tetraploid cultivars until the present time when almost all recent cultivars possess 28 chromosomes ( $x = 7$ ). In daffodil cultivars which have been chromosomally determined, early triploids are found in 'Horsfieldii',  $2n = 22$  (c. 1845), 'Grandis',  $2n = 22$  (pre-1877), 'Emperor',  $2n = 21$  and 'Empress',  $2n = 22$  or  $21 + B$  (both c. 1865). The earliest known tetraploids were 'Madame de Graaff',  $2n = 31$  (1887) and 'King Alfred',  $2n = 28$  (1899) until work in 2009 showed that 'Weardale Perfection' (pre-1869) also possesses 28 chromosomes.

Progression from the original species has been a distinct three-phase process: an initial diploid cultivar phase, followed by an intermediate one that was triploid, moving on to a tetraploid phase – the ideal ploidy level for daffodils – which is now dominant. What led to this tetraploid dominance was its idealness in terms of plant vigour and other desirable characteristics such as good flower substance. Plants showing these traits were selected out, so that by about 1925 a large breeding pool of fertile tetraploid cultivars existed. This, linked to the take-up in the breeding of ornamental plants post-World War I, led to the change that is dominant today.

Returning to the species that are the central subject of this chapter, they are unlike cultivars in that they can exist in a variety of clonal forms that do not show differences large enough to warrant elevation to separate species status, foremost among these being *N. bicolor*.

*N. bicolor* was destined to be centre stage and play a major role in the hybridisation carried out by the first daffodil breeders in the mid-19th century and so it proved to be. Long established, having been in cultivation since at least 1613, widely grown and readily available, generally more vigorous than other species being used in early crosses and of pure and good colour contrast, it was an irresistible choice. Horsefield, Leeds and William Backhouse are all known to have used it in raising their most successful cultivars. When they chose to use *N. bicolor* it was almost certainly on account of its vigour, it being the main breeding aim at that time to increase the vigour of new cultivars. It is now known that this characteristic is closely linked to polyploidy, certainly up to and including the optimal tetraploid level possessing 28 chromosomes. Of course the role, indeed the very existence of chromosomes was unknown at that time and therefore the selection of potential parent material was based purely on external appearances of which vigour was one of the most obvious. There were exceptions, for the *N. bicolor* growing in Horsefield's garden which he used in raising 'Horsfieldii' was reported as being small. Apart from this exception, *N. bicolor* was regarded as vigorous, standing quite a bit taller than its commonest breeding partner *N. pseudonarcissus*. In the early 1940s, Fernandes determined that *N. bicolor* was tetraploid 28 chromosomes<sup>(7)</sup> and later tetraploidy became the accepted optimal level for desirable characteristics such as plant vigour and good flower substance<sup>(8)</sup>. During the 1950s, Wylie suggested, on the basis of a comment made by William Backhouse in 1865, that it was likely that the mid-19th century hybridists were working with a triploid clone. Backhouse had observed that the *N. bicolor* in his possession produced little viable pollen<sup>(9)</sup>, a triploid characteristic, but at the same time it would show a reasonable degree of vegetative vigour when compared with the diploid species being used as its breeding partners. *N. bicolor* became an even more interesting species when Zonneveld reported an hexaploid form (42 chromosomes) in 2008<sup>(10)</sup> and a diploid was discovered during recent observations at Kew<sup>(11)</sup>.

The true origins of 'Emperor' and 'Empress' may never be known with absolute certainty, but the known facts can be cited and the probabilities postulated regarding the involvement of the various *N. bicolor* clones. The known facts are that the clone possessed by Horsefield was small in stature and that used by William Backhouse was of low fertility. There would be a gradient of increasing vigour from the diploid, to the triploid and finally to the optimum tetraploid form. Fertility would vary markedly, being good in the diploid form, bad in the triploid



and good again in the tetraploid. The hexaploid form could not have been involved in the raising of ‘Emperor’ or ‘Empress’.

There are several possible combinations of *N. pseudonarcissus* and a clone of *N. bicolor* that could have given rise to ‘Emperor’ and ‘Empress’ (c. 1865) and also to those earlier cultivars, ‘Horsfieldii’ (c. 1845) and ‘Grandis’ (c. 1850); two such combinations were proposed by Fernandes and Wylie. Fernandes suggested the following:

$$N. \textit{pseudonarcissus} \times N. \textit{bicolor} \text{ (tetraploid clone)} = \text{‘Emperor’ / ‘Empress’}$$

$$7 \text{ (from 14)} + 14 \text{ (from 28)} = 21$$

Wylie believed that because of his comment on poor fertility Backhouse was using a triploid clone:

$$N. \textit{pseudonarcissus} \times N. \textit{bicolor} \text{ (triploid clone)} = \text{‘Emperor’ / ‘Empress’}$$

$$7 \text{ (from 14)} + 14 \text{ (from 21)} = 21$$

This suggested pathway has a major problem for, in order to succeed, the triploid *N. bicolor* would have to produce viable diploid gametes during meiosis, this being a very rare event<sup>(12)</sup>. In the case of ‘Emperor’ and ‘Empress’, which came from the same seed pod, this already rare event would have become doubly rare. The fertility of a triploid could be expected to be poor, as observed by Backhouse, so perhaps he just got very lucky.

The recently discovered diploid clone would present less problems, producing a lot of fertile pollen among which it is suggested some non-reduced grains occurred thus:

$$N. \textit{pseudonarcissus} \times N. \textit{bicolor} \text{ (diploid clone)} = \text{‘Emperor’ / ‘Empress’}$$

$$7 \text{ (from 14)} + 14 \text{ (from 14)} = 21$$

The hexaploid clone of *N. bicolor* would have no involvement in producing ‘Emperor’ or ‘Empress’ but could have been involved with ‘Weardale Perfection’:

$$N. \textit{pseudonarcissus} \times N. \textit{bicolor} \text{ (hexaploid clone)} = \text{‘Weardale Perfection’}$$

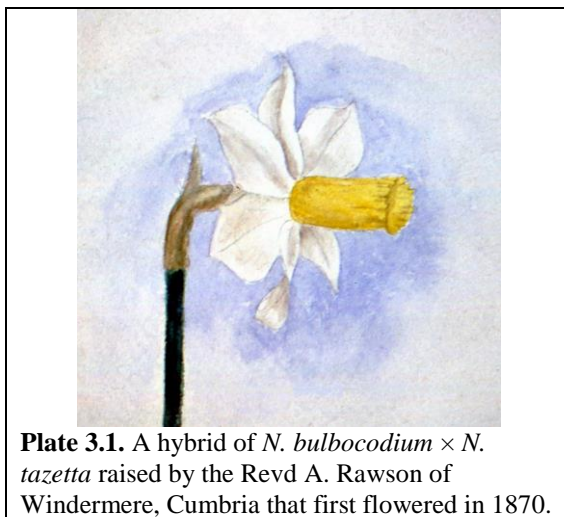
$$7 \text{ (from 14)} + 21 \text{ (from 42)} = 28$$

More realistically it was probably the bicoloured triploid cultivar ‘Empress’ that was involved in the creation of the bicoloured tetraploid cultivar ‘Weardale Perfection’. The former first flowered around 1865 while the cross that produced the latter was made around 1867. Breeders usually use their best cultivars in trying to effect even greater improvement and ‘Empress’ was certainly this, creating a sensation when it first flowered. It is likely therefore that Backhouse would choose his leading cultivar rather than the hexaploid form of *N. bicolor*, which would lack vigour being above the optimal tetraploid level:

$$N. \textit{pseudonarcissus} \times \text{‘Empress’} = \text{‘Weardale Perfection’}$$

$$7 \text{ (from 14)} + 21 \text{ (from 21)} = 28$$

While much of the thinking on cultivar development has rightly centred on the handful of species already mentioned, it is striking to realise just how many of the others have been used and practically over the whole of the time span during which daffodil breeding has been taking place. It is known, for example, that the Revd A. Rawson of Fallbarrow, Windermere in Cumbria was hybridising with *N. bulbocodium* prior to 1870. Recently, Manuel Lima, Harold Koopowitz, Bob Spotts and others in the USA and John Hunter in New Zealand have been engaged in pioneering breeding work using previously untried or little used species (such as *N. viridiflorus*, *N. miniatus*, *N. tazetta* subsp. *aureus*, *N. elegans* and even the unlikely *N. cavanillesii*) with the intention of lengthening the flowering season of cultivars into autumn, increasing the range of miniature cultivars and introducing new colours like the green from *N. viridiflorus* into the perianth.



**Plate 3.1.** A hybrid of *N. bulbocodium* × *N. tazetta* raised by the Revd A. Rawson of Windermere, Cumbria that first flowered in 1870.

In total, 64 of the 184 species, subspecies and varieties, together with six intersectional hybrids, have been used in cultivar creation. While considering those that have been used, it is interesting to reflect on those that have not, especially by the early hybridists in the search for increased vigour and unusual colour combinations. With regard to vigour, it seems remarkable that a handsome and strong growing species like *N. nobilis* does not seem to

have featured, for one would assume that with its vigour (it is a tetraploid), fine flower colouring and blue green foliage, it would have been too good to resist, perhaps even being preferred to *N. bicolor*. William Backhouse certainly knew it, and probably grew it, because it appears in his lists of daffodils; but, although the parentage of many of his hybrids is unknown, it would seem that neither he nor his contemporaries used *N. nobilis*.

The other strangely unrecorded daffodil in the history of hybridisation is *N. triandrus* var. *pulchellus* with its unusual reverse bi-colouration of yellow perianth and white corona. It was so widely grown and known by the 19th century hybridists that it seems remarkable that it was not used or that records of its use do not appear to have survived. It may have featured in the parentage of some early crosses that ultimately gave rise to reverse bicolor cultivars through 'Binkie' and 'Spellbinder', but no recorded evidence of this has so far appeared.

Daffodil breeders from the 19th century onwards had a clear idea of what they wanted to achieve. Remarkably, without any expertise in genetics, which was an unknown science during the early part of this period, they were easily able to select out for factors such as improved vigour. It is now known that these factors are merely the outward expression of the internal chromosome and ultimately gene complement. The ease with which such factors could be selected for is demonstrated in the results from the 1st *Narcissus* Variety Trial carried out at Rosewarne Experimental Horticulture Station between 1955 and 1963<sup>(13)</sup>. If the character of very good flower substance, in which the corona and perianth are thick and often leathery in nature, is taken as an example, hybridists were capable of selecting for this character in a most efficient way, their initial catalogue description frequently corresponding with the later scientific assessment. More often than not, the breeders' descriptions were accurate and they could not be accused of 'gilding the lily' or the daffodil in this case! A good example of this is Lionel Richardson's first catalogue entry for 'Malta' (2Y-O) which was described as having a "clear yellow perianth of immense substance"<sup>(14)</sup>, its subsequent scientific assessment putting it in the highest category of substance, 'very good'<sup>(15)</sup>.

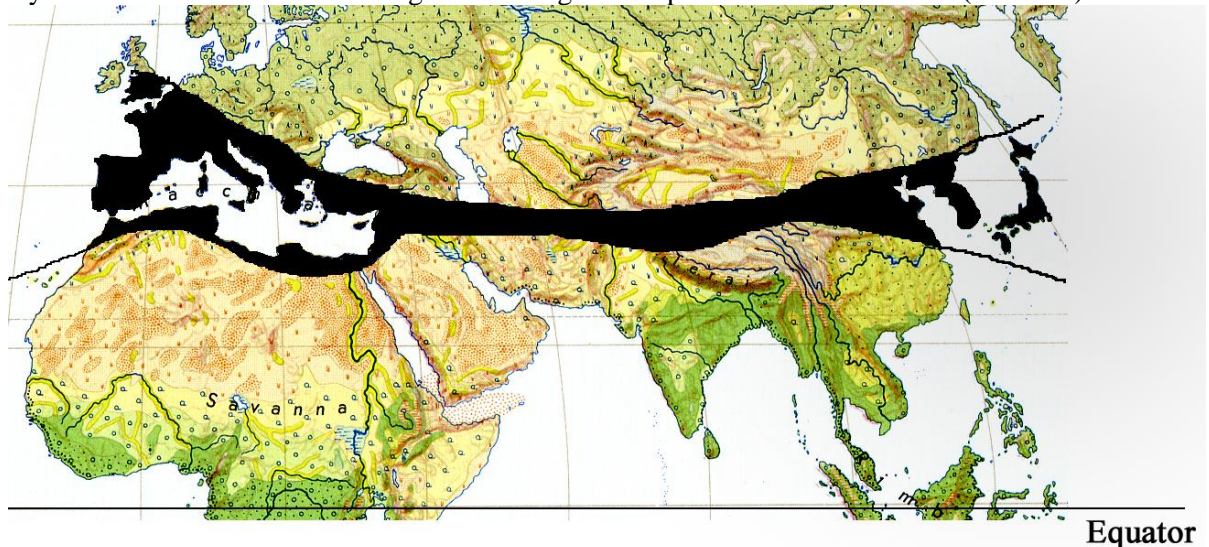
It is now known that factors such as good flower substance are strongly linked to tetraploidy or the possession of 28 chromosomes. In the Rosewarne EHS trials, 92% of those cultivars that were chromosomally known and assessed as having 'very good substance' were tetraploids. From the results of the same trials, it is also possible to see how factors such as 'very good substance', which breeders were selecting for, and tetraploidy developed hand-in-hand between the late 19th century and the critical period in the mid-1920s when tetraploids began to dominate. Only one chromosomally known cultivar from a cross made in the 1890-1900 period was assessed as having a flower of 'very good substance', with seven in the period 1901-1920, increasing to nine for 1921-1925. Of those that are chromosomally known, 88% are tetraploid.

The value of the increasing use of DNA analysis has already been alluded to and in the future may be used not only for the definitive assessment of species but also as a useful tool in confirming the relationship of the species to the early cultivars. Already the analysis of nuclear DNA has convincingly demonstrated that the daffodil known as *N. serotinus*, common around the coastal areas of the Mediterranean, is in fact two distinct species. Known since at least 1576, *N. serotinus* has in the past been described as one of the most widespread species found growing around the coasts of southern Portugal, southern and eastern Spain, part of the east coast of Italy, much of Greece and Israel, along the north African coast from Morocco to Libya and on many Mediterranean islands. Its flowers were described as usually solitary but with sometimes two to three per scape<sup>(16)</sup>. According to where they grew, the corona colour also differed, for example the inland forms in Spain having a red corona, whereas plants in Morocco frequently had yellow coronas. Now, the analysis of nuclear DNA has shown that rather than being a single species, there are two species, *N. serotinus* and a newly described species that has been named *N. miniatus*. These two species have probably grown together in Southern Spain but remained undetected for centuries and it is only the recent use of DNA that has finally highlighted that they are different. Subsequently, examination of morphological features has shown clear differences in bulb colour, in the shape of the floral tube (which is clearly waisted in *N. serotinus* but evenly tapering in *N. miniatus*) and in flower number per scape – normally one but occasionally two in *N. serotinus*, while *N. miniatus* has two to four, sometimes up to five to seven, and infrequently only one. In the mid-1900s, *N. serotinus* was thought to possess 30 chromosomes but more recently it has been shown to have ten, whereas *N. miniatus* has 30<sup>(17)</sup>. But for DNA, it may have been

thought that *N. miniatus* was simply a hexaploid form of *N. serotinus*, 5 chromosomes (from  $2n = 10$ )  $\times 6 = 30$ . This idea was not borne out by the amount of nuclear DNA present, which was 20.9 picograms in *N. serotinus* and 51.3 picograms in *N. miniatus*. If *N. miniatus* were a hexaploid form of the former, the nuclear DNA measurement would have been  $20.9 \times 3 = 62.7$  picograms. What the DNA analysis has indicated is the ancient origin of *N. miniatus* as a doubled chromosome form of a hybrid between *N. serotinus*, 5 chromosomes (from  $2n = 10$ ) + *N. elegans*, 10 (from  $2n = 20$ )  $\times 2 = N. miniatus$  with 30 chromosomes<sup>(18)</sup>.

Another interesting finding occurred in the Section *Jonquilla*, in which the amount of nuclear DNA in two species, *N. assoanus* and *N. gaditanus*, is significantly different from that of other members of this section as currently arranged. The amounts for these two species are 18.1 and 19.8 picograms respectively, while that for other members is consistently much higher. Consequently, it has been suggested that in future these two species could be placed in a new section, *Juncifolii*<sup>(19)</sup>, when the nomenclature is next reviewed.

The general characteristics of the genus *Narcissus* have been described in Chapter Four. The species within the genus are currently divided into ten sections, nine of which have been involved in hybridisation and the creation of cultivars. The main characteristics of these nine sections are given below. *Narcissus* spp. are found in a relatively narrow latitudinal band running from Portugal and Spain eastwards into Asia (Plate 5.1).



**Plate 5.1.** The approximate distribution limits of *Narcissus* species, both natural and through the historic movements of man.

The distribution of species within this band has been augmented by the historic movements of man, particularly in an easterly direction. Figure 5.1 shows the general floral structure of the *Narcissus* flower with the flower stem and flower structure and the umbel arrangement of flowers in a multi-headed daffodil.

**SECTION *Tapeinanthus* (Herbert) Traub**

Flowers: usually solitary, yellow, ascending, with the corona very rudimentary, consisting of a low rim of six small scales.

Flower stem: rounded.

Leaves: very narrow, glaucous.

Flowering time: autumn.

**SECTION *Serotini* Parlatores**

Flowers: solitary or in umbels of four to five, horizontal or ascending, perianth white with some twisting, corona yellow or orange-red, short.

Flower stem: rounded.

Leaves: very narrow, glaucous, often absent at flowering time.

Flowering time: autumn.

SECTION *Tazettae* de Candolle

Flowers: in umbels of three to 20, fragrant, all yellow, all white or bicoloured, horizontal or ascending, corona short and cup-shaped.

Flower stem: compressed.

Leaves: flat, channelled and usually glaucous.

Flowering time: autumn or spring, usually the latter.

(Exceptions to the above: *N. elegans*, corona orange; *N. tazetta* subsp. *aureus*, flower stem round, leaves green.)

SECTION *Narcissus* Linnaeus

Flowers: usually solitary, horizontal or ascending, fragrant, perianth pure white, corona usually with green centre, yellow mid-section and red rim that is often scarious, the red being an ever-present characteristic. The corona is disc-shaped, shallow.

Flower stem: compressed.

Leaves: flat, not channelled, glaucous.

Flowering time: spring to early summer.

SECTION *Jonquilla* de Candolle

Flowers: solitary or in umbels of up to five, rarely eight, horizontal or ascending, fragrant, yellow, perianth segments spreading and reflexed, corona cup-shaped, usually wider than long.

Flower stem: rounded.

Leaves: narrow or semi-cylindrical, green.

Flowering time: spring (green flowered *N. viridiflorus* atypical as it flowers in the autumn).

SECTION *Apodanthi* A. Fernandes

Flowers: solitary or in umbels of two to five, usually ascending (horizontal in *N. cuatrecasii*), sometimes fragrant, white or yellow, perianth segments spreading, slightly reflexed, corona cup-shaped, funnel-shaped or flared, often wider than long.

Flower stem: somewhat compressed.

Leaves: narrow, channelled and glaucous.

Flowering time: spring.

SECTION *Ganymedes* (Haworth) Schultes f.

Flowers: solitary or in umbels of two to six, pendant, white or yellow or somewhat bicoloured (not concolorous), perianth segments reflexed, corona cup-shaped.

Flower stem: elliptical or cylindrical.

Leaves: flat or semi-cylindrical, green.

Flowering time: spring.

SECTION *Bulbocodium* de Candolle

Flowers: solitary, yellow or white, horizontal or ascending, perianth segments insignificant compared to the dominant, funnel-shaped corona.

Flower stem: rounded.

Leaves: narrow, semi-cylindrical.

Flowering time: autumn or spring.

SECTION *Pseudonarcissus* de Candolle

Flowers: solitary, white, yellow or bicoloured. The poise varies with species from ascending to horizontal and drooping. The perianth segments are usually spreading (atypically strongly reflexed in *N. cyclamineus*), corona long, cylindrical and often flared at the mouth.

Flower stem: compressed, sometimes rounded.

Leaves: flat, usually glaucous.

Flowering time: spring.

The botanical classification for those species that have been used in hybridisation to produce cultivars is that in current use by the international registration authority for daffodils, the Royal Horticultural Society, which was last up-dated on 4 September 2008. These species are listed below.

SECTION *Tapeinanthus* (Herbert)  
*cavanillesii* Barra & López (Plate 5.2)

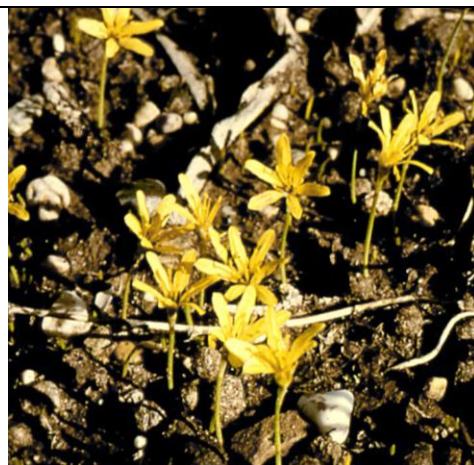


Plate 5.2. *Narcissus cavanillesii*.

SECTION *Serotini* Parlatores  
*miniatus* Donnison-Morgan, Koopowitz &  
Zonneveld  
*serotinus* Linnaeus (Plate 5.3)



Plate 5.3. *Narcissus serotinus*.

SECTION *Tazettae* de Candolle  
*bertolonii* Parlatores  
*dubius* Gouan  
*elegans* (Haworth) Spach  
*panizzianus* Parlatores  
*papyraeus* Ker-Gawler  
*tazetta* Linnaeus (Plate 5.4)  
*tazetta* subsp. *aureus* (Loiseleur-  
Deslongchamps) Baker  
*tazetta* subsp. *lacticolor* Baker  
*tazetta* subsp. *ochroleucus* (Loiseleur-  
Deslongchamps) Baker



Plate 5.4. *Narcissus tazetta*.

SECTION *Narcissus* Linnaeus

*poeticus* Linnaeus

*poeticus* var. *hellenicus* (Pugsley) A. Fernandes

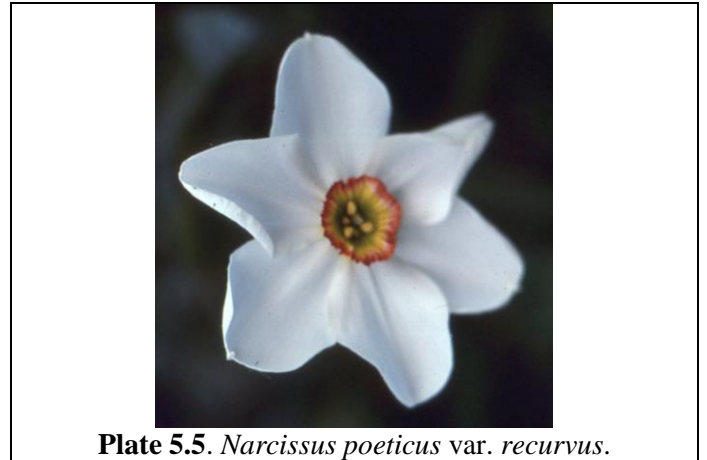
*poeticus* var. *recurvus* (Haworth) A. Fernandes  
(Plate 5.5)

*radiiflorus* Salisbury

*radiiflorus* var. *exertus* (Haworth) A.  
Fernandes

*radiiflorus* var. *poetarum* (Haworth) Burbidge  
& Baker

*radiiflorus* var. *stellaris* (Haworth) A.  
Fernandes



SECTION *Jonquilla* de Candolle

*assoanus* Dufour ex Schultes & Schultes f. (Plate 5.6)

*fernandesii* Pedro

*fernandesii* var. *cordubensis* (Fernández Casas) Fernández Casas

*jonquilla* Linnaeus (Plate 5.7)

*jonquilla* var. *henriquesii* Sampaio (Plate 5.8)

*jonquilla* var. *minor* (Haworth) Baker

*jonquilla* var. *stellaris* Baker

*viridiflorus* Schousboe (Plate 5.9)

*willkommii* (Sampaio) A. Fernandes



**Plate 5.6.** *Narcissus assoanus*.



**Plate 5.7.** *Narcissus jonquilla*.



**Plate 5.8.** *Narcissus jonquilla* var. *henriquesii*.



**Plate 5.9.** *Narcissus viridiflorus*.

SECTION *Apodanthi* A. Fernandes

*atlanticus* Stern

*calpicola* Mendonça

*cuatrecasasii* Fernández Casas, Laínz & Ruis  
Rejón

*rupicola* Dufour (Plate 5.10)

*rupicola* subsp. *watieri* (Maire) Maire &  
Weiller

*scaberulus* Henriques



**Plate 5.10.** *Narcissus rupicola*

SECTION *Ganymedes* (Haworth) Schultes f.

*triandrus* Linnaeus (Plate 5.11)

*triandrus* var. *concolor* (Haworth) Link

*triandrus* var. *loiseleurii* (Rouy) A. Fernandes

*triandrus* subsp. *pallidulus* (Graells) D.A.

Webb



**Plate 5.11.** *Narcissus triandrus* var. *triandrus*.

SECTION *Bulbocodium* de Candolle

*bulbocodium* Linnaeus

*bulbocodium* subsp. *bulbocodium* var. *citrinus*  
Baker

*bulbocodium* subsp. *bulbocodium* var.  
*conspicuus* (Haworth) Baker (Plate 5.12)

*bulbocodium* subsp. *bulbocodium* var.

*tenuifolius* (Salisbury) Baker

*bulbocodium* subsp. *obesus* (Salisbury) Maire

*cantabricus* de Candolle

*cantabricus* var. *foliosus* (Maire) A. Fernandes

*cantabricus* subsp. *monophyllus* (Durieu de

Maisonneuve) A. Fernandes

*romieuxii* Braun-Blanquet & Maire



**Plate 5.12.** *Narcissus bulbocodium* var. *conspicuus*.

SECTION *Pseudonarcissus* de Candolle

*abscissus* (Haworth) Schultes & Schultes f. (Plate 5.13)

*albescens* Pugsley

*asturiensis* (Jordan) Pugsley

*bicolor* Linnaeus (Plate 5.14)

*cyclamineus* de Candolle (Plate 5.15)



**Plate 5.13.** *Narcissus abscissus*.



**Plate 5.14.** *Narcissus bicolor*.



**Plate 5.15.** *Narcissus cyclamineus*.

*hispanicus* Gouan  
*hispanicus* var. *propinquus* (Salisbury) Pugsley  
*hispanicus* var. *spurius* (Haworth) Pugsley  
*minor* Linnaeus  
*minor* var. *conspicius* Haworth  
*moschatus* Linnaeus (Plate 5.16)  
*nanus* (Haworth) Spach  
*obvallaris* Salisbury  
*pallidiflorus* Pugsley (Plate 5.17)  
*pseudonarcissus* Linnaeus (Plate 5.18)  
*pseudonarcissus* var. *humilis* Pugsley  
*tortuosus* (Haworth) Spach



**Plate 5.16.** *Narcissus moschatus*.



**Plate 5.17.** *Narcissus pallidiflorus*.

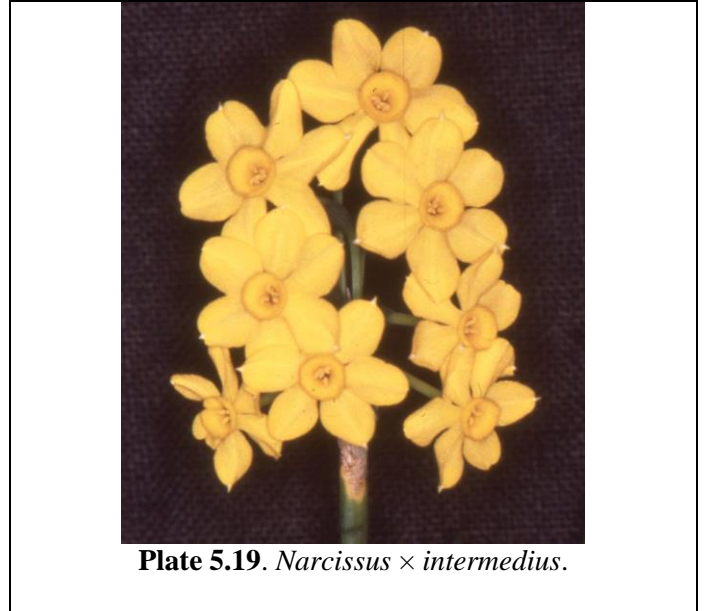


**Plate 5.18.** *Narcissus pseudo-narcissus* growing in Farndale, North Yorkshire.



### INTERSECTIONAL HYBRIDS

- × *bernardii* de Candolle ex Hénon [*hispanicus* × *poeticus*]
- × *incomparabilis* Miller [*hispanicus* × *poeticus* or *poeticus* × *pseudonarcissus*]
- × *intermedius* Loiseleur-Deslongchamps [*jonquilla* × *tazetta*] (Plate 5.19)
- × *medioluteus* Miller [*poeticus* × *tazetta*]
- × *poculiformis* Salisbury [*dubius* × *moschatus*]
- × *taitii* Henriques [*pseudonarcissus* × *triandrus*]



### Species Used in the Creation of Daffodil Cultivars

#### SECTION *Tapeinanthus* (Herbert) Traub

##### *N. cavanillesii* Barra & López

This daffodil has been known by many names in the past, being *Narcissus humilis* prior to receiving its present name. This earlier specific name *humilis* means low growing or more dwarfish than most of its kind and this is exactly what it is, for at 10 cm the flower stem is short compared to other species. It was only in 1969 that Traub placed this plant in the genus *Narcissus*. It was previously known as *Tapeinanthus humilis*, the generic name meaning low flower, referring to its small stature. Before that it was called *Carragnoa humilis* and, even earlier, *Braxireon humile*.

Key characteristics:

- Autumn flowering.
- Flowers usually solitary, medium yellow and upward-facing.
- The corona is very rudimentary, being no more than a low rim of six small scales.

Other characteristics:

- The flower stem is short (10 cm), remaining green and photosynthetic until leaf death in spring.
- Flowering bulbs have but a single leaf or no leaf at all, hence the importance of the green flower stem.
- Perianth segments are narrow, do not overlap and are wide-spreading.

Distribution: It is found in the southern most parts of Spain which are closest to Morocco, where it also occurs from around Tangiers to south of Agidir, and also well to the east of Tangiers.

Chromosome number:  $2n = 28$ .

Example of use in breeding: 'Emerald Sea' × *N. cavanillesii*, H. Koopowitz

#### SECTION *Serotini* Parlatore

##### *N. serotinus* Linnaeus

The specific name means autumnal, of late season and refers to its flowering season. Although there are several other autumn flowering species, the cytology of *N. serotinus* indicates that it is not closely related to the majority of these and it therefore shares this section with only one other species, *N. miniatus*. Its flowers emerge soon after the first autumn rains, so flowering time does vary owing to this and also because of the latitude at which it is found. The actual trigger for flowering is probably a drop in temperature. *N. serotinus* has a long garden history, having been described by the Flemish botanist Clusius as far back as 1576<sup>(20)</sup>.

Key characteristics:

- No leaves present with flowers; the leaves appear in spring. Frequently there is only one leaf per bulb or none at all on flowering bulbs.
- Small bulbs of under flowering size produce leaves during the normal flowering season.
- Leaves thread-like, 10-20 cm long, glaucous and deeply channelled.
- Flowering stems remain green long after flowering is over, taking on the functions of the often absent foliage. They are about 10 cm long.

Other characteristics:

- Flowers normally solitary with white perianth and yellow corona, sweetly scented and upward-facing.
- The corona is tiny at 1-1.5 mm high and 3-4 mm diameter in comparison to the overall diameter of the flower at 34 mm. Perianth segments wide-spreading and separated but sometimes just touching at the base.

Distribution: Formerly thought to be a common daffodil with a wide distribution throughout the coastal areas of the Mediterranean, it has now been found to be much less common since its separation from *N. miniatus*. Its distribution is now thought to be confined to southern Spain, Portugal and Morocco.

Chromosome number:  $2n = 10$ .

Example of use in breeding: 'Little Barry' 12W-Y ('Lilac Delight'  $\times$  *N. serotinus*), H. Koopowitz 1979.

*N. miniatus* Donnison-Morgan, Koopowitz & Zonneveld

This species has recently been separated from the above member of this section following nuclear DNA analysis. It is a larger plant with a multi-flowered scape, often with four-five flowers per stem. The specific name means cinnabar red and refers to the corona colour that is much more intense than the yellow of *N. serotinus*.

Key characteristics:

- Floral tube evenly tapering, not waisted as in *N. serotinus*.
- Perianth white with corona the colour of red lead.
- Multi-flowered scape with two to four flowers, occasionally more to seven, very rarely solitary.

Other characteristics:

- Flowers appear in autumn and face upwards.
- Pedicel length about 14 cm compared to 10 cm in *N. serotinus*.
- Bulbs much darker than those of *N. serotinus*.

Distribution: Widespread along the Mediterranean coasts and on several islands such as the Balearics, Crete and Cyprus.

Chromosome number:  $2n = 30$ .

Example of use in breeding: 'Solstice Star' 3Y-GOO ('Biometrics'  $\times$  *N. miniatus*), H. Koopowitz 2008.

## **SECTION *Tazettae*** de Candolle

*N. bertolonii* Parlatore

This daffodil was named for Antonio Bertoloni (1775-1869), an Italian botanist and a Professor at Bologna. It has had something of a chequered classificatory history, having in the past been a subspecies of *N. tazetta*, and it has also been included within *N. tazetta* subsp. *aureus*. It occurs in four varieties – the bright yellow var. *bertolonii* from Italy, the yellow and orange var. *algecirus* and the pale yellow var. *primulinus* both from Algeria, and var. *discolor* with pale yellow perianth and bright orange corona from Algeria and Morocco. It is thought that the cultivar 'Soleil d'Or', known in gardens since the early 18th century, may be a selected clone of *N. bertolonii*, or possibly a hybrid from it.

Key characteristic:

- Flat white perianth, the outer three segments being sharply-pointed at the end, 12 mm long and almost as wide.

Other characteristics:

- Leaves slightly glaucous, erect, 28 cm long and 15 mm wide.
- Stem somewhat compressed with fine parallel lining and 18 cm long.
- Corona entire and bowl shaped, bright yellow, 3 mm long and 8 mm wide.

- Flowering time late winter to early spring.

Distribution: South-east France, north-west Italy, Sardinia and in Algeria on rocky hillsides.

Chromosome number:  $2n = 22?$

Example of use in breeding: ‘Moriarty’ 12Y-Y (‘Jetfire’  $\times$  *N. bertolonii*), M.G. Temple-Smith 1995.

#### *N. dubius* Gouan

The specific name means uncertain or doubtful, referring to the one-time uncertainty as to its origin. Prior to 1969, it was named *N.  $\times$  dubius*, being regarded as an intersectional hybrid between *N. juncifolius* (now *N. assoanus*) and *N. tazetta*. A. Fernandes deduced that it originated from this general background, specifically through chromosome doubling in a diploid form of *N. papyraceus* ( $2n = 22$ ) and a tetraploid form of *N. assoanus* ( $2n = 28$ )<sup>(21)</sup>. This gave rise to an unusual allopolyploid (a polyploidy with dissimilar sets of chromosomes and with 50 chromosomes in total). Despite its odd genetic composition, it is known to breed true from seed, indicating that its origin occurred some time ago. As a consequence, it is now regarded as a true species, the ‘ $\times$ ’ that formerly indicated its hybridity having been removed from in front of its specific name.

Key characteristics:

- The smallest of all the tazettas with stiffly held, erect stems 15-25 cm long.
- Flowers in umbels of two to six, with the flower stalks of unequal length, the longest being about 4 cm. They are pure white and appear from December to April.

Other characteristics:

- Leaves glaucous, appearing to be covered with a greyish bloom, spreading and up to 50 cm long. They are flat on the inner surface and have parallel striations on the outer.
- The perianth segments just touch and have a small pointed apex.
- The corona is about 4 mm long and 7 mm diameter with a lobed margin.

Distribution: Found in coastal areas in the south of France and down the eastern Spanish coast among limestone rocks and often in exposed and dry situations.

Chromosome number:  $2n = 50$ .

Example of use in breeding: ‘Raindrop’ 5W-W (*N. dubius*  $\times$  *N. triandrus* var. *loiseleurii*), A. Gray 1942.

#### *N. elegans* (Haworth) Spach

The specific name alludes to the graceful and elegant nature of this plant, especially when in bloom with its fragrant umbels of from two to ten flowers of white and dull orange. The species is divided into five varieties, one of which has two forms. Perianth colour ranges from white to greenish-white and cream while corona colour is yellow or orange. *N. elegans* has a long garden history being illustrated by Clusius in 1576<sup>(22)</sup>. It has been grown in Britain since the mid-19th century but does not thrive owing to the climate.

Key characteristics:

- Autumn flowering.
- Flower stem compressed, striate and rough to the touch, 20 cm long.
- Flowers in umbels of two to ten, flower stalks unequal, the longest being about 4.5 cm, fragrant.
- Perianth segments narrowly elliptical and do not overlap at the base, white.

Other characteristic:

- Leaves can vary considerably in length from 8-25 cm. They are glaucous, striate on the outer surface and folded inwards at the tip.

Distribution: Found in the western Mediterranean area, coastal regions of Italy especially on the western side, the islands of Corsica, Sardinia and Sicily and in north Africa from Morocco through Algeria and into Libya.

Chromosome number:  $2n = 20$ .

Example of use in breeding: ‘Glorious’  $\times$  *N. elegans*, H. Koopowitz.

#### *N. panizzianus* Parlato

This daffodil has in the past been considered a subspecies of *N. papyraceus* (*N. papyraceus* subsp. *panizzianus*) with which it has similarities, as indeed it has with *N. polyanthus*. *N. barlae* is now included within *N. panizzianus* but was regarded as a separate species by Fernandes<sup>(23)</sup> on account of its obtuse rather than acute perianth segments. It is one of the smallest of all the white tazettas.

Key characteristics:

- Flower stem very compressed and two-edged.
- The umbel is very compact, the two to eight individual flowers being tightly bunched.
- The dark yellow pollen appears very conspicuous owing to the whiteness and small size of the individual flowers.

Other characteristics:

- Leaves erect, glaucous and keeled.
- The tube is green but white at the upper end.
- The flowers are upward facing.

Distribution: Originally described from around San Remo but also found in other parts of northern Italy, south-eastern France and Iberia.

Chromosome number:  $2n = 22$ .

Example of use in breeding: ‘Cotton Puff’ 8W-W (*N. panizzianus* × *N. papyraceus* seedling), H. Koopowitz 1997.

### *N. papyraceus* Ker-Gawler

The specific name means papery and refers to the texture of the flower, particularly the perianth segments. *N. papyraceus* is the most widely known and grown member of the Section *Tazettae*, having been cultivated in Europe for several centuries and being an important bulb for forcing. It is widely naturalised throughout south-west Europe and along the Mediterranean coast and has been associated with gardens for so long that it may best be regarded as a cultivar, perhaps originally a selection from a large wild form. It has, in fact, acquired several cultivar names of which the best known is ‘Paper White’.

Key characteristics:

- Flowers all white, upward facing and in umbels of three to 20, frequently more than eight. They are about 34 mm diameter, fragrant and papery to the touch.
- The flower stem is compressed, noticeably keeled and with fine parallel longitudinal lines.
- Leaves are glaucous, erect and keeled. They are 30 cm long and 17 mm wide.

Other characteristics:

- Perianth segments ovate, overlapping at the base and with a small pointed apex.
- Flowers borne on stalks of varying lengths, up to 5 cm.
- Corona margin entire or minutely scalloped.

Distribution: Found in many parts of southern Europe, including Spain, Portugal, France, Italy, Sicily, the former Yugoslavia and Greece. This daffodil is also present in north Africa (Morocco and Algeria) at low altitudes in grassland or rocky terrain with a predominantly hot climate but with plenty of moisture in spring. It is also found at up to 2000 m in the Atlas Mountains. This variation in altitude and latitude means that flowering takes place over a long period from winter into spring.

Chromosome number:  $2n = 22$ .

Example of use in breeding: ‘Omri’ 8W-Y (*N. papyraceus* × *N. tazetta*), H. Yahel 1982.

### *N. tazetta* Linnaeus

The specific name refers to the shape of the corona and means little cup. This daffodil has acquired the common name of Polyanthus Narcissus because of its normally multi-flowered stems, polyanthus meaning many-flowered. *N. tazetta* has been in cultivation in Europe since the mid-16th century and by the start of the 19th century many forms had been selected and named, mainly by the Dutch who developed it as a decorative flower. These Continental selections included the Medio Luteo series that contained such cultivars as ‘Medio Luteo d’Harlem’ and ‘Medio Luteo Van Dyk’, all its members being classified 8W-O. Other groups were the Primo series that included a range of colour combinations from 8W-Y (‘Primo Citroniere’), 8W-O (‘Primo de Munk’), 8Y-Y (‘Primo Jaun’) to 8Y-O (‘Primo Madouce’), and the Passe series with cultivars such as ‘Passe Bazelman’ 8W-Y dating from before 1759.

Key characteristics:

- Inflorescence almost always multi-headed consisting of three to 15 flowers, rarely less.
- Perianth segments white, usually ovate at 14 mm wide and 17 mm long and they stand perpendicular to the tube. They always overlap at the base and often for much of their length.

- Corona is the typical cup shape associated with this species, deep yellow, 5 mm long and 10 mm in diameter, its margin being entire or almost so.
- The flowers are strongly fragrant.

Other characteristics:

- Leaves upright and somewhat glaucous, 35 cm long and 17 mm wide and bluntly keeled on the back.
- Scape compressed, 38 cm long.
- Stamens do not project from the corona.

Distribution: Owing to its long history as a cultivated plant going back to at least the 13th century in the Far East, its precise natural distribution is hard to determine. Meyer gave this as in coastal areas, along streams and in moist meadows in Spain and Portugal, the Canary Isles, in north Africa from Morocco to Libya, southern France, Italy, Corsica, Sardinia, the Balearic Isles, Sicily, Greece, and also in coastal areas of Syria, Lebanon, Israel and Cyprus<sup>(24)</sup>. It may possibly be native in Iran, and plants found in Kashmir have twisted leaves similar to those of plants found in the eastern coastal regions of the Mediterranean. These are perhaps not true natives, while those found further east in China and Japan are not generally regarded as wild, although they frequently occur in such abundance that the case for a wild origin cannot be ruled out. At one time, this Far Eastern form of *N. tazetta* was considered to be a variety – var. *chinensis* Roem. It was listed by J. Ohwi in the *Flora of Japan* (1965)<sup>(25)</sup> as a doubtfully naturalised plant along the coastal areas of Honshu and Kyushu, and presumably this applied to the Chinese populations as well.

Chromosome number:  $2n = 20$ .

Example of use in breeding: ‘Saint Agnes’ 8W-O (‘Chaucer’ × *N. tazetta*), P.D. Williams 1926.

#### *N. tazetta* subsp. *aureus* (Loiseleur-Deslongchamps) Baker

The subspecific name *aureus* refers to the golden yellow colour of the flowers – the typical all-gold tazetta as it has been called. Currently regarded as a subspecies of *N. tazetta*, it has in the past had specific status as *N. aureus* Loiseleur-Deslongchamps. It has also been known as *N. cupularis* (Salisbury) Schultes. It has similarities with the cultivar ‘Soleil d’Or’ that may be a selected form.

Key characteristics:

- Perianth bright golden yellow.
- Corona of a richer colour being deep yellow, orange yellow or orange.
- Flowers are approximately 4 cm diameter and number from seven to twelve per scape and are fragrant.

Other characteristics:

- Perianth segments are ovate.
- Corona is about one third the length of the segments and its margin is entire.
- Leaves are glaucous.

Distribution: Another long-cultivated species, known since before 1600, it has had ample opportunity to spread beyond its natural limits. Fernandes<sup>(26)</sup> gave its natural distribution as southern France and Italy, but it is also found in Sardinia, Turkey, Algeria, Morocco and the Balkan Peninsula, being thought to be naturalised in the latter.

Chromosome number:  $2n = 20$ .

Example of use in breeding: ‘Autumn Glow’ (*N. tazetta* subsp. *aureus* × *N. miniatus*), H. Koopowitz.

#### *N. tazetta* subsp. *lacticolor* Baker

The subspecific name means milky coloured and refers to the white perianth segments. It is regarded as closely related to the typical form of *N. tazetta* itself, and may be a wild form of it.

Key characteristics:

- Perianth segments white and overlapping.
- Corona bright yellow.
- Individual flowers are large at 5 cm diameter, being larger than those of *N. tazetta* and are fragrant.

Distribution: Found in Cyprus and possibly Syria; elsewhere growing with *N. tazetta* especially in Italy.

Chromosome number:  $2n = 20$ ?

Example of use in breeding: ‘Shrew’ 8W-Y (*N. tazetta* subsp. *lacticolor* × *N. minor*), A. Gray 1950.

*N. tazetta* subsp. *ochroleucus* (Loiseleur-Deslongchamps) Baker

The subspecific name is derived from the Greek ochra meaning yellow earth and leucos meaning white, referring to the white perianth and lemon yellow corona.

Key characteristics:

- The scape is cylindrical and not compressed.
- Individual flowers relatively small at 25-30 mm diameter, several per stem.
- Leaves green and keeled, not glaucous.

Other characteristic:

- Perianth segments overlap, corona margin entire with slight crenulations.

Distribution: It is found flowering in spring in southern France, although it may be more widespread. It has been described from Honshu in Japan as being doubtfully naturalised along its coast and has been found elsewhere in the Far East but not necessarily as a truly wild plant.

Chromosome number:  $2n = 20?$

Example of cultivar link: 'Scilly White' 8W-W possibly a variant of *N. tazetta* subsp. *ochroleucus*.

## SECTION *Narcissus* Linnaeus

*N. poeticus* Linnaeus

The specific name means 'of the poets' and refers to Ancient Greek gardens that contained theatres and presumably, from time-to-time, poets. It is known to have been grown in Ancient Greece since before the birth of Christ. In Europe, it was known to Lobel in 1570<sup>(27)</sup> and since the 19th century has played a major part in daffodil hybridisation, in the creation of Divisions 2 and 3, and in the development of Divisions 8 and 9. It was not the only species within this section to be involved in the developments described above – *N. radiiflorus* was also important along with many of its varieties. In addition to helping develop cultivar divisions with new flower shapes, these species were also responsible for imparting new colours, such as oranges and reds and later pink as a result of their red coronal colour.

Key characteristics:

- Flowers fragrant, usually solitary but occasionally in pairs, held horizontally or ascending and with a conspicuous circular outline. Very late flowering (June).
- Perianth pure white, sometimes yellowish towards the base on the outside.
- Corona flat and disc-like, about 16 mm diameter, strongly wavy with a bright scarlet edge, below which is a yellow area then a green centre. The red margin often becomes scarious or dried as the flower ages.

Other characteristics:

- Leaves number about four per plant and are flat 30-45 cm long and 10 mm wide, held erect and showing striations.
- Scape often up to 36 cm long, compressed and two-edged.

Distribution: Found from moist meadows near sea level in southern France to the high mountains of central Europe, Pyrenees, Swiss Alps and the Balkan mountains, south to Greece.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'La Tosca' 2W-YYR ('Bernardino' × *N. poeticus*), Brodie 1915.

*N. poeticus* var. *hellenicus* (Pugsley) A. Fernandes

The varietal name, meaning from Greece or Hellenic, indicates that its natural habitat is restricted to Greece.

Key characteristics:

- Location around Mount Pindus and Mount Oeta.
- Rather robust growth relative to the rather small, solitary and fragrant flowers that measure 4.5 cm diameter.
- Perianth segments white and with sharply pointed ends. They just touch at the base and reflex noticeably as the flowers age.
- Corona is cup-shaped with a green centre, yellow mid-section and scarlet, often scarious rim.

Other characteristics:

- Leaves pale green and keeled, about 50 cm long and 10 mm wide.
- Scape compressed and slightly shorter than the leaves.

Distribution: Restricted to that listed above.

Chromosome number:  $2n = 21$ .

Example of use in breeding: 'Kewpie Sprite' 9W-GYO (*N. poeticus* var. *hellenicus* × 'Lights Out'), M.S. Yerger 1993.

*N. poeticus* var. *recurvus* (Haworth) A. Fernandes

This variety is without doubt the most distinctive of all *poeticus* daffodils on account of its swept-back perianth segments, denoted by its Latin name which means bent or curved backwards. It was introduced into Britain during the 19th century and was initially thought to be a cultivar on account of the outstanding quality of its flower. As a consequence, it quickly became and has remained a popular garden plant, acquiring the common name of Pheasant's Eye.

Key characteristics:

- Recurved perianth segments.
- Perianth of the purest sparkling white.
- Corona cup-shaped with a relatively broad red rim, below which is often a whitish zone then greenish yellow intensifying to green in the centre.
- Scent very fragrant, almost overpowering, which has been described as having a distinct nutmeg element.

Other characteristics:

- Plant vigorous with leaves 30-45 cm long.
- Flower size large at 5.75-6.5 cm diameter.
- Perianth margins are often inflexed.

Distribution: The natural habitat of this variety is confined to Switzerland, especially the Valais district, although similar but smaller forms have been found in France in the eastern Pyrenees. A mountain variety, it is typically found growing at 1500-2200 m.

Chromosome number:  $2n = 21$ .

Example of use in breeding: 'Moonbeam' 3W-W ('Mrs Barton' × *N. poeticus* var. *recurvus*), Mrs R.O. Backhouse 1901.

*N. radiiflorus* Salisbury

The specific name denotes its radiating flowers or perianth segments. It has been cultivated in England since at least the 17th century.

Key characteristics:

- The corona shape is flat and discoid, similar to that of *N. poeticus*, but the colour is quite distinct, being bright yellow in the centre with a red margin, which may be narrow but can be much broader than in *N. poeticus*.
- The flowers are much more star-like than those of *N. poeticus* owing to the perianth segments hardly overlapping or not overlapping at all.

Other characteristics:

- The leaves are narrower (5-8 mm) than in *N. poeticus* (6-12 mm) and are green or slightly glaucous.
- The scape is 30-40 cm long, carrying a flower 5.5-7 cm in diameter.
- The stamens are much more equal in length than in *N. poeticus*.

Distribution: Not occurring as far to the west as *N. poeticus*, *N. radiiflorus* is mainly found from Switzerland and Austria through the Balkans to Greece.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Minnie Hume' 3W-W ('Albicans' × *N. radiiflorus*), W. Backhouse pre-1869.

*N. radiiflorus* var. *exertus* (Haworth) A. Fernandes

The varietal name *exertus* refers to the position of the anthers placed above the flat, disc-like corona, *exertus* meaning thrust forth or projecting. This may be a key to differentiating it from other similar daffodils used in breeding in which the anthers are, at most, just rather than fully projecting.

Key characteristics:

- The position of the anthers as described above.
- Corona flat and disc-like, bright yellow below with a scarlet rather than a red margin.
- Perianth segments twisted and recurved, pure white except for a touch of yellow at the base.

Distribution: Found flowering in May in Switzerland and adjacent parts of France.

Chromosome number:  $2n = 14$ ?

Example of use in breeding: 'Almira' 9W-YJR ('Ornatus'  $\times$  *N. radiiflorus* var. *exertus*), pre-1899.

*N. radiiflorus* var. *poetarum* (Haworth) Burbidge & Baker

The word *poetarum* means much the same as *poeticus* (of the poets) and indicates that this variety has a similarity with *N. poeticus*. The exact origin of this daffodil is uncertain, it first being described by Haworth<sup>(28)</sup> from a cultivated plant. Cullen<sup>(29)</sup> regards it similarly, while Fernandes<sup>(30)</sup> suggests that it may be found in south-east Europe but concedes that it may have a garden origin. This being as it may, var. *poetarum* has been important in hybridisation, its strong corona colour being used to pass rich oranges and red into several cultivar divisions (Divisions 2, 3, 4 and 9) and indirectly into many others.

Key characteristic:

- Corona red throughout, fading with age.

Other characteristics:

- Flowers large for a Poet, being larger than those of *N. poeticus*.
- It flowers early for a Poet, often in April.
- The perianth segments are white and overlap, which means that the flowers do not have the pronounced radiating appearance normally associated with this species.

Distribution: Postulated as possibly being from south-east Europe.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Horace' 3W-GOR ('Ornatus'  $\times$  *N. radiiflorus* var. *poetarum*), G.H. Engleheart 1907.

*N. radiiflorus* var. *stellaris* (Haworth) A. Fernandes

The varietal name means with spreading rays, in this case the perianth segments, which give this daffodil a pronounced star-like or stellate appearance.

Key characteristics:

- The star-like flower shape.
- The corona is cup-shaped unlike the flat or discoid coronas of vars *exertus* and *poetarum*.
- The corona colour differs from that of *N. radiiflorus* in that there is a narrow white zone between the yellow centre and the red margin.

Other characteristics:

- Leaves green or slightly glaucous, 45 cm long and up to 8 mm wide.
- Scape compressed and striate, about 40 cm long.
- Flowers usually solitary, horizontal or ascending, 65 mm in diameter.
- Perianth segments white or greenish white, not overlapping.

Distribution: Found flowering from May to June in the region from southern France eastwards to Romania and perhaps beyond, often in mountainous areas.

Chromosome number:  $2n = 14$ ?

Example of use in breeding: 'Spofforthiae Spurius' (*N. incomparabilis*  $\times$  *N. radiiflorus* var. *stellaris*), W. Herbert pre-1843.



## SECTION *Jonquilla* de Candolle

*N. assoanus* Dufour ex Schultes & Schultes f.

The re-naming of this daffodil from the former *N. requienii* and the earlier, but descriptive, *N. juncifolius* was inevitable as the current name is undoubtedly the oldest for the species. It refers to the Spanish botanist Ignatius d'Asso and not to Aswan in Egypt, another meaning of *assoanus* cited by Gledhill<sup>(31)</sup>.

Key characteristics:

- Flower colour yellow, the corona being deeper than the perianth especially as it ages.
- Flower fragrant.
- Leaves three or four in number, green or dark green, usually shorter than the scape, almost cylindrical becoming slightly flattened towards the base. They are grass-like and may be held erect or be prostrate and spreading.

Other characteristics:

- Perianth segments overlapping at the base and with a pointed tip, sometimes slightly reflexed.
- Flowers solitary or in pairs, sometimes in threes with the corona margins roundly notched.

Distribution: Found growing in stony soil in limestone hills in southern France and in the mountains of northern Spain and the Pyrenees. Flowering time is from March to June according to altitude and latitude.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Lintie' 7Y-YYO (*N. assoanus* × *N. poeticus*), Barr and Sons 1937.

*N. fernandesii* Pedro

This daffodil was named for Professor Abílio Fernandes (1906-1994), taxonomist, Director of the Botanical Garden, Coimbra, Portugal and well known daffodil authority. Its specific status has been questioned as there is little to distinguish it from *N. gaditanus* and *N. willkommii*, apart from plant height and flower diameter, which characteristics move it towards *N. assoanus*. As all three species are quite variable in themselves, separation can be difficult. Recent work with DNA appears to indicate a close relationship between *N. fernandesii* and *N. willkommii* with *N. gaditanus* closer to *N. assoanus*<sup>(32)</sup>.

Characteristics:

- Foliage is grass-like, semi-round and faintly veined. It is often prostrate and is considerably longer than the scape at flowering time, being up to 30 cm.
- The scape is finely striate and about half the length of the leaves or less.
- Flowers one to five per stem, upward facing, yellow in colour, the corona being darker than the perianth.
- Perianth segments reflexed, overlapping at the base and with a small point at the apex.
- The corona is cup-shaped with a wavy margin. It is about half the length of the perianth segments.

Distribution: It is found along grassy ditches and banks beside the River Tagus, Portugal and also in south-western Spain, flowering in spring from January to March.

Chromosome number:  $2n = 14$ . Both triploid ( $2n = 21$ ) and tetraploid ( $2n = 28$ ) forms have also been found.

Example of use in breeding: 'Shepherd's Hey' 7Y-Y ('Seraglio' × *N. fernandesii*), Rosewarne EHS 1977.

*N. fernandesii* var. *cordubensis* (Fernández Casas) Fernández Casas

The varietal name is derived from the Province of Cordoba in Spain where this daffodil is found. According to Gledhill<sup>(33)</sup>, there are several ways of spelling this name in addition to the one shown above. The others are Cordova and Corduba, the varietal name being the Latinized form of the latter. It has only recently been given varietal status, having previously been regarded as a species. It differs from the type in having broader perianth segments that are almost twice as wide (13 mm compared to 7 mm) and a wider corona (15 mm compared to 8 mm).

Key characteristics:

- The flowers are a very deep yellow and the fragrance is particularly heavy.
- The corona is cup-shaped and then conical and is markedly six-lobed.
- The perianth segments are very overlapping, often incurving and with a small point at the apex.

Other characteristics:

- The leaves are green and may be erect or prostrate. If the latter, the leaf tips tend to point upwards. They can be up to 35 cm long.
- The scape is round and finely striated, up to 20 cm long.

Distribution: Found in wet turf overlying limestone in southern Spain. It is spring flowering in March and April.

Chromosome number:  $2n = 14$ ?

Example of use in breeding: 'Whipcord' 7Y-O ('Falstaff'  $\times$  *N. fernandesii* var. *cordubensis*), J.W. Blanchard 1996.

### *N. jonquilla* Linnaeus

The specific name is derived from the Spanish vernacular name jonquillo, meaning 'little rush', which its foliage resembles. Its common name is the Jonquil. It was named by Linnaeus in 1753 and has been grown in English gardens since about the mid-16th century. It is the most vigorous daffodil in this section and has the largest flowers, often in umbels of two to six.

Key characteristics:

- The leaves are dark green and almost round in cross-section. They are rush-like, erect and strongly channelled on the upper surface feeling almost rough.
- The leaves and scape are of equal length, the former being uniformly striate.
- The flowers are very fragrant, two to six, sometimes eight, per umbel, pointing upwards, 30 mm in diameter.

Other characteristics:

- The perianth is yellow with segments greatly overlapping and sharply pointed at the apex.
- Corona, cup-shaped, yellow and with a margin cut into rounded notches.

Distribution: Spain and Portugal, often in sandy or stony soil beside rivers where they can become deeply buried in silt deposits. They may be found flowering in such places during March and April while waterlogged. *N. jonquilla* is widely naturalised elsewhere in Europe.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Finch' 7Y-O ('Narvik'  $\times$  *N. jonquilla*), G.E. Mitsch 1966.

### *N. jonquilla* var. *henriquesii* Sampaio

This variety was named for Professor J.A. Henriques of Coimbra University, Portugal, a botanist and 19th century daffodil authority. It differs from the type by having a longer corona.

Distribution: Found in Portugal along the banks of the River Tagus.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Parua' 12Y-Y (*N. jonquilla* var. *henriquesii*  $\times$  *N. cyclamineus*), R. Brown 1995.

### *N. jonquilla* var. *minor* (Haworth) Baker

In some treatments of this section, this variety has been placed with *N. jonquilla* to which it bears a strong resemblance apart from its size, being regarded as a dwarf form with very slender leaves. The varietal name means smaller or lesser, the whole plant being much shorter than in *N. jonquilla*, its flower only measuring 13 mm compared to 30-45 mm.

Distribution: This variety is found growing in Spain and Portugal wherever *N. jonquilla* is to be found.

Chromosome number:  $2n = 14$ ?

Example of use in breeding: 'Starfire' 7Y-O (*N. jonquilla* var. *minor*  $\times$  'Karapiro'), R. Hyde 1959.

### *N. jonquilla* var. *stellaris* Baker

The varietal name refers to the star-like shape of the flowers. As with var. *minor* this variety has only slight differences from the species among which it is found growing throughout its range. It does differ in the shape of the perianth segments that are much narrower and give the flower its star-like shape. Sometimes they may be reflexed, while the corona is distinctly lobed.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Sassy' 12Y-Y (*N. jonquilla* var. *stellaris*  $\times$  *N. cyclamineus*), Glenbrook Bulb Farm pre-1995.

### *N. viridiflorus* Schousboe

The specific name means green-flowered, which is unique among daffodil species as a whole flower colour. While other species in Section *Narcissus* have green parts to their flowers, only *N. viridiflorus* has both perianth and corona that are uniformly dull olive green. It has had a long garden history in England since the early 17th century. *N. viridiflorus* is found growing with *N. serotinus* in southern Spain and Morocco where hybrids were found by G. Maw in 1883 close to Gibraltar<sup>(34)</sup>, and three years later in larger quantities near Tangiers in Morocco. This hybrid was named *N. × alleniae* Donnison-Morgan but its true parentage is now thought to be *N. miniatus* crossed with *N. viridiflorus*.

Key characteristics:

- Green flowers in umbels of up to five.
- Flowers in autumn from early October to late November.
- The flowers are scented being variously described as ‘unpleasant’, ‘fragrant’ and ‘powerful’.

Other characteristics:

- Leaves dark green, cylindrical and hollow. They are not present on flowering bulbs at flowering time but often appear soon after flowering.
- The scapes are dark green resembling leaves, the functions of which they perform in their absence. They continue to grow after flowering whether or not seed is set and may reach 60 cm.
- The perianth segments are spreading, becoming reflexed. They are sharply pointed and do not overlap, 13 mm long and 2 mm wide.
- The corona is normally very short, 1 mm long and with six lobes.

Distribution: Found in southern Spain, around Algeciras and on the north-west coast of Morocco from Tangiers to Agidir; often growing in heavy wet soil.

Chromosome number:  $2n = 28$ .

Example of use in breeding: ‘Emerald Sea’ 7W-G (‘Sea Dream’ × *N. viridiflorus*), J. Hunter 1999.

### *N. willkommii* (Sampaio) A. Fernandes

*N. jonquilloides* was described in 1860 by Heinrich Moritz Willkomm (1821-1895)<sup>(35)</sup>, a German botanist. In 1931, Sampaio<sup>(36)</sup> described a type of *N. jonquilloides* as var. *willkommii* but, in 1966, A. Fernandes<sup>(37)</sup> raised it to specific status. Nowadays, the name *jonquilloides* has passed into history. As with *N. viridiflorus*, Fernandes maintained that this is a daffodil of ancient origin, a hybrid between a tetraploid form of *N. jonquilla* and the diploid *N. gaditanus*. Meyer gives its chromosome number as  $2n = 21$  and concludes that *N. willkommii* “does not appear in any way to be a simple triploid derived from this parentage”<sup>(38)</sup>.

Key characteristics:

- The leaves are flattened at the base where they are 2-3 mm wide but are round for the remainder of their length. They are dark green and very erect before flowering, after which they spread out; 35 cm long.
- The flowers are uniformly deep yellow in umbels of two to three, sometimes up to six, about 30 mm in diameter.
- The perianth segments overlap at the base and have a small pointed apex.
- The corona is conspicuously six-lobed, 6 mm long and 10 mm in diameter, and is more than half the length of the perianth segments.

Other characteristic:

- The scape is round, smooth and about 18 cm long.

Distribution: Southern Portugal and south-western Spain where it is found flowering in spring.

Chromosome number:  $2n = 14$ , possibly with a triploid clone,  $2n = 21$ , referred to by Meyer<sup>(39)</sup>.

Example of cultivar link: ‘Stocken’ 7Y-Y, name given to a variant of an unidentified species, possibly *N. willkommii*. Unregistered.

## SECTION *Apodanthi* A. Fernandes

### *N. atlanticus* Stern

The specific name refers to the Atlas Mountains in north Africa where this species was found. This daffodil was discovered by E.K. Balls in 1936<sup>(40)</sup> who recorded collecting seed in the Grand Atlas Mountains in Morocco near Amiziz, which is thought to be a misspelling of Amizmiz. Some of this seed was sent to Sir F.C. Stern at Highdown in Sussex where it first flowered in 1948, being described two years later<sup>(41)</sup>. Subsequent searches for this species in the Grand Atlas Mountains have not been successful and it is now thought that the field notes of Balls were incorrect with regard to location.

Key characteristics:

- The flowers are fragrant with a sweet scent, solitary and appear in late March to early April. In colour, they are creamy white compared to the icy white of *N. rupicola* subsp. *watieri*. They face upwards and are about 2.5 cm in diameter.
- The perianth segments are somewhat reflexed, usually twisted, do not overlap and have a small pointed apex.
- The corona is cup-shaped with a margin cut into rounded notches.

Other characteristics:

- Leaves number three to six and are glaucous, about 16 cm long and 3 mm wide.
- The scape is about 12 cm long, rounded and striated.

Distribution: Where it comes from is a matter of debate as no flowering plant has been found in the wild since its discovery by Balls in 1936, but it is logically thought to be somewhere in the Grand Atlas Mountains.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Patsy' 1Y-Y ('Tanagra'  $\times$  *N. atlanticus*), F.C. Stern 1960.

### *N. calcicola* Mendonça

The specific name indicates that this daffodil is a lime-lover or calcicole as it is found growing in limey soils. However, this assumption is incorrect for, although the rocks in the areas in which it is found are limestone, the pockets of soil where the bulbs grow are acid. The soil pH can be below 6.0 as a result of the high level of organic matter in the soil. *N. calcicola* was discovered in 1930 and is present in only two areas of central Portugal.

Key characteristics:

- Flowers usually in umbels of two to five, but can be solitary and are deep orange yellow.
- Leaves glaucous, erect and two-keeled, 13 cm long and 3 mm wide.
- The margin of the corona is incurving.

Other characteristic:

- Scape to 18 cm, circular in section and with longitudinal striations.

Distribution: A rare plant in the wild restricted to two areas of central Portugal.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Stella Turk' 6Y-Y (*N. cyclamineus*  $\times$  *N. calcicola*), A. Gray 1958.

### *N. cuatrecasii* Fernández Casas, Laínz & Ruiz Rejón

Named for J. Cuatrecasas, it was first described in 1973 but was in cultivation for several years prior to this, perhaps being best known from Stocken's collection as *N. scaberulus* Grazalema form. It was originally classified as a subspecies of *N. rupicola* (*N. rupicola* subsp. *pedunculatus* (Cuatrecasas) Laínz) but now has specific rank. The name *pedunculatus* was given because of the well-developed peduncle (pedicel) or flower stalk at about 12 mm long, which is very short or absent in *N. rupicola* itself.

Key characteristics:

- Well-developed flower stalk as described above.
- Yellow cup-shaped corona that tends to turn in at the margins.
- Yellow perianth, overlapping and with a small pointed tip.

Other characteristics:

- Leaves glaucous, erect, smooth and two-keeled.
- Flowers one to two per stem, usually solitary.

Distribution: Found in limestone ranges in southern Spain, flowering from February to April. It does not seem to occur where other species of the Section *Apodanthi* grow.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Pequenita' 7Y-Y (*N. atlanticus* × *N. cuatrecasasi*), J.W. Blanchard 1985.

#### *N. rupicola* Dufour

The specific name means growing on or among rocks, which is where it is frequently found on slopes, especially of weathered granite.

Key characteristics:

- Distinguished from other yellow-flowered members of the Section *Apodanthi* by the absence of a flower stalk (pedicel or peduncle).
- Flowers are yellow, solitary, upward facing and relatively large for this section at 30 mm in diameter.
- The corona is short at 4 mm long, appearing flat and often curving outwards.

Other characteristics:

- The leaves are glaucous, upright, channelled on the inner face and two-keeled on the outer; length 15 cm.
- Scape is round in section with striations and equals or exceeds the leaves in length.
- Perianth segments overlap and have a pointed apex.

Distribution: Found in northern and central Portugal and in central Spain, growing in acid soils, often on hillsides. It can be found flowering over an extended period from March to early June.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Stafford' 7Y-O (*N. rupicola* × *N. poeticus*), A. Gray 1956.

#### *N. rupicola* subsp. *watieri* (Maire) Maire & Weiller

The subspecific name is for the French botanist Watier. Apart from *N. atlanticus* this is the only other white daffodil in the Section *Apodanthi* but the shade of white is quite different, being a pure icy white in this case.

Key characteristics:

- Solitary flowers of a pure sparkling white, 3 cm in diameter.
- Corona short and shallow, appearing almost flat.

Other characteristics:

- Leaves about 10 cm long, glaucous and channelled.
- Scape almost the same length as the leaves.

Distribution: Occurs only in the Grand Atlas Mountains of Morocco from 2200-3500 m where it is found growing in acid soils. At the lower levels, it flowers in early spring but at the highest altitudes this is delayed by almost three months to early May.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Dainty Miss' 7W-GWW ((('Rubra' × 'Coverack Perfection') × *N. rupicola* subsp. *watieri*), G.E. Mitsch 1966.

#### *N. scaberulus* Henriques

The specific name means roughish and refers to the leaf margins, which feel slightly rough to the touch.

Key characteristics:

- Leaves thin and four-edged, it being these edges that feel roughened. They are often prostrate.
- Flowers are small at 12-18 mm diameter, sometimes solitary but often in umbels of two to four (occasionally up to seven). They are deep yellow in colour and often with an orange tinge.

Other characteristics:

- The corona is cup-shaped with an entire or slightly notched margin that often rolls inwards.
- The perianth segments just overlap at the base and have an apical point.

Distribution: Found in northern and central Portugal. In the former, it grows in poor acid soil that is very wet in the early season but extremely dry during summer, while in central Portugal it often grows in light shade provided by pines.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Little Rusky' 7Y-GYO ('Ruby'  $\times$  *N. scaberulus*), R.C. Watrous 1989.

### **SECTION *Ganymedes*** (Haworth) Schultes f.

#### *N. triandrus* Linnaeus

The specific name literally means three stamens, the other three apparently not being seen when the plant was first described. As with all daffodils, there are six stamens but, in this species, there are two lengths of filament that are very different. The result of this is that, while three stamens are very obvious, the others are much less so and situated well down in the tube; it is reported that Linnaeus missed these lower ones. A more credible interpretation is that Linnaeus named this species from an illustration by Clusius<sup>(42)</sup>, which showed only the three obvious stamens while being well aware of the three that were hidden. It has a long garden history (since 1579) and has acquired the common name of Angels Tears.

Key characteristics:

- The three prominent anthers.
- The flowers are of a uniform cream, sometimes with a central yellow streak on the perianth segments. They are usually in umbels of two to six, occasionally solitary, cernuous or drooping.
- The leaves are flat on the inner surface, the outer surface having two to four keels or several striations.

Other characteristics:

- Leaves green sometimes with a slight greyish tinge, about 20 cm long.
- Scape to about 30 cm long.
- Perianth segments sharply reflexed and often twisted.

Distribution: It is common throughout Spain and Portugal where it flowers during March and April, although sometimes much later at higher altitudes. Its habitat is in pine woods or scrub at lower altitudes, but higher up, to 2000 m, it is found on open hillsides, always on acid soils and often among granite.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Flying Nun' 5W-W ('Pristine'  $\times$  *N. triandrus*), W.G. Pannill 1985.

#### *N. triandrus* var. *concolor* (Haworth) Link

The varietal name means uniformly coloured, the corona and perianth being the same bright yellow. It was known to Parkinson in 1629 and has probably been cultivated since that time.

Key characteristics:

- Flowers usually solitary and bright yellow, sometimes in umbels of two to three.
- Perianth segments sharply reflexed and often twisted.
- Corona cup-shaped with its entire margin often incurved.
- Styles of three different lengths (trimorphic), mentioned by Meyer<sup>(43)</sup>.
- Leaves similar in colour and length to those of *N. triandrus* but with striations only on the outer surface.

Distribution: Found on rocky granite-littered slopes in Spain and Portugal, flowering in March and April.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Jovial' 5Y-O ('Narvik'  $\times$  *N. triandrus* var. *concolor*), W.G. Pannill 1970.

#### *N. triandrus* var. *loiseleurii* (Rouy) A. Fernandes

This variety was named for Jean Louis August Loiseleur-Deslongchamps (1774-1849), a French botanist and physician. This is an interesting variety, thought for many years to be an endemic found only on the Îles de Glénan off the coast of Brittany, but similar daffodils were discovered later in northern Spain and Portugal. It was introduced to Britain early in the 19th century and is said to be less hardy than other forms of *N. triandrus*.

Key characteristics:

- The flowers are white or pale sulphur yellow, pendulous and large, and up to twice the diameter of other *triandrus* daffodils.
- The flowers occur in umbels of two to three.

Distribution: As indicated above. On the Îsles de Glénan they are often found growing in sand covered by thick vegetation.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Harvest Moon' 5Y-Y (*N. triandrus* var. *loiseleurii* × 'King Alfred'), G.H. Engleheart 1913.

*N. triandrus* subsp. *pallidulus* (Graells) D.A. Webb

The subspecific name refers to the sulphur cream or very pale yellow flowers. It has been cultivated in English gardens since 1777.

Key characteristics:

- Flowers pendulous and creamy, pale yellow.
- Perianth segments of the same colour but with a distinctive darker central streak. They are markedly reflexed, sometimes twisted and do not overlap.

Other characteristics:

- Leaves have a flattened base but become cylindrical, green and with longitudinal parallel lines on the outer surface, 23 cm long.
- Scape slightly longer at 28 cm long.

Distribution: Widespread in central Spain and Portugal.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Snowdrop' 5W-W (*N. triandrus* subsp. *pallidulus* × *N. triandrus*), G.H. Engleheart 1897.

## SECTION *Bulbocodium* de Candolle

*N. bulbocodium* Linnaeus

There have been several explanations as to why the specific name was given. It may have been owing to members of the genus *Bulbocodium* growing among *Narcissus* in Iberia. It may be that the name was proposed by Linnaeus from a statement by Clusius<sup>(44)</sup> that *Narcissus bulbocodium* was synonymous with the *Bulbocodium* of Theophrastus, a completely discrete genus which belongs in the Family Liliaceae. All agree that the first part of the name comes from the Greek bolbos: the doubt concerns the second part, which some say comes from kodion meaning wool or kodicon which means head. Gledhill<sup>(45)</sup> plumps for the latter with the meaning bulb-headed, referring to the inflorescence, presumably on account of its size, shape or both. How it got its vernacular name of Hoop Petticoat is less difficult to understand. *N. bulbocodium* is a very variable species and has a wide chromosomal range among its varieties, in fact, the widest within the genus ranging from diploid ( $2n = 14$ ) to octoploid ( $2n = 56$ ). This is thought to help varieties cope with very different conditions – indeed some can cope equally well with both acid or alkaline soils. Fernandes<sup>(46)</sup> concluded that it was the youngest species in the genus and was undergoing rapid change in nature.

Key characteristics:

- Flowers solitary, deep golden yellow, of unmistakable *bulbocodium* shape and horizontal facing.
- Leaves dark green, narrow (about 1.5 mm), flat inner surface and faintly striate on the outer one, prostrate.
- Perianth segments narrow and spreading.
- The filaments are conspicuously curved.

Distribution: Found growing in western France, Spain, Portugal and Morocco in turf on acid soil. Flowering is in winter or spring depending on altitude and latitude.

Chromosome number:  $2n = 14, 21, 26, 28, 35, 39, 42, 49, 56$ .

Example of use in breeding: 'Marychild' 12Y-Y (*N. triandrus* × *N. bulbocodium*), A. Gray 1956.

*N. bulbocodium* subsp. *bulbocodium* var. *citrinus* Baker

The varietal name refers to the flower colour of citron or pale lemon yellow.

Key characteristics:

- Flower colour of citron yellow combined with a dwarf plant.

- Flowers solitary, pointing upwards and quite large at 35 mm diameter.
- The tube is yellow with conspicuous green stripes.
- The perianth segments are citron yellow with a green stripe.

Distribution: Found flowering from March on grassy slopes and open woodland in Spain and Portugal.

Chromosome number:  $2n = 34$ .

Example of use in breeding: ‘Sevenoaks’ 12W-W (*N. triandrus* × *N. bulbocodium* var. *citrinus*), F.R. Waley 1973.

*N. bulbocodium* subsp. *bulbocodium* var. *conspicuus* (Haworth) Baker

The varietal name obviously means conspicuous, striking or remarkable on account of the robust nature of this daffodil along with its wide corona. It was known in England in the early 17th century.

Key characteristics:

- A robust plant with leaves and flower stems of about equal length.
- Flowers deep yellow, up to 3.5 cm in diameter, the corona being 2 cm wide. The corona margin is entire but wavy.
- Leaves dark green, slender and erect.

Distribution: Found in western France and Spain, flowering in April and May.

Chromosome number:  $2n = 14$ .

Example of use in breeding: ‘Fanflare’ 10G-Y (*N. bulbocodium* var. *conspicuus* × ‘Gaytime’), H. Koopowitz 1979.

*N. bulbocodium* subsp. *bulbocodium* var. *tenuifolius* (Salisbury) Baker

The varietal name means with slender or narrow leaves.

Key characteristics:

- Leaves erect, shining green or slightly glaucous, smooth and cylindrical, about 30 cm long.
- Corona yellow and distinctly six-lobed.
- The style is exerted or protrudes beyond the rim of the corona.

Other characteristics:

- The flowers are solitary, about 2 cm in diameter, borne on scapes about 15 cm long.
- Perianth segments linear-lanceolate.

Distribution: Found in southern France and Spain, flowering in March.

Chromosome number:  $2n = 14$ ?

Example of use in breeding: ‘Solveig’s Song’ 5Y-Y (*N. bulbocodium* var. *tenuifolius* × *N. triandrus* subsp. *pallidulus*), R.B. Wallis 1992.

*N. bulbocodium* subsp. *obesus* (Salisbury) Maire

The subspecific name means succulent, fat or coarse which, according to Meyer<sup>(47)</sup>, refers to the flower shape. It is similar to *N. bulbocodium* but for the leaves, which are invariably spread out flat over the ground or at least are arching and deflexed. It also prefers alkaline soils, tolerating those that are neutral or slightly acid, unlike *N. bulbocodium* that requires pH levels below 7 and prefers soils which are much more acidic.

Key characteristics:

- The leaves are invariably prostrate, or may rise upwards before arching back to the ground.
- Corona yellow, looking ‘fat’ at 20 mm long and 25 mm wide.
- Perianth segments very short and twisted, yellow without any green tinge.

Other characteristics:

- Flowers 3.5 cm in diameter, solitary, horizontal or ascending.
- Corona margin slightly incurved.

Distribution: Found in southern and western Portugal, south-west Spain and Morocco.

Chromosome number:  $2n = 26$  but triploids with  $2n = 39$  are also found.

Example of use in breeding: ‘Little Soldier’ 10Y-Y (*N. bulbocodium* subsp. *obesus* × ‘Chemawa’), J.S. Romine 1984.



### *N. cantabricus* de Candolle

The specific name means from Cantabria in northern Spain. This appears to have been a misapplication of the name for, rather than coming from northern Spain, it is only found in the southern-most parts of that country. The name was given by de Candolle in 1816, based on a statement made by Clusius<sup>(48)</sup> over 200 years earlier that he had received drawings of this *Narcissus* from someone returning from Cantabria. Its most northerly station is around Toledo, some 320 km to the south of the Cantabrian Mountains.

Key characteristics:

- Leaves two per bulb and spreading.
- Pedicel absent.
- Flowers white, solitary and facing upwards.
- Corona twice as wide as long with a crenate margin.

Distribution: Found in southern Spain, the Balearic Islands, Morocco and Algeria, where it prefers to grow among scrub rather than in the open; flowering in winter or early spring.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Highdown Bells' 12W-W (*N. cantabricus* × *N. triandrus* var. *concolor*), F.C. Stern 1969.

### *N. cantabricus* subsp. *cantabricus* var. *foliosus* (Maire) A. Fernandes

The varietal name means leafy or well-leafed, as this daffodil has more leaves than the species at four to five per bulb, and sometimes as many as eight.

Key characteristics:

- Flower colour is a soft milky white compared to the dazzling white of *N. cantabricus*.
- The larger number of leaves mentioned above; these are erect rather than spreading.
- It is the only *cantabricus* with a pedicel up to 17 mm in length.
- The flowers are solitary and face directly forward.

Distribution: An autumn to winter flowerer found in Morocco.

Chromosome number:  $2n = 28$ .

Example of use in breeding: 'Jessamy' 10W-W (*N. romieuxii* × *N. cantabricus* subsp. *cantabricus* var. *foliosus*), D. Blanchard 1952.

### *N. cantabricus* subsp. *monophyllus* (Durieu de Maisonneuve) A. Fernandes

The subspecific name simply means having a single leaf, in this case to each bulb, which is a key identifying characteristic. It has a long garden history and was known to Clusius in 1601<sup>(49)</sup>.

Key characteristics:

- One prostrate leaf per bulb.
- Solitary flower of pure white, ascending or horizontal.
- Corona almost twice as wide as long.
- Pedicel absent.

Distribution: Found in southern Spain, the Balearic Islands, Morocco and Algeria, flowering in early spring.

Chromosome number:  $2n = 28$ .

Example of use in breeding: 'Tania' 5Y-Y (*N. cantabricus* subsp. *monophyllus* × *N. triandrus* var. *concolor*), F.C. Stern 1963.

### *N. romieuxii* Braun-Blanquet & Maire

This is a very variable species, particularly in flower colour and corona shape, variations tending to occur within colonies. Discovered in the mountains of North Africa by Maire in 1922, it is capable of tolerating quite low temperatures.

Key characteristics:

- Flower colour uniform, usually pale yellow, but can be both lighter and darker than this. They are solitary and typically *bulbocodium*-like in outline.
- The pedicel is absent.

- The tube is green at the base going to yellow above.

Other characteristics:

- Leaves green and may be upright or spreading.
- Corona is distinctly six-lobed.

Distribution: Found in the Middle and Great Atlas Mountains and northern central Morocco; flowering in early spring.

Chromosome number:  $2n = 28$ .

Example of use in breeding: 'Taffeta' 10W-W (*N. cantabricus* var. *foliosus* × *N. romieuxii*), D. Blanchard 1952.

## **SECTION *Pseudonarcissus*** de Candolle

*N. abscissus* (Haworth) Schultes & Schultes f.

The specific name means cut-off and refers to the abrupt, straight edge of the corona, which was called a 'clipt trunke' by Parkinson<sup>(50)</sup> in the early 17th century, since when it has been known in English gardens. Confusion has been caused in the past through the presence of an intersectional hybrid from *N. pseudonarcissus* × *N. poeticus*, which was known as *N. × abscissus* as it also had an abruptly straight-edged corona. Hybrids from this or the reverse cross have been known since the early 17th century, later featuring in Victorian catalogues and being grown in gardens prior to the appearance of superior cultivars. It is important to distinguish between the species and the species hybrid as the former could not give rise to reds, oranges or pinks in cultivars in the absence of *N. poeticus*, whereas the latter could. In the case of 'Apricot', for example, if one of the parents was *N. albescens*, the other must have been the hybrid rather than the species *N. abscissus*. The correct view was perhaps given as long ago as 1933 by P.D. Williams when he wrote of the parents of 'Will Scarlett' being *N. muticus* × *N. poeticus* var. *poetarum*<sup>(51)</sup> and not *N. abscissus* × *N. poeticus* var. *poetarum*, which is the more frequently cited version. The species itself is a yellow trumpet daffodil in which the perianth colour is of pale sulphur yellow, while the corona is golden yellow, or more often conspicuously bicoloured.

Key characteristics:

- Corona almost cylindrical with a straight mouth.
- The short tube is orange yellow sometimes shaded green, with the orange yellow always being more intense than the corona colour.

Other characteristics:

- Leaves are green, erect and flat, 11 mm wide and 30 cm long.
- Scape compressed, sharply two-edged, 35 cm long.
- Flowers solitary, horizontal or ascending.

Distribution: Found in the Pyrenees, principally on the French rather than the Spanish side, to a height of above 2000 m.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Glory of Leiden' 1Y-Y ('Emperor' hybrid or *N. abscissus* × 1W-W), de Graaff 1887.

*N. albescens* Pugsley

The specific name means turning white and refers to the sulphur white of the early flower colour, which whitens with age. Although cultivated for several centuries, it is not known in the wild, its natural habitat being postulated as in the Pyrenees.

Key characteristics:

- Flower colour initially whitish turning off-white. The flowers are larger than those of the closely related *N. moschatius* and are horizontal rather than drooping.
- The corona margin is spreading and distinctly six-lobed.

Other characteristics:

- Leaves erect, glaucous and somewhat twisted.
- The scape is 35-40 cm long with two keels.
- Perianth segments rather narrow, held at right-angles to the corona and rather twisted.

Distribution: Thought to come from the Pyrenees. It flowers in April.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Madame de Graaff' 1W-W (*N. albescens* × 'Empress'), de Graaff 1887.

*N. asturiensis* (Jordan) Pugsley

The specific name means from the Province and former Kingdom of Asturia in north-west Spain. This is the smallest of the trumpet species: it has been in cultivation for a long time and was illustrated by Besler in 1613<sup>(52)</sup>.

Key characteristics:

- The corona is constricted midway along its length.
- The spathe is green when the flower opens, and remains so throughout the life of the flower.
- Flowers are solitary, yellow, drooping and with a slight scent.

Other characteristics:

- Corona margin is spreading or reflexed and variously edged (toothed, cut into narrow lobes or fringed).
- The plant is very small with leaves to 15 cm and scape to 10 cm.

Distribution: Found in northern Spanish mountains such as the Asturias, Pyrenees and Picos de Europa at up to 1500 m and also in north to central Portugal, often growing in short grass, flowering from February to May.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Golden Clown' 1Y-Y (*N. asturiensis* × 'Small Talk'), G.E. Morill 1979.

*N. bicolor* Linnaeus

The specific name means two-coloured and in daffodil parlance this usually refers to flowers which have a white perianth and a yellow corona. It is known that *N. bicolor* occurs in four forms, a diploid form with 14 chromosomes, a triploid form with 21 chromosomes, a tetraploid with 28 and a hexaploid with 42. In the past, it has been suggested by Fernandes that the early hybridists, like Backhouse, were using the tetraploid form to create the first triploid cultivars when combined with a diploid species like *N. pseudonarcissus*, i.e. 7 (from 14) + 14 (from 28) = 21. From remarks made at the time by William Backhouse<sup>(53)</sup> on low pollen viability and poor seed set, it was later suggested by Wylie that he was using a triploid clone combined with the diploid species, i.e. 7 (from 14) + 14 (from 21). It was also suggested by Wylie that his contemporary, Edward Leeds, was using a similar clone, but as the seed rather than the pollen parent, which may account for his modest success over an extended period of about 30 years as a daffodil breeder<sup>(54)</sup>. On the other hand, Backhouse was active for a much shorter period of only 13 or 14 years, yet had several outstanding successes including 'Emperor', 'Empress' and 'Weardale Perfection'. One possible reason is Backhouse's use of this clone of *N. bicolor* as the pollen parent rather than the seed parent, for while triploids are not very fertile they are not entirely sterile with a viability of 1% or less<sup>(55)</sup>. As pollen is produced in much larger quantities than egg cells, a viability of 1% or less could have considerable significance if the hybridist chose to use the triploid as the pollen parent<sup>(56)</sup>. Nevertheless, it must be stressed that in order to give rise to 'Emperor' and 'Empress' the triploid *N. bicolor* would need to produce viable diploid grains during meiosis and this is a very rare event. Perhaps Backhouse tried the cross the other way round early in his career and realised he was having no success and so switched the cross round the other way, or he may just have been very lucky. What is certain is that if indeed he was using the triploid clone he was privileged to be the vehicle for one of those unique events which occur from time-to-time to bring about great advances in breeding.

Unfortunately, we shall never know, as he appears to have left few meaningful records of his breeding work. *N. bicolor* has been in cultivation since at least 1613. The plant used by Linnaeus in naming the species was from a garden-grown specimen, and it has been said that it has never been discovered in the wild.

Key characteristics:

- The plant is more robust than any other type within the Section *Pseudonarcissus* with leaves up to 35 cm and a scape of 40 cm. Perhaps this is why it was chosen in preference to that other tetraploid, the attractive *N. nobilis*.
- The flowers are solitary, horizontal with a whitish or cream perianth and a golden yellow corona.
- The corona margin is not expanded and may even be dilated and is entire or finely scalloped.

- The leaves are green or slightly glaucous, erect, flat and up to 2 cm wide.

Distribution: Although thought at one time not to occur in the wild, similar plants have been found in the Pyrenees.

Chromosome number:  $2n = 21, 28$  and  $42$ .

Example of use in breeding: 'Horsfieldii' 1W-Y (*N. bicolor* × *N. pseudonarcissus*), J. Horsfield c. 1845.

#### *N. cyclamineus* de Candolle

The specific name means resembling *Cyclamen*, referring to the drooping flowers and strongly reflexed petals. This daffodil has a long history in cultivation, since at least 1608 when it was illustrated in Vallet's *Jardin du Roi Henry IV*<sup>(57)</sup>, although it was not described botanically until 1816. This surely is the most distinguishable daffodil of all and hardly needs description, but for those new to the genus a few pointers may be helpful.

Key characteristics:

- Flowers yellow, solitary and drooping.
- Perianth segments narrow and sharply reflexed at almost 180° to the corona.
- Leaves green, spreading and keeled, to 12 cm long.
- Corona cylindrical, widening slightly at the mouth with a margin twelve-lobed or fringed.

Distribution: Found in north-west Spain and north-west Portugal, often in damp, heavy soils along riverbanks. It flowers in early spring and is quite rare in the wild.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'February Gold' 6Y-Y ('Golden Spur' × *N. cyclamineus*), de Graaff 1923.

#### *N. hispanicus* Gouan

The specific name refers to its home in Spain although it is not exclusive to that country. Until fairly recently, it was known as *N. pseudonarcissus* subsp. *major* and, when referring to Victorian accounts of breeding, this is the name which will be seen, especially in conjunction with its best known form 'Maximus' or Trinity College Maximus. Along with *N. bicolor*, *N. moschatus* and *N. poeticus*, this was one of the crucial species in early cultivar development. It has been known for a very long time in cultivation, being written about by Lobel in 1576<sup>(58)</sup>.

Key characteristics:

- The leaves are glaucous, erect and twisted. They are keeled with striations on the outer face and from 20-50 cm long.
- Flowers solitary, uniformly deep golden yellow. They are held horizontally, are large in size to 9 cm in diameter and possess a sweet scent.
- The scape is compressed and equal in length to the leaves.
- The corona is dilated towards the base and then expands to the flanged margin that is deeply crenate or dentate.
- Characteristic brown/black apical nodules on the stamens.

Distribution: As the name suggests, it grows in Spain but is also found as a wild plant in Portugal. It also occurs in southern France where it is probably naturalised. Flowers in early spring.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Figaro' 2Y-YYO (*N. hispanicus* × *N. poeticus*), W. Backhouse or E. Leeds before 1869.

#### *N. hispanicus* var. *propinquus* (Salisbury) Pugsley

The varietal name means closely allied or of near relationship indicating that the variety has many similarities with the species. It differs only in its leaves that are less twisted, its pedicel that is shorter and its scape that is less compressed. The flowers are solitary, golden yellow apart from the perianth segments, which are slightly twisted, being flushed with green at the base.

Distribution: Native to south-west France where it flowers in spring.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Grandis' 1W-Y (*N. bicolor* × *N. hispanicus* var. *propinquus*), E. Leeds pre-1877.

*N. hispanicus* var. *spurius* (Haworth) Pugsley

This varietal name means false, though in what way is not clear unless it refers to its rather doubtful wild origin. The flowers are golden yellow but are smaller than those of var. *propinquus* and held on a scape that is often no more than 15 cm long. The pedicel length is about 16 mm, that of *N. hispanicus* being 20 mm, while that of var. *propinquus* is intermediate between the two.

Distribution: Its wild origin is on the Spanish side of the Pyrenees and similar plants have been found in Asturia, north-west Spain.

Chromosome number:  $2n = 14$ ?

Example of cultivar link: 'Henry Irving' 1Y-Y (selection from *N. hispanicus* var. *spurius*), Dutch origin pre-1885.

*N. minor* Linnaeus

The specific name means smaller as a comparative term. There has been considerable debate about the status of this daffodil, its original description being from a cultivated plant of dubious wild origin. In some classifications, *N. minor* included many former small trumpet species such as *N. nanus*, *N. parviflorus*, *N. provincialis* and *N. pumilus*, but in the 2008 *International Register*<sup>(59)</sup> all but the last named appear as species. It has been cultivated in European gardens since around 1600.

Key characteristics:

- The tube is slightly concave and is yellow with green stripes.
- The perianth segments are drooping, yellow and with a darker central stripe.
- The corona is yellow, slightly waisted with an expanded mouth and much frilled margin.

Other characteristics:

- Flowers are solitary and are held horizontally.
- Leaves sage green, erect, three to four per bulb and about 8 cm long.

Distribution: Possibly northern Spain and the Pyrenees as wild plants and naturalised in south-east France.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Piccolo' 1Y-Y (*N. minor* × 'Little Gem'), J. Gerritsen 1967.

*N. minor* var. *conspicuus* Haworth

Almost identical to the above, apart from its defining varietal name, indicating its larger, more conspicuous flower.

Chromosome number:  $2n = 14$ ?

Example of cultivar link: 'Rockery White' 1W-W (*N. minor* var. *conspicuus* sport), G. Zandbergen-Terwegan 1936.

*N. moschatus* Linnaeus

The specific name means musk-like or musky scented. It has been one of the small number of species that have been crucial in the story of cultivar development. It is one of the most distinctive of the larger trumpet species with drooping white flowers and twisted perianth segments encircling the corona, both being of about the same length. This is another species named by Linnaeus from a cultivated plant and was often referred to in the past as *N. cernuus*, which means drooping or facing downwards. It has been cultivated since at least the 1700s when it was grown by Linnaeus at Uppsala.

Key characteristics:

- Flowers solitary and drooping.
- Perianth segments white and drooping alongside the corona, twisted and overlapping at the base.
- Corona white or cream with a slightly flanged margin which is six-lobed.
- The tube is green below and yellowish above.
- Leaves glaucous, upright, channelled and keeled.
- Scape compressed and two-edged.

Distribution: Its distribution in the wild is on the Spanish side of the Pyrenees, also possibly other northern Spanish mountains, and France. It is spring flowering.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Mr Cowan' 1W-Y (*N. minor* × *N. moschatus*), W. Backhouse pre-1869.

### *N. nanus* (Haworth) Spach

This is another dwarf species, indicated by the specific name. Again, it is not known in the wild. There are no features that could be described as key. The flowers are yellow, the perianth being sulphur yellow and the corona bright yellow that deepens towards the crenately lobed margin, and they are horizontal or ascending. The leaves are glaucous, almost upright, flat and about 15 cm long.

Distribution: Not known, as no truly wild plants have been found.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Little Goldfinch' 6Y-Y (*N. cyclamineus* × *N. nanus*), M. Davison 1994.

### *N. obvallaris* Salisbury

The specific name means walled around, enclosed or fortified, but why is not clear. Its common name is the Tenby Daffodil. It has been in cultivation since 1613 and may have been brought to Britain by Flemish Huguenot refugees as similar daffodils were found at a Flemish settlement in Co. Wexford, Ireland. On mainland Britain, it is certainly not confined to Tenby, being found in other parts of west and south-west Wales and across the English Midlands. It was from plants found growing in Oxfordshire that it was described by Salisbury in 1796<sup>(60)</sup>. It has also been found in Spain. It resembles *N. hispanicus* in its concolorous yellow flowers but is a much smaller plant with a broader, flatter perianth.

Key characteristics:

- The tube is striped yellow and green.
- The corona is deep golden yellow, cylindrical in shape below the marginal flange, which is shallowly fringed.
- The style is substantially longer than the stamens.

Other characteristics:

- Leaves glaucous and upright to 30 cm long.
- Flowers are horizontal or face upwards and are 40 mm in diameter.
- The perianth segments, which are also deep golden yellow, are slightly twisted and about three times longer than wide.

Distribution: As indicated above, although the distinction between wild and naturalised plants is not clear.

Chromosome number:  $2n = 14$  (a somewhat larger plant under the name *N. 'Obvallaris Maximus'* has been shown to be a triploid,  $2n = 21$ ).

Example of use in breeding: 'Mervyn' 1Y-Y ('Emperor' × *N. obvallaris*), Cartwright and Goodwin 1908.

### *N. pallidiflorus* Pugsley

The specific name refers to the pale or pallid flowers that are straw-coloured rather than the more usual daffodil yellow. It was first introduced to cultivation in the early 17th century but disappeared and was reintroduced in 1882.

Key characteristics:

- The pedicel is short and abruptly deflexed or bent sharply forward.
- The tube is green with yellow stripes between the perianth segments.
- The perianth segments are broadly ovate being about twice as long as wide, pale yellow with a central darker stripe. They are twisted and just overlap at the base.

Other characteristics:

- Leaves slightly glaucous, upright and channelled, and striated on the outer surface, about 11 mm wide and 30 cm long.
- The scape is about the same length as the leaves and is compressed.
- The flowers are solitary and droop slightly. They are large at up to 75 mm diameter.
- The corona is pale yellow with a dentate margin.

Distribution: Found in northern Spain and southern France, especially in the Pyrenees, Picos de Europa and other northern Spanish mountains, growing at lower altitudes, often in woodland where it flowers in spring.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Sennocke' 5Y-Y (*N. triandrus* × *N. pallidiflorus*), F.R. Waley 1948.

### *N. pseudonarcissus* Linnaeus

The specific name means false *Narcissus*, used in an early classification to differentiate it from the true *Narcissus*, *N. poeticus*. Along with *N. bicolor*, *N. moschatus* and *N. poeticus*, this daffodil played a crucial role in the early history of cultivar development. It, along with *N. tazetta*, has the widest distribution of any daffodil, *N. pseudonarcissus* being found over a large swathe of Europe, from Romania in the south-east to Britain in the north-west. In many of these areas, it occurs as a wild plant, but at the extremities of its range, especially in the north-west, it is almost certainly naturalised. In England, it has acquired the common name of Lent Lily owing to the time of year it is often found in flower, but it is doubtfully native, probably having been introduced by travelling monks from southern Europe many hundreds of years ago. The earliest record of it in England is in 1570<sup>(61)</sup>. Being found over such a wide geographical range, it is bound to show a degree of variation, for example from concolorous pale or medium yellow flowers to those in which the corona is of a considerably deeper yellow than the perianth; this latter form is the most common.

Key characteristics:

- Flowers solitary, horizontal or slightly drooping, to 65 mm diameter.
- Perianth segments most often pale yellow, deflexed, twisted and overlapping at the base.
- Corona often bright yellow with the margin sometimes conspicuously expanded and slightly or deeply toothed or lobed.
- Leaves broad, glaucous and upright, 15-30 cm long.
- Scape about the same length as the leaves, compressed and two-edged.

Distribution: Found throughout much of Europe from Romania to England. Fernandes thought it to be native only in Spain and southern France and naturalised elsewhere<sup>(62)</sup>. It is found from sea level to 1500 m.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Princess Mary' 2W-O (*N. pseudonarcissus* × *N. poeticus*) × *N. poeticus*, E. Leeds pre-1877.

### *N. pseudonarcissus* var. *humilis* Pugsley

The varietal name means low-growing or close to the ground. It is very similar to *N. pseudonarcissus* apart from being of smaller stature. It is found in Scotland, being at one time known as *N. scoticus*, and also in parts of the English Midlands. As with some forms of the species, the perianth is sulphur yellow and the corona deeper yellow with the mouth widely expanded and the rim deeply crenate.

Chromosome number:  $2n = 14$ ?

Example of cultivar link: 'Scoticus' 1Y-Y (a selection of *N. pseudonarcissus* var. *humilis*), pre-1819.

### *N. tortuosus* (Haworth) Spach

The specific name means winding growth, usually in reference to the stem but, in this case, must refer to the perianth segments that are regularly twisted or winding, especially as the stem or the leaves are not. It is somewhat similar to *N. moschatus* but the flowers are more two-toned and larger, the whole plant being more robust. *N. tortuosus* has been in cultivation for several centuries but was only discovered in the wild in northern Spain in 1925.

Key characteristics:

- The flowers are ginger-scented, large and slightly drooping.
- The perianth segments are sulphur white, oval, incurved and with a pronounced regular twisting.
- The corona is sulphur yellow, ultimately fading to the colour of the perianth, its margin being more or less six-lobed.

Other characteristics:

- Leaves glaucous, upright and flat up to 16 mm wide.
- Scape up to 40 cm long and two-edged.

Distribution: It has only been found in the wild in northern Spain, flowering in spring.

Chromosome number:  $2n = 21$ .

Example of cultivar link: 'Silver Bells' 1W-Y (a variant of *N. tortuosus*).

## Intersectional Hybrids

*N. × bernardii* de Candolle ex Hénon

This is a hybrid of *N. hispanicus* × *N. poeticus*, although this parentage has been the subject of considerable debate over the years. As there does not appear to have been any work done on the DNA of this hybrid that would settle the argument, it must be accepted that the official view is as stated above, i.e. the cross was *N. hispanicus* × *N. poeticus*. The flower shows considerable variation, particularly in the colour of its corona, which can range from yellow to bright orange and also in its length, which can be quite short to almost as long as the perianth segments. The perianth is whitish-yellow that pales as the flower ages.

Distribution: As with its parentage, there is disagreement about its distribution. Some think its range extends from the Pyrenees through southern France and northern Italy into Austria<sup>(63)</sup>, while others are of the opinion that it existed in France and possibly Italy only as a naturalised plant.

Chromosome number:  $2n = 14$ ?

Example of cultivar link: 'Philip Hart' 2W-O (selection from wild collected *N. × bernardii*), C. Wolley-Dod 1893.

*N. × incomparabilis* Miller

The hybrid name means beyond compare. Known since 1614, when it featured in the *Hortus Floridus* of Passe<sup>(64)</sup>, this hybrid was regarded as a very desirable daffodil from then until the close of the 19th century. It is a cross between *N. poeticus* and *N. pseudonarcissus* which produced offspring of considerable variability, and which has attracted a variety of names over the years, including *N. × abscissus*, *N. × juratensis* and *N. × sabinii*. With these parents, the flower dimensions correspond with Division 2 cultivars and the most widely grown form was one with a lemon perianth and a yellow corona that deepened towards the margin. In *The Narcissus: its history and culture* (1875)<sup>(65)</sup>, Burbidge showed six plates (Plates XVII-XXII) of this hybrid in its many forms, which confirms its importance in gardens in the mid- to late 19th century.

Distribution: First found in southern France but rapidly becoming naturalised throughout the rest of Europe, flowering in spring.

Chromosome number:  $2n = 14$ .

Example of use in breeding: 'Spofforthiae' 3W-YOO (*N. × incomparabilis* × *N. radiiflorus* var. *stellaris*), W. Herbert before 1843.

*N. × intermedius* Loiseleur-Deslongchamps

A hybrid between *N. jonquilla* and *N. tazetta*, the name indicates that this daffodil has characteristics that are intermediate between the two species. It is yellow-flowered, often paler than *N. jonquilla* and with three to ten flowers per scape.

Distribution: It is found in France, in the foothills of the Pyrenees, flowering in spring.

Chromosome number:  $2n = 17$ .

Example of use in breeding: 'Serendipity' 5Y-Y ('Fair Colleen' × *N. × intermedius*), W.G. Pannill 1972.

*N. × medioluteus* Miller

This is a hybrid of *N. poeticus* and *N. tazetta*, the hybrid name meaning with a yellow centre. The perianth is white and the corona primrose yellow, becoming whitish and papery towards the margin as the flower ages. The scapes usually have two to three flowers.

Distribution: Found in southern France, naturalised elsewhere in Europe, flowering in spring.

Chromosome number:  $2n = 17, 24$ .

Example of use in breeding: 'Greenheart' 12W-GYY (*N. × medioluteus* × *N. poeticus*), Barr and Sons, before 1907.

*N. × poculiformis* Salisbury

This is a hybrid between *N. dubius* and *N. moschatus*, which has pure white flowers borne in pairs on scapes 30 cm long. The flowers droop as in the pollen parent, the perianth segments are spreading and the corona goblet-shaped, which is the meaning of its hybrid name.

Distribution: Found flowering in April in the Pyrenees.

Chromosome number: unknown.



Example of use in breeding: 'Fantasie' 3W-Y (*N. × poculiformis* × *N. poeticus*), G.P. Haydon before 1907.

*N. × taitii* Henriques

This daffodil is a hybrid of *N. pseudonarcissus* and *N. triandrus* subsp. *pallidulus* and has been known as both *N. × taitii* and *N. × johnstonii* since the 1880s when it was discovered simultaneously by A.W. Tait and E.J. Johnston in March 1885, growing along the banks of the Rio de Avintes in Portugal. The flowers are sulphur yellow, one or two per scape, with the perianth segments deflexed.

Distribution: Found in Portugal and Spain, flowering in spring.

Chromosome number:  $2n = 21$ .

Example of cultivar link: 'Mrs George Cammell' 1Y-Y (a selection by Peter Barr in 1888 from wild collected *N. × taitii* [as *N. × johnstonii*]). Another selection made from Barr's introductions from northern Spain in 1887 and 1888 was 'Queen of Spain' 5Y-Y.

In conclusion, it can be said that the journey from species daffodil to modern cultivar has been an exciting one. Considerable progress was made by a small band of hybridists over a relatively short period. What began in the early 19th century – with the experimental re-creation of natural hybrids by a cleric, William Herbert, in Yorkshire – has led to a vast array of new shapes, sizes, colours and colour combinations, together with an extension of the flowering season of cultivars at both ends of that found among the species. What began in England has become a world-wide activity. It is remarkable that until very recently all this change and progress was achieved without any specific knowledge of daffodil genetics; indeed, the foundations of the modern cultivar were laid long before the birth of this science. Success can only be put down to dreams of what might be possible, and the keen observation and further utilisation of change when it occurred. Only now are these desirable, observed external changes being linked to the unseen internal power of the plant's genetics.

Although this chapter demonstrates that a considerable array of species, subspecies and varieties, along with natural hybrids, have been utilised in the creation of today's cultivars, only some 40% of the former group and 10% of the latter have been used to date. The inescapable conclusion is that the next 200 years are likely to be as productive and as interesting as the last.

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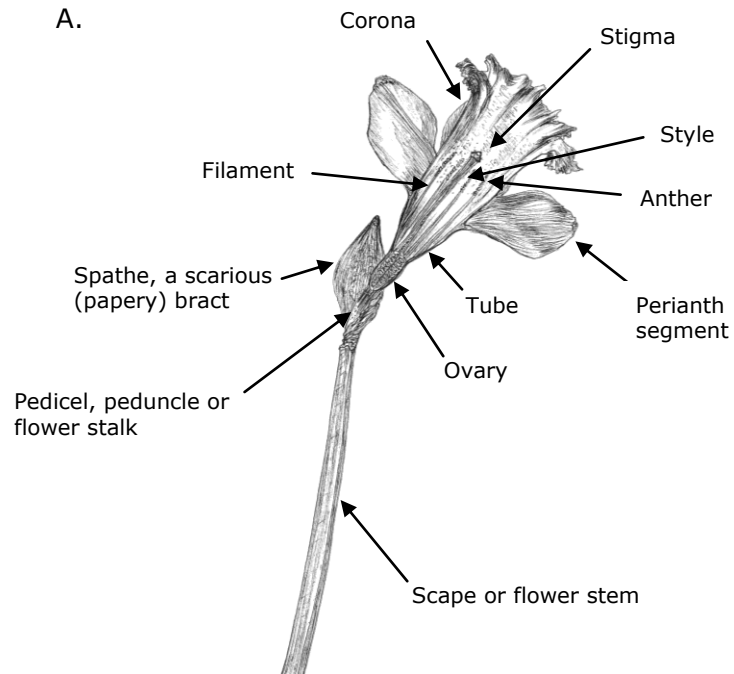


Figure 5.1. A. General floral structure of the *Narcissus* flower with the flower stem and flower structure. Figure 5.1.B. The umbel arrangement of flowers in a multi-flowered daffodil.

## CHAPTER 6 SPECIES INTO CULTIVARS

Daffodil hybridisation commenced in earnest in the 1830s with the work of Edward Leeds (1802-1877), who raised new cultivars at Longford Bridge, Stretford, Manchester from 1843 to 1874. Leeds was followed by William Backhouse (1807-1869) who hybridised daffodils, chiefly at St John's, Wolsingham, Co. Durham from 1856 to 1868. Examination of some of the most famous cultivars raised by these breeders shows clearly that they were using species daffodils as their basic material, from which they created new and improved forms. Leeds, for example, raised 'Princess Mary' from a seedling, possibly of *N. pseudonarcissus* subsp. *major* (syn. *N. hispanicus*) × *N. poeticus* crossed with another *poeticus*. Backhouse's illustrious pair, 'Emperor' and 'Empress', were raised from *N. pseudonarcissus* and *N. bicolor*. In creating 'Princess Mary', Leeds produced one of the earliest, man-made examples of a Division 2 (large-cupped) daffodil in which the corona length is intermediate between those of the parents. Subsequent breeding produced Division 3 (small-cupped) daffodils from crosses between Division 2 cultivars and *N. poeticus* or *poeticus* cultivars. Once again, the corona length is intermediate between those of the parents.

While *N. pseudonarcissus* (and its subspecies at that time, for example, subsp. *bicolor* and subsp. *moschatus*) and *N. poeticus* were the main species used in the creation and improvement of daffodils during the 19th century, other species were also involved, including *N. tazetta*, *N. triandrus*, *N. cyclamineus* and even *N. bulbocodium*. The use of the last species in breeding may be regarded by many as a relatively recent innovation. However, there is evidence to show that it was being used much earlier – in the collection of correspondence and paintings discovered at Trinity College, Dublin in 1982<sup>(1)</sup>, which indicates that hybrids were raised from it by A. Rawson at Fallbarrow, Windermere around 1870.

Daffodil cultivars have been developed in relatively recent times, the various steps in this process often being meticulously recorded by the hybridists involved. Furthermore, outstanding contributions to our knowledge of daffodil ancestry have been made by the American Daffodil Society in compiling the computerised Daffodil Data Bank<sup>(2)</sup> and by the Royal Horticultural Society in the 1998 and 2008 *International Daffodil Register and Classified List*<sup>(3,4)</sup>. Perhaps most useful of all to those with internet access is the American Daffodil Society's Daffseek website. This combined information shows that in all their vigour and variety, today's daffodils arose in less than 200 years from a handful of species that in general displayed far fewer of the characteristics of later cultivars. Not only is there a good written record of these developments, but also, because these changes have taken place in the relatively recent past, it would be quite feasible to lay out a living collection of species and cultivars charting the various steps involved. In what follows, an attempt will be made to answer the questions as to how and why daffodils changed so dramatically during such a relatively short period (probably amounting to no more than about 30 generations).

Progress has been remarkably rapid by any standards. During this age of improvement, new cultivars have become more vigorous than their ancestors. Flowers have become larger and their quality in terms of substance, purity and poise has improved dramatically. New flower shapes have been created in Divisions 2 and 3 and, more recently, in the split corona daffodils of Division 11. Colour has been transferred from one type to another, most notably the red found among the species in the corona of *N. poeticus*. Now it is to be found in various shades in the coronas and even in the perianths of many types of cultivar. Other colours have been worked on and accentuated, as in the ever-increasing purity of the white daffodils, and in the enlargement and intensification of the green eye in *N. poeticus* and small-cupped cultivars. Colour combinations, either rare or absent in nature, have been produced in cultivars, as in the reverse bicolors, the pink cupped cultivars and those showing the unusual combination of yellow perianth and pink corona. Daffodils with true *poeticus* red trumpets still have to be perfected, as was the case with the pale apricot pinks at the start of the 20th century. Yet who is to say that they too will not be improved further in the future to become as commonplace as those with true pink coronas are today. Almost anything seems to be possible.

While the reasons for it are clearly scientific, this phenomenal rate of development and improvement was achieved with little or no knowledge of the genetics involved, although since the time of the Revd William Herbert (1778-1847) the inherent variability and consequent potential for development within the genus have been keenly appreciated. Since sometime between 7500 and 6500 BC, when the earliest cultivators settled in the ‘fertile crescent’ of the Mesopotamian plains, man has improved plants by the selection of seedlings showing extra vigour or some other beneficial characteristic. This was achieved by nothing more sophisticated than meticulous observation, and it is observation that has formed the springboard for the changes within the genus *Narcissus* over the past two centuries. What has taken place among daffodils has been compressed into a very short period, whereas with many other plants the process of improvement has extended over hundreds if not thousands of years.

For a variety of reasons, the genus *Narcissus* is ideal for the study of development and improvement. It has taken place over a relatively short period of 200 years, and yet has been extensive in terms of the numbers of cultivars raised (in excess of 27,000). The dates of the introduction of these cultivars are largely known, as is their ancestry. Once produced, cultivars are propagated exclusively by vegetative means in order to perpetuate the morphological features for which they were originally selected. Finally, almost all the species, subspecies and varieties from which the cultivars were developed are still in existence and, therefore, available for study, as are a considerable number of the early cultivars.

Genetically, the genus *Narcissus* consists of two distinct groups or subgenera. The smaller group (Subgenus *Hermione*) contains *N. tazetta* and a few allied species that have basic (haploid) chromosome numbers of 10 or 11. The larger group (Subgenus *Narcissus*) contains all other species and has a haploid chromosome count of 7. Examples of these two subgenera, which consist almost exclusively of diploids, are given below:

Subgenus <i>Hermione</i> (n = 10 or 11)	Subgenus <i>Narcissus</i> (n = 7)
<i>N. elegans</i> 2n = 20	<i>N. asturiensis</i> 2n = 14
<i>N. tazetta</i> 2n = 22	<i>N. jonquilla</i> 2n = 14
	<i>N. poeticus</i> (most) 2n = 14
	<i>N. pseudonarcissus</i> 2n = 14
	<i>N. triandrus</i> 2n = 14

There are, of course, exceptions to the above, for example some forms of *N. tazetta* having 20 or 21 chromosomes. Moreover, higher polyploid forms are found within the species of the larger group: perhaps most important, as far as cultivar development has been concerned, is *N. bicolor*, which is often tetraploid, although diploid, triploid and hexaploid clones are known. Similarly, *N. cantabricus*, although not featuring extensively in cultivar development, also contains 28 chromosomes, while *N. poeticus* var. *recurvus* possesses 21. By far the most variable species is *N. bulbocodium* in which chromosome numbers of 14, 21, 26, 28, 35, 39, 42, 49 and 56 occur.

It is true to say, however, that all the species which have consistently featured in the ancestry of modern cultivars were diploid, with the important exception of *N. bicolor* and, somewhat less importantly, *N. poeticus* var. *recurvus*. The species most involved in cultivar improvement were the diploid forms of *N. pseudonarcissus* and *N. poeticus*, together with *N. bicolor*, which occurs in diploid and several polyploid forms. They were responsible for the vast majority of cultivars in Divisions 1, 2 and 3. The only other species with any input into these divisions has been *N. triandrus*, its subspecies and varieties. Divisions 1, 2 and 3 contain approximately 87% of all cultivars and, of these, Division 2 is by far the largest with about 50% – as is to be expected, for the primary cross used in cultivar production has been the trumpet daffodil *N. pseudonarcissus* crossed with *N. poeticus* with its small corona. Double daffodils comprise approximately 4% of the total, and the modern cultivars appear to have been derived from forms of the same two parent species. The species *Narcissus triandrus*, *N. cyclamineus*, *N. jonquilla*, *N. tazetta* and *N. poeticus* have been involved respectively in the production of the hybrid Divisions 5, 6, 7, 8 and 9. In total, these account for only a small percentage (approximately 7%) of the cultivars that have been registered. These species are generally interfertile, even between those having haploid chromosome numbers of 7 and 11. Hybrids produced from such crosses are, however, generally sterile.

Hybridisation, and the consequent improvement of daffodils, is best regarded historically as having involved a three-stage process:

Stage 1 consisted predominantly of the crossing of species, most of which were diploid ( $2n = 2x = 14$ ). A few, however, such as *N. poeticus* var. *recurvus* ( $2n = 3x = 21$ ) and *N. bicolor* ( $2n = 3x = 21$  and  $2n = 4x = 28$ ) were polyploid.

Stage 2 consisted of crossing offspring from Stage 1. These early cultivars were also frequently diploid, possessing 14 chromosomes and invariably showed only slight improvement over their species parents. Occasionally a new hybrid stood out from its siblings as a marked advance on what had gone before, for example 'King Alfred'.

Stage 3 is the most recent phase of cultivar development during which dramatic changes have taken place.

It is impossible to delineate each of these stages with great accuracy but, as an approximation, Stage 1 ran from the mid-19th to the early 20th century (Plate 6.1), Stage 2 from then until 1925 (Plate 6.2), and Stage 3 from 1925 to the present day.



**Plate 6.1.** 'Lucifer' 2W-YOO (Mrs Lawrenson, pre-1890), a typical early diploid cultivar.



**Plate 6.2.** A selection of early cultivars, photographed in 1904, showing typical diploid characteristics.

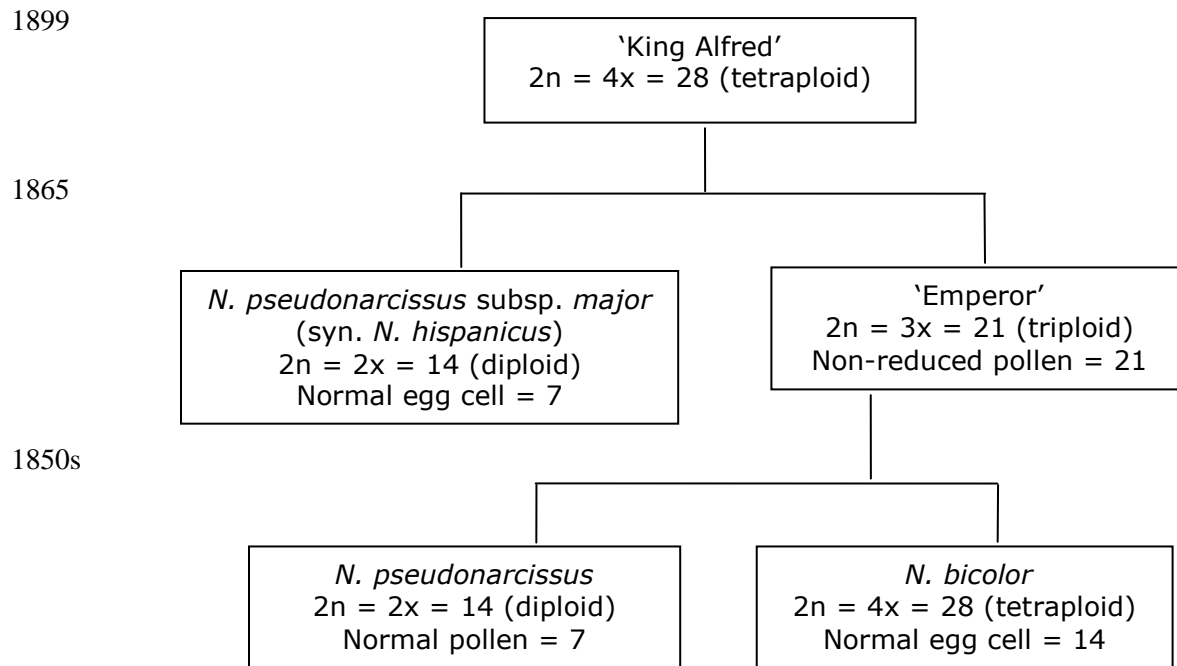
The early cultivars of Stage 2 may be regarded as the intermediate stage in the development and improvement process and, in general, they showed only marginal changes in their external appearances when compared to their species parents. It is now known that chromosomal changes were also limited, many early cultivars being diploid. This was due to several factors, including the short time-span of this particular developmental phase, the relatively small number of cultivars raised, the exclusively vegetative propagation of cultivars and the limited influence of polyploids at that time.

The major developments occurred during Stage 3 in which the result of chromosomal changes gave rise to the production of higher ploidy forms. Most cultivars raised during this stage were tetraploids with 28 chromosomes. The creation of tetraploids occurred chiefly as the result of the non-reduction of the chromosome numbers during the formation of the pollen grains and egg cells. The forerunner of pollen and egg cell formation is the process of meiosis. When this proceeds normally, the diploid chromosome complement of vegetative cells halve during gamete production, giving pollen grains and egg cells with the haploid number of chromosomes. At fertilisation, the haploid input of the male gamete from the pollen grain and the egg cell unite to produce a diploid zygote, which develops into the embryo. When meiosis is abnormal and non-reduction occurs, the male gamete or egg cells will be diploid and when combined with a normal haploid male gamete or egg cell will produce a triploid embryo. This is not the only means of triploid production, however, and there is little doubt that many important triploid cultivars arose through the use of the tetraploid clone of *N. bicolor* ( $n = 14$ )<sup>(5)</sup>, or from a triploid

clone of the same species providing 14 of its 21 chromosome complement<sup>(6)</sup>. In both cases, the end result was a triploid offspring, i.e. either 7 (from 14) + 14 (from 28) or 7 (from 14) + 14 (from 21). It is likely that ‘Emperor’ and ‘Empress’ arose as a result of one of these combinations or from non-reduction in the recently discovered diploid clone.

Another form of chromosomal change through which a few early and outstanding cultivars may have arisen is chromosome doubling, which can occur during the mitotic multiplication of vegetative cells. This process is analogous to the non-reduction encountered during meiosis and occurs when the halves of each chromosome, termed chromatids, fail to separate to form two daughter nuclei during cell division. As a consequence, a single nucleus with double the normal number of chromosomes is produced. This subsequently divides to form a tetraploid sector of cells that may, in the fullness of time, give rise to a new, entirely tetraploid bulblet. Finally, it will break away from the diploid mother bulb to establish a separate existence. As the plant produced from such a tetraploid bulb is likely to be large and vigorous, there is a chance that it will be noticed as being different and, if it possesses outstanding new qualities, may be selected and given a cultivar name. Some authorities believe that ‘King Alfred’ may have arisen by this method, although it could have resulted from a non-reduction of chromosomes during ‘Emperor’ pollen formation. However, the parentage of ‘King Alfred’ is not known with any certainty (Figure 6.1).

Date (approximate)



**Figure 6.1.** Ancestry of ‘Emperor’ (after A. and R. Fernandes<sup>(7)</sup>) and possible ancestry of ‘King Alfred’.

The ancestry of ‘Emperor’ (after Wylie), and possibly that of ‘King Alfred’, is shown in Figure 6.2. Figure 6.2 is based on comments made by William Backhouse in 1865 on the characteristics of the *N. bicolor* that he was using as parent material. In his opinion it “seeds badly and is deficient in pollen”<sup>(9)</sup>, indicating that it was not the tetraploid clone which he possessed but a triploid one<sup>(10)</sup>. The successes which Backhouse had in what was a relatively short period of breeding (1855/6 to 1869) also indicates that he was using this triploid *N. bicolor* as the pollen parent. For, owing to the low fertility of triploids, the use of its pollen rather than its egg cells (which are numerically much fewer) would greatly enhance the chances of success.

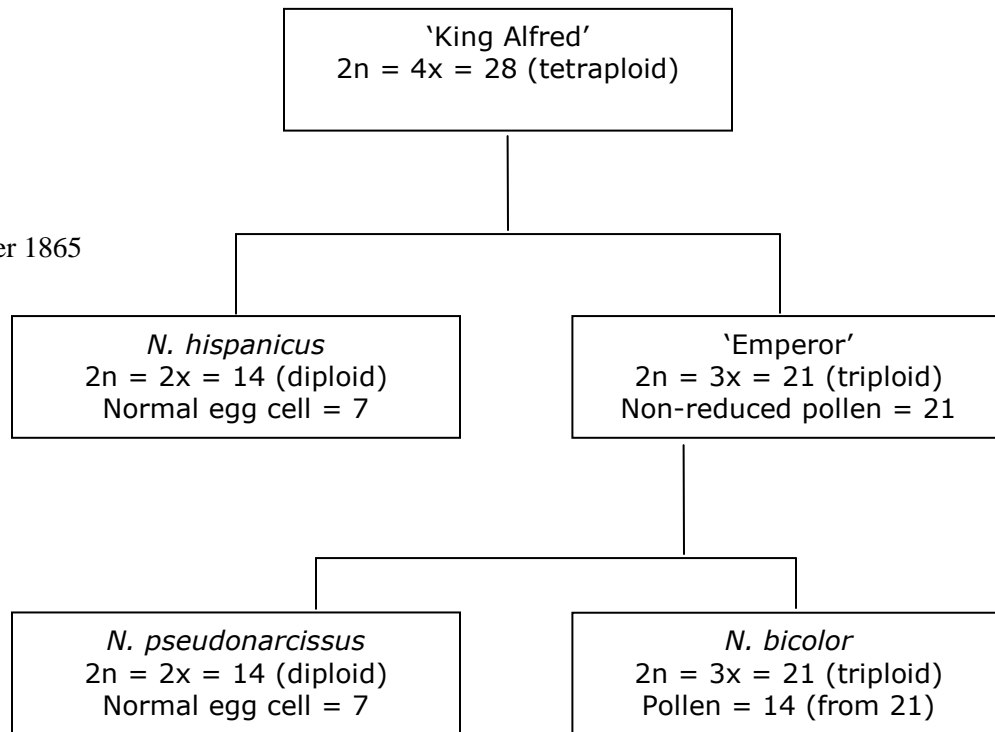


Date

1899

Sometime after 1865

1850s



**Figure 6.2.** Ancestry of 'Emperor' (after Wylie<sup>(8)</sup>) and possible ancestry of 'King Alfred'.

Chromosome doubling during mitosis is unlikely to have given rise to more than a handful of improved cultivars, for the time taken from the initial doubled cell to a flowering-sized, detached bulb is extremely lengthy, and is unlikely to occur in the beds of hybridists where such change would be readily noticeable. The flowering of such bulbs is more likely to take place in commercial cut flower crops, in which case the change or improvement has to be very marked indeed, if it is to be seen among the general mass of flowers. In addition, those tending such crops would not possess the expert eye of the hybridist and may easily miss such changes. Nevertheless, some well known cultivars have arisen through this means, the best known being the 'Cheerfulness' cultivars that originated from 'Elvira'. In this case, the mutant 'Cheerfulness' was quite different from its parent, being a white and yellow double, 'Elvira' being a single of similar colour. Subsequently, 'Primrose Cheerfulness' and 'Yellow Cheerfulness' arose from 'Cheerfulness' but, again, the changes were distinct, both being all yellow doubles, the former of a pale shade.

The important influence of *N. bicolor* in the development of modern cultivars can be ascertained by reference to Figure 6.3 located at the end of this chapter. The range of daffodil types that it affected can be judged from the following examples:

Division 1: 'Bridal Robe' (1W-Y, G.L. Wilson, 1938), 'Rathkenny' (1W-Y, G.L. Wilson, 1938), 'Spellbinder' (1Y-WWY, G.L. Wilson, 1944), 'Empress of Ireland' (1W-W, G.L. Wilson, 1952).

Division 2: 'Hospodar' (2Y-O, J.C. Williams, 1914), 'White Nile' (2W-W, Brodie, 1916), 'Interim' (2W-YYO, G.L. Wilson, 1944), 'Bann' (2W-P, G.L. Wilson, 1946), 'Easter Moon' (2W-GWW, G.L. Wilson, 1954), 'Romance' (2W-P, J.L. Richardson, 1959).

Division 6: 'Lilac Charm' (6W-GPP, B.S. Duncan, 1973).

These are but a few of the daffodils to have felt the influence of *N. bicolor*, for a study of the breeding of cultivars will reveal this relationship in many. It was almost certainly responsible for the early tetraploids 'King Alfred' and 'Madame de Graaff' through its equally important triploid offspring 'Emperor' and 'Empress'.

Although chromosome numbers have been determined for several hundred species and cultivars, this work is insufficiently comprehensive to trace with certainty the changes that took place during the three developmental stages. It does give, however, a reasonable idea of what was taking place. Crosses using named examples, where possible, are given below to indicate the likely progress during each of the developmental stages.

STAGE 1 (mid-19th to early 20th century)

Example A: *N. pseudonarcissus* × *N. radiiflorus* var. *poetarum* = ‘Lucifer’  
diploid + diploid = diploid  
7 + 7 = 14

This type of cross and result predominated during this stage.

Example B: ‘Unknown’ × *N. jonquilla* = ‘Hesla’  
diploid? + diploid = triploid  
14 (non-reduced)? + 7 = 21

This type of cross and result occurred occasionally during this stage.

Example C: *N. pseudonarcissus* subsp. *major* × ‘Emperor’ = ‘King Alfred’  
(syn. *N. hispanicus*)  
diploid + triploid = tetraploid  
7 + 21 (non-reduced) = 28

STAGE 2 (early 20th century until approximately 1925)

Example D: ‘King Alfred’ × Predominant Stage 1 cvs = Stage 2 cvs  
tetraploid + diploid = triploid  
14 + 7 = 21

Example E: ‘Madame de Graaff’ × ‘King Alfred’ = ‘Mrs E.H. Krelage’  
modified tetraploid + tetraploid = tetraploid  
14 + 14 = 28

Such crosses and results became more common during Stage 2; nevertheless tetraploid × tetraploid crosses were still relatively rare.

STAGE 3 (approximately 1925 to the present day)

Example F: ‘Mrs E.H. Krelage’ × ‘Beersheba’ = ‘Samite’  
tetraploid + tetraploid = tetraploid?  
14 + 14 = 28?

During Stage 3, this type of cross and result has predominated.

In the late 19th century, hybridists carried out visual selection of potential cultivars from their beds of seedlings in which the few polyploids present would stand out clearly from the others, being larger and more vigorous. Indeed, it was probably the polyploid vigour of *N. bicolor* that caused it to be such a popular parent plant among Victorian hybridists. This vigour was well known and it was felt that *N. bicolor* was more robust than any other *N. pseudonarcissus* except subsp. *leonensis* (syn. *N. nobilis* var. *leonensis*). Why was *N. bicolor* chosen by the early hybridists with such consistency and why was var. *leonensis* not used at all? The reason is simple in that it was a matter of availability. *N. bicolor* was common and easily acquired, while var. *leonensis* was rare, being known only from a single collection made in 1896.

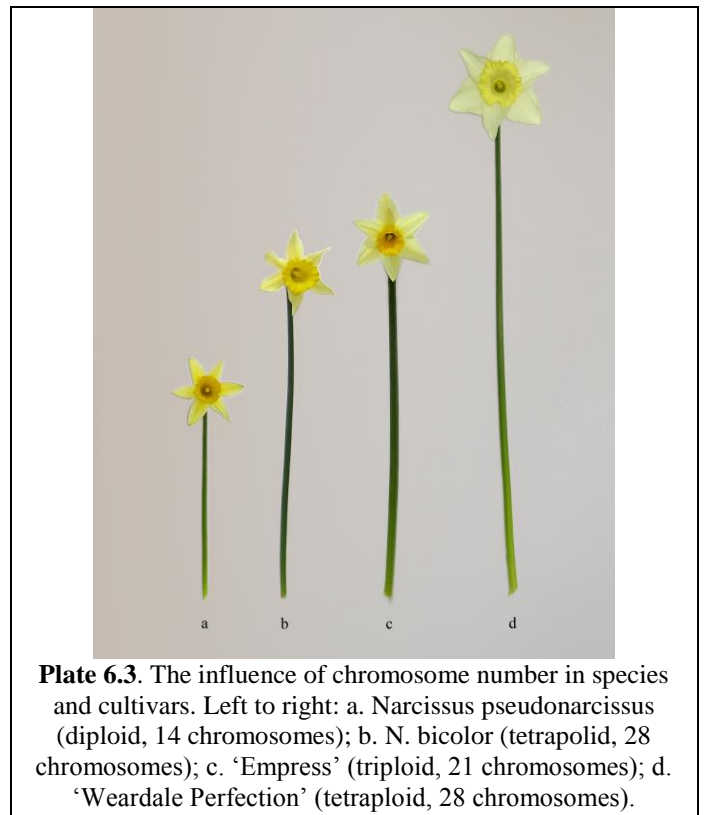
Once triploid cultivars began to appear it was only a matter of time before tetraploids followed as a result of non-reduction of triploids at the time of pollen or egg cell formation. Tetraploids are larger and more vigorous than triploids, and thus they were the seedlings selected out by hybridists for naming as cultivars, and for use in their breeding programmes. As tetraploids are fertile, they tend to give rise to even more tetraploids when crossed with one another. This pattern can be seen in such parental sequences as ‘Beacon’ (2n = 28) 1897 – ‘White Sentinel’ (2n = 28) 1926 – ‘Rose of Tralee’ (2n = 27) 1937 – ‘Salmon Trout’ (2n = 27) 1948.

The cultivars of which the chromosome counts were known in 1986 numbered 468 out of a total of approximately 11,000 listed in the Daffodil Data Bank. Much of this and subsequent work was carried out by Dr Peter Brandham at the Royal Botanic Gardens, Kew. Ultimately, where uncertainty currently exists, DNA analysis of early cultivars should provide an authoritative explanation of how these were developed from the species.

During the last years of the 19th century and up until approximately 1925, the numbers of diploid, triploid and tetraploid cultivars remained very similar. Of those that are chromosomally known, about 25 of each sort existed in 1925. By 1970, the diploids and triploids had increased to 50 of each, but the number of tetraploids had rocketed to 300 or 75%. The same trend has continued in recent years.

Daffodils have therefore responded in an explicable manner to the selection pressures exerted by man. The mainly diploid species were relatively small in size. They were used in the hybridisation hobby followed by members of the Victorian middle-class, at a time when plant improvement was all the rage, plant size and vigour being important aspects of this improvement process (Plate 6.3). Through the widespread use of the polyploid *N. bicolor*, triploid and later tetraploid cultivars began to appear. Suddenly, in the 1920s, there was a pool of tetraploids available to hybridists which, when crossed together, resulted in the phenomenal rise in the tetraploid population between that date and the present day. This sudden upsurge in tetraploid numbers in the 1920s may have been the result of the tetraploid pool reaching a sufficient size to exert a significant effect, which then combined with the resurgence in the breeding of *Narcissus* and other ornamental plants following World War I.

The probability of even higher polyploids occurring from time-to-time would obviously arise through the presence of triploid and tetraploids in the breeding population. These are generally slower growing, however, and tend to be passed over at the time of seedling selection. There is always an occasional exception, the best known being ‘Rijnveld’s Early Sensation’ which is a sub-pentaploid with 33 chromosomes. It is thought to have arisen in one of two ways: either from triploid parents as the result of non-reduction in one and aneuploidy in the other, e.g.  $21 + 12$  (from 21) = 33; or from one triploid and one tetraploid parent, e.g.  $21 + 12$  (from 28) = 33. Among the chromosomally known cultivars this is the only pentaploid which has been determined, and hexaploids and octoploids are unknown. Tetraploids, on the other hand, show their optimal level of ploidy as far as observational selection is concerned and, consequently, are now dominant among *Narcissus* cultivars.



**Plate 6.3.** The influence of chromosome number in species and cultivars. Left to right: a. *Narcissus pseudonarcissus* (diploid, 14 chromosomes); b. *N. bicolor* (tetraploid, 28 chromosomes); c. ‘Empress’ (triploid, 21 chromosomes); d. ‘Weardale Perfection’ (tetraploid, 28 chromosomes).

## References

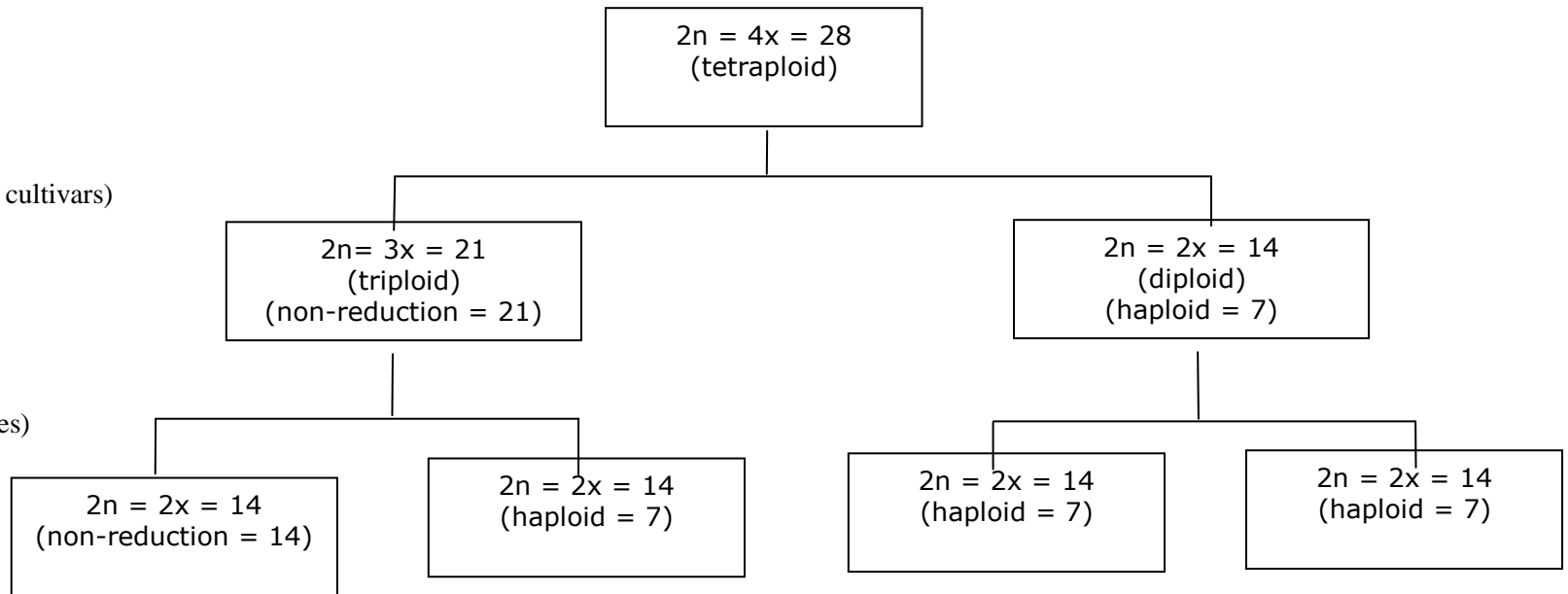
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A. Possible route to tetraploid daffodil cultivars, from a diploid species

STAGE 3 (Modern cultivar)

STAGE 2 (Older cultivars)

STAGE 1 (Species)



B. Possible route to tetraploid daffodil cultivars, from diploid species and a tetraploid species (*N. bicolor*)

STAGE 3 (Modern cultivar)

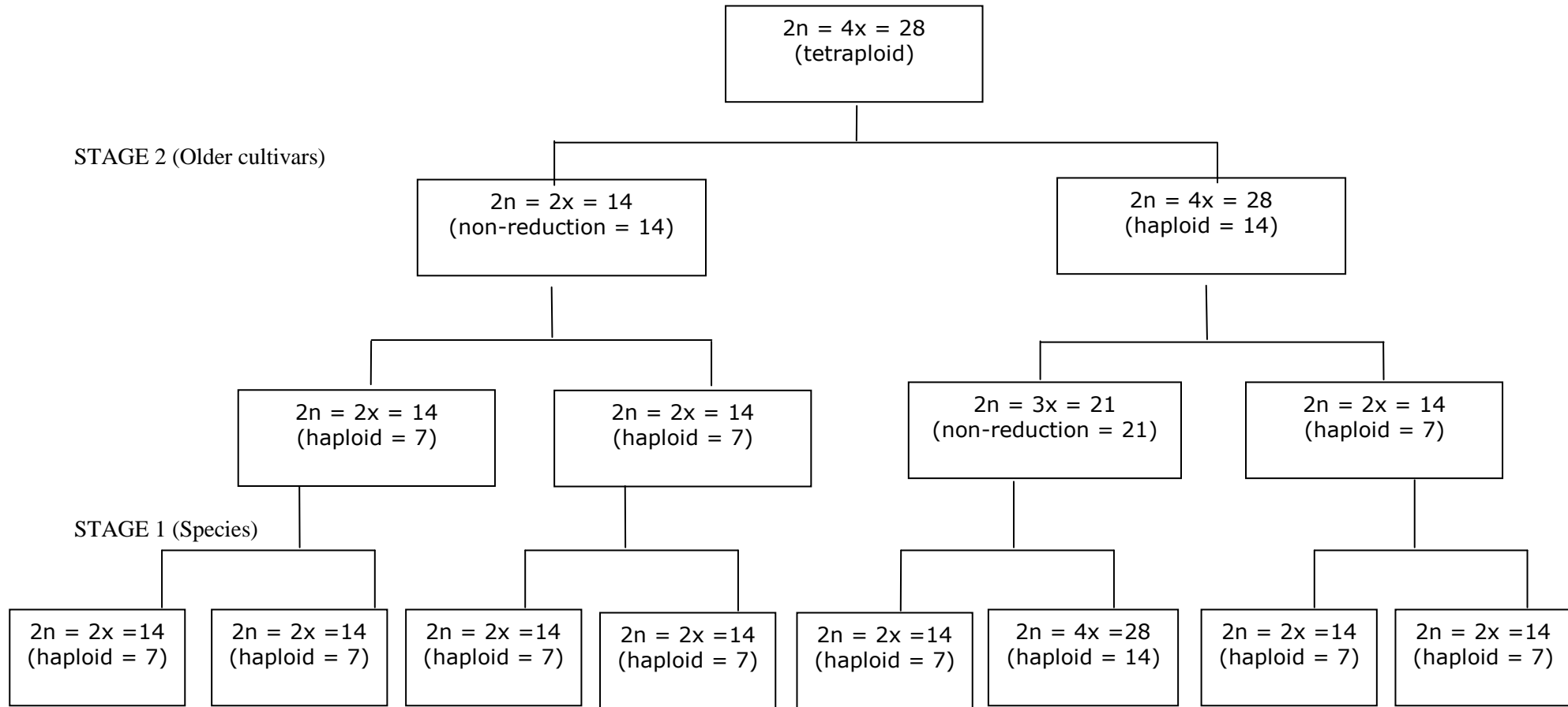


Figure 6.3. Two possible routes to tetraploid daffodil cultivars. A. From a diploid species, B. From a diploid species and a tetraploid species (*N. bicolor*).

## CHAPTER 7

### GUY L. WILSON, OR 'YELLOW FEVER' PERSONIFIED

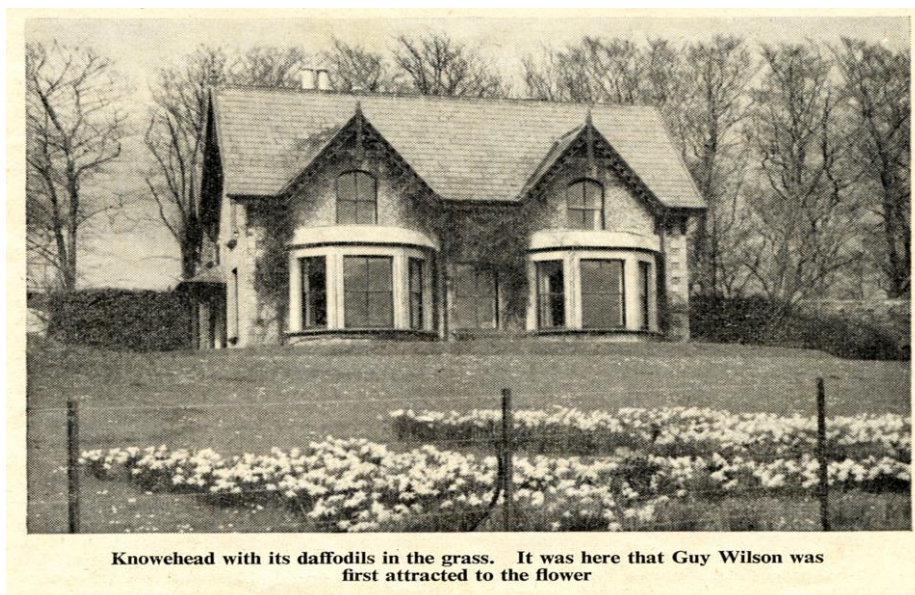
There are many references throughout daffodil literature to the blissful state of 'yellow fever', a condition gladly suffered by all true daffodil devotees. It has also been referred to occasionally as 'yellow peril' but it is felt that the former phrase is the more appropriate.

'Yellow fever' is a continuous, year-long condition that begins with the planting of bulbs in autumn and the anxious wait for their emergence, followed by a seemingly interminable period in mid-winter when growth comes to a complete halt. Then, at last, there is the joy of spring, the headlong rush into growth and the first glimpses of flower following a few warm February days, often all too quickly curtailed by a sudden cold snap and biting east winds. Finally, warmer weather prevails and the true reward for the long wait comes with the wealth of April bloom, which extends through May and frequently into June. It is during the flowering period that the term 'yellow fever' takes on its true meaning. For it is then that the pollinations are made which will produce the next generation of hybrids; there is also a first glimpse of the flowers of those conceived perhaps six or seven years earlier, which unveil their form and colours to display their ordinariness or, hopefully, their uniqueness.

At the end of the season comes the gathering of the seed crop and, after the foliage has died back, the harvesting and storage of the bulbs. Bulbs, like flowers, are very variable but there is nothing more satisfying than a perfect bulb – solid, round, tight-scaled and dark in colour, with its as yet largely hidden potential for the quality of the following season's display and the onset of a further bout of delirium. Anyone who joyfully looks forward to each stage of this annual pageant with ever-increasing enthusiasm can truly be said to be infected with 'yellow fever'.

Guy Livingstone Wilson (1885-1962) was one of the most important of daffodil hybridists. He may not have been the greatest hybridist, but how do we measure greatness? No other breeder, however, was more afflicted by 'yellow fever' for almost his entire 76 years. Because of his unstinting devotion to the growing, exhibiting and improvement of the daffodil, it is without apology that a chapter is reserved for this account of his life and work.

He was born at Knockboy, Skerry, Co. Antrim on 29 January 1885 and was raised at the family home, Knowehead at Coreen, near Broughshane also in Co. Antrim, Northern Ireland (Plate 7.1), a farm of some 24 hectares. It had been bought by his father, William Orr Wilson, in the mid-1800s and commanded a fine view to the south over the Braid Valley with Slemish Mountain in the distance. Guy had four brothers and a sister, Blanche (1869-1919).



Knowehead with its daffodils in the grass. It was here that Guy Wilson was first attracted to the flower

**Plate 7.1.** Knowehead, near Broughshane, Northern Ireland, boyhood home of Guy L. Wilson.

Two of his brothers, William (1865-1876) and Harvey (1878-1885) both died in childhood. The two surviving brothers, who were considerably older, differed from Guy because of their academic aptitude. His eldest brother, John Barnett (1862-1936), was 23 years his senior and he studied medicine later joining the Royal Army Medical Corps in which he attained the rank of major-general. His other brother, James Alexander (1872-1921), studied history at Liverpool University and divinity at Cambridge before entering the ministry of the Presbyterian Church. By contrast, Guy's record at Belfast Academy was undistinguished. The family member who had the greatest influence on Guy was his mother, Jemima (née Barnett), and it was she who introduced him to daffodils. Wilson's enthusiasm for the daffodil began remarkably early in his life and his comment on this, many years later, was: "I think my love of daffodils must have come into this world with me from a better place, for I cannot recall a time when I did not love them."<sup>(1)</sup> Whilst still too young to be taken to church, which was very young in Ireland in those days, he would spend his time, while the rest of the family were engaged in less earthly matters, wandering around the garden examining the daffodils that his mother had planted. It is reported that he was quite inconsolable as the flowers began to fade as the end of the season approached. A few years later, while still a pupil at the local school, he insistently requested that his bedroom be decorated with daffodil wallpaper and, as this was not readily available, it was specially manufactured for him! In later life, he frequently referred to this youthful enthusiasm: "My love of daffodils dates back from earliest childhood as far back as memory carries me."<sup>(2)</sup> The final years of Wilson's schooling were spent at Campbell College, Belfast and Belfast Academy as a boarder, by which time he had a considerable collection of daffodil cultivars growing in the garden at Knowehead. Before leaving for each new term in Belfast, he would compile copious notes for his mother on how these were to be tended during his absence. In addition, he would send home carefully drawn plans of the beds that he had planted in the autumn, asking his mother for progress reports about their development in the spring. His youthful interest in daffodils had initially been stimulated by the plantings that his mother had carried out at Knowehead. These apparently were all yellow for he asked his mother specifically if there were daffodils of other colours: "Are there any white daffodils?"<sup>(3)</sup> – a somewhat prophetic question in view of his subsequent work as a hybridist improving this type of flower. Wilson's curiosity and early interest were stimulated by his mother's reply when she told him that such flowers did exist and gave him a copy of W.B. Hartland's 1888 edition of *Ye Original Little Booke of Daffodils*<sup>(4)</sup>, which contained an extensive list of this type of flower. White daffodils were Hartland's speciality, for which he had become well known, exporting bulbs as far afield as New Zealand. Wilson became enthralled with the white daffodils described in the *Little Booke* and its contents had a profound influence on much of his subsequent work in hybridisation. He later recalled:

"How many hours I spent poring over that beautiful old catalogue and how much I owe to its inspiration would be impossible to guess, but I think that ever since then whites have had a special fascination for me."<sup>(5)</sup>

Long before Wilson left school, it was his intention to become a full-time grower of daffodils, but when the time came his mother would not entertain the idea and insisted that he join the family cloth manufacturing business at Raceview Mill, Broughshane and Knowehead Mill close to Coreen. Eventually he became chief dyer to the company, having a wonderful eye for colour that was to serve him well later on in his work with daffodils. In spite of his duties at the Mill, there were few occasions when he spent a full day working there. This family commitment never hindered his regular visits to other daffodil breeders or prevented him from exhibiting in Birmingham and London. Indeed, Wilson regarded any time spent away from daffodils as a decided waste and a hindrance to the proper conduct of his breeding work. Nevertheless, his job provided a useful source of income while he was building up his breeding stock and waiting for his own seedlings to flower and gain recognition. He also had the use of the land at Knowehead, for it was not until 1916 that he moved to The Knockan at Broughshane where he was to grow daffodils for the rest of his life<sup>(6)</sup>.

While Wilson was still working at the Mill, he had developed his daffodils sufficiently to employ John Shaw, who was to remain with him as his 'right-hand man' for the rest of his working life, rarely taking a holiday. In 1920, Wilson decided to cease being an enthusiastic amateur and so left Raceview in order to become a full-time grower and hybridist: he was "ashamed to take any more money from the Mill"<sup>(7)</sup>. By 1923, he had built a fine house on his land at The Knockan where he subsequently resided, enjoying a fine view to Slemish Mountain, which he greatly admired.



A dedicated perfectionist, thereafter Wilson devoted the vast majority of his time to daffodils. His hybridisation work began in 1906 and might be said to have extended uninterrupted until 1967 when his final seedlings flowered five years after his death, although other breeders will feel the influence of his work for many more years yet with the use of his cultivars. The normal hours of daylight were frequently insufficient for him and there are many tales of him visiting seedlings at night, by moonlight or torchlight. One such moving account is to be found in his *Seedling Record Book* for 1919:

“The supreme hours came in the long, calm, soft, clear, serene evenings. Standing there at the lowest end of the furthest enclosure one’s eye travelled over the long beds, mostly of fairy-like Leedsii and other cool-toned and white things, poised with such light and infinite grace on their stems: and onwards to where the line of wonderful bloom was continued in the boxwood enclosure and the middle and upper enclosures, all more or less visible from this viewpoint and all brimful of luminous white and golden flowers. And lastly to the green lawn itself where hosts and drifts of flowers looked like pools of milky light. A sense of the heavenly peace and unearthly beauty of the scene stole over me till I felt I stood on holy ground.”(8)

In 1922, he wrote of another late evening visit to his beloved daffodils:

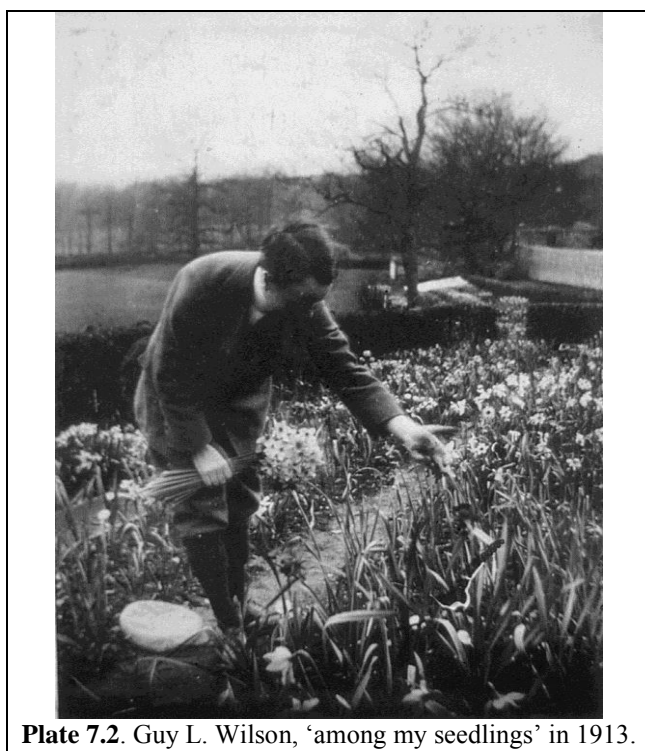
“Zeal for hybridising prevented me from spending too much time simply enjoying the flowers – but there were times really quite indescribable when one felt overpowered in the presence of so much infinite beauty. Such was one evening when the whole atmosphere was saturated with the warm rose colour of a most gorgeous sunset. The distant hills to the eastward glowed with a splendour of colour which would have put amethysts to shame. Presently an indigo shadow fell across them and the belt of beeches beside the river was outlined against this dark velvet background in an almost indescribable blaze of vivid copper rose. Moment by moment the scene was silently changing, the contrasts between deep shadow, inky black cloud and flaming, vivid illumination being almost unreal. The daffodil patches lay in shadow and gleamed ethereally. I came to anchor, indeed to my knees to be exact, beside a little patch of wonderful bloom and gazed at them spellbound.”(9)

As these quotations demonstrate, Wilson was a fine writer. He was also prolific, his first important article appearing in the *Daffodil Year Book* of 1915<sup>(10)</sup>. It was entitled ‘Among my seedlings’ (Plate 7.2). Commenting on the article, the doyen of daffodil breeders at that time, the Revd G.H. Engleheart, suggested that: “A new planet has come into the daffodil world in G.L. Wilson, who can also write good English, an accomplishment not so common as is supposed.”<sup>(11)</sup> Later, Wilson received a letter of congratulation from another daffodil expert, F. Herbert Chapman, who concluded that: “For Engleheart to tell a man that he can write good English is praise indeed.”<sup>(12)</sup> Subsequently, articles by Wilson appeared regularly in the *Daffodil and Tulip Year Books*, the last being in 1961 the year before he died.

In 1950, Wilson received the highest honour of the Royal Horticultural Society, the Victoria Medal of Honour in Horticulture, for his outstanding work in the improvement of daffodils.

In presenting the award, the President of the Society, Lord Aberconway, said of Wilson:

“When he was a boy his people said business is the thing for you, but they were always rather frightened of the Yellow Peril as they called it because they knew that from his boyhood he was fascinated by daffodils; and when he had had a certain time in business he gave it up and went in entirely for daffodil growing and he made the greatest possible success of it. He has been a member of our Narcissus Committee for 24 years



**Plate 7.2.** Guy L. Wilson, ‘among my seedlings’ in 1913.

and he writes in a way that makes everyone who reads his works enthusiastic about daffodils.”<sup>(13)</sup>

A year later, in 1951, Wilson received an honorary Master of Agriculture degree from Queen’s University, Belfast in recognition of his services to horticulture in Northern Ireland. According to the Public Orator at the degree ceremony:

“Guy Wilson has adorned some acres of his native county with a spring loveliness that was not there before him; he has created beauty and has scorned that which is ugly; he has provided ample fare for our aesthetic appetite just as John Clarke, by his work with the potato, has contributed to the sustenance of our bodies. The results of his work will grow and spread after he has gone and his skill will have added to the beauty of floriculture throughout the temperate world. For half a century he has laboured quietly and patiently in the lovely fastnesses of the county which gave him birth – he has had his greatness thrust upon him.”<sup>(14)</sup>

Of all the honours Wilson received during his later years, he prized none more than the invitation to be Guest of Honour at the First Convention of the American Daffodil Society, which subsequently dedicated its first *Year Book* to him. Introducing Wilson at the Convention on 7 April 1956, the President of the Society, Frederick P. Lee, said of his work:

“The genetic strains resulting from wide and painstaking hybridisation by an outstanding plant breeder will necessarily be part of the inheritance of plants and gardens for centuries to come. The daffodils in those gardens will be the better for there having been a Guy Wilson. His genius is evidenced not alone in his masterpieces of today, his medals and awards, his reputation and generous and gracious personality. His achievements will find an enduring expression in daffodils as long as there are daffodils.”<sup>(15)</sup>

In 1957, the Royal Horticultural Society also dedicated its *Daffodil and Tulip Year Book* to him. In his preface, Charles H. Curtis recalled Wilson’s remarkable childhood love of the flower which was to form the basis of his life’s work, when he wrote of him, though barely able to walk, “becoming quite inconsolable when the golden flowers of the old double ‘Van Sion’ faded away”<sup>(16)</sup>.

When engaged on daffodil business, Wilson frequently lost all track of time as evidenced by his total disregard for normal mealtimes to the constant exasperation of his housekeeper, Jane Quaite, who tolerated much more than a wife would have done. Similarly, when dealing with daffodil correspondence he frequently kept his secretary working until well after 3 p.m., without lunch and without realising what the time really was. Wilson had a typically religious Ulster background and his work with daffodils had a strong spiritual value for him. He once caught an employee staring out of the bulb-shed window. When asked what he was doing the employee replied that he was watching the beautiful sunset, not wishing to admit that he was wasting time. Wilson slapped him on the shoulder: “Good boy, the heavens declare the glory of God and the earth showeth forth his handiwork.”<sup>(17)</sup> Wilson retained his interest in daffodils until the end of his life. He was visited at The Knockan by J.L. Richardson and C.R. Wootton in 1960, by which time he was a very frail old man. Nevertheless, on one day during the visit, Wilson spent twelve hours among his seedlings and his guests could see him still enjoying his flowers in the half-light. Even on the day of their arrival, and ignoring the fact that it was 8.30 pm, with the light of the spring evening rapidly fading, Wilson insisted that his guests inspect at least two or three of his seedling beds there and then. Later Wilson remarked to his visitors on the perfection of the flowers: “I do not think they have ever been so good. Perhaps this is the last time and the Lord is giving me everything.”<sup>(18)</sup>

His final years were filled with worry about what would happen to his bulb collection. He was even persuaded to go to a séance in the hope that he might get a calming message. The medium is reported as getting a message from ‘Bowley’ (E.A. Bowles) which said: “Do not worry, there are daffodils here.”<sup>(19)</sup> Many years earlier, during a visit by Matthew Zandbergen to The Knockan, Wilson had suddenly asked: “Matthew, do you think there will be daffodils in heaven?” and, without waiting for a reply, continued: “Heaven without daffodils is bound to be a very poor place.”<sup>(20)</sup> Guy Wilson died of a stroke on 5 February 1962. *The Times* obituary stated that, although he raised many notable coloured daffodils:

“It was in breeding white daffodils that he took most delight and won his greatest fame. The magnificent white trumpets ‘Empress of Ireland’, ‘White Prince’, ‘Vigil’ and ‘Cantatrice’ and the small-cupped ‘Chinese White’ and ‘Frigid’ are perhaps the best known of a host of new varieties which he has raised.”<sup>(21)</sup>

Thus ended a major epoch in the history of daffodil development in Ireland, for J. Lionel Richardson had also died four months earlier. His career, like that of Wilson, had spanned 50 years during which both had been responsible for a revolution in daffodil breeding, involving not only the improvement of existing types but also the creation of entirely new ones. The memory and work of Wilson lives on along with that of the other Irish hybridists in the Guy L. Wilson Daffodil Garden, which was established at the (New) University of Ulster’s Coleraine campus during the early 1970s. The official opening took place on a gloriously sunny day in April 1974 and was carried out by Professor Fergus Wilson, Guy’s nephew, who as a boy had spent many happy holidays at The Knockan. In his address, he summarised the traits in his uncle’s character that had led to his greatness. These were:

“Total Dedication – in practice that meant that everything else in life was subordinated to the daffodil.

Great Patience – by nature Guy was far from being a patient man but, in his hybridising work, all the careful record keeping that this involved and in waiting at least five years for his seedlings to bloom, his patience was exemplary.

The Capacity to Learn from Experience – this is a quality which every good gardener must possess in some degree. In the case of Guy Wilson the lessons derived from each season’s experience, together with what he learned from other growers, largely made good his lack of scientific education. He came to gain a profound knowledge of the material he was handling and an insight into its genetic potential.”<sup>(22)</sup>

Under the curatorship of the author, the daffodils at Coleraine went on to become a National *Narcissus* Collection, which was awarded Heritage Garden status by the International Committee for Monuments and Sites. By 1984, the collection numbered almost 2,000 cultivars and species, gathered together from all over the world.

Perhaps the most fitting epitaph to Guy Wilson’s life-long love of daffodils is to be found in a talk that he gave in London in 1935 in which he said:

“The earliest of daffodils are amongst the first flowers to greet us after the dead of winter. They give us the first real foretaste of spring. More than anything else I think they give us a sense of life and youth renewed and a particular thrill of delight as well as an assurance of greater glories soon to follow.”<sup>(23)</sup>

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## CHAPTER 8 HERBALISTS, BOTANISTS, HYBRIDISTS AND ENTHUSIASTS

### The Daffodil in 15th Century Mainland Europe

Improvements in printing techniques in Europe during the 15th century led to a considerable growth in book production, which coincided with a growing interest in the newly emerging science of botany and a demand for more realistic plant illustrations to replace earlier idealised drawings.

Leaders in the development of this new science of plant description and associated illustration were Dodoens, Clusius and Lobel, all of whom were employed by the Antwerp publisher, Christopher Plantin. Plantin employed skilled artists and engravers who worked under the supervision of Dodoens, Clusius and Lobel in the preparation of botanically accurate illustrations for inclusion in their books. Also, during the 15th century, there was a considerable, and complementary, movement of plants around Europe. Among the earliest reflections of this trade and the emerging revival of interest in the daffodil was *The Herbal* of Pietro Andrea Mattioli<sup>(1)</sup> (Plate 8.1), which was published in 1546.

Most of the commoner species of daffodils were well known at that time and found their way into illustrations in typeset books. These included the Poet's Narcissus, *N. poeticus*, and the Lent Lily, *N. pseudonarcissus*, which were the most important building blocks of the 19th century hybridists. Also well known was the Polyanthus Narcissus, *N. tazetta*, which was to be extensively developed and selected for cut flower and forcing purposes during the 18th century.

In addition, there were examples of hitherto lesser-utilised types, such as various forms of *N. bulbocodium*, the Hoop Petticoat Daffodil, and *N. jonquilla*, the Sweet Jonquil. Examples of the works in which these plants are illustrated, in addition to the Mattioli *Herbal*, include Lobel's *Plantarum seu Stirpium Historia*<sup>(2)</sup> published in Antwerp in 1576 and the *Rariorum Plantarum Historia*<sup>(3)</sup> also published in Antwerp, a second edition of which was issued in 1605. Many of the illustrations prepared at the Antwerp publishing house of Plantin, under the supervision of Dodoens, Clusius and Lobel, were collected in an album (*Plantarum seu Stirpium Icones*) published in 1581<sup>(4)</sup>.

### England

#### *In the beginning*

John Parkinson (1567-1650) is thought to have been born in Nottingham, but later moved to London where he became Apothecary to King James I. It was he who produced the first descriptive list of daffodils growing as ornamental plants in the gardens of early 17th century England. This appeared in his famous work, published in 1629 and entitled *Paradisi in Sole Paradisus Terrestris*<sup>(5)</sup> – a play upon his own name in dog Latin, i.e. Park-in-Sun's Earthly Paradise.

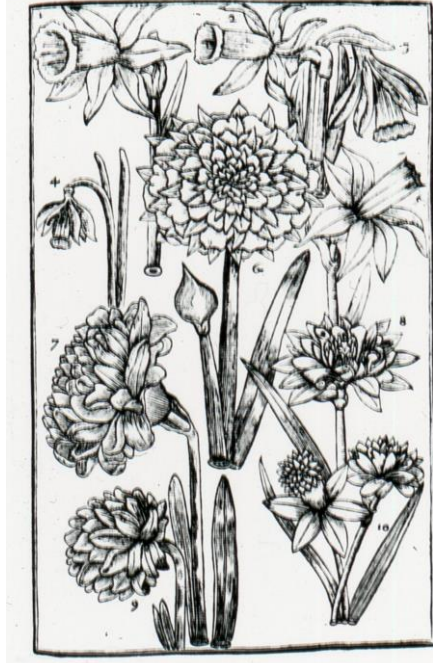
Prior to this publication, descriptive lists of flowering plants that had been published in England were exclusively concerned with their medicinal uses. For the first time Parkinson's book dealt with plants based on their garden worthiness. Apart from the descriptive list that contained information on country of origin, Parkinson attempted to classify the daffodils into two groups, the Narcissos or True Daffodils and the Pseudonarcissos or Bastard Daffodils (Plate 8.2). He also raised a question of nomenclature still debated today, namely what is a daffodil and what is a *Narcissus*.



**Plate 8.1.** *Narcissus juncifolius* from *The Herbal* (1546) of Pierandrea Mattioli (1501-1577)(1).

He commented that:

“Many ignorant gardeners doe call some of these Daffodils Narcisses when as all know who know any Latine, that Narcissos [sic] is the Latine name and Daffodil the English of one and the same thing.”



**Plate 8.2.** Daffodils from *Paradisi in Sole Paradisus Terrestris* (1629) by John Parkinson (1567-1650)<sup>(5)</sup>.

Parkinson had a garden at Long Acre, London, which was apparently well-stocked with rare plants, in which he raised daffodils from seed. He selected new forms from among the resultant seedlings, growing these on at Long Acre alongside the most famous daffodil with which he was associated, ‘Van Sion’ (Plate 8.3).



**Plate 8.3.** ‘Van Sion’ (4Y-Y), a cultivar grown by John Parkinson in the early 17th century.

### ***Enthusiasts of the early 19th century***

Richard Anthony Salisbury (1761-1829) was born in Leeds, the only son of Richard Markham, a cloth merchant there. His love of gardening developed early in life and he subsequently went on to study botany at Edinburgh University. His botanical studies were encouraged in 1785 when a distant relative, Anna Salisbury, offered him £10,000 provided he agreed to change his name to Salisbury in honour of her deceased brother, John Salisbury of Exeter. On completion of his studies, he returned to the Leeds suburb of Chapel Allerton, where his father, Richard Markham, a prosperous cloth merchant, owned property. Salisbury took over one of his father’s houses that had a large garden. In 1796, he published a list of plants growing there, which he expanded on in 1812 in ‘On the cultivation of rare plants’ in which he described 37 distinct types of daffodils<sup>(6)</sup>.

Little had been written about the daffodil for almost 200 years, since the time of Parkinson, until Salisbury included this account of the genus in his work, which suggests the status it held in gardens at that time. The account was 24 pages in length and exhibits Salisbury’s own enthusiasm for the daffodil. He was elected to Fellowships of the Royal Society and the Linnean Society, as well as being secretary to the

Horticultural Society of London. Following his move from Leeds to London, he gardened at Mill Hill, where he grew what was considered to be a very complete collection of all the types of daffodil known at that time. He also worked on a *Genera Plantarum*<sup>(7)</sup>, which remained incomplete at his death.

Adrian Hardy Haworth (1768-1833) spent his early years at Cottingham, between Beverley and Hull, before moving to Chelsea. He first came to prominence as a daffodil enthusiast in 1819 with the publication of the *Narcissorum Revisio*<sup>(8)</sup>. This was followed in 1831 by his important work, the *Narcissinearum Monographia*<sup>(9)</sup>. This contained Latin descriptions of 148 forms of daffodil, all of which were regarded by Haworth as species: inevitably, he is regarded as among the most notorious of botanical ‘splitters’. Contemporary daffodil enthusiasts often met at the Chelsea Physic Garden to discuss the genus, the curator there, William Anderson, having built up a comprehensive collection. In addition to Haworth and Anderson, Robert Sweet, well known for his publication *The Flower Garden*<sup>(10)</sup>, was often among their company.

Fierce debate took place between the botanical ‘splitters’ and their opponents, the ‘lumpers’. The Revd Wolley-Dod, who belonged to the latter camp, felt that Haworth’s creation of 148 species resulted from his being “far too credulous and not a good arranger”<sup>(11)</sup>. Referring to the all too prevalent trend in the early 19th century to create species out of varieties and natural hybrids, Wolley-Dod thought that: “If one is to give a separate name to all slight varieties, our seed catalogues would become Octavo volumes.”<sup>(12)</sup> He also commented on five species created by Haworth, “none of which he [Haworth] had ever seen”<sup>(13)</sup>. In his monograph, on the other hand, Haworth justified his high number of species on the grounds that most of them were growing at that time in the Horticultural Society’s garden at Chiswick.

If nothing else, Haworth’s extreme views prompted renewed discussion and interest in the daffodil including, some six years later, Revd William Herbert’s response<sup>(14)</sup>, in which the number of genera was reduced from 16 to six, and many of the 148 species were given varietal status.

John Horsefield (1792-1854) was a handloom weaver who lived in a small cottage at Prestwich, near Manchester. He was a keen amateur naturalist and at one time President of the Prestwich Botanical Society. Horsefield is remembered for a single cultivar named after him but usually spelt ‘Horsfieldii’. It is thought to have arisen from a particularly fine form of the Lent Lily (*N. pseudonarcissus*), found growing on the banks of the River Irwell, and *N. bicolor*, which Horsefield grew in his own garden. The seedling, first noticed in about 1845, was named in honour of Horsefield by James Percival of Smithy Bridge, who was President of the Lancashire Botanical Association. The naming ceremony was performed at a special meeting of the Society at which the new cultivar was extolled as “a very Queen of Daffodils”<sup>(15)</sup>. ‘Horsfieldii’, which at times has also been known as ‘Mrs Harrison Weir’, went on to justify this accolade, becoming one of the most popular garden daffodils and, along with other well known Victorian cultivars such as ‘Emperor’, one of the most extensively grown cut flower types. By 1853, Horsefield had fallen on hard times and was also in poor health. Because of his plight, his friends rallied round and provided him with some assistance by collecting £50. He died in the following year but all that his widow managed to raise from the sale of the stock of ‘Horsfieldii’ was £2 11s (£2.55), for its fame and extensive cultivation was yet to come.

Edward Leeds (1802-1877) was born at Pendleton, Lancashire but later moved to Longford Bridge, Stretford, Manchester, where he carried out all his work on daffodil hybridisation between about 1843 and 1874. His early working life was in the cotton trade but subsequently he entered his son’s stock-broking business at St Ann’s Square, Manchester. From his early years, botany had been a major interest and most of his spare time was spent in his garden. He also corresponded with many well known people of similar interests, including Sir Joseph Hooker and the Revd William Herbert. Leeds and Herbert must have had much in common through their work in daffodil hybridisation but, while Herbert’s main interest lay in brightly coloured daffodils and in attempting to re-create older forms of the flower through hybridisation, Leeds’ interests were with the whites and paler colours and in the creation of entirely novel sorts. Although Leeds commenced hybridisation some time after 1835, probably in 1843, it was only in the 1850s that his work began to attract attention with the appearance of the large bicolor ‘Grandis’ in *The Gardeners’ Magazine of Botany* (1850-51)<sup>(16)</sup>. Leeds, like Herbert, held the potential of the daffodil in high regard:

“I think much remains to be done in the production of fine hybrids of this beautiful tribe of plants ... which will last for centuries, with very little care, as the common kinds have done in our gardens.”<sup>(17)</sup>

By 1874, Leeds was crippled and in poor health, and decided to dispose of his whole collection of daffodils. This consisted of 169 cultivars, numbering in all some 24,223 flowering-sized bulbs, together with some smaller, unflowered seedlings. His will required these bulbs to be burnt, if unsold, on his death. Peter Barr enquired of the sum needed to purchase the collection and was told it was £105. Anxious that the bulbs should survive, yet fearful of his own ability to pay this sum, he decided to form a syndicate with other daffodil lovers. He was joined in this endeavour by the Revd John Gudgeon Nelson, W.B. Hume, H.J. Adams (an entomologist from Enfield), G.J. Brackenbridge, and Dutch nurserymen P. van Velsen of Overveen and Polman Mooy of Haarlem. The bulbs were shared out according to the proportion of the £105 that each member had contributed, Barr having managed to afford enough for a half share. Following Leeds' death in 1877, his widow is thought to have burnt what seeds there were – together with his hybridising records, as no trace of these has ever been found.

Leeds' name is commemorated in a hybrid named 'Leedsii' which he raised from a clone of *N. pseudonarcissus* subsp. *major* (syn. *N. hispanicus*) × *N. poeticus* in 1851; but, more significantly, in the Leedsii division which appeared in the classification system after the 1884 Daffodil Conference. It contained pale coloured hybrids, which were his favourite types of daffodil.

### ***The clergy lend a hand***

Throughout the centuries, the Church has played an important role in the development of gardening and the utilisation of plants. Nowhere has this influence been felt more strongly than in the development of daffodils. Most of the clergy involved with this development were members of the Church of England, facilitated by the infrequency of moves from one parish to another, and thus free to engage in the relatively long-term breeding programmes so necessary in daffodil improvement. By no means all, however, were involved with hybridisation, for some were growers, collectors, writers or observers of the daffodil scene: but all provided a useful service in promoting the flower.

The Revd William Herbert (1778-1847) was a son of the first Earl of Carnarvon and was educated at Eton and Christ Church, Oxford (1795-1798). Initially, he went into politics, becoming Member of Parliament for Hampshire in 1806, and for Cricklade in 1811. In 1814, he left politics for the Church, becoming Vicar of Spofforth in Yorkshire. Herbert was a scholar of outstanding ability, editing Greek and Latin verse, and translating Danish, Icelandic, German and Portuguese poetry. In 1840, he left Spofforth to become Dean of Manchester, but not before he had made an exhaustive study of the genus *Narcissus* from which came his great work *Amaryllidaceae*<sup>(18)</sup>, published in 1837. In this, he described and classified some 150 types of daffodil. Herbert was convinced that many of the 'species' described by Haworth were nothing more than natural hybrids and, in order to prove this point, he set up a breeding experiment: this involved the crossing of trumpet, *N. × incomparabilis* and *N. poeticus* daffodils and it established him as the early pioneer of daffodil hybridisation. In addition to proving his theory regarding natural hybrids, his breeding work brought a realisation of the great potential of daffodils for improvement and the creation of new types. In his view:

“It is desirable to call to the attention of the humblest cultivator, of every labourer indeed ... who has a spot in his garden or a ledge at his window, to the infinite variety of *Narcissi* that may be raised ... offering him a source of harmless and interesting amusement and perhaps a little profit and celebrity.”<sup>(19)</sup>

Herbert was a forward-looking botanical thinker who had to withstand considerable criticism, not only from jealous botanists but also from fellow churchmen, who regarded his breeding experiments as a violation of God's laws. Nothing is known of the fate of his considerable collection of daffodil seedlings.

The Revd John Gudgeon Nelson (1818-1882) was a well known member of the 19th century daffodil fraternity, whose name was celebrated in the sub-group *Nelsonii* of the *Mediocoronatae* – flowers of this type having a very characteristic straight cup and snow-white perianth. He had an even more famous cousin, the Admiral Lord Nelson. John Nelson lived at Aldborough Rectory, Norfolk, where he



raised daffodils from 1860 to 1882. He was a member of Peter Barr's syndicate that was instrumental in saving the daffodil collection of Edward Leeds from destruction.

The Revd George Philip Haydon (1846-1913) was vicar at Hatfield, Yorkshire from 1877 to 1898, when he retired to Westbere near Canterbury, where he raised daffodils for many years. Several of his hybrids were still in commerce around the time of World War I, 1914-1918, and at least two were meritorious enough to be used by Guy Wilson in his early breeding programmes – 'Pearl of Kent' and 'Sea Horse'. Haydon's other claim to fame is that it was he who encouraged Alexander M. Wilson (see below) to take up daffodil breeding.

The Revd Stephen Eugene Bourne (1845-1907) was a well known grower and judge of daffodils, pressure of work apparently preventing him from becoming a hybridist. He was regarded as one of the top show judges and would frequently give lengthy discourses on the finer points of the perfect show flower at the dinners that took place at the conclusion of the Birmingham Daffodil Shows. His many thoughts related to growing and showing are to be found in the *Book of the Daffodil*<sup>(20)</sup>, published in 1903.

The Revd Joseph Jacob (1859-1926) is principally remembered for his book *Daffodils*<sup>(21)</sup>, which was published in 1910 while he was Vicar of Whitwell, near Whitchurch in Shropshire, a post that he held from 1884 until his death. It had an extensive contents list (History, Breeding, Cultivation, Pests and diseases, etc.) and was published as one in a series of very popular gardening books that covered a wide range of garden genera. At the time, it helped to popularise daffodils and their cultivation. The previous book solely devoted to daffodils had been Burbidge's *The Narcissus: its history and culture*<sup>(22)</sup>, 35 years before. *Daffodils* was prefaced by the Revd W. Wilks, Secretary of the Royal Horticultural Society, who was "a consistent but by no means fanatical grower"<sup>(23)</sup> of daffodils. Wilks referred to the tremendous increase in the number of cultivars over the previous 30 years, from some 50 to almost 2,500. He went on to question if such a rate of increase would continue, judging that it would not at "the present truly ridiculous prices of £30, £40 and £50 a bulb"<sup>(24)</sup>. The Revd Jacob is also remembered as Secretary of the Midland Daffodil Society and the person who proposed to the Narcissus and Tulip Committee in 1919 that a formal investigation of Basal Rot should be carried out.

The Revd Canon Rollo Meyer (1868-1953) bred daffodils at Watton-at-Stone, Hertfordshire for many years, commencing in 1909. He raised a long list of cultivars, of which the best known was probably the large-cupped pink 'Maiden's Blush'.

By far the most important of all the churchmen involved in the improvement of the daffodil was the Revd George Herbert Engleheart (1851-1936) (Plate 8.4). His hybridisation work began in 1882, first at Appleshaw, near Andover, and continued at Dinton, near Salisbury – until 1923, when he decided to cease his hybridising activities at the age of 72. By this time, his bulbs had become badly attacked by both Eelworm and Bulb Fly. Engleheart has been described as "the father of the modern daffodil"<sup>(25)</sup> and may well have inherited an interest in the flower from one of his predecessors, William Herbert. In all, some 170 of his cultivars were registered in the *Classified List*<sup>(26)</sup>. Many of these were of outstanding quality, subsequently being found in the breeding programmes of other hybridists. 'Beersheba', for example, when crossed with 'Eskimo' by Guy Wilson, gave rise to 'Cantatrice', and was also involved in the ancestry of J.S.B. Lea's 'Canisp'. 'Beacon' was the seed parent to his important pair of cultivars 'Mitylene' and 'White Sentinel' (both 2W-Y), which proved to be so prolific in producing pink cupped cultivars. 'White Sentinel' was also the seed parent of 'Kilworth'. 'Firebrand' (WWY-R) was the seed parent of 'Hospodar', which in turn was seed parent of 'Marksman', from which came 'Ceylon'. 'Will Scarlett' (2W-O), one of the most famous of all late 19th century daffodils, gave rise to many of Mrs R.O. Backhouse's red-centred daffodils, including probably the most famous of all, 'Hades'; while 'Dulcimer' (9W-GYO), one of the few tetraploid *poeticus* hybrids, was almost certainly involved in the creation of 'Falaise'.



**Plate 8.4.** G.H. Engleheart (right) with E.T. England at the Daffodil Show in Birmingham (undated).

Without doubt, Engleheart was the major hybridist in the period between the death of William Backhouse and World War I. He raised daffodils in many divisions, although the *poeticus* hybrids were probably his own favourites. Several of his cultivars are still available and widely-grown today, while many more feature in the ancestry of modern cultivars.

### **The botanists**

Herbert William Pugsley (1868-1947) was born in Bristol and worked in the Civil Service. All his spare time, however, was devoted to the study of systematic botany, and much of it to the genus *Narcissus*. His first substantial contribution to knowledge of the genus, entitled '*Narcissus poeticus* and its allies'<sup>(27)</sup>, was published in 1915 as a supplement to the *Journal of Botany*. Retirement from the Civil Service in 1928 allowed him even more time for his consuming interest and, as a result, his important work on trumpet daffodils, entitled 'A monograph of *Narcissus* sub-genus *Ajax*'<sup>(28)</sup>, appeared in the *Journal of the Royal Horticultural Society* in 1933. In both works, Pugsley attempted to clarify the difficult nomenclature of the *poeticus* and trumpet species. He divided the species of *N. poeticus* into two series, the *Poetici* and the *Radiiflori*, placing five species in the former and four in the latter. Nowadays, *poeticus* daffodils are divided into two species only, the remainder being considered to have varietal status. The monograph on the trumpet daffodils showed a similar trend. Pugsley was perhaps more of a 'splitter' than anyone since Haworth.

John Gilbert Baker (1834-1920) was born in Thirsk, North Yorkshire (where a small street known as Baker's Alley is named in his honour), and was educated at Quaker schools in Ackworth and York. He spent his working life at the Royal Herbarium, Kew, eventually becoming Keeper, and first came to prominence in the world of daffodils when he published a classification system in *The Gardeners' Chronicle* during 1869<sup>(29)</sup>. Later, he contributed the 'Review of the Genus *Narcissus*' in F.W. Burbidge's *The Narcissus: its history and culture* (1875)<sup>(30)</sup>. In 1910, the Revd Joseph Jacob described this joint publication as "their monumental work", which "every student of this interesting family should have in his library"<sup>(31)</sup>. In his classification, Baker created the three great daffodil groups, the Magnicoronatae, the Mediocoronatae and the Parvicoronatae, which were equivalent to the trumpet, large-cupped and small-cupped daffodils of today.

In the early 1880s, in view of the contemporary increase in the number of hybrids, Baker (along with Peter Barr and F.W. Burbidge) approached the Royal Horticultural Society with a proposal to

organise a conference on daffodil classification. This was duly held on 1 April 1884 at the Society's gardens in South Kensington, and was subsequently described as: "The event which more than anything else set the ball rolling."<sup>(32)</sup> Baker's earlier classifications (1869 and 1875) were extended and published in *The Gardeners' Chronicle* in 1884<sup>(33)</sup> to coincide with the first Daffodil Conference and, for the first time, a place was found in the scheme of things for the garden hybrids (cultivars). In 1888, Baker published his final work on daffodils, the *Handbook of Amaryllideae*<sup>(34)</sup>, which was the last comprehensive account of the species until recent times. In recognition of his outstanding work, he received the Victoria Medal, the highest award of the Royal Horticultural Society.

No one has done more in recent years than Dr Peter Brandham to show the way in which cultivars have developed from the daffodil species during the past 200 years, especially through the meticulous analysis of chromosome numbers in many cultivars and species through the whole time span of this development. In 'The chromosomes of species, hybrids and cultivars of *Narcissus*' (1987)<sup>(35)</sup>, this development is clearly explained on the basis of genetics, which fits in very neatly with the practical reasons why hybridists have selected particular seedlings for growing on and eventual naming: hybrid vigour is closely associated with the most advantageous chromosome levels, particularly tetraploids and to a lesser degree triploids. Dr Brandham's work has highlighted areas of difficulty for hybridists and suggested ways in which some of these difficulties may be overcome. It is to be hoped that, as a result of his investigations, hybridists will once again attempt the improvement of some of those divisions that have been long neglected. One division in which the way forward is now much clearer, owing to Dr Brandham's efforts, is the Jonquils, following the publication of 'A solution to current problems in Jonquil breeding'<sup>(36)</sup> in *Daffodils 1987-88*. At this time, the raising of new Jonquil cultivars was almost static as shown by the low level of new registrations in Division 7. The problem stemmed from the fact that the majority of existing Jonquil cultivars were triploids and, due to their low fertility, when crossed the outcome was frequently unsuccessful. Brandham's article listed the chromosome counts of a range of popular cultivars showing most to be low fertile triploids with a few diploids and tetraploids. The aim of breeding was to get to fertile tetraploids that showed not only good vigour but also other desirable qualities. Two ways forward were suggested through the crossing of diploids with triploids with non-reduced pollen grains or through hybridisation using the few cultivars that had been determined as tetraploids. If using the first method the direction of the cross is all important, as non-reduction is a rare event. It will give rise, at best, to something less than 1% of viable ovules and pollen grains but, as the latter are produced in far greater numbers, it is vital to always use the known triploid as the pollen parent.

### **The 'King of Daffodils'**

The son of a Scottish mill owner, Peter Barr (1826-1909) was born in the Govan district of Glasgow. It was initially intended that he should follow the craft of weaving but, like Guy Wilson, his interest from the earliest age lay in flowers. This led him to start work for a Glasgow seedsman at the age of ten. It was not until much later, however, when he moved to London and founded the firm of Barr and Sugden, that his reputation as the 'King of Daffodils' began to grow. The first move in this process began when he purchased the seedlings of William Backhouse and a portion of those belonging to Edward Leeds, totalling some 361 distinct sorts, on the death of these earlier hybridists.

Some 20 years after his arrival in London, he founded the firm of Peter Barr in succession to Barr and Sugden and, shortly afterwards, became deeply involved in the organisation of the first Daffodil Conference in 1884. There he suggested a new classification system to include the new hybrids, and this was largely accepted. Later in the same year he published his strangely titled *Ye Narcissus or Daffodil Flowre and Hys Roots with Hys Historie and Culture*<sup>(37)</sup>. It vied with Hartland's *Ye Original Little Booke of Daffodils*<sup>(38)</sup>, also published in 1884, as the first catalogue devoted solely to daffodils. Its descriptive lists contained many long-cultivated species and hybrids, together with the new Backhouse and Leeds seedlings.

Initially, Barr grew his daffodil collection at his nursery in Garratt Lane, Tooting but, in 1889, it was transferred to Long Ditton, Surbiton, Surrey where it remained until 1910, the year after his death. Because of limited space at Tooting, part of Barr's collection was sent to de Graaff at Leiden, the Netherlands to be grown on for him, and it was from among these seedlings that the famous white trumpet, 'Madame de Graaff', may have been selected and named. It was first catalogued in 1888 at £5 5s (£5.25)

per bulb. Another white trumpet of which he was especially proud was 'Peter Barr', which created a price record when first listed in 1900 at £50 per bulb.

A different aspect of Barr's work involved his deep interest in the species, which took him on journeys to Spain, Portugal and the Maritime Alps in order to seek them out in their native habitats. As a result of these expeditions, his introductions included *N. pallidiflorus* which, although known to Parkinson, was re-introduced to cultivation following its discovery in the western Pyrenees by Barr in 1883. He recorded it as flowering at his Tooting nursery on 7 February 1884. He was also responsible for the re-introduction of *N. asturiensis* in 1887: this species had been illustrated as early as 1613 in Besler's *Hortus Eystettensis*<sup>(39)</sup>. Barr also introduced two daffodils thought to be among the best miniatures. They were known as 'Santa Maria' (1887) and 'Queen of Spain' (1888), the latter being a form of the wild hybrid *N. × johnstonii*. This wild hybrid does not appear under that name in the up-dated botanical classification of 2008<sup>(40)</sup> as its parents, *N. pseudonarcissus* and *N. triandrus* subsp. *pallidulus*, are the same as those of *N. × taitii*, which is now deemed to be the correct name.

Barr's most famous introduction to commerce was *N. triandrus* var. *albus*, better known as Angel's Tears. The story of this plant's discovery has many versions and has been romantically embroidered over the years, but the most likely authentic version is as follows. In the early spring of 1888, Barr was plant-hunting in the north-west provinces of Spain. Requiring some assistance he approached a Cornish mine inspector, resident there. His name was Robert Nancarrow who, together with his wife, ran a Sunday School for Spanish children: one who attended and had learnt a little English was Angel Gancedo. Nancarrow agreed to let Barr take Angel as his assistant on an expedition. One day, Barr saw, on the slope of a valley above him and at some distance, what appeared to be a white *N. triandrus*. Angel was despatched to investigate and bring down a few bulbs. The slope was both steep and rough and the day was very hot. By the time Angel returned he was agitated and weary, and began to cry, whereupon Barr humorously labelled the bag of bulbs 'Angel's Tears', and so it has remained to this day. On another occasion while travelling in Spain, Barr was obliged to stay overnight at a small village hotel in which the only vacant room contained two single beds. He was offered the room but the hotelier insisted on being paid the rate for a double room, despite Barr being the sole occupant. Although objecting to this, Barr had little choice but to accept, there being no other accommodation in the vicinity. Not to be completely outdone, however, he set his alarm clock to go off in the middle of the night, spending the remainder of the night in the second bed.

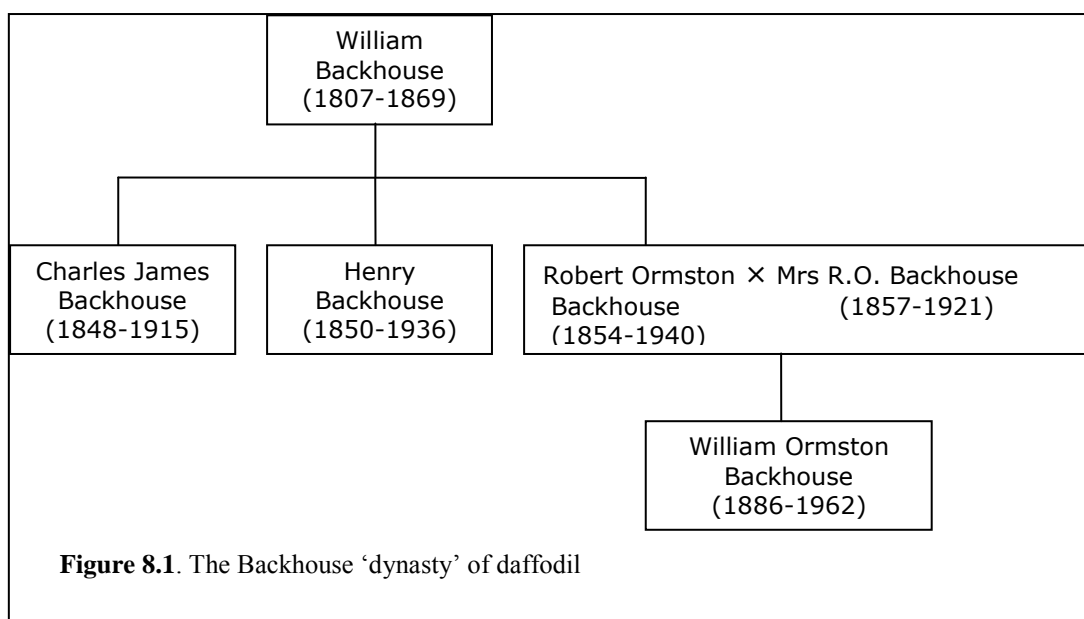
Barr became a legend in his own lifetime, both for his successes with daffodils and for his extraordinary vigour. *The Times*<sup>(41)</sup>, for example, recorded that, of 30 cultivars receiving awards during the latter half of the 19th century, 18 belonged to Barr. The *Daily Mail*<sup>(42)</sup> commented that the passion for spring gardens had arisen during his lifetime, perhaps as a reflection of his work. At the age of 72, Barr set off on a world tour that took seven years to complete. It was one long lecture tour during which he talked of gardening in general and daffodils in particular, besides collecting many plants on his way. On his return, he settled in Dunoon in Argyll, where he devoted much of his attention in his c. 1 hectare garden to Primulas, Hellebores and his beloved daffodils. When Barr died in 1909, a very special era in the history of daffodils came to an end. In the following year, the Revd Jacob said of him: "He made the Daffodil. He travelled for it, he worked for it, he classified it, he advertised it.", concluding that "Thanks to the labours of Peter Barr ... the daffodil has become overwhelmingly popular."<sup>(43)</sup>

### **The Backhouses**

William Backhouse was the first member of a dynasty of daffodil hybridists whose activities spanned three generations and 106 years (Figure 8.1).

A banker by profession, William Backhouse raised daffodils mainly at St John's, Wolsingham, Co. Durham between 1856 and 1868. The names of his cultivars read like a roll of honour in the history of daffodil development, but none achieved more lasting fame or exercised more influence on so many of today's cultivars than two of his earliest, 'Emperor' and 'Empress'. He also raised 'Weardale Perfection', found in the ancestry of many modern cultivars and now thought to be the earliest tetraploid cultivar. Backhouse carried out all his hybridisation using plants grown in pots in a small glass porch attached to his

house. The majority of crossings were carried out in the early morning before leaving to catch the train for work.



Henry Backhouse, William’s second son, took specimens of ‘Emperor’ and ‘Empress’ to show to the editor of *The Gardeners’ Chronicle* in 1865, with whom they are reported to have “created quite a sensation”<sup>(44)</sup>. Henry raised daffodils at Darlington, Co. Durham from 1895 to 1904 and then at Bournemouth between 1905 and 1925. Although described by Robert Sydenham in 1913 as: “A great enthusiastic grower who has raised some beautiful varieties.”<sup>(45)</sup>, none achieved the stature of his father’s ‘Emperor’, ‘Empress’ and ‘Weardale Perfection’, or of ‘Mrs R.O. Backhouse’ and ‘Hades’, raised by his sister-in-law; nor have they had a similar influence on subsequent breeding.

Henry’s brother, Robert Ormston Backhouse, was born in Darlington in 1854. He married in 1884, both he and his wife being Quakers. They moved to Sutton Court, near Hereford two years later where she raised daffodils until her death in 1921 and he for 52 years until his death in 1940. The starting point for their breeding programme at Sutton Court was some of the seedlings of William Backhouse which they took with them when they moved south.

During the early part of their work, it was perhaps Mrs Backhouse who enjoyed most success, being responsible for a number of outstanding cultivars. These included ‘Sunrise’, classified 3W-YYO, but in fact a flower in which orange rays radiate out from the corona across the white perianth, resembling the rays of the sun. Another was the large-cupped bicolor, ‘Lord Kitchener’, one of those early 2W-Y cultivars which, like ‘Mitylene’ and ‘White Sentinel’, were found to be capable of giving rise to pink cupped seedlings. Her most famous cultivars were the one named after her, ‘Mrs R.O. Backhouse’ (2W-P), and ‘Hades’ (2W-R), registered in 1923 and 1925 respectively. The former was the first pink cupped cultivar with strong enough colour to catch the imagination of the gardening public, achieving immediate fame that has persisted for over 80 years: it remains widely grown and readily available. ‘Hades’, a vivid red cupped cultivar, was purchased by J.L. Richardson, who took it back to Ireland where it was used in the production of ‘Kilworth’ – which in turn gave rise to a race of wonderful new white and red cultivars when crossed with ‘Arbar’. Of about the same vintage as ‘Mrs R.O. Backhouse’ and ‘Hades’ were those reverse bicolor seedlings seen by Guy Wilson during a visit to Sutton Court in 1923 and again, in the following year, when he was accompanied by J.L. Richardson. As far as is known, these were the earliest recorded sightings of reverse bicolor cultivars and pre-date the first registered cultivar of this type by some 15 years.

After his wife’s death, Robert continued to pursue one of their earliest objectives in breeding, which was to produce a red-trumpeted daffodil. Numerous deep-orange cupped seedlings with increasingly long coronas began to appear, of which ‘Flaming Torch’, registered in 1933, was perhaps the best. Finally, at the age of 85 he saw a developing flower that had a brick red corona of trumpet length. Perhaps this was

the flower he had yearned to see for over 50 years. He eagerly awaited the next spring in order to see this daffodil again but he died, appropriately enough in the garden he loved so much, before it arrived.

R.O. Backhouse's work on breeding red trumpets was taken up by his son, William Ormston Backhouse, who was successful in realising his father's aims with cultivars such as 'Brer Fox', 'Tidd-Pratt' and 'Uncle Remus', their trumpets being of the strongest orange tones. Thus, what started out in the 1880s as a dream with the crossing of *N. obvallaris* and *N. radiiflorus* var. *poetarum*, was all but turned into reality some 70 years later.

### ***The Williams' family***

The Williams' family was the south-west of England's answer to the Backhouses. Although, in terms of numbers, the time span over which they worked and generations involved, the Backhouses were superior, the daffodils raised by the Williams' family have had an enduring influence on the development of the genus. Those raised by Percival D. Williams (1865-1935) (Plate 8.5) have been especially important in this respect.



**Plate 8.5.** Guy Wilson (second from left), Mrs Richardson (in doorway) and P.D. Williams (with dog) at Brodie Castle (undated).

P.D. Williams raised daffodils at Lanarth, St Keverne, Cornwall from 1899 until 1935. Throughout the history of daffodil breeding, hybridists have usually kept immaculate records of the work in which they were engaged, Guy Wilson and J.L. Richardson being two excellent examples of this. A glance at the *Daffodil Data Bank*<sup>(46)</sup>, however, will quickly indicate the paucity of information on the parentage of the majority of P.D. Williams' cultivars. In very few instances is there any hint of the parent material and, indeed, the frequently reported method used by Williams in achieving his crosses would have rendered record keeping virtually impossible. Apparently, this method, if such it can be called, was based on nothing more than instant inspiration, for he would gather a few flowers, putting these in his buttonhole, and later dabbing their pollen on to the stigmas of other daffodils that took his fancy. If this was precisely what he did, his hand must have been guided from above as many of the resultant seedlings were of outstanding quality.

P.D. Williams had two things in his favour. Firstly, he was working during the early period of the 'polyploid explosion' when conditions were very much in favour of improvement. Secondly, he must have been keenly observant for it seems as though he could spot polyploids, and especially that most favourable tetraploid condition, at a glance because all his most successful cultivars possessed 28 chromosomes. Examples of these include 'Brunswick', 'Carlton', 'Crocus', 'Polindra', 'Porthilly' and 'Trousseau'. Many of his cultivars became firm favourites with commercial growers of cut flowers in the south-west of

England, where they were grown in their thousands. Several are still used for this purpose or for garden decoration almost 80 years after their introduction. A considerable number of his finest cultivars were registered during the impressively short period between 1927 and 1934, with the former being a most successful year. These cultivars, which all received First Class Certificates, were:

'Carlton'	2Y-Y	1927
'Crocus'	2Y-Y	1927
'Havelock'	2Y-Y	1927
'Penrose'	2Y-Y	1927
'Polindra'	2W-Y	1927
'Porthilly'	2Y-O	1927
'Trevithian'	7Y-Y	1927
'Cragford'	8W-O	1930
'Trenoon'	2Y-Y	1930
'Brunswick'	2W-Y	1931
'Trousseau'	1W-Y	1934

Of these eleven outstanding cultivars only the parentage of 'Trevithian' is known in full. The parentage of two others, 'Cragford' and 'Trousseau', is known in part but, sadly, the origins of the other eight went unrecorded.

P.D. Williams was a forceful character, often holding dogmatic views and rejecting outright some of the parental choices of fellow hybridists. He swore, for example, that he would never have the deep-orange cupped 'Will Scarlett' on his ground, at a time when it was being widely used elsewhere. His work not only benefited the flower-growing industry of his native south-west of England, but also exerted considerable influence on other hybridists, none more so than J.L. Richardson in Ireland. Following visits to Cornwall, Richardson wrote of the wonderful coloured flowers that he had seen at Lanarth, which were predominantly yellow and orange/reds. These visits, during the early 1920s, made Richardson eager to emulate Williams' example by breeding similar types of daffodil. He later recalled his visits to Williams in Cornwall, saying that it was there that he had purchased some of Williams' highly coloured seedlings, and he used these to lay the foundations of his own. From these he produced the most brightly coloured daffodils yet seen.

A cousin of P.D. Williams, John Charles Williams (1861-1939) raised daffodils at Caerhays Castle, Gorran, Cornwall between 1893 and his death. Although he did not produce as many top-class cultivars as P.D. Williams, he was nevertheless responsible for some that have had a considerable influence on daffodil development. One such was 'Hospodar' (2Y-O), registered in 1914: this was pollen parent of 'Diolite' and 'Marksman', which later became the parents of that Richardson masterpiece 'Ceylon'. 'Hospodar' was also a parent of 'Rustom Pasha', which proved to be most effective in imparting sun-proof qualities to the orange/red coronas of its offspring.

Michael P. Williams (1903-1963), the son of P.D. Williams, continued with his father's breeding work at Lanarth following his father's death in 1935 until his own demise in 1963. His most notable product was the large-cupped, all yellow 'Saint Keverne': this was not only an outstanding exhibition daffodil but has also been found to possess a considerable degree of field resistance to the fungus responsible for the devastating disease of Basal Rot. Consequently, 'Saint Keverne' was extensively used in the Rosewarne EHS breeding programme that had the dual aim of producing new commercial cut flower cultivars with a high degree of Basal Rot resistance.

### ***One to remember***

Most of the hybridists discussed in this chapter spent many years attempting to improve daffodils through breeding. In so doing, they invariably registered many new cultivars, and a few outstanding hybridists, such as J.L. Richardson, registered several hundred. Some of these were such significant improvements on their predecessors that their names live on in the history of daffodil breeding. Examples which spring to mind include 'Arbar', 'Content', 'Falaise', 'Kilworth', 'King of the North', 'Mrs R.O. Backhouse' and 'Will Scarlett'. There are, however, a handful of breeders who are remembered only on

account of a single cultivar which, owing to outstanding qualities, has become a household name, not only to daffodil enthusiasts but to all those interested in garden plants.

Two such cultivars are among the best known of all daffodils, still being grown in considerable numbers many decades after their introduction. They have also had a considerable impact on the commercial cut flower industry, as well as a telling input to modern cultivars through their use in breeding. They are, of course, 'King Alfred' and 'Fortune'.

'King Alfred' (1Y-Y) was registered in 1899, nine years after the death of its raiser, John Kendall (1828-1890), and it is unlikely that he ever saw it flower. Although Kendall raised several cultivars, including the very fine 'Lulworth' (2W-YOO) in 1886 (awarded a First Class Certificate in 1894 because of its excellence), he is nowadays remembered only for 'King Alfred'. No cultivar is better known to amateur gardeners and professional growers alike. Indeed, it is the only daffodil cultivar name with which the general public are familiar and, in the minds of many, 'King Alfred' and the daffodil are synonymous. It has been said that the appearance of 'King Alfred' was "the greatest single advance ever made in the progress of daffodils"<sup>(47)</sup>. In many respects, this is true, for not only has it been involved in the breeding of innumerable famous offspring but it is still, over a century after its introduction, one of the most widely grown cultivars.

Because, unfortunately, Kendall left no record of its ancestry, over the years various parentages for 'King Alfred' have been postulated. *N. pseudonarcissus*, *N. pseudonarcissus* subsp. *major* (syn. *N. hispanicus*), 'Golden Spur', 'Maximus Superbus' and 'Emperor' have all been cited as having been involved. The most likely parentage is between *N. pseudonarcissus* subsp. *major*, a diploid, and the triploid 'Emperor', giving rise to the tetraploid 'King Alfred' through non-reduction of the triploid parent at meiosis. When bulbs of 'King Alfred' were first catalogued in the early 1900s, they cost six guineas (£6.30) each, but by 1913 the price had dropped to 2s 6d (12.5p). For all that, it still reigned supreme, being described by Robert Sydenham as "the recognised gem of the yellow trumpet daffodils, a large flower of perfect form, proportion and quality"<sup>(48)</sup>. The passage of time has not diminished its popularity.

The lone cultivar for which Walter Ware (1855-1917) is remembered is 'Fortune' (2Y-O), registered in 1923. While this cultivar is possibly not as well known to the general public as 'King Alfred', it has been a daffodil of immense importance and has enjoyed considerable popularity over many years with enthusiasts, hybridists and commercial bulb growers. Indeed, it has been claimed that 'Fortune' is the best daffodil, irrespective of type or class, possessing the qualities of earliness, large size, good form and substance, fine colouring, strong stem and almost perfect poise. It was first spotted by Ware in his seedling beds at Inglescombe, near Bath, where he had carried out hybridisation since 1900. The year of this first sighting was 1915 and in the same year he exhibited it at the Midland Daffodil Society's Birmingham Show. His exhibit, which included 'Fortune' and others of his seedlings, now long since forgotten, won the Bourne Cup. Asked about the parentage of 'Fortune' by F.H. Chapman in 1915, Ware said it came from a batch of mixed seeds and he was thus unable to confirm its parentage. This view was later supported by Ware's son-in-law, C.C. Titchmarsh. Suggested parentages have included 'King Alfred' and 'M.J. Berkeley' crossed with an orange-crowned seedling raised by Engleheart from 'M.J. Berkeley' or 'Maximus' crossed with 'C.J. Backhouse'. Mr Ware's manager at the time, J. Firman, thought that 'Fortune' had come from 'Blackwell' × 'Sir Watkin', but the wide variance of views on its parents indicates that in all likelihood they were unknown, as they remain.

The very survival of 'Fortune' in its early years was in itself fortunate because Ware's daffodil stocks began to be attacked by Stem and Bulb Eelworm before the control of this pest, using hot water treatment, had been perfected. Concerned that the stock of 'Fortune' might not survive if all the bulbs remained at Inglescombe, Ware decided to sell some bulbs, two being purchased by Brodie in 1917 for £80. Ware died shortly after sending out the bulbs and the transaction had to be completed with his executors. 'Fortune' thrived at Brodie Castle, and either must have been treated against Eelworm in 1919 when the hot water method was perfected, or the original two bulbs were clean and remained so in the isolation of Morayshire, far removed from the main areas of daffodil production. All the many millions of 'Fortune' bulbs raised subsequently are thought to have originated from the two acquired by Brodie in 1917.



'Fortune' was not only remarkable in the manner of its arrival and survival, but also for the awards it received, confirming that here was a cultivar of outstanding quality and tremendous potential. They were:

- 1924 First Class Certificate (RHS) for show, cutting and garden decoration
- 1926 Award of Merit (Haarlem)
- 1927 First Class Certificate (Haarlem)
- 1934 Forcing Award (Haarlem)
- 1935 First Class Forcing Award (Haarlem)
- 1947 Award of Merit (RHS) for garden decoration after trial at Wisley

Guy Wilson was greatly impressed by 'Fortune' when he first saw it in 1920, Brodie sending him flowers from the two bulbs purchased three years earlier. Brodie recouped his outlay in 1920 when he sold a large offset to Dr N.Y. Lower for £50, and a smaller one to James Coey for £30. Subsequently, Guy Wilson obtained a stock, presumably from Coey, growing and selling it successfully for many years at up to £25 per bulb. He would hold a handful of 'Fortune' bulbs, saying that their value was more than that of a field of corn, which at the time was probably true. 'Fortune' was widely used, both as a seed parent and as a pollen parent, by all the leading hybridists. Brodie himself raised a series of 44 cultivars from it, all prefixed 'Fortune'. They are now mostly lost, although 'Fortune's Crest' is still occasionally encountered. Richardson and Guy Wilson also used it extensively and it features in the ancestry of that outstanding daffodil 'Armada'.

Philip John Worsley (1834-1917) raised daffodils at Clifton, Bristol, from 1891 until his death, but is remembered today solely for 'Bernardino' (2W-Y), which was registered in 1907. Sydenham's catalogue for 1913 listed it at £1 5s (£1.25) per bulb, describing it as "very large ... the cup being beautifully flushed with apricot and orange"<sup>(49)</sup>. 'Bernardino' was frequently used in breeding and features in the ancestry of many modern cultivars, none more famous than 'Romance'. It also enjoyed considerable success as a cut flower cultivar in Britain and the Netherlands, receiving an Award of Merit from Haarlem in 1915.

### ***The early development of double-flowered cultivars***

William F.M. Copeland (1872-1953) lived initially at Kibblestone Hall, Stone, Staffordshire, but later moved to Shirley, near Southampton, where he began raising daffodils in 1893. While he was responsible for the introduction of many fine white *triandrus* hybrids, his lasting fame comes from his work with double daffodils. Copeland began his double breeding programme at a time when, apart from 'Van Sion', the Phoenix group of cultivars and 'Rip Van Winkle', double daffodils were exceedingly rare. Only four cultivars definitely recorded as resulting from man-made crosses were registered prior to the commencement of his work. This state of affairs arose from the inherent infertility of double flowers, few of which are capable of producing pollen, and in which the stigma is frequently malformed or absent. Yet between 1908 and 1930, in this somewhat unpromising area of daffodil breeding, Copeland succeeded in raising several improved cultivars, of which the last 'Mary Copeland' later revolutionised the development of Division 4 through its fertile offspring 'Falaise'.

### ***Small is beautiful***

Alec Gray (1895-1986) was born in London but lived for many years in Cornwall, both in the Isles of Scilly and in Camborne. His first contact with daffodils involved growing the larger types for the cut flower trade while living in the Scilly Isles, but it was miniatures that entirely commanded his attention once he began hybridising in 1927. This work resulted in the registration of a considerable number of miniature cultivars, most of them being *cyclamineus* or *triandrus* hybrids. His best known cultivars in these divisions include 'April Tears', 'Minnow', 'Sundial' and 'Tête-à-Tête'. Gray also used the white *N. rupicola* subsp. *watieri* in his hybridisation work. 'Xit' is a fine cultivar raised from it, fit to grace any rock garden or alpine house. His unrivalled knowledge of this type of daffodil was put into print in 1955 when he published *Miniature Daffodils*<sup>(50)</sup>.

Cyril F. Coleman (1892-1980) was born at Wrotham, Kent and later moved to Cranbrook in the same county, where he raised daffodils from 1933 until his death. His fame sprang from his work with *cyclamineus* hybrids and began when he raised 'Charity May' (6Y-Y), 'Dove Wings' (6W-Y) and 'Jenny'

(6W-W) from a cross between 'Mitylene' and *N. cyclamineus*. From 'Jenny' came the fine bicolor 'Winged Victory'. Coleman was also instrumental in pioneering the development of orange/red cupped *cyclamineus* hybrids in the early 1960s. His best known cultivars of this type are 'Andalusia' (6Y-O), 'Cock Robin' (6Y-R) and 'Whang-hi' (6Y-O). He raised some fine white *triandrus* hybrids, of which 'Ice Wings' is a fine example. Coleman was also the author of *Hardy Bulbs 2*<sup>(51)</sup>, published in 1964.

The Blanchards were a well known father and son partnership of David (1887-1968) and John (1930-present), who raised daffodils at Blandford, Dorset, the former between 1925 and 1968 and John from 1954 until the present day. David Blanchard raised daffodils spanning a wide range of divisions, such as 'Karamudli' (1W-Y), 'Roseworthy' (2W-P), 'Hamzali' (3W-WYR), 'Kimmeridge' (3W-YYO), 'Arish Mell' (5W-W), 'Tuesday's Child' (5W-Y) and 'Cyclades' (6Y-Y). From crosses between *N. bulbocodium* var. *romieux* and *N. cantabricus* he raised cultivars such as 'Muslin' (10W-W) and 'Tarlatan' (10W-W). 'Arish Mell' is a top *triandrus* hybrid for exhibition purposes, while 'Kimmeridge', a daffodil with a glistening white perianth, was a leading show flower among the small-cups. John Blanchard has raised such excellent cultivars as 'Ashmore' (2W-GWW), 'Hambleton' (2YYW-Y), 'King's Stag' (1Y-Y) and 'Purbeck' (3W-YOO); the last of these has had considerable success as a show flower.

### **Other recent hybridists in England**

During the second half of the 20th century, there have been a considerable number of hybridists working in England, in addition to those already mentioned. A number of these operated on a fairly moderate scale and could truly be described as amateur in the sense that they were not solely dependent on their daffodil work. Nevertheless, many of their cultivars have been important in advancing the development of daffodils. Others were and, indeed, are major players who have both bred and grown daffodils on a professional level, many of their cultivars being both top exhibition daffodils and important advances in the inexorable progress of daffodil cultivars.

Fred E. Board (1902-1966), a Yorkshire man by birth, raised daffodils at Darley Dale in Derbyshire from 1948 until his death. Several of the cultivars that arose from his sowing of around 10,000 seeds a year have been outstanding of their type. Among them are to be found several recent show daffodils, including 'Pennine Way' (1W-Y), 'Broomhill' (2W-W), 'Shining Light' (2Y-R), 'Strines' (2Y-Y), 'Altruist' (3O-R), all registered in 1965, and 'Misty Glen' (2W-GWW) which was registered in 1976. Several of Board's cultivars, such as 'Broomhill' ('Easter Moon' × 'Knewehead') and 'Misty Glen' ('Easter Moon' × 'Pigeon'), reflect his long friendship with Guy Wilson. 'Dover Cliffs' (2W-W) had Wilson's fine 'Cantatrice' as its pollen parent, its seed parent being 'Riber', which was raised by Board's close friend and neighbour, Dennis B. Milne.

Dennis B. Milne (?-1979 or 1980) raised one of the first all-deep-orange daffodils, which he named 'Ambergate' (2O-O) in 1950. This caused a sensation when first introduced simply because it was so different from anything seen before. Perhaps it was this cultivar that inspired Board to produce the even more deeply-coloured 'Altruist' (3O-R) some 15 years later, which is now the leading show flower of its type. Not to be outdone, however, Milne registered 'Sabine Hay' (3O-R) in 1970, which was described as: "The most dramatic of the orange-red flowers ... a real show stopper which will be in great demand once the price permits."<sup>(52)</sup> It was catalogued at £20 per bulb in 1982. Milne's hybridisation work eventually spanned 40 years (1932-1972).

W.A. Noton (1923-2006) was a fine exhibitor and amateur hybridist of Oakham in the old county of Rutland. His outstanding achievement was in raising the top small-cupped, yellow cultivar 'Citronita' (3Y-Y) from 'Lemonade' × 'Perimeter' in 1977. He also raised several fine quality large-cupped whites such as 'Rutland Water' (2W-W), 'Silversmith' (2W-W) and 'Cold Overton' (2W-GWW), the latter gaining an Award of Merit as an exhibition flower in 1976 and First Prize at the London Show in 1978.

Mrs B. Abel Smith (1914-1995) was a prolific raiser of high quality cultivars, including the outstanding 'April Love' (1W-W), from 'Ave' × 'Empress of Ireland', and 'Park Springs' (3W-WWY). These have featured as successful exhibition daffodils in the recent past. Other interesting cultivars raised by her at Letty Green, Hertford include 'Pink Panther' (2W-P), 'Upper Broughton' (2W-P) and 'Willow Green' (1W-Y).

J.M. de Navarro (1896-1979) was an American who settled at Broadway in Worcestershire, where he raised daffodils at Court Farm from 1944 until his death. New sorts began to emerge from his initial crosses during the late 1940s, and throughout the following 30 years he registered many excellent cultivars. These included 'Sacramento' (3W-W, 1949), 'Fayum' (3W-O, 1953), 'Arriba' (2Y-O, 1954), 'Crater' (2Y-GRR, 1956), 'Carintha' (3W-O, 1957), 'Estramadura' (2Y-O, 1967), 'Delos' (3W-GWW, 1968), 'Roseate Tern' (2W-P, 1975) and 'Gettysberg' (2Y-GYR, 1979). His most successful exhibition daffodil was 'Front Royal' (2Y-YYO, 1958).

Although C. Reginald Wootton (1897-1970) raised daffodils of many types, today he is best remembered for his jonquil hybrids, such as 'Golden Incense' (7Y-Y, 1957) and 'Pin Money' (7Y-O, 1975). Probably the most charming of all is 'Tittle Tattle' (7Y-Y, 1953), a late bloomer with two to three flowers per stem.

Michael J. Jefferson-Brown (1930-2004) began raising daffodils at Whitbourne in Worcestershire in 1944. Among his most interesting cultivars are 'Tradition' (1W-Y) and 'Hero' (initially registered as 1O-R but re-classified as 1Y-O in 1998). In addition to breeding daffodils, Jefferson-Brown also wrote several books and articles on the subject, his best known works being *Daffodils* (1951)<sup>(53)</sup>, *Daffodils and Narcissi* (1969)<sup>(54)</sup> and *Narcissus* (1991)<sup>(55)</sup>.

F.C. Postles (1937-) began raising daffodils in 1974 and ten years later took over John Lea's unique collection on the latter's death. Postles carries on his breeding work at Droitwich, which is close to Stourport, Worcestershire where Lea hybridised so successfully for almost 40 years. Considering the relatively short time that he has been involved in breeding, Postles has enjoyed much success himself, having raised a number of cultivars that regularly feature among the top exhibition daffodils. These have included 'Broadway Village' (2Y-YRR), 'Stanway' (3Y-ORR) and 'Heslington' (3W-YRR), which was awarded Best Bloom at the RHS Daffodil Competition in 1987. 'China Doll' (2W-WWP) a fine-rimmed pink from Lea's 'Dailmanach', received the award for the Best Seedling at the Daffodil Society Show in 1984. Other Postles' cultivars, which have gained success in recent years, include 'Crowndale' (4Y-O), 'Hanbury' (2W-W), 'Moon Shadow' (3W-GYY) and 'Nice Day' (3W-GWW); while among those likely to feature prominently in the early part of this century are 'Honeybourne' (2W-Y), 'Neon Light' (2W-YOO) and 'Ombersley' (1Y-Y).

R.A. Scamp (1943-) of Falmouth in Cornwall began hybridising in 1969 and has recently had considerable success with cultivars in several divisions, including 'Boslowick' (11aY-O), 'Cape Cornwall' (2Y-YYO), 'Menabilly' (4O-O), 'Menehay' (11aY-O), 'Millenium Sunset' (2Y-O), 'Tehidy' (3Y-YRR) and 'Tiffany Jade' (3Y-YYR).

John Pearson (1936-) of Little Totham, Essex began breeding daffodils in 1962 and founded Hoffland Daffodils in 1987. He has raised some that are outstanding, several of which have become leading exhibition cultivars. Among these and totally dominant in its class is 'Altun Ha' (2Y-W), raised from 'Camelot' × 'Daydream'. Other fine cultivars include 'Goff's Caye' (2YYW-W), 'Lighthouse Reef' (1YYW-WWY), 'Quiet Waters' (1W-W) and the large-cupped white 'Shelagh Rowan'.

Barbara Fry (1922-1997) was instrumental in the great body of work carried out at Rosewarne Experimental Horticulture Station that has made an outstanding contribution to our knowledge of cultivars. The work consisted of the screening of hundreds of daffodil cultivars in order to determine their suitability for commercial cut flower production, the results being contained in three reports covering the period from 1955 to 1971<sup>(56, 57, 58)</sup>. An extensive hybridisation programme was also undertaken with the aim of producing new cut flower cultivars that possessed two principal characteristics, namely an early flowering habit and increased resistance to Basal Rot. Several cultivars from this programme have been released into the trade. Barbara Fry played a major role in this breeding work that will not only benefit growers in the south-west of England but also those much further afield. Her dedication to this work and its success gained her both national and international recognition.

## A recent 'giant'

J.S.B. Lea (1911-1984) first became an exhibitor of daffodils when the Daffodil Society's shows resumed after World War II and, a few years later, he took daffodils to the London shows for the first time. His hybridising career began at Stourport in 1948 and within a decade he had raised enough quality seedlings of his own to compete for the Engleheart Cup, gaining a Highly Commended award. Lea first succeeded in winning this trophy in 1971, being the first Englishman to beat the Richardsons in this competition for 40 years. He went on to win the Cup in ten consecutive years, a feat only bettered by J.L. Richardson himself, who had a run of eleven wins in a row from 1946 to 1956 inclusive. In all, Lea won the Engleheart Cup on twelve occasions, in 1971 and 1973, followed by the ten-year run from 1975 to 1984. Lea retired from full-time employment in the early 1970s and thereafter was able to devote more of his time to daffodils. He issued his first price list in 1971, which was followed by his first catalogue a year later. He started putting up trade stands at the RHS Show in 1972 and received the first of several Gold Medals in 1975.

His own cultivars received Best Bloom awards on eleven occasions. 'Achduart' (3Y-O) and 'Inverpolly' (2W-W) each won the award three times, while 'Canisp' (2W-W) was the first cultivar ever to win Best Bloom at both the RHS Show and Competition in the same year. Other exceptional cultivars included 'Lurgain' (1Y-Y), 'Ben Hee' (2W-GWW), 'Torridon' (2Y-O), 'Loch Hope' (2Y-R), 'Loch Lundie' (2Y-O), 'Loch Owskiech' (2Y-O) and 'Cairntoul' (3W-YOO). The names of his cultivars read like a gazetteer of the Scottish Highlands: their key characteristics are superb texture and great depth of colour. According to Lea's obituary: "We have lost one who was without doubt the most successful and gifted raiser and exhibitor of daffodils in Britain today, whose achievements command respect and admiration wherever the modern daffodil is grown."<sup>(59)</sup>

## ***The State lends a hand – Rosewarne Experimental Horticulture Station, Camborne, Cornwall***

From the time of the daffodil revival in the mid-19th century until the early 1960s, all daffodil breeding was carried out by a relatively small number of amateur hybridists, and an even smaller number of professionals or semi-professionals. The aim of these hybridists was twofold, first and foremost being to develop novel cultivars that showed distinct improvements on their parents and forebears, chiefly in the form of flower quality or new colours or colour combinations. Secondly, they hoped to achieve recognition and endorsement for their efforts through success at shows, which was largely a measure of a new cultivar's worth. Thus, the objective of amateur hybridisation programmes was to produce good new cultivars for exhibition.

It was not until 1963 that an 'official' daffodil breeding programme was set in motion in England – at Rosewarne Experimental Horticulture Station, Camborne, Cornwall – with the objective of raising new cultivars for growing as commercial cut flowers. Trials had commenced at Rosewarne some eight years earlier to assess the characteristics of a wide range of cultivars for suitability as commercial cut flowers. The characteristics examined included date and period of flowering, number of flowers per bulb, rate of bulb increase, stem length and strength, length of neck, foliage type (erect or spreading), flower size and, possibly most important of all, the vase life. Between 1955 and 1971, approximately 2,000 cultivars were examined for these qualities at Rosewarne EHS, the results being published in three reports covering the years 1955 to 1963, 1964 to 1967 and 1968 to 1971. These trials continued until 1983 when the programme was run down following the retirement of Barbara Fry. It was the best of the existing cultivars from these trials that set the standard to be bettered when the breeding programme was begun in 1963. In addition to improving on the qualities shown by existing cultivars, the breeding work also attempted to improve disease resistance and extend the length of the flowering season. The latter was to be achieved by raising early flowering trumpet and *tazetta* cultivars, together with new late types. It was also hoped that the programme would give rise to some new double cultivars suitable for the cut flower trade. What did this breeding work, now sadly ended, achieve on behalf of the commercial grower of cut flower daffodils?

Since 1979, 27 registered cultivars and three unregistered seedlings have been released into the trade, either for use as commercial cut flowers or as amenity garden plants. A further 278 selected clones and 225 unselected seedlings underwent trials, successful ones being released to the trade once their worth was proved. Bulb growing interests in the south-west of England, in particular the Cornish Area Bulb

Growers Association, purchased the majority of cultivars that were released. Several of the Division 1 and 2 daffodils which were released possess as one of their parents the very early-flowering 'Rijnveld's Early Sensation'. Another cultivar extensively used in the breeding programme was 'Saint Keverne' because of its excellent field resistance to Basal Rot disease caused by the fungal organism *Fusarium oxysporum* f. *narcissi*.

A distinct advantage of a sexual propagation programme, such as that carried out at Rosewarne EHS, is that it provides a break in the cycle of virus transmission that does not occur during the normal vegetative propagation process. Certified virus-free stocks of such bulbs can quickly give rise to large virus-free populations by means of modern rapid propagation techniques, which are then available for extensive commercial cropping. Bulbs produced in this way can then be used to exploit the field advantage of their extra virus-free vigour.

Probably the best known of the Rosewarne cultivars are the yellow trumpet 'Tamsyn' and the large-cupped yellows, 'Tamara' and 'Armyne'. In trials at Rosewarne EHS between 1971 and 1981, 'Tamara' proved to be an exceptional early flowerer, blooming between 13 January and 9 March, or some 10-29 days sooner than the most widely grown yellow daffodil, 'Golden Harvest'.

### **Hybridists, Botanists and Enthusiasts in Ireland**

The unique position which Ireland has occupied in the history of daffodil improvement owes its origins to two factors, its amenable climate and its early advocates of the flower. The earliest daffodil introductions into Ireland probably occurred through the agency of monks travelling into northern Europe, principally from Iberia. These early daffodil arrivals, and especially the white species, found the Irish climate amenable and were thus able to survive unattended during the two centuries when this flower's popularity waned. So conducive were the conditions that not only did the original introductions survive, they also hybridised freely, giving rise to many new forms. These new hybrids and their progenitors were to be found, therefore, in considerable abundance around the sites where they had been planted many years earlier, and where they had subsequently hybridised – sites frequently in the vicinity of monasteries.

This large pool of daffodil material proved to be immensely useful to the early enthusiasts, collectors and hybridists when interest in the flower was rekindled during the latter half of the 19th century. No one had a greater hand in the daffodil's revival in Ireland at that time than F.W. Burbidge (1847-1905). Burbidge was born in Wymeswold, Leicestershire of a farming family involved in fruit growing among other activities. It was probably this early contact with fruit growing which eventually directed his activities towards horticulture and botany. On leaving school, he became apprenticed in a private garden, where he made every effort to improve his education both through attending evening classes and private study. On concluding his apprenticeship, he became a full-time student at the Royal Horticultural Society's garden, then situated at Chiswick. He rapidly made his mark as a student but decided simultaneously to expand his talents by taking a course in art.



**Plate 8.6.** Drawing of *Narcissus* × *gracilis* by F.W. Burbidge, dated 16 May 1887, discovered in Trinity College, Dublin in 1982 as part of a large collection of paintings, drawings and letters.

So earnestly did he apply himself to this task that by the end of the course he had become highly skilled in the accurate painting of plants and flowers (Plate 8.6). This ability was confirmed by the result of his final examination, when he received the First Prize, valued at £4, which he used to purchase a microscope.

In 1868, he completed his training at Chiswick but, still determined to gain more experience, he moved to the Royal Botanic Gardens, Kew. There he showed considerable enthusiasm for horticulture, and

particularly its more botanical aspects, which was to stand him in good stead in his later work. On leaving Kew in 1870, Burbidge joined the staff of *The Garden* magazine, the horticultural journal of William Robinson, where he remained until 1878. His distinctive style of writing soon aroused the interest of the gardening public but it was not for his journalistic work alone that this period proved valuable, for he also found time for a considerable amount of private work, publishing four books. Two of these, *The Narcissus: its history and culture* (1875)<sup>(60)</sup> and *Cultivated Plants: their propagation and improvement* (1877)<sup>(61)</sup> were to become the standard works on their particular subjects for many years. No less a person than Sir Joseph Hooker described the latter work as “a book of great merit”<sup>(62)</sup>.

In 1878, Burbidge left the staff of *The Garden*. He had been commissioned by the well known London nursery firm of J. Veitch and Son to go with Mr Peter Veitch to Borneo and the Sulu Islands to collect plants at that time not in cultivation. Among the plants which Burbidge introduced as a result of this voyage of discovery were several types of orchid, including *Cypripedium lawrenceanum*, *C. petri*, *C. burbridgei* and *Phalaenopsis mariae*, together with the insectivorous pitcher plants *Nepenthes rajah* and *N. bicalcarata*. The latter is an interesting species and, unlike other *Nepenthes*, has its pitchers embedded in moss and other ground vegetation. Each pitcher possesses two spurs of immense strength, their apparent purpose being to prevent the entry of small mammals into the pitchers, which might result in them being damaged. In fact, it was frequently the small animals that sustained the damage, for Burbidge often discovered rats caught by the neck between the spurs. The plant *Burbidgea nitida* was named by Sir Joseph Hooker in Burbidge’s honour, it being a showy member of the Ginger family (Zingiberaceae) discovered in north-west Borneo:

“In recognition of Mr. Burbidge’s eminent services to horticulture, whether as a collector in Borneo or as author of *Cultivated Plants: their propagation and improvement*, a work which should be in every gardener’s library.”<sup>(63)</sup>

The toll of the Borneo trip on Burbidge’s health was considerable for he contracted malaria and was very ill for many weeks.

In June 1879, Burbidge was appointed Curator of the Trinity College Botanic Gardens in Ballsbridge, Dublin, a position that he held until his death in 1905. Burbidge’s presence in Dublin had an almost instantaneous effect on W.B. Hartland, who from about 1880 gave himself over almost entirely to the collection, growing and breeding of daffodils. Both Burbidge and Hartland were prime movers in the organisation of the Royal Horticultural Society’s Daffodil Conference in 1884. A considerable correspondence must have developed between them though, sadly, only remnants remain, principally in the form of extracts published in Hartland’s catalogues. Hartland made use of Burbidge’s artistic skills, including several of his woodcuts in the annually revised *Little Booke*<sup>(64)</sup> – as indeed did other writers on daffodils, such as James Craig Niven, Curator of the Botanic Gardens at Hull and son of Ninian Niven, Curator of the Royal Botanic Gardens, Dublin from 1834 to 1838.

As Curator of Trinity College Botanic Garden, Burbidge was able to extend his earlier literary contribution to daffodils into the more practical aspects of growing them. By the end of the 19th century he had amassed one of the largest collections of bulbous plants growing anywhere at that time. One of the important daffodils that Burbidge found growing at Trinity on his arrival was a particularly fine form of *N. pseudonarcissus* subsp. *major* (syn. *N. hispanicus*): this became known as the Trinity College Maximus and was used extensively in hybridisation work by both Guy Wilson and the Revd G.H. Engleheart. It was also used on a large scale by commercial cut flower growers at the end of the 19th century, being listed in Hartland’s catalogues at that time, which also included “a Dutch form”<sup>(65)</sup>. It featured in a list of the best yellow daffodils issued by Burbidge in 1889, while it also had its share of show successes, such as the Special Prize gained for the exhibit staged by John T. Poe of Riverstown, Co. Tipperary at the Dublin Spring Show of 1886. In the run-up to the Daffodil Conference in 1884, Burbidge assisted Peter Barr in the compilation of the quaintly titled *Ye Narcissus or Daffodyl Flowre and Hys Roots with Hys Historie and Culture*<sup>(66)</sup>. This small book-cum-catalogue of some 48 pages contained a list of all the various types of daffodil then being grown and may be regarded as a summary of daffodil knowledge in England at that time.

In 1889, Burbidge wrote an important and somewhat prophetic article entitled ‘The *Narcissus*’<sup>(67)</sup> in which he discussed the increasing occurrence of orange/red colouration in the coronas of daffodils, in

the wild (*N. × incomparabilis*) and in cultivars such as ‘C.J. Backhouse’ (2Y-O). He cited *N. poeticus*, the sole species with any red pigmentation, as the source of this colouration and went on to forecast the eventual appearance of a red trumpeted daffodil. In fact, it took about 80 years for colour approaching this to appear. In the same article, Burbidge made what must then have seemed an even more outlandish forecast. He predicted the appearance of pink in daffodil flowers, for while orange/red was already known in daffodils (wild and some of the early cultivars), pink was a completely unknown colour, not occurring at all in nature. In spite of this, the pink-crowned daffodil was less slow in coming than were those with red trumpets for, within nine years, de Graaff in Holland had registered the faintly pink-tinged ‘Apricot’. Another major contribution that Burbidge made to the later 19th century daffodil scene was his advocacy of a rationalisation of daffodil nomenclature, urging the Narcissus Committee to group similar types together in order to “prevent further confusion”. He went on to say:

“We have at present the anomaly of plants of possibly the same parentage passing under different sectional names. Take the numerous hybrids between the Poet’s *Narcissus* and the variations of *N. × incomparabilis*, Barrii and some Burbidgei raised by Herbert, Leeds, Backhouse and others in gardens. Most of the Barriis are simply *N. × incomparabilis* and most of the true Burbidgei are merely seminal phases of *N. poeticus*.”<sup>(68)</sup>

By 1889, Burbidge’s achievements in improving the Trinity College garden and his literary and scientific contributions to horticulture were recognised by Dublin University as of sufficient importance to merit the award of the degree of Master of Arts, Honoris Causa. This was followed, in 1897, by the award of the Victoria Medal of Honour when he was chosen to be among the first 60 recipients to mark the 60th year of Queen Victoria’s reign. Burbidge was also elected as the first President of the Irish Gardeners’ Association, a position he held for several years. On his death, the Association raised funds in order to found the Burbidge Memorial Library for the use of Irish gardeners. There can be little doubt that it was the presence of Burbidge in Dublin that proved to be the catalyst that sparked the various daffodil enterprises that, from about 1912 to the present time, placed Ireland firmly at the centre of the dramatic advances that took place in this beautiful genus of plants.

William Baylor Hartland (1836-1912) was born at Mallow, Co. Cork into a family whose nursery connections went back to 1790. He was to become one of Ireland’s most loquacious and persuasive advocates of Irish horticulture. His life’s work began in a seed shop in Cork belonging to a cousin, John Bullan Hartland. William had been left the family nursery, Bellevue, Mallow at the tender age of seven when his father died in 1843. Not surprisingly, the nursery failed to survive. In 1878, he tried again with the purchase of three acres (1.21 ha) of land at Temple Hill, Cork, moving to the adjacent Ard Cairn Nursery in 1889, Temple Hill having become too small to do “real pioneer work”<sup>(69)</sup>. He also took over a shop in the city of Cork in order to establish his own seed business. Running the nursery at Ard Cairn was no easy task for he had:

“... to contend against the unskilled labour of the period, in fact I had to take the spade, shovel, rake, line and all in my own hands as the other workers knew nothing of bulb planting, many of them saying that I was very near Dr. Osborne’s Lunatic Asylum and that it would be far better for me to plant Champion potatoes – then all the rage – on such a fine bit of fresh pasture. Well I have lived all that down and now employ more labour at spade work on a given acre than any man within Munster.”<sup>(70)</sup>

From shortly after Burbidge’s arrival in Dublin, Hartland increasingly came under his influence: indeed, to such an extent that almost all his efforts were directed towards the culture of the daffodil to the detriment of other plants in which he had formerly been interested. One of Hartland’s major contributions was the gathering together of daffodils from all parts of Ireland, especially from the grounds surrounding old religious establishments and those of old and, at that time, often neglected estates. His particular interest was in white daffodils of which there were many hybrids, the products of crosses between the originally introduced white species that had thrived in the amenable Irish climate. So successful were his efforts that by the late 1800s he had amassed the largest collection of white daffodils in the British Isles. These were listed in *Ye Original Little Booke of Daffodils*<sup>(71)</sup>, the first edition of which – published in 1884 – was, along with the Barr catalogue<sup>(72)</sup> for that year, the earliest devoted entirely to daffodils.

It was no accident that Hartland first issued this catalogue in 1884, the year of the first Daffodil Conference, an event described by the Revd Joseph Jacob as: “The send off of daffodils as we now know them. This event more than anything else set the ball rolling.”<sup>(73)</sup> It was not unexpected, therefore, that Hartland, a dedicated propagandist for his favourite flower, should seize on this event to launch his catalogue. Jacob later wrote of the *Little Booke* saying a copy of this little book is: “One of my literary treasures. It contains 84 varieties of which the most expensive were ‘Sir Watkin’ 3s-6d, ‘Emperor’ 2s-6d, ‘Empress’ 2s-6d and ‘Princess Mary’ 2s-6d; while one bulb of every kind listed might have been bought for something under £3.”<sup>(74)</sup> Hartland re-issued his catalogue annually from 1884 until his death in 1912. It was one of the earlier issues that initially stimulated the young Guy Wilson’s interests in white daffodils.

Another of Hartland’s publications had as its outer cover a map of the world captioned round the margin with the words “Hartland’s Daffodils annually sent to all parts of the world via Liverpool and London”<sup>(75)</sup>. There was an enlarged inset of the British Isles in which Cork was the only name to appear, this being “the true home of daffodils”. This perhaps indicated Hartland’s strong nationalistic streak that led him to advertise packets of shamrock seed as a St Patrick’s Day present for the exiled Irish. He tended, however, to control his nationalism at least to the extent that he did not fall foul of people in high places. It did not prevent him, for example, from placing a cluster of ‘Horsfieldii’ in the Royal Carriage at Ballyhooly Railway Station at the start of the visit of Queen Victoria to Cork in 1885. The Queen was seen to be wearing the spray as she entered the city. In the same year, Hartland sent a box of his new *Narcissus* ‘Rip van Winkle’ to the Princess of Wales at Buckingham Palace for which he received her grateful thanks.

While Hartland believed that the Irish climate produced the finest quality bulbs, which he exported to all parts of the world, the mildness also had the disadvantage of making his daffodils flower too early for the English shows, thus depriving him of “a host of medals and awards”<sup>(76)</sup>. Hartland referred to Ard Cairn Nursery as “Haarlem in South Cork” in the same publication and it was he who pioneered exports to the Netherlands, establishing close ties with Simon Adrian de Graaff of Leiden in the late 19th century. At about the same time, his first bulb exports to Sir Heaton Rhodes at Tai Tapu, New Zealand were made.

Another interesting Hartland publication appeared in 1890. It consisted of 49 illustrations of daffodils drawn by his niece Gertrude Hartland, a keen daffodil observer and artist of no mean accomplishment. By 1890, Hartland had collected many wild white hybrids among which were ‘Bishop Mann’, ‘Colleen Bawn’, ‘Hartland’s Leda’ and ‘Helen Falconer’. Many bore a resemblance to white species, ‘Colleen Bawn’ being described as a greatly magnified *moschatus*. All were illustrated by Gertrude Hartland in *Daffodils*<sup>(77)</sup> of 1890.

One of the problems of the late 19th century, brought about by the increasing number of hybrids, was the need for a new system of classification: indeed, this was one of the reasons for calling the 1884 Daffodil Conference. Some degree of uniformity in classification was being sought, yet as late as 1885 Hartland still used some quaint sectional names in his *Little Booke*<sup>(78)</sup> of that year. These included the Coffee Cup Section, Tea Cup Section and Tea Saucer Section, their use drawing considerable criticism from the Revd G.H. Engleheart who accused Hartland of “doing his best to make the lamentable confusion of *Narcissus* nomenclature worse confounded”<sup>(79)</sup>. He went on to advise Hartland to get it revised by authorities competent in such matters as “languages, living and dead”. Notwithstanding this somewhat harsh judgement, Hartland played a prominent part in the renaissance of the daffodil through his collecting, breeding, growing and publicising of the flower he loved. His over-riding interest in white daffodils kindled the early enthusiasm of Guy Wilson for these flowers and, had Hartland’s work achieved nothing more than this, it would perhaps have been sufficient. Let the final judgement rest with the Revd Jacob, who suggested in 1910 that: “Thanks to the labours of Mr. Peter Barr, Mr. W. Baylor Hartland and others the daffodil has become overwhelmingly popular.”<sup>(80)</sup>

### ***The Richardsons of Waterford (1890-1978)***

Joseph Lionel Richardson (Plates 8.7 and 8.8) was born at Tramore, Co. Waterford in 1890 into a highly respected family whose early roots were deeply implanted in the soil of Ulster. Shortly after his birth, the family moved to Prospect House, Waterford, a stately residence, to the door of which daffodil lovers from all parts of the world beat a well-worn path for close on half a century.



It has already been noted how Guy Wilson's interest in daffodils was first stimulated by those growing around his family home. So it was with Richardson, whose interest was aroused at the age of 20 by the sight of daffodils that his father had planted in the garden at Prospect House. After this, he was quick to establish himself as a daffodil grower, being fortunate in having several good friends who made this possible. Most important in this respect were Sir Frederick Moore, Director of the Royal Botanic Garden, Glasnevin, Dublin and Miss F. Currey of Mall House, Lismore, Co. Waterford. Miss Currey was already an established daffodil grower and regular exhibitor in Dublin, Birmingham and London, having first shown daffodils at the Spring Show in Dublin in 1895, when she won two first prizes and was awarded the Royal Horticultural Society of Ireland Silver Medal for a Collection of Daffodils. It was through her help that Richardson obtained a small collection of the latest cultivars, which was further expanded a little later through the sale of bulbs of 'Glorious', chiefly to the Netherlands. It was Sir Frederick Moore who made a gift of part of the stock of this cultivar to Richardson who, realising its potential as a commercial cut flower, quickly acquired the remainder of the stock from other sources. It was chiefly the sale of 'Glorious' bulbs that enabled Richardson to purchase stock of the best new cultivars then available. The period between 1910 and 1920 was primarily concerned with the building-up of stocks and the sale of cut flowers but it also saw the start, and indeed the first results, of his breeding work that he had been encouraged to take up by Miss Currey and Sir Frederick.

It was during this period that Richardson started to make his mark as an exhibitor. He first showed daffodils at the Dublin Show in 1912 when he won all the prizes available for Poetaz cultivars. In 1914, he was back and won most of the major prizes. The Revd Macduff Simpson maintained in his show report that: "The blooms staged by Mr. Richardson of Waterford ... were of exceptional quality and deserve the highest praise."<sup>(81)</sup> One year later, Richardson won the Show's most coveted award, the Lord Ardilaun Cup, presented for an exhibit of 50 cultivars. The daffodil section in that year was judged by E.A. Bowles, for many years Chairman of the Daffodil and Tulip Committee of the Royal Horticultural Society who, commenting on Richardson's exhibit, said: "It is good to have learned that ... Mr. J. Lionel Richardson can both grow and stage blooms ... as well as any man living."<sup>(82)</sup> Richardson continued to win the Lord Ardilaun Cup annually until he decided to relinquish his amateur status by issuing his first catalogue in 1923.

Subsequently, he pursued a full-time career in daffodil breeding, being ably assisted from the late 1920s until his death in 1961 by Jack Goldsmith (Plate 8.7).



**Plate 8.7.** Daffodil breeders and enthusiasts in 1929. Left to right, standing: J.L. Richardson, Sir Wm Fitzherbert, Guy L. Wilson, E. Mudge, B.Y. Morrison (USA), W.A. Watts, L. van Leeuwen (the Netherlands), John Shaw, Jack Goldsmith; seated: H. Smith (Director, Robert Sydenham and Co.), Revd J. Buncombe, Mr Humphreys (Curator, Edgbaston Botanic Garden).



**Plate 8.8.** J.L. Richardson at the London Daffodil Show (undated).

Turning professional had been encouraged following the awards by the Royal Horticultural Society of Ireland of First Class Certificates for his new cultivars ‘Helen O’Hara’ (1W-W) and ‘Royal Ruby’ (3W-R), and Merit Certificates for ‘Golden Prospect’ (1Y-Y) and ‘Marquis of Headfort’ (1W-Y), in 1920. Other successful seedlings also appeared during this early period: the most noteworthy were ‘Golden Pedestal’ (2Y-Y), which received an Award of Merit (RHS) in 1922 as an exhibition flower, and the bicolor trumpet ‘Silverspring’ (1W-Y). Richardson’s early breeding work was carried out in a somewhat haphazard manner compared with the high standards of his later written records and, as a consequence, little is known of the parentage of many of these cultivars.

Richardson’s first catalogue contained only three cultivars that he had raised himself: ‘Helen O’Hara’, a fine white trumpet described as “a great addition to this section second only to ‘Beersheba’”; ‘Golden Pedestal’, “without doubt the finest self-yellow *Incomparabilis* yet seen”; and ‘Silverspring’, “a flower with very tall, strong stems and a fine garden plant”<sup>(83)</sup>. In 1923, Richardson listed the new cultivar ‘Fortune’ at £40 per bulb, but the venture appears to have been successful, as he had no bulbs left to list in the following season. The sale of high-priced bulbs such as ‘Fortune’ and ‘Glorious’, which was listed at five guineas (£5.25) in 1924, enabled Richardson to visit the leading breeders of the day and purchase some of their best seedling stocks. Luckily, this process was able to continue for several years until his own seedling stocks became more numerous, owing to the fact that the prices of ‘Fortune’ and ‘Glorious’ remained relatively high for some considerable time. His 1930 catalogue listed the former as “price on application” and the latter at £2 per bulb. The 1920s and early 1930s were characterised, therefore, by the purchase of new seedling stock that enabled Richardson to pursue his aim of considerably improving the yellow and red daffodils. To this end, he bought the complete stock of what were to prove to be five extremely important seedlings – ‘Carbineer’ (2Y-O) from A.M. Wilson, ‘Diolite’ (2Y-YYO), ‘Marksman’ (2Y-O) and ‘Rustom Pasha’ (2Y-O) from Miss Evelyn, and ‘Penquite’ (2Y-O) from P.D. Williams. He bought part of the stock of ‘Porthilly’ (2Y-O) and ‘Tregoose’ (2Y-O) from Williams, and earlier had bought ‘Carlton’ (2Y-Y), ‘Damson’ (2WWY-R), ‘Folly’ (2W-O), ‘Godolphin’ (1Y-Y), ‘Killigrew’ (2Y-O) and ‘Saint Egwin’ (2Y-Y) from him also.

The 1920s marked Richardson’s arrival on the London Daffodil Show scene where in 1925 he received his first Gold Medal “with special congratulations of the President and Council of the Royal Horticultural Society”<sup>(84)</sup>. Richardson’s daffodil breeding had started in earnest following visits to the Brodie of Brodie in Morayshire and P.D. Williams in Cornwall during 1923, where he saw many really bright yellow and red daffodils. From the stocks already mentioned, and the expensive ‘Fortune’ and ‘Hades’, purchased from R.O. Backhouse in 1925, he raised several cultivars which were a considerable improvement on their predecessors. Outstanding among these were ‘Bahram’ (‘Porthilly’ × ‘Penquite’) and the excellent ‘Royal Mail’ and ‘Sudan’ that had ‘Tregoose’ as their seed parent, the pollen parent of the

latter being 'Hades'. 'Carbineer' crossed with 'Porthilly' gave rise to 'Narvik' and 'Peiping', while crossed with 'Bahram' it produced 'Revelry' and 'Border Chief', the latter in turn giving rise to the brilliant 'Irish Light'. Probably the best of all the cultivars that Richardson raised in this section (strongly coloured yellow and orange/red daffodils), however, involved the cultivars of Miss Evelyn, sometimes in combination with those of P.D. Williams. They included some outstanding rimmed cups and sun-proof yellow and orange/red daffodils, the best being 'Red Goblet', 'Sun Chariot' and 'Ceylon'. A new standard was set by 'Ceylon', which remained the supreme flower of its type for many years before being superseded by some of its progeny – of which 'Vulcan', a flower of amazing brilliance of colour, 'Falstaff' and 'Pinza' have proved to be outstanding. Although 'Hades' was marginally involved in the improvement of the yellow-reds, its major contribution was with the white and reds to which Richardson next turned his attention. Before Richardson took a personal hand in this work, however, Jack Goldsmith, the gardener at Prospect House, crossed 'Niphetos' with an unnamed white and red seedling to produce 'Fermoy', an outstanding bright-coloured daffodil that received two Awards of Merit and a First Class Certificate.

Ever since those early days in his breeding career, when he raised the small-cupped white and red 'Royal Ruby', Richardson was determined to become personally involved in the improvement of this colour group and 'Hades' was to be his vehicle for doing so for, when crossed with 'White Sentinel', it produced a seedling that was to prove to be a major breakthrough. It was later named 'Kilworth'. A few years later, a second seedling appeared, subsequently named 'Arbar' which, when crossed with 'Kilworth', proved to be one of the most successful pairings in the whole of daffodil history. This particular cross was made on five separate occasions, producing 2,400 seeds that in turn produced 30 named cultivars, many being of outstanding quality. The names of the 'Kilworth' × 'Arbar' offspring are now legendary in daffodil circles, those that received the highest honours being 'Avenger', 'Don Carlos', 'George Leak', 'Kilmurry', 'Norval', 'Orion', 'Pirate King' and 'Rockall'. While still numbered seedlings, Richardson took about 20 flowers from these plants to the London Daffodil Show for the purpose of giving George Leak, for many years a colleague on the Daffodil and Tulip Committee of the RHS, the opportunity of choosing a flower to bear his name. Thus the cultivar 'George Leak' was registered in 1960. A long-standing friendship had been duly honoured.

Richardson's attention was next focussed on pink daffodils. His first encounter with this type of flower among his own seedlings occurred early in his career with the appearance of 'Fanny Currey', registered in 1925. A further dozen years were to pass, however, before the next pink cultivars were registered: 'Kenmare', and the very important 'Rose of Tralee', which opened the way for the great advances that took place during the following quarter of a century. From an open pollination, it gave rise to the magnificent 'Salmon Trout', which was for many years the most outstanding pink cupped daffodil. But this was only the beginning of what turned out to be an avalanche of world-beaters, the most famous of which were 'Infatuation', 'Romance', 'Rose Caprice', 'Rose Royale' and 'Salome'.

During the early years of his hybridisation work, Richardson had paid little attention to the advancement of yellow trumpet daffodils – they often proved difficult to breed as well as being rather susceptible to Basal Rot. It was only following the appearance of the seedlings later named 'Goldcourt' and 'Kingscourt' that his interest was aroused. Thereafter, first class daffodils of this type appeared with astonishing regularity – 'Spanish Gold' (1948), 'King's Ransom' (1950), 'Arctic Gold' (1951), 'Golden Rapture' (1952), 'Viking' (1956), 'Golden Horn' (1958) and 'Arkle' (1968). During a visit to Prospect House by Guy Wilson the visitor went missing. He was duly located sitting on a path with his gaze fixed on a bed of 'King's Ransom'. All he said, without moving, was: "Bring my tea out here, I can't take my eyes off that flower. It is the most perfect yellow trumpet I have seen."<sup>(85)</sup> Such appreciation by a connoisseur was surely the true reward for the thought and patience that had gone into its creation.

Although the creations of Lionel Richardson were of outstanding importance and merit in several groups of daffodils, those to which he perhaps made the most significant contribution were the garden doubles that were to all intents and purposes created at Waterford. Their story is a fascinating one that started with one of those strokes of luck that litter the pages of plant breeding. Double daffodils had always been notoriously difficult to breed from because, in the doubling process, the sexual parts of the flowers become so modified that they are unable to fulfil their normal functions. The earliest of double forms had arisen as a result of mutation from normal single-flowered forms, thereafter maintaining this habit owing to

the vegetative method of their propagation. What happened at Waterford, however, was different. In 1929, Richardson found, purely by chance, a pod containing viable seed on the old white and orange cultivar 'Mary Copeland'. This seed, when collected and sown, gave rise to six seedlings, only one of which was considered to be worthy of retention – a double with very white petals and red petaloids. It was later named 'Falaise' and, although judged by modern standards it would have been far from ideal, it did possess some remarkable qualities, in particular a delicious scent which, in conjunction with its very white petals, indicated to Richardson that *poeticus* may have been involved in the cross. Apart from its outward appearance 'Falaise' had one attribute found in no other double daffodil at that time: it was fertile as a seed parent, so opening the way to the modern doubles that are seen in present-day gardens. Richardson crossed 'Falaise' with daffodils from many other divisions and all proved to be compatible, an amazing range of colours appearing in the offspring. Some of the most noteworthy are 'Acropolis' (white/red), 'Candida' (white/yellow), 'Double Event' (white/yellow), 'Fiji' (yellow), 'Gay Time' (white/red), 'Hawaii' (yellow/orange), 'Monterrico' (white/orange), 'Papua' (yellow) and 'Takoradi' (white). 'Gay Time' proved to be almost as important as 'Falaise' in advancing double daffodils, for it gave rise to a whole new family of doubles, including 'Gay Buccaneer' (4Y-O), 'Gay Cavalier' (4Y-O), 'Gay Challenger' (4W-O), 'Gay Record' (4W-O), 'Gay Song' (4W-W), 'Gay Symphony' (4W-Y) and 'Gay Trip' (4W-R). More recently, double daffodils underwent further improvement at the hands of Mrs Richardson (Plate 8.5) who took over when her husband died in 1961. Using cultivars raised by Lionel Richardson, she raised the first pink doubles to appear in Ireland by crossing the large-cupped 'Marietta' with the double 'Irani' (4W-Y), the resulting cultivars being named 'Pink Champagne', 'Pink Gin', 'Samantha' and 'Viennese Rose'.

The Waterford story ended in 1978 when Mrs Richardson died but the breeding aims so long pursued there have been continued and developed by Brian Duncan in Ulster as illustrated by the appearance during the 1970s of 'Pink Pageant' and 'Pink Paradise'. Both were raised from Lionel Richardson's 'Falaise' × 'Debutante' seedling crossed with Mrs Richardson's 'Polonaise'. The Richardson contribution to daffodils was significant in terms of quality, volume and sheer invention. Seven hundred and seventy three seedlings were named; the yellow/reds, the white/reds and the pinks were improved beyond recognition; and the modern doubles were created from scratch. On the show front, that most prized of all daffodil trophies, the Engleheart Cup, returned to Waterford on no fewer than 33 occasions, while Lionel himself won 64 Gold Medals for his exhibits at the London Shows of the Royal Horticultural Society. It is unlikely that their achievements will ever be challenged.

### **James Coey (1863-1921)**

James Coey was a somewhat enigmatic figure in Irish horticulture, chiefly owing to an absence of records and references to his considerable contribution, no aspect of which was more important than the influence exerted on the development of daffodil interest in Ulster during the first two decades of the 20th century. Born in Larne, Co. Antrim, Coey is perhaps best remembered as the proprietor of the Donard Nursery at Newcastle, Co. Down. He purchased the lease of the nursery in 1912 but, both before and afterwards, Coey was growing plants in his native Larne. It was there that Guy Wilson visited him and saw many of the latest daffodil introductions, describing what he witnessed at Larne in the spring of 1919 as "a sumptuous feast of the finest daffodils in the world"<sup>(86)</sup>. Coey built the Donard into one of the leading nurseries in Ireland, enjoying an international reputation for the range and quality of his stock.

As a young man, Guy Wilson frequently visited Coey at Larne, where a considerable programme of daffodil growing and breeding was being undertaken. Coey, who was a man of considerable means, was also in the habit of purchasing some of the best stocks of seedlings raised by Engleheart and other prominent breeders of the day. Most famous among these was the seedling exhibited at the London Forced Bulb Show in 1914, described by Wilson at the time as "a gorgeous yellow Ajax"<sup>(87)</sup>. The stock had been bought from Engleheart by Coey, who named it 'Magnificence'. It later became one of the leading cut flower cultivars in both Britain and the Netherlands, still being widely grown for that purpose many years after its introduction. Another yellow trumpet daffodil purchased from Engleheart was 'Splendour' but this cultivar never achieved the status of 'Magnificence'. Wilson not only gained an insight into what the master hybridist Engleheart was raising, but was also greatly encouraged by Coey, who bought several of his own early seedlings. Coey was also instrumental in introducing Wilson to the Brodie of Brodie, accompanying him on his first visit to Brodie Castle in 1920 in what was to become an almost unbroken annual pilgrimage and which continued until Brodie's death in 1943. It was during the initial visit that

Wilson saw 'Beersheba' and 'Fortune' for the first time. The impact that Coey had on Wilson is perhaps summed up by a comment in Wilson's Record Book at the time of Coey's death.

"This has been a sad season for me from the outset, for in the first week of February James Coey died after a three-week illness. I am sure that as long as I live I shall not cease to miss him."<sup>(88)</sup>

On the death of Coey in 1921, the Donard Nursery (which was renamed the Slieve Donard Nursery around 1928) was taken over by William Slinger (1887-1961). He had joined Coey in 1910 as his nursery manager, having come to Ireland from Yorkshire three years earlier as a rose grower to Alex Dickson of Newtownards. An important aspect of the work at the Donard/Slieve Donard Nursery was concerned with the breeding of new shrub cultivars, especially of *Escallonia*, *Potentilla* and *Viburnum*, for which the nursery achieved international fame. Although the main interest in daffodils after 1921 was as a cut flower crop, the amount of hybridisation carried out in the years prior to this was considerable, as shown by the award of the Engleheart Cup to Slinger in 1922. He was the first hybridist in Ireland to achieve this success and undoubtedly did so with Coey's seedlings. In fact, almost all the cultivars registered under the Donard name appeared prior to the mid-1930s, and most were probably from crosses made by Coey. Some, however, were certainly the work of Slinger, including the important 'Solid Gold', winner of both an Award of Merit (1931) and First Class Certificate (1936). There is good evidence to support this view. When Lord Aberconway presented the Peter Barr Memorial Cup to Slinger in 1940 he noted that he had raised a number of fine varieties including the best of all, the refined yellow trumpet 'Solid Gold'. Certainly Slinger had an enviable reputation as an exhibitor of daffodils, not only in Ireland but also at the English and Scottish shows, where the consistently high standard of his flowers featured over many years.

### ***In the 'footsteps' of Guy Wilson***

The presence of Guy Wilson (Plates 8.5 and 8.7) at Broughshane, working on the improvement of daffodils for almost 60 years, inevitably influenced those in the vicinity who had the slightest interest in this plant. He gathered quite a band of enthusiasts around him, giving them not only inspiration through the high standard of his own work and the international recognition which it achieved, but also by his frequent gifts of bulbs which, if not actually free, were parted with for a fraction of their catalogue price. In time, some of these enthusiasts also went on to become internationally acclaimed hybridists in their own right. Others worked on a much smaller scale in the gardens surrounding their homes, gaining immense pleasure and comradeship through what for many became an all-consuming hobby. Among those who have left an indelible mark on the progress of daffodil improvement are W.J. Dunlop, Tom Bloomer and the Reades, all of whom lived within a few kilometres of The Knockan.

Dunlop (?-1990) was born in Ballymena, 5 km to the east of Broughshane. His father owned a drapery business in Ballymena. Like Wilson, he initially went into the family business and – similarly, before quitting – had become deeply involved with daffodils as an amateur, making his first crosses in 1937 and exhibiting in London for the first time two years later. This early love of plants and the death of his father both encouraged and facilitated the move from shop counter to a career as a professional daffodil grower. When he was advised by his doctor to take up outdoor work, he needed no second telling. Following his doctor's orders, Dunlop purchased a farm overlooking the Braid Valley and about 5 km to the south-west of Broughshane: so as a young man he frequently visited Wilson with whom he forged a close and lasting friendship. Prior to turning professional, Dunlop had acquired a considerable reputation as an amateur exhibitor at Ballymena and Coleraine, sweeping the boards with his prize-winning displays at the latter town's Spring Shows in 1940-1942. By this time, he had a large collection of bulbs in his garden, and shortage of space to expand began to become a problem. This was another reason for purchasing the farm where, incidentally, the soil was that deep glacial loam which neither compacts nor water logs, making this area of Co. Antrim so ideal for bulb growing. On becoming a full-time grower, he was rewarded with almost instant success. His trade groups received Gold Medals in Dublin in 1942 and 1945. Once World War II ended, the Royal Horticultural Society's Shows resumed in London and he had many successes there, including Gold Medals in 1949 and 1950. Although Dunlop never won the premier award, the Engleheart Cup, he did get a well-deserved second place in 1963.

His favourite type of daffodil was that which possessed a red corona: his most outstanding, with white perianths, were 'Enniskillen', 'Glenwherry' and 'Irish Splendour'. The best of the yellow/reds were 'Craigwarren', 'Elmwood', 'Moneymore' and 'Red Ranger'. Undoubtedly, however, his best known cultivars are 'Newcastle' and 'Ormeau'. 'Ormeau', a large-cupped yellow, possessed all the qualities for an exhibition daffodil and first-class garden plant. Its popularity quickly spread all over the world, especially in the USA where its perfect form and rich gold yellow colour helped it to outclass the previously dominant 'Galway'. 'Newcastle' was the outstanding white/yellow trumpet bicolor of recent years, being voted Best Bloom at the London Show in 1962 and 1969. Dunlop's career ended prematurely in 1973 when he slipped, breaking a femur, from which it took him a considerable time to recover. While Dunlop always worked in the shadow of 'The Master' Wilson, his contribution to daffodil progress, though not comparable, was nevertheless considerable. 'Newcastle' will always occupy a special niche in the history of daffodil progress and excellence, while other fine types such as 'Irish Splendour' featured in many later breeding programmes.

Dunlop's activities formed a bridge between the Wilson era and that of the more recent hybridists in Northern Ireland, particularly Kate Reade (1923-), who also worked at Broughshane until retiring. Kate Reade's daffodil breeding took place at Carncairn Lodge, Broughshane, a finely proportioned Georgian mansion dating from about 1740. When she moved there from Belfast in 1951, the grounds already contained many daffodils, the long drive being lined with several miniature species such as *N. bulbocodium*, *N. cyclamineus* and *N. rupicola*. These were cared for by the gardener, John Maybin, who was already afflicted with 'Yellow Fever', having worked for Guy Wilson. During a visit to the Ballymena Spring Show shortly after arriving at Broughshane, Mrs Reade saw exhibits of the latest cultivars that so impressed her that she decided to buy some from Guy Wilson so that she too might compete in these classes. Later that year she paid Wilson a visit, accompanied by John Maybin, who was rather a favourite of his ex-employer. Thinking she was being somewhat extravagant, Mrs Reade asked Wilson for £1 worth of bulbs suitable for exhibition. What she had no idea of at that time was the price at which newly introduced cultivars normally changed hands. Wilson offered her a bag containing cultivars such as 'Chinese White', 'Cotterton', 'Golden Torch', 'Postmistress' and many others, all for £1. Being of a generous disposition, Wilson handed the bulbs over without so much as a hint that the £1 would not normally have been sufficient to purchase half a bulb of 'Chinese White'. Indeed, it was not until several years later – when the original purchase had multiplied and had been planted out in a field – that the true value of the bulbs was fully realised. There was, for example, a bed of 'Cotterton', listed at that time in Wilson's catalogue at £1 per bulb. Since then, hybridisation at Carncairn has produced many excellent cultivars, such as 'Coolattin', 'Coolgreany', 'Dromona', 'Gaybrook' and 'Irish Ranger'. Perhaps two, however, stand out above all the others: the exceptionally fine reverse bicolor 'Gin and Lime'; and 'Foundling', the appearance of which heralded the establishment of an entirely new family of daffodils, the pink *cyclamineus* hybrids.

Although Guy Wilson's immediate successor, W.J. Dunlop, was a professional grower of daffodils, the strength of amateur interest in Ulster and especially in the Ballymena area was such that no one could be complacent. One of the leading amateur hybridists was Tom Bloomer (1905-1989), who excelled not only locally but also in London where he won the top amateur prize, the Bowles Cup, three years in succession (1955-1957). In 1956, he also won the P.D. Williams Silver-gilt Medal and the Barr Vase, which was a remarkable achievement. Living within 8 km of Guy Wilson and W.J. Dunlop, it was inevitable that his frequent visits to these two leading hybridists should lead him to try his hand at daffodil breeding. His first crosses were made in 1949, and between 1950 and 1973 he sowed almost 16,000 seeds resulting from his hybridisations. As with Wilson before him, Bloomer's outstanding achievements have been in the raising of superb white cultivars, the most outstanding being 'Silent Valley', 'White Empress' and 'White Star'. All these were raised from the same cross that used two of Wilson's favourite white trumpets, 'Rashee' and 'Empress of Ireland'. Bloomer's successes were not confined, however, to white daffodils for, in addition, he raised several fine yellows, including 'Golden Jewel' (2Y-GYY), 'Golden Joy' (2Y-Y) and 'Midas Touch' (1Y-Y), all from 'Camelot' × 'Arctic Gold'.

By 1971, Bloomer's seedlings were in such demand that he decided to establish Rathowen Daffodils in order to release them to other daffodil enthusiasts. Rathowen developed to such an extent during the succeeding two seasons that the increased workload, together with advancing years, gave

Bloomer less and less time to devote to the enjoyment of his daffodils for their own sake. As a result, he decided in 1973 to give up the business side of his daffodil activities, which passed to Brian Duncan.

Another Ulster hybridist who knew Guy Wilson, but worked further afield than the Ballymena and Broughshane triumvirate, was Sir Frank Harrison (1910-2002), who raised daffodils at Ballydorn, Killinchy, Co. Down. He began his daffodil enterprise towards the end of World War II on his farm on the shores of Strangford Lough, which had previously been devoted to cattle and sheep with some cereals and vegetables. At the time he decided to go into bulbs, it was extremely difficult to obtain stocks – owing to wartime regulations that prohibited the growing of flower crops on land that was fit to grow vegetables and other food crops. Established professional bulb growers in Ulster, like Wilson and Dunlop, had been allowed to retain small stocks, but in the Republic of Ireland, which was neutral, no cropping restrictions were in force during the war. Consequently, Richardson possessed considerable quantities of bulbs. There was a snag, however, to Harrison obtaining his bulbs from Richardson, for there were restrictions on the import of what were termed non-essential materials. A Government licence had to be issued before such imports could be made. Harrison duly obtained one on the premise that a new post-war cut flower trade was to be established in Northern Ireland. Thus, the first bulbs from Waterford arrived in 1944, and these were augmented in the following year by some bulbs from Guy Wilson. A considerable cut flower and bulb trade was built up within a few years. The majority of the flowers were marketed in Edinburgh and Glasgow, where prices were much better than could be obtained locally.

Hybridisation commenced in the early 1950s, the aims being to raise both very early and very late cultivars for those parts of the season when prices were at their highest. This was one of the few occasions on which such a programme has been carried out privately.

There was also interest in inducing new colour breaks through the treatment of daffodil seeds with gamma radiation. Several thousand seeds from ‘Alight’, ‘Boswin’ and ‘Porthilly’ were sent to the British Atomic Energy Authority at Harwell. The first orange/red daffodil to result from this radiation treatment was ‘Rio Rouge’ that emerged from a cross between ‘Foxhunter’ and an ‘Alight’ seedling that had grown from irradiated seed.

Harrison was a Queen’s Counsel (QC) involved with the Boundary Commission in establishing new electoral areas in Northern Ireland. In the 1950s and 1960s, he grew flowers on a large scale and was a bulb grower to the wholesale trade in addition to all his work hybridising daffodils. By 1972, pressure of public duties made it necessary for Frank Harrison to alter his pattern of horticultural production by reducing the number of cut flowers that he grew. This provided the time and opportunity to increase the size of the hybridisation programme: the raising of new cultivars became his main enterprise.

Frank Harrison’s main interest was in raising cultivars with deep green eyes: ‘Fairmile’, ‘Faraway’, ‘Jamestown’, ‘Lancaster’ and ‘Lisbane’ are excellent examples. Success was not, however, solely confined to the small-cupped, green-eyed daffodils for his ‘Churchman’ (2W-W) had also been outstanding, winning First Prize in its division at the 1969 London Show along with a Silver Simmonds Medal. Nor was its success confined to Britain, for in 1973 it featured in a group that won the Carey E. Quinn Gold Medal at the National Convention of the American Daffodil Society. It was also voted Best Flower, Garden Club of Virginia in 1974. ‘Monkstown’ (2Y-Y) is another fine daffodil of deep colour and robust constitution, which may prove to be a successful cut flower cultivar and is certainly an excellent garden plant.

All the hybridists in Ulster mentioned so far were active during Guy Wilson’s lifetime. The only Ulster breeder who did not know Wilson personally and started work after ‘The Master’s’ death was Brian Duncan (1934-). His only early exposure to daffodils had been the sight of the old double ‘Van Sion’ around the farmhouse into which his family moved in 1939. Another daffodil remembered from those early days was the *N. poeticus* ‘Pheasant’s Eye’, discovered growing in an old orchard. Between 1939 and 1959 Brian Duncan, who had undergone an agricultural training, cannot remember noticing “a daffodil of any kind”<sup>(89)</sup>. It was only after his marriage and the purchase of a house in 1959 that pride of home ownership made him consider planting the 0.2 ha of compacted soil and builders’ rubble that surrounded it. In the autumn of 1960, he purchased a selection of bulbs that included ‘Beersheba’, ‘Fortune’, ‘Mrs R.O.

Backhouse' and 'Unsurpassable'. It was only after these had flowered that he was introduced to the wonderful new daffodil creations of Guy Wilson by Alan Smith, a college contemporary who had trained in horticulture.

The first batch of these bulbs was purchased from Guy L. Wilson Ltd for, by this time, Wilson was dead and his bulbs were growing in Kent. Single bulbs of twelve cultivars were acquired at 2s 6d (12.5p) each and, as soon as these flowered, Duncan realised the remarkable advances which had been made in terms of form, colour, size and in all other respects over the older varieties which he had purchased originally. The next important step in the development of Duncan's awareness of daffodils was a talk and demonstration given by Tom Bloomer at a meeting of the Omagh Horticultural Society on 6 May 1963. Following this meeting, Duncan joined Wilson, in spirit at least, when he "was confirmed as an incurable member of the yellow fever fraternity"<sup>(90)</sup>. Within a few days he had made his first cross between 'Kilworth' and a pink daffodil, possibly 'Interim', which had been given to him by Bloomer. The following year saw the first of what were to become annual visits to Prospect House, the breeders in the Broughshane area and the London Show. By the end of the 1964 season, he was familiar with all the best daffodils available at that time, including 'Canisp', 'Olympic Gold' and 'Rose Royale'.

The idea of breeding pink daffodils was uppermost in his mind but he could not afford to buy the best pink cultivars, 'Rose Royale', for example, was then priced at £30 per bulb. Mrs Richardson, however, generously provided him with blooms of 'Debutante', 'Rose Caprice', 'Rosedew', 'Rose Royale' and 'Salmon Trout' to use as pollen parents. He had already purchased all the less expensive pink cultivars from Waterford and also those raised by W.J. Dunlop. Using all of these, Duncan made his first serious crosses in 1964. These early endeavours provided the first successes, one seedling winning the single and three-bloom classes for pinks at Ballymena in 1971. It was subsequently named 'Premiere' and, although its parentage was not recorded in Duncan's records, it is thought to have come from 'Pink Isle' × 'Rose Royale'. Other successes quickly followed, with 'Lilac Charm' winning in London in 1973-1975 and 'Delta Wings' at Omagh in 1975. More recently, there was the introduction of a pair of magnificent pink doubles, 'Pink Pageant' and 'Pink Paradise'. Other notable pinks were 'Fragrant Rose', a strongly scented 2W-GPP, and the trio of yellow/pinks, 'Brindisi', 'Pink Mink' and 'Undertone'. There have been many other successes, in addition to the pinks, such as 'Ulster Bank' (3Y-R), 'Doctor Hugh' (3W-GOO), 'Smokey Bear' (4Y-O) and the beautifully rimmed 'Mount Angel' (3W-YJR). When Tom Bloomer retired in 1973, Duncan traded and exhibited under the Rathowen name for the next 16 years (1973-1988), founding Brian Duncan Daffodils in 1989.

Brian Duncan has been a major hybridiser in recent times receiving gold medals from the RHS for trade displays, the prized Engleheart Cup and the American Hybridisers Trophy, each on several occasions. He was also awarded the M.B.E. for his contribution to daffodil breeding in Northern Ireland and for his services to the RHS Daffodil and Tulip Committee on which he served as chairman.

Ringhaddy Daffodils of Killinchy, Co. Down is run by Nial and Hilary Watson who were introduced to daffodils through the proximity to and the enthusiasm and encouragement of Sir Frank Harrison. They list a wide range of cultivars, including many raised at Ballydorn by Sir Frank and a good selection of Brian Duncan's recent introductions.

A breeder who has come to prominence in the last decade is Dr Derrick Turbitt of Portstewart, Co. Londonderry who caused something of a sensation with his cultivar 'Causeway Sunset' (2Y-R). In its short life, it has already won many prizes about which it has been said that "every once in a while something really special comes along ... this is one such flower because of its wonderful colour ... and its amazingly consistent exhibition quality"<sup>(91)</sup>.

## Scotland and Wales

The Brodie of Brodie (1868-1943) was one of the major hybridists of the 20th century, raising new daffodils at Brodie Castle, Forres, close to the Moray Firth coast, from 1898 until his death. Brodie is probably best remembered for his breeding work with 'Fortune' in which he tried to improve this cultivar, the result being a string of new sorts. Most have now vanished but 'Fortune's Crest', which has the deepest cup colour of any in the series of 44 cultivars bred from 'Fortune' and which were all prefixed with the



name 'Fortune's ...', is occasionally seen. He is also remembered for a range of cultivars covering several divisions, most remarkable of which was 'Broadford' (1Y-Y). Although it only survived long enough to produce one flower, pollen from this single bloom gave rise to 'Royalist', and from this came 'Kingscourt'. Other important yellow trumpets were 'Cromarty', 'Hebron' and 'King of the North'. 'Cromarty' came from 'Hebron', which had 'White Empress' in its parentage: this was one of the earliest attempts to influence refinement in yellows through the use of a white parent – 'Cromarty' possesses a perianth of broad, over-lapping and very smooth segments. 'King of the North' was responsible, along with 'Content', for the creation of the reverse bicolor hybrids and luminous, sulphur-yellow cultivars made famous by Guy Wilson and Grant Mitsch.

Another Brodie cultivar of note was 'Tain' (1W-W), a fine daffodil with 'Beersheba' on both sides of its parentage. Brodie was one of the earliest British hybridists to grow 'Beersheba', which had so impressed Guy Wilson during one of his annual visits to Brodie Castle during the 1920s. 'Swansdown' (4W-W) and 'Wild Rose' (2W-P) were both registered in 1939, and both had 'Mitylene' in their parentage. Brodie and Guy Wilson were the first hybridists to realise the usefulness of 'Mitylene' and its sister seedling 'White Sentinel' in the production of improved pinks. Other fine cultivars raised by Brodie were 'Golden Torch' (2Y-Y), which received three Awards of Merit and two First Class Certificates, for exhibition, as a commercial cut flower and as a garden plant, 'Cotterton' (2W-W), 'Daviot' (2W-OOY) and 'Loch Maree' (2W-P). Brodie Castle is now in the care of the National Trust for Scotland, which is endeavouring to build up an extensive collection of Brodie cultivars within the grounds.

Alexander M. Wilson (1868-1953) began his daffodil growing career at East Keal in Lincolnshire where he farmed for 14 years following his marriage in 1894.

During this time, he became an exhibitor at the London and Birmingham Shows but found that the cold spring weather in Lincolnshire prevented his flowers from being at their best at show time. He therefore decided to move and, in 1908, went south-west to Shovell in Somerset. Something far more serious than cold affected his daffodils at Shovell where Stem and Bulb Eelworm struck with devastating results, the value of his stocks being reduced from £12,000 to £200 in just two seasons. At that time, the true nature of the problem was unknown but Wilson assumed that it originated in imported bulbs. There was little he could do in the way of control, however, as hot water treatment was still a thing of the future. After losing so many bulbs, Wilson decided to move yet again in the hope of finding the perfect place to raise daffodils. This he did when he settled at Presteign in Radnorshire in 1918, where his reputation as a leading hybridist became firmly established. He was chiefly famous for his work with brightly coloured yellow and orange/red daffodils. His best known cultivar is 'Carbineer' (2Y-O), which received three Awards of Merit and a First Class Certificate, and became a leading exhibition, commercial and garden daffodil.

Three others came from crosses made by Wilson but the seedlings were grown on by Miss G. Evelyn, who also lived in Presteign. She is sometimes listed as the 'raiser', a rather loose term that normally indicates the breeder, but not in this case. These three cultivars were 'Diolite', 'Marksman' and 'Rustom Pasha', the first two being fine quality flowers which were frequently exhibited and used in hybridisation. Although 'Rustom Pasha' was not in the same class as an exhibition flower, it did possess the outstanding quality of having a sun-proof corona and was capable of imparting this characteristic to its offspring. When Lionel Richardson acquired stocks of these three cultivars from Miss Evelyn in 1930, he maintained that it was "the best day's buying I ever did"<sup>(92)</sup>. A.M. Wilson's best known daffodil – apart from 'Carbineer' – of which he is acknowledged as the breeder is the beautiful 'Ludlow' (2W-W), recipient of an Award of Merit and a First Class Certificate for use as a commercial cut flower and exhibition daffodil.

The third resident of Presteign associated with the raising of daffodils was Dr Nynian Y. Lower (1872-1926), who bred daffodils there from 1908 until his death. His 'Royalist', a parent of 'Kingscourt', was the leading exhibition yellow trumpet for years and has had a major influence on daffodil improvement. He was also responsible for 'Beauty of Radnor' (2W-WWP), described by Guy Wilson in the 1920s as having "unique colour"<sup>(93)</sup>.

## The Netherlands

The daffodil trade began in the Netherlands in the 16th century, trumpet daffodils, *N. poeticus*, *N. tazetta* and *N. bulbocodium* all being involved. The first recorded import of bulbs into the Netherlands occurred in 1561 when Matthias de Lobel brought *N. tazetta* from southern France. Shortly afterwards came the Double Roman from Constantinople and 'Paper White', again from France. In 1739, the catalogue of Dirk and Peter Voorheim listed 50 different types of daffodil. More recently, and particularly since the late 19th century, many Dutch nursery firms have been associated with the growing of daffodil bulbs for sale and the breeding of new cultivars. Two firms, which achieved considerable stature for their hybridisation work, emerged during this period. They were de Graaff Bros of Noordwijk, which began raising daffodils in 1872 under Simon Adrian de Graaff, and E.H. Krelage and Son, an old established nursery firm from Haarlem that was active between 1900 and 1920.

Simon Adrian de Graaff (1840-1911) was the pioneer of daffodil hybridisation in the Netherlands. A contemporary of Peter Barr, he acquired a similar nickname as the 'Dutch Daffodil King'. Particularly through exchange visits, he established strong links with Hartland and Burbidge in Ireland. After one visit to the Netherlands to see de Graaff's seedlings, Burbidge thought that they were very fine and that they would be very much appreciated when there were sufficient numbers for general distribution. The most famous cultivar that de Graaff registered was the white trumpet 'Madame de Graaff', although its origins may have been in England rather than in the Netherlands, due to the possibility of it being among the seedlings of W. Backhouse purchased by Barr, some of which were later transferred to de Graaff's nursery. It featured prominently in the history of the development of white daffodils through 'Mrs Ernst H. Krelage' and 'Beersheba', one or both being found in the ancestry of many of the best modern cultivars. Another daffodil through which the name of de Graaff is widely known is 'February Gold' (6Y-Y), which was registered as long ago as 1923 but is still readily available and widely grown today. De Graaff was also responsible for raising the first cultivar to show pink colour in the corona. It was named 'Apricot' (1W-P) and was registered in 1898, although recently re-classified as 1W-Y. It is not thought to have played a direct role in the gradual development of pinks during the early 20th century, but it did supply hybridists with inspiration and the knowledge that pink colouration was an achievable goal.

Ernst H. Krelage (1849-1936) represented Dutch bulb growers at the Daffodil Conference in London in 1884. He went on to issue the first Dutch catalogue to be devoted entirely to daffodils in 1899; and it is he who is credited with raising a most important early white trumpet, 'Mrs Ernst H. Krelage', registered in 1923.

J.W.A. Lefeber (1891-1973) began raising daffodils at Lisse in 1912 and was one of the earliest hybridists to develop split corona cultivars. He achieved this by pollinating a freak form of 'Victoria', with an extremely deeply divided corona, with several large-cupped cultivars. He thus established what became known as the Papillon Daffodils, of which 'Cape Kennedy' and 'Papillon Blanc' are perhaps the best known.

J. Gerritsen (1907-1991) began raising daffodils at Voorschoten in 1928 and immediately further developed split corona types. He called those that he raised Collar Daffodils, from the collar that formed when the corona split to the base. During the past 50 years the name of Gerritsen has become almost synonymous with split corona daffodils. It was he who raised many of the best known cultivars, such as 'Cassata' (11aW-W), 'Frileuse' (11aW-Y), 'Orangery' (11aW-OOY), 'Parisienne' (11aW-O) and 'Valdrome' (11aW-Y).

### Other Dutch Hybridists

Many other important cultivars were raised by Dutch hybridists. Perhaps the best known are 'Dawson City' (1Y-Y), 'Golden Harvest' (1Y-Y), 'Mount Hood' (1W-W), 'Thalia' (5W-W) and 'Unsurpassable' (1Y-Y). 'Thalia' was raised by van Waveren of Hillegom in 1916. It has remained one of the favourite *triandrus* hybrids and received an Award of Merit and a Forcing Award from Haarlem. 'Dawson City' was raised by van Tubergen of Haarlem in the early 1920s. It subsequently enjoyed considerable popularity as a cultivar for cutting (Award of Merit and First Class Certificate, Haarlem) and

as an exhibition flower and garden plant, for which it received Awards of Merit from the Royal Horticultural Society in 1925 and 1930. 'Unsurpassable' is a deep yellow trumpet raised by G. Lubbe of Oegstgeest. It has enjoyed considerable popularity as a commercial cut flower and received both an Award of Merit and a First Class Certificate from Haarlem. 'Mount Hood' came from P. van Deursen of Sassenheim and, although registered in 1937, is still widely grown today. Then there is 'Golden Harvest'. Over the years this has been, perhaps, the closest rival to 'King Alfred' as the leading commercial cultivar; it is also excellent as an early forced flower. It was raised by Warnaar and Co. of Sassenheim and received the top awards from Haarlem.

The career of Professor E. van Slogteren (1888-1968) began in 1917, when the ravages of the Stem and Bulb Eelworm were at their worst. He immediately became involved in the formulation of suitable hot water treatments to control this pest. Under his leadership, the Flower Bulb Research Laboratory was established at Lisse, where it achieved a position of international prominence in the field of bulb research. Later, Slogteren became involved in work on abnormalities of foliage and flowers, which he proved to be of viral origin and *Aphis*-transmitted; this led on to the formulation of control measures. His work was honoured in many countries: in England with the award of the Peter Barr Memorial Cup in 1938; and in the USA by the American Horticultural Society in 1955 and the American Daffodil Society in 1959.

## Portugal

As Portugal is home to many daffodil species, it is unsurprising that Coimbra University was heavily involved in the study of these plants over a period of many years. At the end of the 19th century, the academic who pioneered this work was Professor J.A. Henriques. His name is remembered in the Jonquil, *N. jonquilla* var. *henriquesii*, but his most important work on daffodils was *Amaryllideas de Portugal*<sup>(94)</sup>, published in 1887.

The tradition at Coimbra for research into the daffodil species was perpetuated in the 20th century by Professor Abílio Fernandes (1906-1994), whose doctoral thesis examined the chromosomes of both Liliaceae and Amaryllidaceae. Two years later, in 1933, he was appointed Assistant Professor following submission of a work entitled 'New caryological studies of the Genus *Narcissus* L.'<sup>(95)</sup>. He was appointed Professor in 1937 and in 1942 took up the Chair of Botany and was made Director of the Botanical Museum, Laboratory and Garden. His earliest study, after being appointed Professor, was on the diagnostic characteristics of *N. jonquilla*, *N. gaditanus* and *N. jonquilloides* (syn. *N. willkommii*). This research revealed the intermediate nature of the last-named, suggesting that it could be a hybrid of the other two species. This he later confirmed through cytological investigation. Fernandes also carried out detailed cytological studies on *N. bulbocodium* and its allies, showing in particular the relationship between *Narcissus bulbocodium*, *N. cantabricus*, *N. romieuxii*, *N. hedraeanthus* and *N. obesus* (syn. *N. bulbocodium* subsp. *obesus*). He also worked on heterostyly in *Narcissus*. Like his predecessor Henriques, Fernandes is also celebrated in one of the beautiful native species of southern Portugal, *N. fernandesii*.

Since the end of the Cold War, interest in daffodil breeding has taken hold in several eastern European countries such as Hungary and Latvia. Janis Ruksans from Latvia, in particular, has become a well known name throughout the daffodil world as he owns an impressive bulb nursery where he grows many rare types.

## Australasia

William Jackson (1865-1948) lived in Tasmania where he worked from 1898 onwards. By the mid-1920s, he had amassed a considerable collection of daffodils. He took up hybridisation and between 1929 and 1948 raised and registered many of his own seedlings, the best known of which were the yellow trumpets 'Chromis' and 'Corlo': both were raised from 'Crocus' crossed with an earlier Jackson yellow trumpet named 'Chruseos'. Australian hybridists of Jackson's time were pre-occupied with breeding pink daffodils of trumpet proportions, and he contributed to this development with a number of cultivars such as 'Pinkess' and 'Pinklette', both having 'Mrs R.O. Backhouse' and 'Pink o' Dawn' as their parents. William Jackson's work was continued by his son William (1908-1975) at Dover, Tasmania, who had much success with yellow trumpets, 'Comal' being especially fine: it has proved one of the most successful exhibition daffodils in its class. Other good yellow trumpets are 'Akala' and 'Ristin', while 'Cyros' (1W-

Y) was a favourite among the bicolors. Among the large-cupped daffodils, 'Kasia' (2Y-OOR) has been a frequent winner at top shows. William Jnr also worked on pink doubles, 'Lawali' (4W-P) being the best known.

Another Tasmanian who raised daffodils at Hobart between 1922 and 1949, Crawford E. Radcliff (1880-1949), like Jackson Snr, had the quest for pink daffodils high on his list of priorities. It was he who raised perhaps the best known cultivar of this type to come out of Australia in 'Pink o' Dawn'. Other important pinks raised by Radcliff were 'Dawnglow' (1W-P), 'Karanja' (1W-P), 'Pink Monarch' (2W-P) and 'Rosario' (2W-P). Other important Australian pinks were raised by Alister Clark (1865-1949) of Bulla, Victoria, who bred the rimmed pink 'Mabel Taylor' (2W-WPP), and by Oscar Ronalds (1873-1955) of Tarago, Victoria. He named his best cultivar after his wife 'Mrs Oscar Ronalds' (2W-P).

Phil Phillips (1915-1984) raised daffodils at Otorohanga, New Zealand from 1943 until his death in 1984. Although only a relatively small number of cultivars were registered, several have become popular show flowers in New Zealand and are also reasonably well known elsewhere. Among the best are 'Bar None' (1W-Y), a very large well formed flower, 'Crimpelene' (3W-O) with its glistening white perianth, and 'Sedate' (2W-P). David S. Bell (1904-1987) began raising daffodils in 1945 at Spreydon, near Christchurch, New Zealand, moving to Templeton in 1964. Several of his cultivars are grown in Britain, including 'Bengal Tiger' (2Y-O), 'Caprice' (2W-GOR), 'Checkmate' (2Y-R), 'City Lights' (2W-YYR) and 'Stormy Weather' (1W-Y). Jim O'More (1911-1996) raised daffodils at Wellington, New Zealand for a number of years and several of his cultivars are now available in Britain. These include 'Alray' (1Y-Y), 'Red Hot' (2O-R) and 'Sea Dream' (3W-GWW). 'Alray' is considered to be one of the best southern hemisphere yellow trumpets for British gardens, 'Red Hot' is a useful addition to the flushed orange daffodils, while 'Sea Dream' is a consistent flower of show quality.

One cannot discuss the daffodil achievements of New Zealand breeders without mention of Clarrie Andrews (1905-1983). He built up a remarkable collection of daffodil cultivars at Brightwater, Nelson, which consisted of around 2,000 different types. His work in collecting old cultivars, long before plant conservation became fashionable, has given us a living link with the past. This collection was maintained by lessees, Mr and Mrs L.A. Kerr, who took over when Clarrie Andrews, owing to ill-health, could no longer carry on. Following his death, the family sold the land and, tragically, this important collection was dispersed or lost. Several others have been prominent in New Zealand. Max Hamilton (1928-) began breeding daffodils in 1956 and formed Koanga Daffodils with Peter Ramsey while the pioneering work of John Hunter (1935-), using *N. viridiflorus* for its unique colour and as a pathway to fertile jonquils, is considered outstanding.

## United States of America

From 1934, when he began work at Canby in Oregon, Grant E. Mitsch (1907-1989) dominated daffodil hybridisation in the USA for much of the 20th century. He first came to prominence with a series of reverse bicolor cultivars from the same cross which Guy Wilson had used earlier to produce 'Spellbinder', namely 'King of the North' × 'Content'. Mitsch raised excellent reverse bicolors in both Division 1 ('Chiloquin', 'Honeybird', 'Lunar Sea' and 'Nampa') and Division 2 ('Bethany', 'Charter' and 'Daydream'). Two of his pink cultivars, 'Rima' (1W-P) and 'Rubythroat' (2W-P) are among the most intensely coloured of their kind. 'Resplendent' (2Y-R) is a consistent show quality flower that is sun-proof. The small-cupped daffodils 'Aircastle' (3W-Y) and 'Audubon' (2W-WWP) have become very well known, the former being one of the most successful show flowers and the first American cultivar to receive a Best Bloom award in London. The split corona 'Shrike' (11aW-P) is also an outstanding addition to this division. In common with several other American hybridists, Mitsch worked in the often neglected species hybrid divisions, raising some outstanding cultivars, such as 'Jetfire' (6Y-O), 'Stratosphere' (7Y-O), 'Pipit' (7YYW-W), 'Dickcissel' (7Y-W), 'Bunting' (7Y-O), 'Verdin' (7Y-W) and 'Seraph' (9W-GYR). Grant Mitsch was widely honoured for his work in daffodil breeding. Among his awards were the Honour Medal of the American Daffodil Society, the Gold Medal of the Garden Club of America and the Peter Barr Memorial Cup. From 1989, his work was taken further by his daughter, Elise Havens (1942-), who started breeding daffodils in 1964, and by her husband Richard (1940-). Their business is known as Grant Mitsch Novelty Daffodils.

Like Mitsch, Murray W. Evans (1912-1988) also worked out of Oregon. He first came to prominence in the mid-1960s with cultivars such as ‘Descanso’ (1W-Y), ‘Replete’ (4W-P) and ‘Sunapee’ (3Y-YYR). Others raised since include ‘Chapeau’ (2W-Y), ‘Jolly Roger’ (2W-Y), ‘Minikin’ (3W-GYR) and ‘Minx’ (3W-GYR). His outstanding success is ‘Celilo’ (1W-W), which is considered to be the best white trumpet to come out of America.

A surgeon by profession and an amateur hybridist by inclination, Dr T.D. Throckmorton (1914-2000) became well known for three distinct aspects of daffodil work. He created a novel series of cultivars described as toned daffodils. Their outstanding identifying characteristic is that the flower colours undergo subtle changes as ageing occurs. Fine cultivars in this group include ‘Earthlight’ (3Y-WWY), ‘Flight’ (2W-GWW), ‘Johnnie Walker’ (3Y-Y), ‘Lalique’ (3Y-GYY), ‘Once-in-a-While’ (2W-GPP), ‘Painted Desert’ (3Y-GYO), ‘Silk Stocking’ (3Y-GWY), ‘Star Trek’ (3W-GYR) and ‘Suave’ (3Y-Y). Later additions to this remarkable group were ‘Golden Pond’ (3Y-YYO), ‘Orchard Place’ (3Y-YYO) and ‘Weldon Pond’ (3Y-Y). As with Guy Wilson’s Mystic series, the colour code system does not adequately reflect the subtle changes seen in these cultivars. With ‘Suave’, for example, the yellow described in the colour code is itself an unusual shade, but this is only seen in mature flowers that have undergone a certain amount of ageing. The flowers first open with a white perianth and corona, shaded with greyish-lavender and pearl with a buff rim: the entire flower only becomes yellow with maturity. Dr Throckmorton made a major contribution to daffodil knowledge in the establishment of the Daffodil Data Bank at the Methodist Medical Center in Des Moines, Iowa. This contained a vast amount of information on the breeding and characteristics of many thousands of cultivars, and was the tool used by Dr Throckmorton in deciding on the parents for his toned daffodils: ‘Aircastle’, ‘Altruist’ and ‘Irish Coffee’ all featured prominently. His most lasting legacy will undoubtedly be the acceptance of his suggestion for the colour code system, now an established part of daffodil classification (see Chapter 4).

In the USA, new types of daffodil are being developed using previously unused or little-used species with the aim of extending the flowering season into autumn and introducing new forms and colours to cultivars. Prominent in this work are: Dr Harold Koopowitz (1940-), who commenced daffodil breeding in 1968; Robert Spotts (1937-), involved since 1957; and, finally, Manuel Lima, who is working with *N. viridiflorus* in an attempt to create a race of green garden daffodils.

Daffodil breeding is a long-term project involving great patience and a certain insight into the future – into what might be possible. Time has shown the worth of the work of William Backhouse, Engleheart, Guy Wilson and Lionel Richardson. They not only broke new ground but in doing so ensured that their work would live on into the future. Many of the more recent hybridists will no doubt achieve this enviable goal in the fullness of time.

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## CHAPTER 9 THE YELLOW DAFFODILS

If someone in the street was asked to imagine a daffodil, it would almost certainly be yellow in colour. Ask the same person to name a daffodil and the reply would probably be 'King Alfred'. In the minds of many, daffodils are yellow, and it is flowers of this colour that for centuries have lifted the spirits during the first warm rays of spring sunshine. These were the daffodils which Wordsworth saw "fluttering and dancing in the breeze"<sup>(1)</sup>, and at which he "gazed and gazed but little thought what wealth the show to me had brought". The yellows are the very essence of daffodils, linking the death of the old year to the birth of the new, through the season of bursting buds and the scent of crushed ramsons underfoot.

### The Trinity College Maximus

No species daffodil has featured more prominently in the ancestry of the cultivars than *N. pseudonarcissus* subsp. *major*, and especially that form of it referred to over the centuries by a variety of names, including *N. hispanicus* Gouan, 'Maximus' (Hort.) and 'Maximus Superbus' (Hort.) (Plate 9.1).

The earliest name given to this plant under the binomial system was *N. hispanicus* in 1773, although the plant was known for at least two centuries prior to this, being illustrated by Lobel in 1576<sup>(2)</sup>. This form of the subspecies was easily recognisable by the length of the flower stems, the exceptionally deep golden yellow colour of the flower, the characteristically twisted perianth segments and the deeply notched, broadly flanged trumpet. Throughout horticultural history, it has been described and illustrated on many occasions by leading writers of the day, such as Rudbeck in 1701<sup>(3)</sup>, Hill in 1757<sup>(4)</sup>, Curtis in 1793<sup>(5)</sup> and Salisbury in 1796<sup>(6)</sup>.

Burbidge was certainly aware of the "well marked varieties of the common daffodil" when he wrote *The Narcissus: its history and culture* in 1875<sup>(7)</sup>, and he referred to 'Maximus' as having stems that "frequently attain a height of two to three feet [60-90 cm] ... their great golden flowers being proportionately large". Burbidge was certainly aware of the "well marked varieties of the common daffodil" when he wrote *The Narcissus: its history and culture* in 1875<sup>(7)</sup>, and he referred to 'Maximus' as having stems that "frequently attain a height of two to three feet [60-90 cm] ... their great golden flowers being proportionately large". The Kew taxonomist, J.G. Baker, also referred to the 'Maximus' form under the name *Ajax maximus*<sup>(8)</sup>. Once installed as Curator of the Trinity College Botanic Garden in Dublin, Burbidge encountered an extra special form of 'Maximus' growing there, this form becoming known to the early hybridists and enthusiasts as the Trinity College Maximus. Burbidge brought this outstanding form to the notice of F.W. (later Sir Frederick) Moore, Director of the Royal Botanic Garden, Glasnevin in 1880. It is not clear if the form was brought to Ireland or originated there, but it is known to have been in the Trinity College Garden in 1876. Some parts of it were then said to be:

"Quite gorgeous with the flowers of that noble daffodil *Narcissus* 'Maximus' which attains a height of almost two feet [60 cm] and is, when grown in rich soils, so large that it more resembles a tropical than a hardy northern flower."<sup>(9)</sup>

In the 1880s, *N. pseudonarcissus* subsp. *major* and 'Maximus' forms were introduced to commerce in Ireland by Hartland of Cork. In his *Ye Original Little Booke of Daffodils* (1885)<sup>(10)</sup> they were listed as Trumpet 'Major' and Trumpet 'Maximus'. He described the former as "very rich, almost uniform deep yellow throughout" and went on to say that it and its 'Maximus' form had considerably increased in price due to the demand for them as cut flowers. They were listed at 2s 0d (10p) per dozen for 'Major' and 7s 6d (37.5p) per dozen for 'Maximus'. Hartland maintained that the latter was "very difficult to procure",

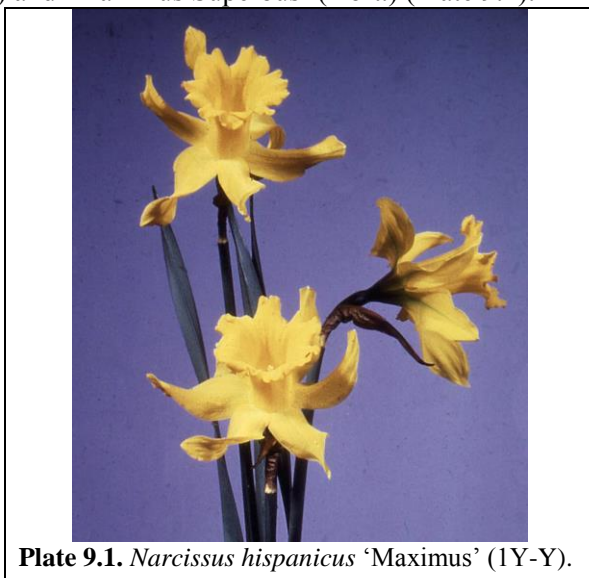
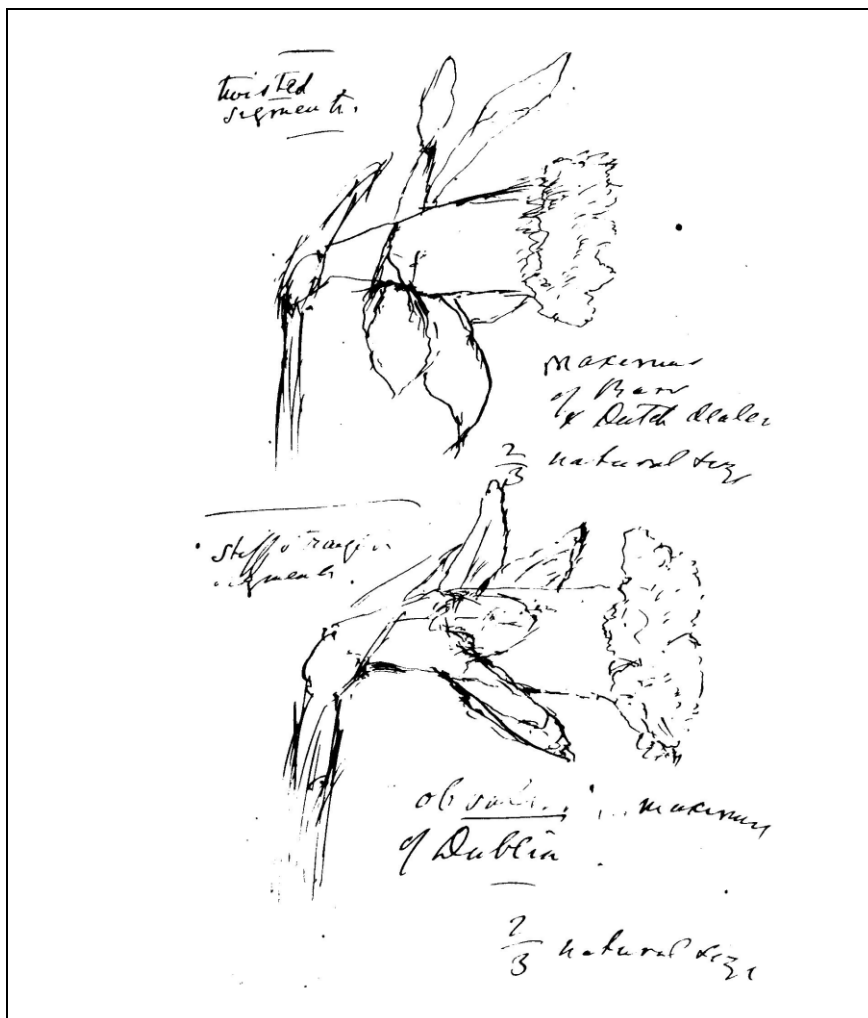


Plate 9.1. *Narcissus hispanicus* 'Maximus' (1Y-Y).

adding: “There are two distinct varieties; one a Dutch form and the other I believe Irish. Of the latter I have a very limited supply ... the Irish form is not in commerce to any extent.”<sup>(11)</sup>

The existence of these two forms was also known to the Revd Wolley-Dod, who illustrated them in a letter to Burbidge on 19 March 1884 (Figure 9.1).



**Figure 9.1.** Forms of *Narcissus pseudonarcissus* ‘Maximus’ illustrated by the Revd Wolley-Dod in a letter to F.W. Burbidge written 19 March 1884 that lay undiscovered at Trinity College, Dublin until 1982.

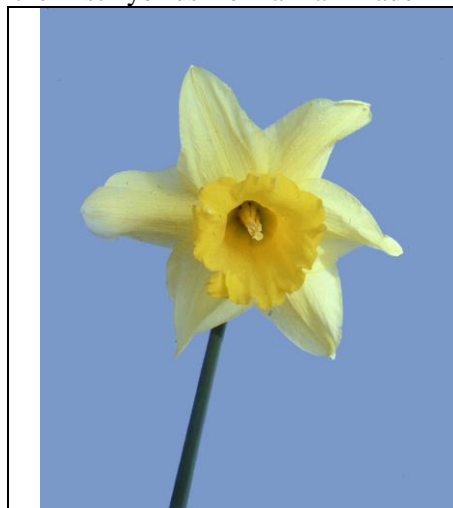
His drawing appeared to correspond closely with Hartland’s description of the Irish form of ‘Maximus’, the trumpet of which was “most gracefully flanged”<sup>(12)</sup>. The first mention of the Trinity College Maximus in the hands of an Irish grower of commercial cut flowers was in 1886 when John T. Poe of Riverstown, Co. Tipperary included it in his exhibit at the Spring Show in the Rotunda, Dublin. It won a Special Prize for *Narcissus* offered by Messrs Drummonds, Seedsmen of Dublin.

Many attempts have been made to determine the origin of the Trinity College Maximus for, clearly, it was different from other forms. Both Burbidge and Hartland occasionally referred to it as *Superbus Longivirens* to denote both its superiority over all other forms, and the fact that its foliage remained green long after the leaves of other sorts had died down. Burbidge thought that it might have been a naturalised form of the ‘Maximus’ found between Dax and Bayonne (south-west France, towards the Bay of Gascony and the western end of the Pyrenees) by W.O. Osborne, but all subsequent attempts to discover it in the wild failed. Another theory about its origin was that it was a seedling raised by Edward Leeds from the ‘Maximus’ that was illustrated and described in 1851 by Thomas Moore, Curator of the Physic Garden, Chelsea. Whatever its origin, its presence in Dublin became widely known to those hybridists working in the latter part of the 19th and the early part of the 20th centuries. They used it

extensively for its vigour, deep golden flower colour and wonderful blue-green foliage, characteristics that, it was found, persisted even after several generations of breeding.

## Early Developments Outside Ireland

Naturally, the first attempts to improve on the daffodil species through hybridisation during the mid-19th century revival involved yellow-flowered species. One of the first hybrids from a man-made cross to which a definite date can be ascribed was the yellow trumpet ‘Emperor’ (Plate 9.2), raised from *N. pseudonarcissus* and *N. bicolor* during the early 1860s. ‘Emperor’ is a triploid, while *N. bicolor* is a polyploid known to occur in triploid, tetraploid and hexaploid clones. A. and R. Fernandez (1946)<sup>(13)</sup> reported a tetraploid form, while Wylie (1952)<sup>(14)</sup> found it to be a triploid. Recently, Zonneveld (2008)<sup>(15)</sup> maintained that a hexaploid clone also existed. From observations made by William Backhouse at the time, it is now thought highly likely that he was working with a triploid clone of *N. bicolor* and was using it as a pollen parent. The triploid ‘Emperor’ (1Y-Y) is, therefore, likely to have arisen in one of two ways: either from a diploid *N. pseudonarcissus* (7 from 14) and a tetraploid clone of *N. bicolor* (14 from 28) = 21, as suggested by A. and R. Fernandez; or from *N. pseudonarcissus* (7 from 14) and a triploid clone of *N. bicolor* (14 from 21), as suggested by Wylie. The latter view now appears to be correct. A triploid ‘Emperor’ would have low fertility, although this does not appear to have been formally assessed.



**Plate 9.2.** ‘Emperor’ raised by William Backhouse before 1869 and an important early triploid cultivar.

Nevertheless, it has featured in breeding, along with ‘Empress’, as an ever-present, greatly influencing subsequent events. It features not only in the family trees of many modern cultivars, but also in present-day gardens, being recommended for naturalised plantings well over a century after its introduction. ‘Emperor’ was illustrated by Burbidge in 1875<sup>(16)</sup> in *The Narcissus: its history and culture*, and was listed in Hartland’s catalogue ten years later at 2s 6d (12.5p) per bulb. According to Hartland: “This is one of the finest daffodils grown and one of the best for cutting. Should be in all distinguished collections.”<sup>(17)</sup>

Another early yellow trumpet was ‘Golden Spur’, registered in 1885. It was originally found growing wild on the estate of Prince van Wied at Wassenaar in the Netherlands, from where it was collected. Subsequently, it was widely grown by Dutch cut flower producers. It was much valued because of its early flowering habit and its excellence for forcing. These characteristics ensured its continuing survival when other less suitable collected forms had been forgotten. It became one of the leading cut flower cultivars and was later found to be a fine daffodil for naturalising. Because of its persistence when naturalised, it is frequently found in gardens and estates today. Found as a wildling, its background is unknown but it is thought likely to have been a selected form of *N. hispanicus*. The Revd Joseph Jacob listed ‘Golden Spur’ among “thirty good seed bearers”<sup>(18)</sup> in 1910 and it was much used in hybridisation. Its most famous offspring, ‘Golden Harvest’ (1Y-Y), emerged from a cross with ‘King Alfred’ (1Y-Y).

The name ‘King Alfred’ (Plate 9.3) is probably better known than that of any other daffodil. The introduction of this cultivar was said to have been “the greatest single advance ever made in the progress of daffodils”<sup>(19)</sup>. This is largely true for, a century after its introduction, it was still an extensively grown commercial variety; its influence in the hybridisation that led to the development of modern cultivars was pervasive. The parentage of the tetraploid ‘King Alfred’ is uncertain but various possible combinations have been suggested, including: *N. hispanicus* (diploid) or ‘Maximus Superbus’ (1Y-Y), a triploid × unknown tetraploid; or *N. hispanicus* × ‘Emperor’. The latter would appear to be the more likely combination – 7 (from 14) plus 21 (from 21), as



**Plate 9.3.** ‘King Alfred’ (J. Kendall, pre-1899), probably the best known of all daffodils and an important tetraploid from the late 19th century.

tetraploids were extremely rare in the late 19th century. There is another possibility in the form of the yellow trumpet species *N. pseudonarcissus* subsp. *confusus* (syn. *N. confusus* Pugsley) from central Spain, known to have been in cultivation continuously since 1601. It is a tetraploid and a robust plant, as would be expected, with slightly twisted perianth segments, a characteristic that is also found in ‘King Alfred’. ‘Maximus Superbus’ × *N. confusus* (14 from 21 plus 14 from 28) is, therefore, a possibility, although such a case has weaknesses. Chief among these is that *N. confusus* does not appear in information that can be gleaned about late 19th century hybridisation; also, by that time, breeders were tending to work with the best cultivars available. Therefore, *N. hispanicus* (syn. *N. pseudonarcissus* subsp. *major*) × ‘Emperor’ (7 from 14 plus 21 from 21) seems to be the more credible pairing.

Sometime during the early years of the 20th century, the Brodie of Brodie made a cross that proved to be of outstanding importance in the improvement of yellow trumpet daffodils. It was between ‘King Alfred’ and ‘Lord Roberts’ (1Y-Y), and resulted in a yellow trumpet seedling which Brodie named ‘Broadford’ (1Y-Y). It proved to be a quite remarkable daffodil in that it produced but one flower, following which the only bulb died. Brodie, using some of the pollen from this lone flower on ‘Ben Alder’ (1Y-Y), produced Seedling 196/24, which in turn gave rise to ‘Elgin’ (1Y-Y), one of his “finest trumpets ... It combines excellent form, fine substance, quality, and ... deep rich golden colour in a flower of largest size.”<sup>(20)</sup> More remarkably and significantly, however, Brodie sent a portion of the pollen from the lone ‘Broadford’ flower to Dr N.Y. Lower in Wales, who used it on ‘Cleopatra’ (1Y-Y) to produce ‘Royalist’ (1Y-Y). This went on to form part of J.L. Richardson’s breeding programme in Ireland and became the seed parent of the unbeatable ‘Kingscourt’ (1Y-Y).

‘Magnificence’ (Plate 9.4) was another of the early yellow trumpet cultivars to become of great commercial importance and to enjoy a prolonged existence as a consequence. It was raised by Engleheart from ‘Maximus’ × Seedling (*N. pseudonarcissus* subsp. *major* var. *spurius* × unknown). ‘Magnificence’ was seen by Guy Wilson at the Forced Bulb Show in London in 1914, when he described it as a “gorgeous yellow Ajax”<sup>(21)</sup>. The stock was purchased by James Coey of Larne, Co. Antrim who introduced it to commerce. Although Wilson realised at this early stage that ‘Magnificence’ was something special, he could hardly have foreseen its successes, which included two Awards of Merit, a First Class Certificate and general acceptance as one of the leading cut flower varieties in both Britain and the Netherlands. It is still being used in this way today, over 90 years after its introduction.



**Plate 9.4.** ‘Magnificence’ (1Y-Y) raised by G.H. Engleheart (1914).

Other important advances in yellow trumpets were made by Brodie. He raised ‘Hebron’ in 1923 from ‘White Emperor’ (1W-W) × ‘King Alfred’. The use in this cross of a white daffodil was one of the first attempts to improve the refinement in the yellows by this means. In due course, this cross led to the creation of ‘Cromarty’ (1Y-Y) in 1933 from ‘Hebron’ × ‘Alchemist’ (1Y-Y), which was one of the first yellows to have a double triangle perianth of broad, overlapping and very smooth segments. ‘Cromarty’ in turn gave rise to ‘Goldcourt’ (1Y-Y) that, along with ‘Kingscourt’, is classed as Richardson’s most significant early achievement in this field.

‘Golden Harvest’ has already been mentioned. Like its seed parent ‘Golden Spur’, it is a fine early cut flower cultivar that is excellent for forcing, for which purposes it received an Award of Merit, a First Class Certificate and an Early Forcing Award from Haarlem. This vigorous daffodil was raised by Warnaar at Sassenheim, the Netherlands and was a good commercial cultivar with a rapid increase in bulb weight, a high level of flower production and a long vase life. Its perianth segments are slightly twisted, pointed and overlapping and of a clear yellow colour, the corona being a deeper golden shade.

## Guy Wilson's Yellow Trumpets

Wilson was such a master artist in the creation of white daffodils that other aspects of his work are overshadowed or even overlooked. One such aspect was his work with the yellow daffodils, of which he raised several important cultivars. In all, he registered some 80 cultivars of this type and no matter what criteria are used to judge their importance – the awards system, success at shows, usefulness as breeding stock or value as commercial cut flower crops – the magnitude of his endeavours is obvious. They received 23 Awards of Merit and seven First Class Certificates, they had many show successes, they were much used in breeding programmes, and several continue as fine cut flower or garden plants.

There can be little doubt of Wilson's interest in or affection for yellow trumpet daffodils. His admiration for the 'Trinity College Maximus' was well known, and his interest in the new yellow cultivars that appeared at the start of the 20th century is well documented. He made annual visits to James Coey at Larne where he first encountered many of these new yellows, including 'King Alfred', which he described on one occasion as "the most beautiful sight I saw this season"<sup>(22)</sup>. One of Wilson's own favourites among his yellow trumpets was raised early in his career. It was bred from the 'Trinity College Maximus', crossed with a seedling of unknown parentage. It was named 'Goldbeater' and registered in 1923. From that time, until Wilson's retirement almost 40 years later, it enjoyed the distinction of continuous inclusion in his catalogue, which proudly proclaimed its 'Maximus' parentage and went on to list those characteristics that it inherited from this parent – "twisted perianth and boldly notched bell-mouthed trumpet, glorious deep intense orange gold colour throughout"<sup>(23)</sup>.

His first yellow trumpet to have great success was 'Principal' (1931) from 'Cleopatra' × 'Sorley Boy' (1Y-Y). He regarded it as superior to 'Dawson City' (1Y-Y), which was considered to be one of the finest cultivars in the 1920s and 1930s. It received three Awards of Merit and a First Class Certificate and was one of the leading commercial cut flower cultivars at that time. Wilson said of 'Principal' that it was "a grand show flower and one of my very best yellow trumpets"<sup>(24)</sup>; it had better balanced flowers borne on stronger stems than 'Dawson City'. His high opinion of it was confirmed when it received an Award of Merit in 1935 and a First Class Certificate in 1937.

Brodie in Scotland thought that the best method of bringing refinement to the yellow trumpets was through the use of white daffodils. He used 'White Emperor' to raise the high quality 'Hebron'. As this approach to breeding developed, Brodie crossed the superb quality 'White Knight' (1W-W) with the rather rough flowered yellow trumpet 'Ben Alder', producing the exquisitely smooth 'Sulphur Prince' (1Y-Y) in 1931. Wilson repeated this cross to raise the refined 'Moongold' (1Y-Y), which was also sulphur yellow in colour: it shared with 'Goldbeater' (1Y-Y) the unique honour of appearing in Wilson's catalogues from its registration in 1929 until 1961 – in which it was described as: "A most lovely and distinct flower of fine quality and remarkably thick waxy substance."<sup>(25)</sup>

By the mid-1920s, Wilson's hybridisation had advanced to such a degree that he was in the enviable position of being able to select parent material from his own seedlings and cultivars. Using two very late flowering sorts, 'King of May' (1Y-Y) and 'Last Out' (1Y-Y), he raised 'Garron', which first flowered in 1928 and which he described as "a large clear yellow trumpet of lovely form, substance and quality"<sup>(26)</sup>. 'Garron', registered in 1934, entered commerce in the following year and subsequently gained three Awards of Merit as an exhibition and commercial cut flower, and as a garden plant. 'Garron' is perhaps the perfect example of a high quality Wilson yellow trumpet, the worth of which was to some extent masked by the stature of the white daffodils that he was raising during the same period. 'Kanchenjunga' (1W-W), for example, was also registered in 1934. Nevertheless, by the time of the first report from Rosewarne EHS on the *Narcissus* Variety Trials (1955-1963)<sup>(27)</sup>, 'Garron' had established itself in the south-west of England as one of the standard commercial cut flower cultivars in competition with such revered sorts as 'King Alfred' and 'Magnificence'. In 1936, a fine trumpet seedling flowered for the first time having been raised from an open pollinated 'Counsellor' (1Y-Y). It was named 'Bastion'. Its flowers were deep yellow in colour and it had immensely strong foliage and huge bulbs. It received an Award of Merit as an exhibition flower in 1946 and a similar award from Haarlem in 1948. The latter distinction perhaps indicated its suitability as a commercial cut flower but, more recently, trials at Rosewarne EHS have shown that its neck continues to grow in water after picking, rendering it less useful in this respect than was initially thought.

Undoubtedly, Wilson's major contribution to the yellow trumpets came from his crossing of 'King of the North' (1Y-Y) with 'Content' (1W-WWY). Several seedlings are recorded in the Wilson Record Books as having come from this cross. They were noted during 1941 and 1942 at their first flowering, all being of delicate greeny lemon or luminous pale yellow in colour. The most famous of Wilson's cultivars from this cross was 'Moonstruck' (1Y-Y) that was introduced in 1948 at £15 per bulb. It was described at the time as: "The largest and most robust of the remarkable series of trumpets bred from 'King of the North' and 'Content'. An immense flower of fine quality and stately bearing."<sup>(28)</sup> It received an Award of Merit in 1949 and a First Class Certificate two years later as an exhibition daffodil, with similar awards from Haarlem in 1958 and 1960. At The Knockan, Wilson regularly produced flowers of 'Moonstruck' measuring 14-15 cms in diameter. As was the case with the reverse bicolor 'Spellbinder' (1Y-W), raised from the same cross, the appearance of the large, ghostly 'Moonstruck' caused some raised eyebrows among the daffodil establishment when it was first introduced. Consequently, the recommendation for its first award was by no means unanimous. Since that time, it has become accepted for what it is – a very beautiful flower, excellent garden plant and something which was different from anything known before Wilson had the intuition to cross 'King of the North' with 'Content'. How much we owe to that chance sighting of the strange reverse bicolor seedlings in Herefordshire many years earlier! 'Moon Goddess' (1Y-Y) was another cultivar raised from the same parents and, while possessing a similar unearthly colour quality, it was of more modest dimensions. Initially sulphur yellow, the flower develops to greenish-cream but, unlike 'Moonstruck', it possesses an illuminating band of bright lemon yellow around the corona rim.

Another excellent cut flower cultivar is 'Irish Luck' (1Y-Y), raised in 1948 from 'Counsellor' crossed with Richardson's famous 'Goldcourt'. It is a flower of bright, deep lemon yellow with flat and overlapping perianth segments. It received an Award of Merit in 1948 and a First Class Certificate in 1950 from Haarlem on account of its great flower substance and robustness. These factors, together with its very long vase life, made it one of the cultivars recommended for commercial cut flower use following trials at Rosewarne EHS. 'Ulster Prince' (1Y-Y), from 'Hebron' × 'Mortlake' (1Y-Y), first flowered in 1942 and was registered in 1950. At that time, Wilson noted the durability of its flowers that gave it considerable potential as a garden plant and cut flower. Subsequently, it proved to be highly satisfactory in both roles, gaining an Award of Merit in 1959 and a First Class Certificate in 1968 as a garden plant following trials at Wisley; it was recommended as a cut flower by Rosewarne EHS. One of Wilson's most important yellow trumpets was 'Slieveboy' (1953) which first appeared in 1947, its parents being that famous old cultivar 'Royalist' (1Y-Y) and Richardson's 'Gold-digger' (1Y-Y). Wilson described it when it first flowered as "a clear yellow trumpet of perfect form, quality, balance and poise"<sup>(29)</sup>, adding, in 1951, that the flower was perfect and that he had decided to name it. 'Slieveboy' was a flower of superb quality, and its excellence was acknowledged when it was judged Best Bloom at the RHS London Show in 1958, it subsequently being adopted by the Daffodil Society as their motif.

Wilson's interest in yellow trumpets began when, as a young man, he saw magnificent examples of this type of flower at the Coey Nursery in Larne. It continued until the end of his life. In 1962, the year of his death, his last yellow trumpet, 'Strathrowan', raised from 'Bawnboy' (1Y-Y) and Richardson's 'Spanish Gold' (1Y-Y), flowered for the first time.

Owing to Wilson's extra special efforts in the breeding and improvement of white daffodils and the worldwide fame that this brought him, his work with the yellows has often been overlooked. In addition, during the latter part of his career, his yellow trumpets had to live in the shadow of the fine exhibition cultivars, such as 'Goldcourt' and 'Kingscourt', raised by J.L. Richardson. However, he did make an outstanding contribution to this class of daffodil when he crossed 'King of the North' with 'Content' to produce the giant lemon coloured 'Moonstruck'.

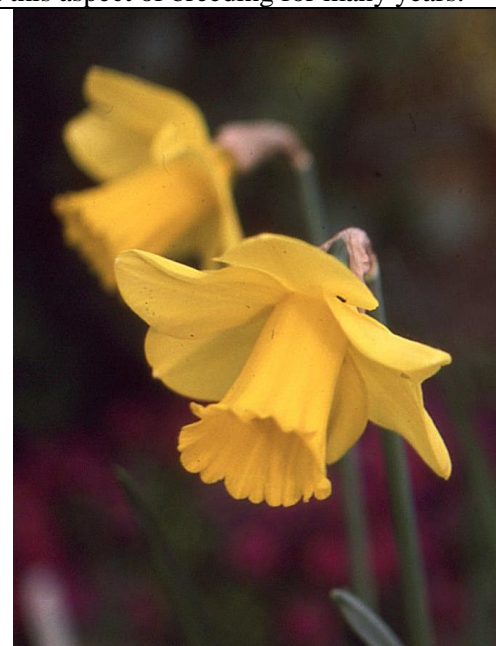
## **J. Lionel Richardson's Yellow Trumpets**

Understandably, Lionel Richardson's early efforts at hybridisation were primarily concerned with the raising of yellow daffodils; there was ample parent material available at that time. His efforts met with a reasonable degree of success. Four of his earliest introductions gained Awards of Merit as exhibition flowers: the trumpet 'Loyalist' (1923) and the large-cupped 'Golden Pedestal' (1922), 'Golden Ingot' (1923) and 'Alroi' (1926). 'Golden Pedestal' was, in fact, the first Richardson cultivar to gain an Award of Merit in 1922 as an exhibition daffodil. He regarded it as "without doubt the finest *Incomparabilis* yet

seen”<sup>(30)</sup>. When introduced in his 1924 catalogue, it was priced at £12 per bulb, by far his most expensive cultivar at that time.

However, Richardson was not altogether happy with yellow daffodils, as many sorts seemed predisposed to Basal Rot. As a consequence, he tended to neglect this aspect of breeding for many years.

It was only with the appearance of ‘Goldcourt’ and ‘Kingscourt’ (Plate 9.5) in the mid-1930s that his interest in yellow daffodils was rekindled. ‘Kingscourt’ was raised from ‘Royalist’ × ‘Crocus’ (2Y-Y), the seed parent being one of the smoothest textured daffodils of its day, while ‘Crocus’ was intensely golden in colour, both of these important characteristics also being evident in ‘Kingscourt’. Introduced to commerce in 1942 at £15 per bulb, it has proved over many years to be the most important of the yellow trumpet daffodils for exhibition purposes. It first topped the overall list of exhibition cultivars in the Daffodil Ballot in 1948 and still held that position in 1963. As recently as 1988, it continued to appear among the top six yellow trumpet daffodils for exhibition purposes. In addition, ‘Kingscourt’ received three Awards of Merit and a First Class Certificate, honours gained as an exhibition flower, a garden plant and for commercial use. Richardson was in no doubt of its outstanding qualities. In 1942, he maintained that: “This is probably the finest exhibition yellow trumpet seen to date. An immense flower of faultless form, superb quality and perfectly uniform intense deep golden yellow.”<sup>(31)</sup>



**Plate 9.5.** ‘Kingscourt’, a superb show daffodil raised by J.L. Richardson (1938).

If ‘Kingscourt’ was the most famous of Richardson’s yellow trumpets, ‘Goldcourt’ ran it a close second. Raised from ‘Crocus’ × ‘Cromarty’ (1Y-Y), the pollen parent was another Brodie cultivar of smooth texture and a deep golden yellow colour. If anything, it was even more intensely coloured than ‘Kingscourt’, “pure Maximus gold”<sup>(32)</sup> being the way Richardson described it on its introduction in 1942. Its trumpet was more slender than that of ‘Kingscourt’, giving the flower a very well balanced appearance, while in substance it was even thicker. ‘Goldcourt’ never achieved the supremacy in the Daffodil Ballot enjoyed over so many years by ‘Kingscourt’, but it did receive two First Class Certificates as an exhibition flower and garden plant. Every yellow trumpet daffodil of note subsequently raised at Waterford had connections with ‘Kingscourt’ or ‘Goldcourt’, or both, the list being a particularly formidable one.

The first of these important offspring was ‘King’s Ransom’ (1Y-Y), raised from a cross between ‘Kingscourt’ and ‘Goldcourt’. Registered in 1950, it received the award of Best Bloom in Show when exhibited at the London Daffodil Show of that year. According to Richardson, “this wonderful flower created a sensation”<sup>(33)</sup> on its first appearance. It was first listed in the 1957 catalogue at £20 per bulb. It was a flower of ‘King’s Ransom’ that so fascinated Guy Wilson during a visit to Prospect House, Waterford that he entirely forgot the time. He had gone outside to see the daffodils before tea with J.M. de Navarro but almost an hour later, with the tea on the table they had not returned. A search was made and they were found by Mrs Richardson sitting on the path staring at blooms of ‘King’s Ransom’. She asked “When is water to be put to the tea”, Wilson apparently replying “Bring my tea out here I cannot take my eyes off that flower. It is the most perfect yellow trumpet I have seen.”<sup>(34)</sup> Close on the heels of ‘King’s Ransom’ came ‘Ark Royal’ (1Y-Y), raised from ‘Kilkenny’ (1Y-Y) × ‘Goldcourt’ and registered in 1945. Introduced commercially in 1953 at £15 per bulb, it inherited the intense colour and good substance of ‘Goldcourt’, but the trumpet was larger and it possessed a beautifully serrated and rolled mouth. ‘Ark Royal’ received an Award of Merit as a garden plant in 1967 and during its trials at Wisley showed itself to be a vigorous grower.

A cross between ‘Goldcourt’ and ‘Kingscourt’ produced Richardson’s next notable yellow trumpet, which he named ‘Arctic Gold’. Registered in 1951, it was introduced commercially three years later at £10 per bulb. It is a flower of superb quality with broad, overlapping perianth segments of waxy smoothness and a beautifully flanged and serrated trumpet. It was perhaps even more intensely coloured

than 'Goldcourt'. During the 20 years following its introduction, it was this cultivar, more than any other, with which hybridists hoped to intensify still further the gold colouring of their seedlings. 'Arctic Gold' received both an Award of Merit and a First Class Certificate as a show flower and, until relatively recently, was a regular winner at shows. Its fine potential as a garden plant was also recognised with an Award of Merit in 1963, and it has recently been described as "a yellow trumpet of perfect form"<sup>(35)</sup>. A cross between 'Pretoria' (1Y-Y) and 'Goldcourt' gave rise to 'Golden Rapture' (1Y-Y), which was registered in 1952. It was a large flower, specimens frequently approaching 12.5 cm in diameter, and it possessed both smooth texture and good substance. The recipient of a First Class Certificate as an exhibition flower in 1959, its description at the time not only indicated its excellent show qualities but also its size and vigour. This made it a potential cut flower variety, for which it later received an Award of Merit from Haarlem.

Another cultivar with 'Kingscourt' and 'Goldcourt' as parents was registered as 'Banbridge' in 1955 and over 30 years later it was still one of the leading exhibition yellow trumpets. In colour, it resembles 'Arctic Gold', which had the same parents, with its bright lemon yellow perianth and deeper lemon yellow corona. The flower, however, is larger, being particularly noteworthy for its smooth, flat and overlapping perianth segments, its almost straight-sided corona and its long vase life. The next influential yellow trumpet came from a seedling raised from the same parents as 'Kingscourt', namely 'Royalist' × 'Crocus'. This seedling was crossed with 'Goldcourt', the selected offspring being registered as 'Bayard' (1Y-Y) in 1956. Richardson described it as "a show flower of the highest class"<sup>(36)</sup> on its introduction in 1959, adding that it was particularly useful on account of its late flowering habit. 'Bayard' proved over the years to be a most successful show flower and was described by M.J. Jefferson-Brown in 1962 as "possibly the best show yellow trumpet"<sup>(37)</sup>. For it to reach this position, it had to possess several good qualities, but perhaps the most outstanding was its texture, first mentioned by Richardson in his initial description of this cultivar and later emphasised by J.S.B. Lea and D.A. Lloyd – "a beautifully smooth yellow trumpet"<sup>(38)</sup>. It received Awards of Merit as an exhibition flower in 1958 and as a garden plant in 1962, following trials at Wisley. There it demonstrated its vigour and floriferous nature by producing 88 flowers in the second year of the trials from the 25 single-nosed bulbs initially planted. 'Viking' (1Y-Y) (Plate 9.6) was another product of the 'Goldcourt' and 'Kingscourt' pairing that received two Awards of Merit – as an exhibition flower and as a garden plant. Until the mid-1990s, it was a most successful show daffodil, winning 21 prizes in 1987 and 18 in 1988. Its closest rival in those two years was its pollen parent 'Kingscourt' with 13 placings.



**Plate 9.6.** 'Viking' (1Y-Y), a fine cultivar raised by J.L. Richardson (1956)

One of the last great yellow trumpets was 'Olympic Gold', raised from 'Yellow Idol' (1Y-Y) × 'King's Ransom' and registered in 1965. It was first listed in the catalogue in that year at £20 per bulb. Mrs Richardson then described it as:

"A very large trumpet of lovely quality and form, bright 'Kingscourt' yellow throughout. The outer petals are very broad and overlapping, beautifully smooth and flat and of wonderful substance."<sup>(39)</sup>

This mid-season cultivar consistently produces blooms of excellent show quality and for a time was a regular winner at the leading shows, receiving an Award of Merit as an exhibition flower in 1969.

Yellow trumpet cultivars have come a long way from the charming Lent Lily of our hedgerows and pastures and from the Trinity College Maximus in the later 1800s. J.L. Richardson was probably responsible for more of this improvement than any other hybridist.

## Commercial Yellow Trumpets of the 1950s

Two important commercial yellow trumpets emerged during the 1950s: 'Early Sensation' (1954) and 'Rijnveld's Early Sensation' (1956). The first was raised in the Netherlands by Anthony C. van der



Schoot of Hillegom and the second by Herbert Chapman in England (though it was released into commerce by F. Rijnveld and Son Ltd, also of Hillegom). By the time 'Early Sensation' was assessed as a commercial cut flower at Rosewarne EHS in the *Narcissus* Variety Trials (Second Report, 1964-1967)<sup>(40)</sup>, it was already well established as a market cultivar in both the Netherlands and the British Isles. The results of the Rosewarne trials clearly indicated the reasons for this. 'Early Sensation' had very satisfactory rates of flower production and bulb increase, it was exceptionally early flowering, the first appearing in late February, and the flowers were of good substance and had a long vase life. The perianth colour is sulphur yellow, the segments flat, pointed and overlapping, and the corona is a clear lemon yellow.

Although 'Early Sensation' is a very early flowering cultivar, as its name implies, it was easily outstripped in this respect by 'Rijnveld's Early Sensation', which in the same series of Rosewarne EHS trials (1964-1967) produced its first flowers in early January, and had completed its flowering before the end of that month. Owing to its extremely early flowering, it was recommended by Rosewarne EHS as a potential market crop, although it was less vigorous than 'Early Sensation', its substance was less satisfactory and its vase life was much shorter. Its colour was also not so good, the perianth segments being pale greenish sulphur yellow with paler tips and a greenish reverse, while the corona of clear medium lemon yellow faded towards its base. Nonetheless, 'Rijnveld's Early Sensation' stood out to such an extent from all other commercial cut flower cultivars on account of its earliness that its use in breeding was almost inevitable. Indeed, it was at Rosewarne EHS that it became used extensively in the hybridisation work carried out there, one of the aims of which was to lengthen the flowering season. It features as a parent in one of the earliest flowering cultivars released from Rosewarne EHS named 'Tamara' (2Y-Y), which has produced its first flowers as early as 13 January.

## Modern Yellow Trumpets

One of the recent leading exhibition cultivars is 'Ballyrobert' that has beautifully smooth and consistent flowers of deep golden yellow. This vigorous and free flowering daffodil was introduced by W.J. Dunlop in 1968, when it won Best Bloom at the Daffodil Society Show. As with several other Dunlop cultivars, its parentage is unknown. Another yellow trumpet seen recently among winning entries at leading shows is the Australian raised 'Comal' of William Jackson Jnr. It came from the unregistered 'Leti' (2Y-Y) crossed with another unregistered daffodil, 'Zimi'. 'Comal' and another Jackson yellow trumpet, 'Ristin', are noted for the elegance of their narrow trumpets, that of the former being slightly flanged. The perianth is flat and smooth and, together with the narrow corona, forms a beautifully proportioned flower of deep yellow. Since registration in 1968, 'Comal' has been a successful exhibition daffodil in both the southern and northern hemispheres. 'Golden Vale' (1Y-Y), an early season cultivar raised by F.E. Board from 'Golden Rapture' × 'Chevalier' (2Y-Y), was registered in 1976. It too has enjoyed some success among leading exhibition types at the top shows, having smooth flowers of uniformly rich gold.

A recent introduction among the yellow trumpets is 'Standfast' (1982), raised by Tom Bloomer from a cross between 'Camelot' (2Y-Y) and 'Arctic Gold'. A large deep yellow flower of circular outline, it has very good substance and smooth texture. It has had many local show successes and its future as an exhibition flower, garden plant and for growing in pots seems assured. A more recent introduction, 'Ombersley' (1Y-Y, Postles, 1985) (Plate 9.7), is undoubtedly the current show bench favourite, a regular Best Bloom contender at all major shows.



**Plate 9.7.** 'Ombersley' (1Y-Y), a modern leading show cultivar raised by C. Postles (1985).

## The Large-Cupped Yellows

The first notable daffodil in this sub-division was ‘Sir Watkin’ that has also been known by several other names over the years. One was ‘James Dickson’, named after its introducer, the proprietor of the nursery firm of J. Dickson and Son. However, this daffodil had been grown in Welsh gardens for many years prior to its wider introduction and during that time had been called the Giant Welsh Daffodil or Welsh Peerless. In the late 19th century, W. Pickstone, seeing the potential of the Giant Welsh Daffodil as a commercial cut flower, collected some, naming them ‘Sir Watkin’ after Sir Watkin W. Wynne. It was registered in 1884, when it also received a First Class Certificate. The perianth segments are twisted, pointed, barely overlapping and coloured primrose, the corona being a deeper lemon yellow shade. In the 1880s, it was the largest yellow cupped daffodil then available, measuring 10 cm in diameter. It was due to this characteristic that it had acquired its common name of Giant Welsh Daffodil. It was also known for its floriferousness. According to Robert Sydenham in *All About Daffodils*<sup>(41)</sup> in 1913, two to three flowers could be confidently expected from a top sized bulb; while in *The Bourne Gold Medal Daffodils* (1913)<sup>(42)</sup> it was said to be a very strong grower and a good forcer. ‘Sir Watkin’ was included in the first series of variety trials carried out at Rosewarne EHS, where it produced three to four flowers per bulb in the third year after planting. It was shown to be an early flowering cultivar, starting in early March, and, once cut, the flowers have an excellent vase life. ‘Sir Watkin’ reigned supreme for many years and only in 1927 were several cultivars introduced that eventually superseded it. These included ‘Carlton’, ‘Crocus’, ‘Havelock’ and ‘Saint Egwin’. These were all raised by P.D. Williams but their breeding is unknown, apart from the seed parent of ‘Saint Egwin’ which is recorded as being ‘Merit’ (2Y-Y) – another Williams’ cultivar, also registered in 1927.

Among the most widely grown commercial cut flower cultivars, ‘Carlton’ is perhaps the most important of this quartet. The reasons for this are not difficult to identify. It is a very vigorous plant, capable of producing three to four flowers per bulb in the third year after planting, by which time the bulb weight is likely to have increased between five- and six-fold. It also flowers early, commencing in early to mid-March in the south-west of England. Its perianth segments are coloured sulphur yellow and, though showing some creasing and twisting, are broad and overlapping. The open-mouthed corona is a deep lemon yellow. Its potential as a cut flower cultivar was soon recognised and it received an Award of Merit from Haarlem in 1930. Subsequently, its excellence as a garden plant resulted in both an Award of Merit (1936) and a First Class Certificate (1939).

‘Havelock’ also became a leading cut flower cultivar. Rosewarne EHS trials showed it to be an even more floriferous and vigorous sort than ‘Carlton’, producing four to five flowers per bulb and giving an almost six-fold increase in bulb weight after three years. It too flowers in early March and it has been widely used as a forcing variety. The flowers have very good substance and an excellent vase life. The colour is good, the perianth being deep primrose yellow and the corona a golden yellow. If it has faults, these relate to its somewhat ‘crêpey’ flower substance (a term used in the Rosewarne EHS trials to indicate the lowest category of flower substance) and the tendency to produce flowers with a buckled segment, although in general the segments are flat, broad and overlapping. Its commercial excellence was recognised with a string of awards – an Award of Merit (Haarlem, 1930), Award of Merit (RHS for cutting, 1931), and a First Class Certificate (1933), Forcing Award (1936) and First Class Forcing Award (1938) – all from Haarlem. It also received an Award of Merit as an exhibition daffodil in 1927, while its excellence as a garden plant was recognised with an Award of Merit (1933) and a First Class Certificate (1936).

‘Crocus’ also received a considerable number of awards for exhibition, garden decoration and cut flower purposes. In quality, it was probably superior to ‘Carlton’ and ‘Havelock’, although it was less vigorous than either. It was of excellent colour with a bright golden perianth and deeper rich golden yellow corona of almost trumpet proportions. The perianth was notable because of its smoothness, the flowers being borne on stiff and sturdy stems.

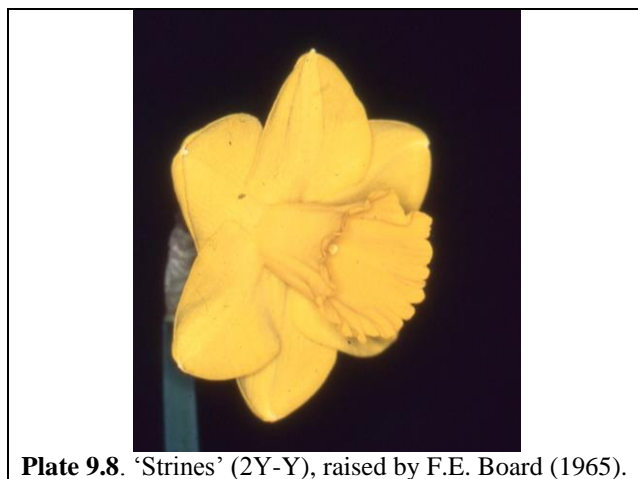
‘Saint Egwin’ was best known in its day as a fine exhibition cultivar for which it received an Award of Merit in 1927 and a First Class Certificate in 1936. It was a flower of good substance with smooth, broad and overlapping perianth segments of pale lemon yellow, the corona being a deeper shade. The whole flower gave the impression of having a very neat appearance.

J.L. Richardson, who had already made a name for himself with some of the leading yellow trumpets, produced somewhat later in his career a trio of large-cupped yellows of outstanding merit. These were ‘Galway’ (1943), ‘Camelot’ (1962) and ‘Golden Aura’ (1964). ‘Galway’ was perhaps the only other Irish-raised cultivar to rival Guy Wilson’s ‘Armada’ (2Y-O) in the number of official honours bestowed upon it: these included Awards of Merit and First Class Certificates (RHS) as an exhibition flower and garden plant, and similar awards from Haarlem as a commercial cut flower. It has been said that ‘Galway’ is perhaps the daffodil by which Richardson will be longest remembered: such a claim, in view of his pioneering work with white and red, pink and double daffodils, places ‘Galway’ in a very special category indeed. It was introduced in 1943 at the modest price of £7 7s (£7.35) per bulb, the now almost forgotten ‘Spitzbergen’ being listed at £18 in the same catalogue. ‘Galway’ reigned supreme as the finest large-cupped yellow for almost 20 years from shortly after its introduction, when Guy Wilson described it as “quite magnificent”<sup>(43)</sup>, until the final Daffodil Ballot in the *Daffodil and Tulip Yearbook* (1964)<sup>(44)</sup> when it was still well ahead of any rivals in popularity. The parentage of ‘Galway’ is not known with certainty but it is thought to have come from ‘Royalist’ × ‘Crocus’. The plant is vigorous and strong-stemmed, the large golden flower consisting of a smooth, broad perianth and well-flanged corona bordering on trumpet size.

‘Camelot’ was raised from ‘Kingscourt’ × ‘Ceylon’ (2Y-O), giving it a deep clear yellow colour. The perianth is very circular and composed of broad, flat segments of exceptional quality and substance. The corona is only slightly shorter than the perianth segments and has an even, neatly serrated rim. The plant is strong and robust and proved to be the natural successor to ‘Galway’. ‘Golden Aura’ came from an open pollinated ‘Halo’ (2Y-R), an unregistered cultivar introduced by Richardson in the mid-1950s. It is a very consistent show flower that always has an exceptionally neat appearance. This is the modern cultivar that sets the standard in this sub-division from the time it was awarded Best Bloom at the London Daffodil Competition in the year of its registration.

In dealing with the Richardson cultivars, several other very interesting ones that appeared during the 1940s have been passed over, and mention must now be made of them. The first is ‘Golden Torch’ (2Y-Y) that was raised by Brodie and registered in 1942. Its parents were ‘Golden Rod’ (1Y-Y) × Seedling. ‘Golden Torch’ has smooth, broad perianth segments of clear lemon yellow with an almost trumpet-sized corona of deep gold. It is a vigorous, early flowering cultivar with very good flower substance. It proved to be an excellent all-round flower, receiving an Award of Merit (1947) and a First Class Certificate (1949) as an exhibition flower, similar awards from Haarlem as a commercial cut flower (1949 and 1954) and an Award of Merit as a garden plant in 1956. The influential ‘Saint Keverne’ was raised by M.P. Williams (1934), coming from ‘Royalist’ crossed with an unknown pollen parent. ‘Saint Keverne’ has been used in modern breeding programmes aimed at producing improved cut flower cultivars, owing to its resistance to Basal Rot disease; it has been among the best 2Y-Y exhibition daffodils. This excellent all-round cultivar received an Award of Merit (1950) and a First Class Certificate (1951) for this latter purpose, together with First Class Certificates for culture in pots (1976) and as a garden plant (1978).

W.J. Dunlop’s ‘Ormeau’ (2Y-Y) was registered in 1949, its parentage being ‘Pilgrimage’ (2Y-Y) × ‘Cromarty’ (1Y-Y). ‘Ormeau’ was a successful exhibition daffodil until the early 1980s when it was superseded by later, improved arrivals. It lives on, however, as an excellent garden plant for which purpose it received both an Award of Merit (1967) and a First Class Certificate (1971). ‘Strines’ (Plate 9.8) appeared with regularity among the leading exhibition 2Y-Y daffodils, being very consistent in the quality of flowers which it produces and consequently a firm favourite among exhibitors. It was raised by F.E. Board who used ‘Golden Torch’ × ‘Kingscourt’ to produce this very large, smooth, deep yellow flower of almost trumpet proportions, borne on strong, vigorous stems. It received an Award of Merit as an exhibition flower in 1969 and a First Class Certificate for the same purpose ten years later.



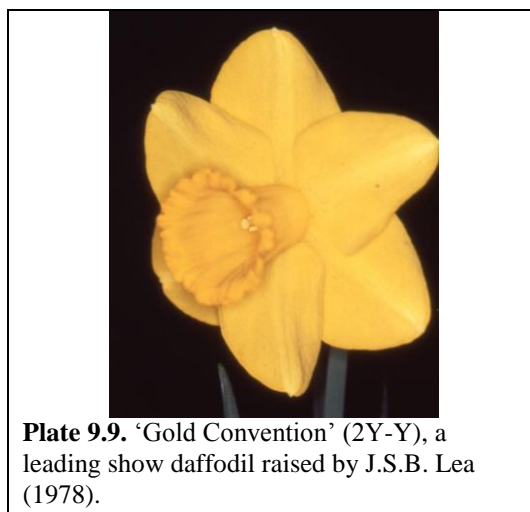
**Plate 9.8.** ‘Strines’ (2Y-Y), raised by F.E. Board (1965).

Three fine cultivars came from Ireland during the 1970s: Tom Bloomer's 'Golden Joy' (2Y-Y) and 'Golden Jewel' (2Y-GYY) registered in 1973, and Mrs H.K. Richardson's 'Great Expectations' (2Y-Y) in 1977. 'Golden Joy' is a deep golden daffodil of perfect smoothness, good substance and glistening texture. It has proved to be a fine exhibition daffodil, winning First Prize for Single Bloom in London in 1974 and 1975. 'Golden Jewel' is a smaller flower but of a deeper colour, and it has a beautiful green eye at the centre of the corona. Both came from 'Camelot' × 'Arctic Gold'. 'Great Expectations' has an impeccable parentage in 'Golden Aura' × 'Camelot'. 'Hambleton' is an interesting cultivar which has appeared under a variety of colour classifications (2Y-Y, 2Y-WWO, 2YW-WYY), finally settling for 2YYW-Y. The reason for this can be seen from the description of the way in which the flower colour develops. The exceptionally broad and overlapping perianth segments are primrose yellow but develop a white halo at the base, while the deep primrose corona fades to white at its base, the outer serrated edge eventually changing to buff apricot. This vigorous cultivar, raised from 'Golden Aura' × 'Daydream', is one of the very best of modern exhibition cultivars and it received an Award of Merit in 1982.

Several interesting large-cupped yellow cultivars have arisen in other countries, especially in the USA and New Zealand. Those of special note include 'Butterscotch' (1962), 'Amberglow' (1969), 'Top Notch' (1970) and 'Executive' (1972), all raised by G.E. Mitsch in the United States, and 'Demand' (1975) raised by Phil Phillips in New Zealand.

Without doubt, one of the finest recent introductions is J.S.B. Lea's 'Gold Convention' (Plate 9.9) that was registered in 1978. Its breeding must be unique in that Lea worked at its production over several generations, using in the process seven unnamed seedlings and four cultivars. Its ancestry is shown in Figure 9.2 at the end of this chapter.

On its introduction, 'Gold Convention' was regarded as a breakthrough in yellow trumpets on account of its almost circular perianth of broad overlapping segments and its slender corona, forming a very elegant flower borne on a tall, vigorous stem. Although introduced as a trumpet daffodil (1Y-Y), 'Gold Convention' is variable in its dimensions and is now registered in the large-cupped subdivision as a 2Y-Y.



**Plate 9.9.** 'Gold Convention' (2Y-Y), a leading show daffodil raised by J.S.B. Lea (1978).

It featured in four winning Engleheart Cup entries and was Best Bloom at the Daffodil Society Show in 1985. In 1991, it received an Award of Merit as a garden plant after trials at Wisley, and in 1995 an Award of Garden Merit, its excellent vigour being evident in the average of three flowers per bulb in the third year after planting.

During the 1980s, a number of 2Y-Y daffodils were released by Rosewarne EHS as the result of the breeding programme initiated in 1963 with a view to raising good quality, early flowering and disease resistant yellow trumpets and large-cups. The best known of this series are: 'Tamara' (1980), raised from 'Trenance' (2Y-Y) × 'Rijnveld's Early Sensation', which flowers 21 days before 'Golden Harvest', the standard commercial cut flower in the south-west of England; and 'Armyne' (1985), which came from 'Dawley' (2Y-Y) × 'Saint Keverne' and flowers five days before 'Golden Harvest', in addition to having some resistance to Basal Rot through its pollen parent.

More recent introductions are already proving successful with 'Gold Bond' (2Y-Y, Duncan, 1983) and 'Goldhanger' (2Y-Y, Pearson, 1993) being two top quality cultivars.

## The Small-Cupped Yellows

These are relatively few in number owing to the fact that the main ancestral yellow input came from yellow trumpets, which are at the opposite end of the corona size scale to the small-cups. For many years, the small-cups have been dominated by a single cultivar, 'Lemonade', which has been increasingly challenged in more recent times by 'Citronita'. 'Lemonade' was registered in 1959 by J.L. Richardson who

raised it from 'Green Island' (2W-GWY) × 'Chinese White' (3W-W). It is a plant of considerable vigour, the flower being composed of a broad, flat perianth of excellent quality, which opens whitish but after several days acquires a lemony shade, the flat corona being a slightly deeper shade. It received an Award of Merit as an exhibition flower in 1961. A serious rival to 'Lemonade' was named 'Citronita' by its raiser W.A. Noton, who registered it in 1977. Its parents were 'Lemonade' × 'Perimeter' (3Y-YYO). 'Citronita' is one of the most consistent of exhibition cultivars, possessing large flowers that are perfectly circular in outline. In colour, it is more distinctly yellow than 'Lemonade', the perianth being a definite soft yellow with the saucer-shaped corona a shade deeper. It has been the recipient of many awards at top shows and is regarded as Noton's finest introduction. Also registered in 1977 was B.S. Duncan's 'Advocat' (3Y-GYY), raised from 'Clogheen' (3W-Y) × 'Woodland Prince' (3W-Y). It is a large flower of good quality with smooth, overlapping perianth segments of medium lemon yellow, the somewhat richer toned corona being enhanced by the presence of a deep green eye. Of even more recent origin is J.W. Blanchard's 'Ferndown' (3Y-Y) registered in 1990 and given an introduction date of 1982 in the American Daffodil Society's Data Bank. Raised from 'Lemonade' crossed with a seedling, it has the best, most definite yellow colouring of any daffodil in this sub-division. Also of interest are some of Dr T.D. Throckmorton's toned daffodils that change their colour tones as they develop. Notable among those in this sub-division are 'Suave' (3Y-Y), registered in 1976 and 'Johnnie Walker' (3Y-Y) in 1977, both of which were raised from 'Aircastle' (3W-Y) × 'Irish Coffee' (3Y-YYO).

## **The Yellow Daffodils 1980-2010**

In reviewing all the cultivar divisions during this period, the only judgement that can be made about their potential importance in further development must be based on their show successes. Daffodil breeding is a slow process; one has to stand back in order to make an objective judgement and, with the most successful recent introductions, it is virtually impossible to do this. Some of today's great successes will lead nowhere, as was the case with a number of top cultivars in the past: only time will tell. It is, however, interesting to note just how many of the older, established cultivars have continued to hold sway during the 1980-2010 period; and how many of the leading modern cultivars trace back to a relatively small number of outstanding ancestors that imparted a firm basis of quality.

### ***The yellow trumpets***

During the 1980s to the mid-1990s, two older cultivars, 'Viking' (Richardson, 1956) and 'Ballyrobert' (Dunlop, 1968) were dominant on the show scene: but in 1996, 'Goldfinger' (Duncan, 1983) began to feature and in 2003 it was the top exhibition yellow trumpet. In second place was 'Ombersley' (Postles, 1996) with 'Chobe River' (Duncan, 1996) third. 'Ballyrobert' continued to win top prizes but other cultivars provided strong competition, including 'Rathowen Gold' (Bloomer, 1973), 'Barnesgold' (Duncan, 1992), 'Sharnden' (Burt, 1992) and 'Ethos' (Duncan, 1993). The older Australian cultivar 'Comal' (W. Jackson Jnr, 1968) was also successful, as was the more recent introduction from that country 'Disquiet' (Jackson's Daffodils, 1993). These last two daffodils have little or no connection with the great show daffodils from the past, apart from the link of the latter to 'Camelot'. Those raised in the British Isles, however, have especially strong ties to the major advances of J.L. Richardson through 'Goldcourt', 'Kingscourt' and 'Arctic Gold'. At the approach of 2010, 'Ombersley' was the clear leader of its type with 'Goldfinger', 'Chobe River' and 'Disquiet' its close rivals.

### ***The large-cupped yellows***

This group was long dominated by older cultivars, the top three prize winners in 2003 being 'Golden Aura' (Richardson, 1964), 'Gold Convention' (Lea, 1978) and 'Camelot' (Richardson, 1962). Among the newcomers were 'Hambleton' (Blanchard, 1985), which is not totally yellow (2YYW-Y), 'Goldhanger' (Pearson, 1993), 'Gold Ingot' and 'Arleston' (both Duncan, 1996), and 'Happy Valley' (Jarman, 2004), which was the best 2Y-Y and the best unregistered seedling at the London Daffodil Show in 2004. Several of these trace back to the great Richardson successes of 'Golden Aura' and 'Camelot', the former dominating the period from 1980 to 2003, along with 'Strines' (Board, 1965) which had many wins until about 1995. Today, this is a busy section with many contenders for top places. 'Gold Convention' still retains this position with 'Arleston', 'Goldhanger', 'Happy Valley' and 'Summer Breeze' (Postles, 2005) all making ground.

### ***The small-cupped yellows***

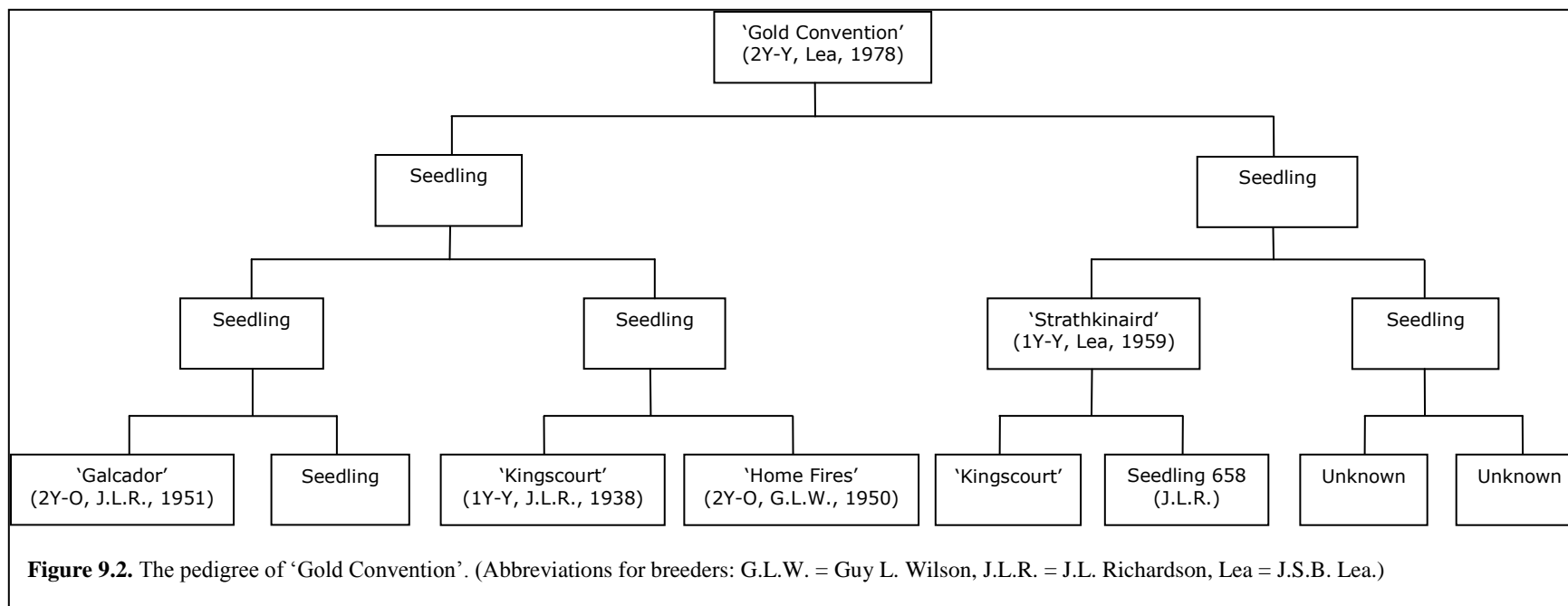
Relatively few cultivars have competed successfully and continuously throughout the period under consideration. Initially 'Lemonade' (Richardson, 1959) and 'Citronita' (Noton, 1976) were predominant, but more recently two other fine cultivars appeared. These were 'Ferndown' (Blanchard, 1990) and 'Nonchalant' (Jackson's Daffodils, 1989), the former being the leading exhibition cultivar in 2003. Little has changed in very recent years with 'Citronita', 'Ferndown' and 'Nonchalant' sharing the top places, though newcomer 'Wychbold' (Postles, 2002) is making inroads.

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## CHAPTER 10 THE WHITE DAFFODILS

### The Wild White Trumpets

All white cultivars have been derived, at least in part, from the wild species, chiefly *N. pseudonarcissus* subsp. *moschatus*, now given specific status as *N. moschatus*. In some past treatments, this has included subspp. *alpestris*, *albescens* and *tortuosus* but in the 2008 classification<sup>(1)</sup> each is treated as a separate species. The home of *N. moschatus* is in the Spanish Pyrenees and other northern Spanish mountains, and possibly also on the French side, where it is found growing at up to 2,100 m. It is thought to have been introduced into the British Isles hundreds of years ago and may have been re-introduced on several occasions between the 12th and 17th centuries. Monks travelling from the religious houses of southern Europe probably played an important early role, for it was from around such establishments in Ireland that W.B. Hartland collected numerous white forms during the 19th century.

The white Pyrenean *N. moschatus* is known to have grown in the gardens of northern mainland Europe from at least the early 16th century, but it appears likely that it was present much earlier than this. It is possible, therefore, that it was brought to the British Isles by skilled Flemish weavers and spinners during the period 1327 to 1377 when they are known to have brought many plants with them. Huguenot refugees are thought to have been another potential source, their first flight to Britain being after *N. moschatus* was recorded as growing in the gardens of mainland Europe. A large number of Dutch, Walloon and French refugees landed and settled on the south-east coast of England in 1561 and it was their descendants who moved to London to establish the seed trade in England. By the late 16th century, they included daffodil bulbs among their merchandise. Huguenots also settled in Ireland, although this took place considerably later following Louis XIV's Edict of Nantes in 1685: the first entries in the register at the French Church in Portarlinton were made in 1694. Another method by which daffodils came to Britain was by way of the gardener-traveller. John Tradescant, for example, travelled widely in Europe during the early 17th century acquiring new plants. He is known to have visited Haarlem in 1611 where he purchased a quantity of daffodil bulbs that he sent back to England. However it arrived, the white daffodil appears to have thrived in the mild climate of Ireland, hybridising freely. F.W. Burbidge commented on this in 1890:

“How they were originally introduced to Ireland I do not know but the fact is they have grown and thriven in old neglected Irish gardens better than anywhere else in the world. That they have seeded there spontaneously is also past disputation and hence, no doubt, the variety noticeable among them today.”<sup>(2)</sup>

These natural hybrids formed a great source of breeding potential for the collectors and hybridists engaged in the 19th century revival of the daffodil's fortunes. From that time to this, most of the great white cultivars form links in a chain that leads directly from the small, drooping flowers of *N. moschatus* to the superb blooms of the modern hybrids.

### Important Early Cultivars

The development of the white cultivars owes much to a unique combination of the mild Irish climate and the interest of William Baylor Hartland in this type of daffodil. During the latter part of the 19th century, Hartland scoured the old demesnes and ruined monastic sites of Ireland searching for the varied descendants of the long-introduced *N. moschatus*. He found a great number of naturally improved white forms, of which ‘Bishop Mann’ (1W-W, 1889) and ‘Colleen Bawn’ (1W-W, 1885) (Plate 10.1) became the most widely grown, the latter still occasionally being found in gardens to this day.



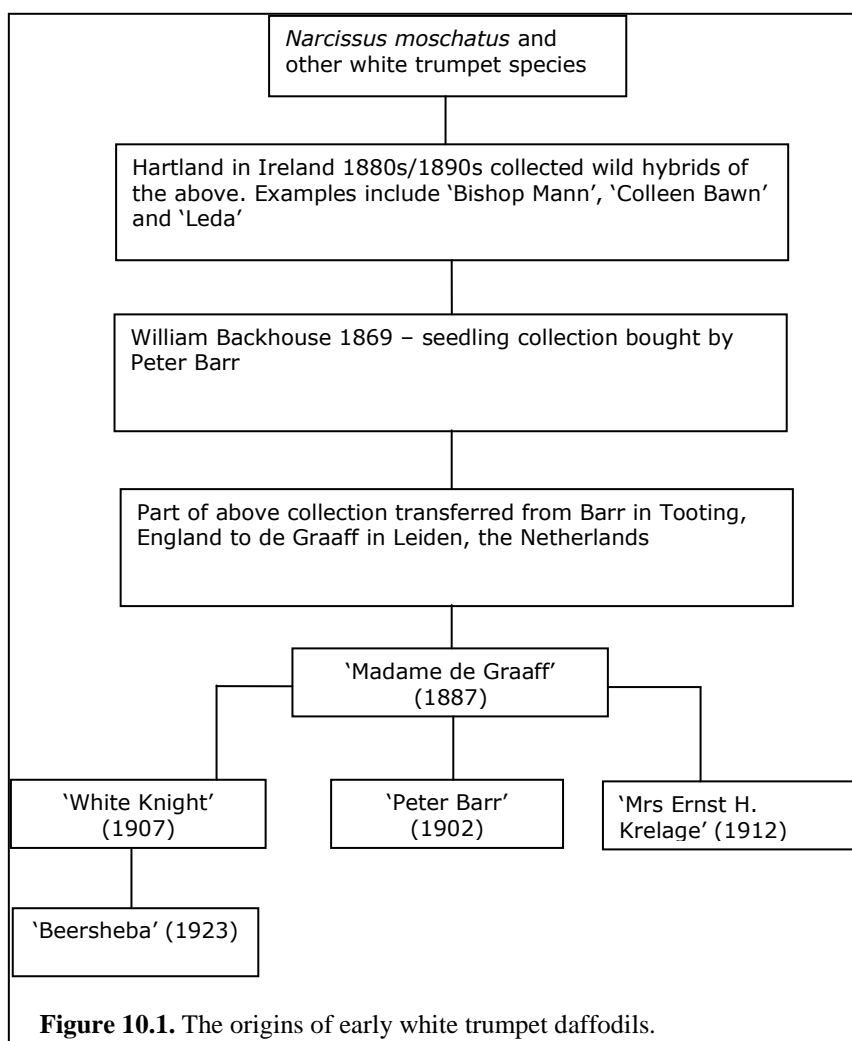
**Plate 10.1.** ‘Colleen Bawn’ (1W-W), one of the hybrids discovered by W.B. Hartland and named in 1885.

While the white daffodils which were discovered or raised by Hartland do not appear to have played any significant role in the further development of this type of flower, through their use in hybridisation Hartland did promote their virtues most ardently in his *Ye Little Booke of Daffodils*<sup>(3)</sup> published annually from 1884 until his death in 1912. It was this publication that exerted a strong influence on the future direction of the young Guy Wilson, leading to the immense development and improvement that he pioneered during the 1930s. The hybrids that were to provide the basic material for this development, however, arose elsewhere and probably numbered no more than three important cultivars.

The first of these and the most significant was ‘Madame de Graaff’ (1W-W, 1887). Its origins almost certainly lay in the collection of seedlings that Peter Barr purchased on the death of William Backhouse in 1869. This collection was originally grown at Barr’s Tooting nursery but part was later transferred to de Graaff’s at Leiden in the Netherlands and it was from among these bulbs that ‘Madame de Graaff’ probably came. Chromosome research has indicated that it arose from a cross between Backhouse’s ‘Empress’ (1W-Y) and *N. albescens*. ‘White Knight’ (1W-W, 1907) was raised from an open pollinated flower of ‘Madame de Graaff’, also at Leiden. The pedigree then moved to England where the Revd G.H. Engleheart crossed ‘White Knight’ with an unnamed white trumpet seedling to produce ‘Beersheba’ (1W-W, 1923). Hardly a white trumpet cultivar of any significance that has appeared since the 1920s has not had ‘Madame de Graaff’ or ‘Beersheba’, or both, in its ancestry, and they also feature in many important 2W-W daffodils.

The last of this trio of influential early white cultivars was ‘Mrs Ernst H. Krelage’ (1W-W, 1912). It was raised from ‘Madame de Graaff’ crossed with ‘King Alfred’ (1Y-Y, 1899) and, although classified as a white trumpet, it is in reality a pale lemon yellow and white bicolor that fades to white as it ages. Owing to its background of ‘King Alfred’, it is a vigorous plant with tall stems.

Mention must also be made of another early white cultivar that enjoyed considerable fame at the turn of the 20th century, although it appears to have played little part in subsequent developments. This was ‘Peter Barr’ (1W-W, 1902), which was named after its raiser and bred from ‘Monarch’ (1Y-Y, 1907) × ‘Madame de Graaff’. This cultivar caused a sensation when first introduced, due both to its quality and its price of £50 per bulb. The relationships and origins of the early white trumpet daffodils is shown in Figure 10.1.



## Guy Wilson's White Trumpet Daffodils

Inspired by the work of Hartland, Guy Wilson from his youth determined to improve white daffodils through breeding. This aim became almost obsessive, so that nothing was allowed to interfere with his hybridisation programme, which was largely devoted to the raising of white cultivars in Divisions 1, 2 and 3. Wilson's efforts were duly rewarded with marvellous new flowers of each type that showed steady improvement in quality right through to the end of his life. Some of the cultivars he raised stand out as milestones on the road leading to the very best in modern white daffodils. Year after year, many of his successful cultivars proved to be supreme examples of their type – 'Empress of Ireland' and 'Cantatrice' among the trumpets, 'Slemish' and 'Ave' among the large-cups, and the incomparable 'Chinese White' in Division 3.

When Wilson was a young man, the white daffodils of Hartland and those of other breeders had many faults. Invariably, they lacked stem length; perianth quality was often poor; the flowers had a downward pose known as swan's neck, which although a charming characteristic in dwarf daffodils, looked awkward in the larger cultivars; and the white colouration was frequently less than pure, often being cream or off-white. The constitution of whites was also suspect, the best growing conditions being required if they were to thrive. All these factors made white daffodils unpopular, with the exception of a few like 'Madame de Graaff' and 'Peter Barr', until the advent of 'Beersheba' and other improved sorts during the 1920s. From that time on, white cultivars had few of the faults of their predecessors and henceforward they began to gain recognition as fine flowers in their own right.

Early in his working life, Wilson became familiar with the best of the white cultivars. By 1907, for example, he was using 'Madame de Graaff' in his breeding programme and from it he raised a fine white seedling which he later sold to his friend James Coey of Larne for £2.

Among Wilson's selected seedlings of 1913 was one raised from 'Madame de Graaff' × 'Lola' (1W-W, 1908), which he registered in 1922 as 'White Dame' (1W-W). This cultivar was Wilson's first major success in breeding white daffodils and it was awarded a First Class Certificate as an exhibition flower in its year of introduction.

In 1918, Wilson was given a bulb of 'White Knight' (1W-W, 1907) by the Revd G.H. Engleheart, which flowered at Knowehead during the following season when he commented that it "showed itself to be an aristocrat of the first water"<sup>(4)</sup>. 'White Knight' had been raised from an open pollinated 'Madame de Graaff' and although it was a much smaller flower than its parent, it was also much whiter. As a consequence of this whiteness, it was widely used in breeding, and Engleheart himself raised 'Beersheba' from it. Wilson first saw this daffodil in 1920 at Brodie Castle and was entranced by it. He maintained that the journey to the north of Scotland would have been worthwhile had he seen nothing other than 'Beersheba'. He described the flower itself, as: "The finest white Ajax [trumpet] I have yet seen. It is a seedling of 'White Knight' and has the style and character of that exquisite flower but is twice the size, whiter and a tall plant."<sup>(5)</sup>

Here then was a cultivar that showed distinct improvements over the majority of earlier white hybrids. It possessed the qualities that Wilson so successfully strove to refine in his own seedlings throughout his life. In addition to 'Beersheba', Wilson also brought back from Brodie Castle his first plants of 'Mrs Ernst H. Krelage', planting them in "a little patch of extra choice new things which gave me special delight"<sup>(6)</sup>. 'Mrs Ernst H. Krelage' was a pale lemon bicolor and not a daffodil that Wilson could admire for its purity of colour. However, it had other qualities that made it an important plant for the daffodil breeder. It had large and vigorous flowers similar to those of its pollen parent 'Madame de Graaff', but they were carried on much stronger stems and the poise of the flower was better, all characteristics inherited from its seed parent 'King Alfred'.

These then were the early cultivars that Wilson was to exploit to create a whole new race of white daffodils. His success can be ascribed to several factors. At the start of the 20th century, there was relatively little interest among hybridists or the public in white daffodils. Wilson, therefore, had the field to himself. Apart from the handful of cultivars already mentioned, the whites were in a fairly rudimentary stage of development so that any improvement was significant. Wilson achieved early success from his efforts to improve the whites and was therefore encouraged to go on. 'White Dame' was raised from a cross made in only his second year as a hybridist, and was quickly followed by the excellent 'Driven Snow' (1W-W, 1923) and 'Everest' (1W-W, 1926). It is remarkable that the seventh and eighth white trumpets registered by Wilson were the outstanding 'Samite' and 'Kanchenjunga'. When these factors, such as relatively little interest among hybridists and the general public and his early successes, were combined with Wilson's traits of dogged persistence, single-mindedness and the belief that he had been put into this world to create beautiful daffodils, especially white ones, success was almost inevitable.

### **'Kanchenjunga' and the Giant Whites**

Wilson's own description of the first flower produced by Seedling 2/30, later named 'White Dame', shows clearly the improved characteristics he was aiming for in his breeding of white daffodils. The entry in 1913 for Seedling 2/30 in his Record Book read:

"This is my best flower of the season and a great prize. A superb white trumpet, a bloom of supreme loveliness and great dignity of bearing. Size  $4\frac{3}{4}$  in [12 cm] across . . . . The flowers opened on the plant very much whiter than 'Mme. de Graaff' or 'Pearl of Kent'."<sup>(7)</sup>

Sixteen years elapsed before Wilson's next major advance in white daffodils. The year was 1929 when the seedlings, later to become 'Samite' (1W-W, 1930) and 'Ardclinis' (1W-W, 1934), first

flowered. Although 'Ardclinis' never achieved any major honours, it was held in great esteem by Wilson over a considerable period of time for as late as 1940 he wrote:

"This last season one of the most lovely varieties was 'Ardclinis'. Again and again I kept going back to admire it as its flowers were a feast to the eye ... like glistening white satin."(8)

'Samite', on the other hand, received two Awards of Merit and a First Class Certificate, its flowers setting a new standard for white daffodils on account of its exquisite form and superlative texture, which was velvet smooth throughout. These two daffodils are significant because they were the first Wilson cultivars to have 'Mrs Ernst H. Krelage' in their parentage, and 'Beersheba' was also involved as the pollen parent of 'Samite'. Interestingly, 'Beersheba' was often a successful parent when used for the production of seed, but rarely gave rise to anything of note when used as pollen parent. The most famous example of this apparently strange behaviour in daffodils is the famous 'Kilworth' and 'Arbar' cross, which seldom worked in the reverse direction.

The development of quality white cultivars, such as 'Ardclinis' and 'Samite', were steadily taking Wilson towards his ultimate goal of the perfect white daffodil. His efforts bore their first fruit in 1930 when Seedling 19/59, later named 'Kanchenjunga' (1W-W) (Figure 10.2, Plate 10.2), flowered for the first time. Its origins went back to Wilson's early friendship with the Brodie and

their shared interest in white daffodils. Brodie had received a seedling from the Revd G.H. Engleheart that, although its parentage was unknown, was thought to have *N. triandrus* in its ancestry. Brodie crossed this seedling with 'King of the North', a yellow trumpet of his own raising. The outcome was 'Nevis' (1W-W, 1916), a white of remarkably fine substance and smooth texture which, moreover, had the ability to pass these qualities on to its progeny. 'Nevis' was in turn crossed with a seedling from 'Weardale Perfection' (1W-Y, 1872) × 'Duke of Bedford' (1W-Y, 1899), 'Askelon' (1W-W, 1923) being the result. This was a noble flower, much used in hybridisation on account of the breadth of its perianth segments. It was recognised as a potent influence in increasing the size of white trumpet daffodils, and later became the pollen parent of 'Kanchenjunga'.

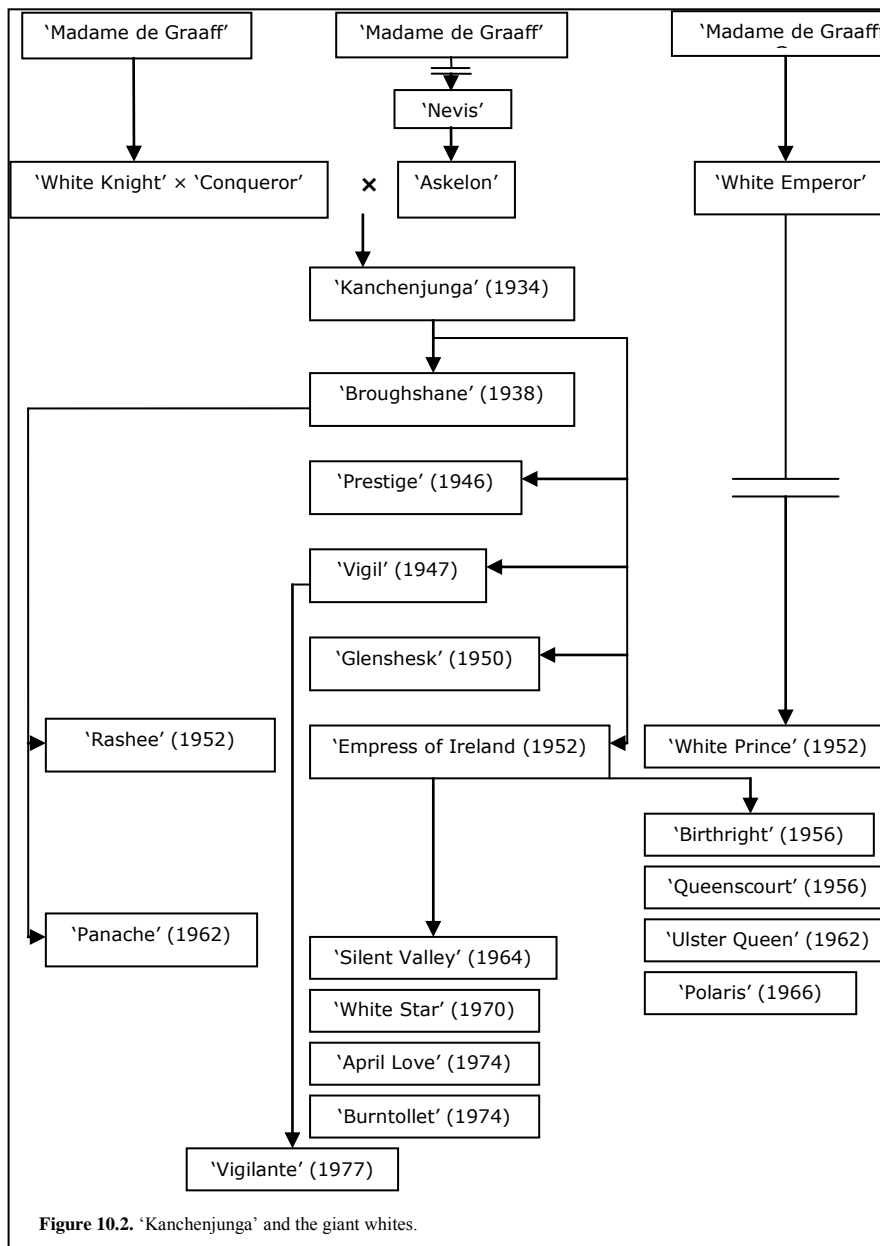


**Plate 10.2.** 'Kanchenjunga' (1W-W), G.L. Wilson's giant tetraploid break through in the 1930s. (Reproduced by kind permission of the American Daffodil Society, Daffseek.org. Photograph by Willis H. Wheeler.)

Brodie also played an important role in the maternal background of 'Kanchenjunga', whose seed parent was an unnamed seedling which he had raised from de Graaff's 'White Knight' (1W-W, 1907) crossed with P.D. Williams' 'Conqueror' (1W-Y, 1907). Several seedlings resulted from the cross but Brodie only retained two, which he grew on for some years before deciding that neither was good enough to name. At that point, he gave one to Guy Wilson. This seedling had the general character of 'White Knight' but its texture was much thinner. Despite this fault, Wilson decided to cross the seedling with 'Askelon' and one of the seedlings which resulted appeared to have considerable potential, being given the number 19/59. Later it became known the world over as 'Kanchenjunga'. In 1938, Wilson recalled both the cross and the magnificent daffodil that resulted from it:

"This [the 'White Knight' × 'Conqueror' seedling] was given to me by Brodie and I grew it on for several seasons having the good luck to pollinate it with 'Askelon'. Only two or three seedlings resulted but one of them was 'Kanchenjunga'. I well remember my astonishment as its first flower unfolded wonderful petals of unheard of breadth ... it may prove as important in daffodil breeding as was 'Dominion' in the breeding of Juno Irises."(9)

Indeed, 'Kanchenjunga' was to prove as much a giant in the breeding of white daffodils as the Himalayan mountain after which it was named.



One important lesson that Wilson learned from 'Kanchenjunga' was to allow new seedlings sufficient time to settle down and mature fully. When it first flowered in 1930, he recorded that it had a fault in that it had "a lack of substance"<sup>(10)</sup>. During subsequent years, however, it improved dramatically. As he wrote in 1938:

"When it first bloomed as a seedling the plant was not strong and the texture of the flower was on the thin side but it has since gained strength and has developed amazingly and now has great substance."<sup>(11)</sup>

'Kanchenjunga' was to head a dynasty of outstanding white trumpet daffodils across the entire period from the 1930s to the present day's leading exhibition cultivars like 'White Star' (1W-W). In fact, the cultivars at each stage of this development were among the very best show flowers of their time and, currently, some still play a leading role.

Wilson's next important white trumpet was 'Cantatrice' (1W-W, 1936), although it did not form part of the succession which led from 'Kanchenjunga' to 'White Star', its parentage being 'Beersheba' x 'Eskimo' (2W-W, 1927). There is little doubt that until relatively recently many

daffodil experts considered ‘Cantatrice’ to be the best flower of its type and, indeed, several commented that it was the finest daffodil bred by Guy Wilson. ‘Cantatrice’ won almost every award available to it in all parts of the world and remained at the head of its sub-division as the finest exhibition white trumpet for longer than any other cultivar. As recently as 1968, it was voted number one favourite at the American Daffodil Symposium and yet had received its First Class Certificate as an exhibition daffodil almost 30 years earlier. In between, C.B. Habershon maintained that it was “the best exhibition flower of its type yet seen”<sup>(12)</sup>, and Wilson added that “it delights me with its flawless smoothness of texture and superb quality”<sup>(13)</sup>.

In 1936, Seedling 25/31 flowered. At the time Wilson described it as an “immense and noble flower with a massive thick and broad, pure white perianth of great size”<sup>(14)</sup>. This was the first successful seedling in the line that led from ‘Kanchenjunga’ to the great white trumpets of today, its parents being ‘Trostan’ (1W-Y, 1938) × ‘Kanchenjunga’. Seedling 25/31 became ‘Broughshane’ (1W-W, 1938) (Figure 10.3 at the end of this chapter) and showed many of the characteristics of its pollen parent, especially its remarkable substance. This quality was demonstrated in most dramatic fashion in 1936 when a flower was exhibited at the Midland Daffodil Society Show in Birmingham. Despite having been badly frozen at The Knockan prior to picking, it was subsequently taken to Sutton Court in Herefordshire, the home of R.O. Backhouse and then exhibited at the Hereford Show the following day. Finally, it was left with A.M. Wilson at Presteigne in Wales where its pollen was used in his breeding programme. Flowers of lesser substance than ‘Broughshane’ would never have withstood such treatment.

If ‘Kanchenjunga’ had a fault it was that it had rather short stems at about 40 cm. ‘Trostan’, however, had long stems. According to Wilson, it was “one of the grandest trumpets I have raised: very tall noble plant carrying its great flowers on two foot [60 cm] stems”<sup>(15)</sup>. This trait was reflected in ‘Broughshane’, whose strong stems were at least 60 cm long. Wilson confirmed excellent vigour in 1942:

“My giant white trumpet ‘Broughshane’ fully justified my opinion of it as the most spectacular thing I have yet raised. Two blooms in particular towered head and shoulders above their neighbours, faultless in form and balance. Their immense size, beauty and giant foliage was quite amazing.”<sup>(16)</sup>

It is remarkable that ‘Broughshane’ was only six generations removed from its species ancestors or, looked at another way, that they were separated by a mere 50 years. Like ‘Kanchenjunga’ before it, ‘Broughshane’ proved to be a successful pollen parent, playing an important role in the improvement of large-cupped whites. ‘Glendermott’ and ‘Knowehead’ were two of its finest progeny.

Several fine white trumpets followed ‘Broughshane’, each with ‘Kanchenjunga’ as pollen parent. These included ‘Prestige’ (1946), which for a time was classed as one of the best cultivars of its type. Wilson thought it “a very large flower of great substance, beautiful quality and fine carriage”<sup>(17)</sup>. Another was ‘Vigil’ (1947), which had Brodie’s ‘Courage’ (2W-W, 1933) as its seed parent. ‘Vigil’ was one of Wilson’s most important white trumpets and for many years it was a favourite exhibition cultivar both in America and Britain. It possessed an almost crystalline texture: “An air of purity and icy unattainability that is quite unique.”<sup>(18)</sup> The same parentage of ‘Courage’ × ‘Kanchenjunga’ also produced ‘Glenshesk’ (1950), another white trumpet of good form and substance whose flowers were slightly smaller than those of ‘Vigil’.

The next white trumpet raised from ‘Kanchenjunga’ was undoubtedly Wilson’s special favourite. It first flowered in 1947 and was registered five years later as ‘Empress of Ireland’ (Figure 10.4 at the end of this chapter, Plate 10.3). Its seed parent was Wilson’s ‘Guardian’ (2W-Y, 1942). Wilson regarded ‘Empress of Ireland’ as his masterpiece and, as he grew it at The Knockan, there is little doubt that it was. If given the power to create a daffodil to his own ideal, he was once asked, what properties would it possess? Wilson pointed to ‘Empress of Ireland’ and said “that is what I would have



made<sup>(19)</sup>. In 1956, ‘Empress of Ireland’ received an Award of Merit as an exhibition flower after Wilson put “nine truly regal blooms before the committee”<sup>(20)</sup> which, incidentally, gave the award unanimously. In the following year, it was introduced in his catalogue at £35 per bulb. In 1959, W.J. Dunlop, the well known Ulster hybridist, wrote of ‘Empress of Ireland’:

“Although still expensive it is outstanding. I remember vividly seeing it as a seedling and it has, if anything, improved from those days.”<sup>(21)</sup>

In 1970, it received an Award of Merit as a garden plant, producing 82 flowers in the second year from an initial planting of 25 bulbs. Wilson realised its potential in hybridisation, using it extensively. It was particularly successful as a seed parent. He crossed it with ‘Vigil’ to produce ‘Ulster Queen’ (1W-W, 1962), a cultivar that he also regarded very highly indeed. The overall excellence of ‘Empress of Ireland’ is evident from the fact that it topped the Royal Horticultural Society’s poll as the favourite exhibition white trumpet from 1960 to 1976, taking over from that other famous Wilson daffodil, ‘Cantatrice’, which for the previous 20 years had remained unchallenged in that position. More recently, the supreme position of ‘Empress of Ireland’ has been challenged, not least by a number of its own fine offspring; nevertheless, it continued to appear among the most successful white trumpet cultivars at the top shows until well into the 1980s.

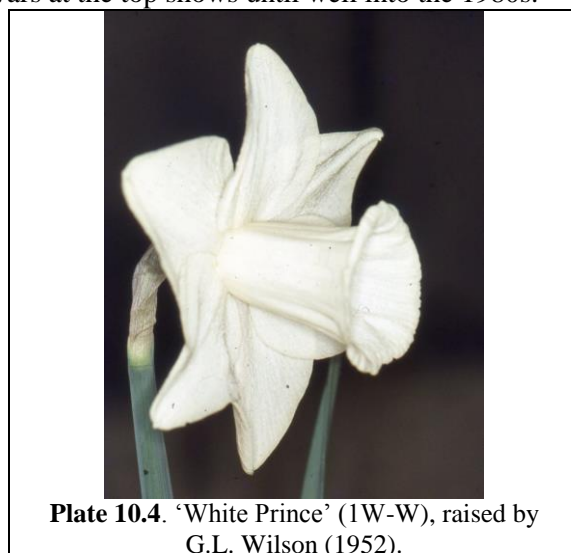
Nineteen forty-seven was a remarkable year even by Wilson’s standards, for not only did it see the first flowering of ‘Empress of Ireland’, but also that of another wonderful white trumpet, later named ‘White Prince’ (1W-W, 1952) (Plate 10.4), which was raised from (‘Quartz’ 1W-W × ‘Tenedos’ 2W-Y) × ‘Guardian’ 2W-Y. Wilson recorded at the time that it was “large, smooth and pure white”<sup>(22)</sup>, and later added a pencilled note in his diary that it was “magnificent in 1952”. Reviewing exhibition cultivars in 1959, D.A. Lloyd felt that: “Any idea that Guy L. Wilson had reached his zenith with ‘Empress of Ireland’ was scotched this year when he showed his new ‘White Prince’.”<sup>(23)</sup>

Seedling 38/128, later named ‘Rashee’ (1W-W, 1952), flowered two years after ‘White Prince’ was first seen, being raised from ‘Cotterton’ × ‘Broughshane’. It was described by Wilson as “one of the most exquisite flowers that has yet appeared here”<sup>(24)</sup>; and later, by Francis Hanger, as “an exquisite connoisseur’s flower of the purest ice white”<sup>(25)</sup>. It was an exhibition cultivar of first-class quality that, as recently as the mid-1970s, continued to win awards at major shows in all parts of the world. ‘Rashee’ has been widely used in breeding white trumpets, particularly by Tom Bloomer, who produced a wonderful series of white trumpets from ‘Rashee’ × ‘Empress of Ireland’.

Wilson’s 51st year in daffodil breeding was marked by the appearance of his last great white trumpet, ‘Panache’ (1W-W, 1962). It was raised from (‘Courage’ × ‘Broughshane’) × ‘Empress of Ireland’, and was another of those glistening, snow-white miracles that typified his later years, fulfilling all those youthful dreams of raising the ‘perfect’ white trumpet. It amply met his early claim that: “One day we will have white trumpets as white as the poets.”<sup>(26)</sup> for, in ‘Panache’, Wilson had raised the whitest trumpet ever known at that time.



**Plate 10.3.** ‘Empress of Ireland’ (1W-W), G.L. Wilson’s favourite among all the white trumpets he raised (1952).



**Plate 10.4.** ‘White Prince’ (1W-W), raised by G.L. Wilson (1952).

Thus a great chapter in the history of the daffodil came to a close. An era of change and vast improvement had occurred in Ulster. Guy Wilson had nurtured these flowers from the small, inconspicuous sorts that he had known as a boy to a state of previously unimagined magnificence. Writing in 1962, Jefferson-Brown summed up Wilson's achievement. Guy Wilson had:

“... brought white daffodils to within an ace of perfection for, although better flowers may be bred than ‘Empress of Ireland’ and ‘White Prince’, a revolutionary flower of this type was unlikely to appear.”(27)

### Modern White Trumpets

Since the 1960s and the passing of Guy Wilson, the pace with which improved white trumpets have come forward has slackened. This state of affairs is perhaps confirmed by the fact that cultivars such as ‘Empress of Ireland’, ‘Cantatrice’, ‘Vigil’ and ‘Panache’ continued to rank in the top six or seven exhibition white trumpets for a considerable period. Some notable new sorts have established themselves, however, superseding these older favourites, while a number of recent introductions have made their mark but have yet to be assessed over a longer period to see if they stand the test of time.

Those which have established themselves include: ‘Silent Valley’ (1964) (Plate 10.5) and ‘White Star’ (1970) (Plate 10.6), both raised by Tom Bloomer; Mrs Abel Smith’s ‘April Love’ (1974); J.S.B. Lea’s ‘Burntollet’ (1974) (Plate 10.7); and Brian Duncan’s ‘Vigilante’ (1977). Others await their turn in the wings – ‘Ladybank’ (1981), ‘Majestic Star’ (1982) and ‘White Convention’ (1983). Additionally, some fine white trumpets raised in other parts of the world are now becoming more readily available, the American raised ‘Celilo’ (1968) being a fine example. Almost all of these daffodils have one thing in common – a link back to the white trumpets of Guy Wilson and, in particular, ‘Empress of Ireland’, either directly or through cultivars such as ‘White Majesty’ or ‘White Star’. The exceptions are ‘Celilo’, which came from Richardson’s ‘Petsamo’ and ‘Vigilante’ from an open pollinated ‘Vigil’.



**Plate 10.5.** ‘Silent Valley’ (1W-GWW), raised by T. Bloomer (1964) – a leading show cultivar.



**Plate 10.6.** ‘White Star’ (1W-W), raised by T. Bloomer (1970).



**Plate 10.7.** ‘Burntollet’ (1W-W), a successful show flower raised by J.S.B. Lea (1962).

‘Silent Valley’ and ‘White Star’ were both raised from ‘Rashee’ × ‘Empress of Ireland’ by Tom Bloomer in Ulster, as were ‘White Empress’ and ‘White Majesty’. These daffodils have already achieved many outstanding successes and have been referred to as “Tom Bloomer’s special ‘1c’s”<sup>(28)</sup>. They have all been widely used in breeding as, for example, in ‘Majestic Star’ from ‘White Majesty’ × ‘White Star’. From the outset, Bloomer’s quartet were highly thought of as “promising to be spectacular improvements on both parents”<sup>(29)</sup>. ‘Silent Valley’ won the white trumpet class at the

London Show in 1975; 'White Empress' was Best Bloom at Ballymena in 1970; and 'White Majesty' received First Prize at Omagh in 1973. But it was left to 'White Star' to claim the major honours. Along the road to success, it gained many Best Bloom awards, culminating in 1978 when it won this award at the Royal Horticultural Society's London Show. Three years later, it was voted Best Division 1 daffodil at the same show. 'White Star' has a snow-white flower of wonderful substance and is exceptionally consistent. After its 1978 London success, it was claimed that:

"The 1W-W class now has 'White Star' as the outstanding flower in its section. It really has something special – it is not a variety which only gives an occasional good flower. The majority of its blooms are up to the highest show standards: the difficulty will not be in getting it to present you with a perfect bloom, but in getting hold of a bulb of it in the first place."<sup>(30)</sup>

'Vigilante' is an outstanding introduction raised by B.S. Duncan, who confidently expected it to "provide 'White Star' with some useful competition"<sup>(31)</sup>. It shares with 'White Star' an outstanding degree of consistency and in addition possesses the fine form enthusiasts previously associated with 'Cantatrice'. 'Burntollet' was raised by J.S.B. Lea from 'Glenshesk' × 'Empress of Ireland', the stock being purchased by a group of Ulster hybridists while still under a seedling number. It has large flowers of smooth texture and the purest white colour, and is particularly admired for the exceptional breadth of its perianth segments. 'April Love', raised from 'Ave' × 'Empress of Ireland' by Mrs Abel Smith, possesses a consistency similar to that of 'White Star'. As a result, it has enjoyed much success as an exhibition daffodil. 'Majestic Star' and 'Ladybank' were both raised in Northern Ireland, the former by Bloomer from 'White Majesty' × 'White Star', and the latter by B.S. Duncan from 'Empress of Ireland' × 'White Star'. Lea's 'White Convention' from 'Pitchroy' (2W-GWW, 1973) × 'Panache' was introduced in 1988 at £40 per bulb. It has very broad perianth segments, with rounded tips similar in shape to those found in the earlier 'Gold Convention', which give it an almost circular outline. 'White Convention' was the last seedling to be named and registered by Lea. In the USA, 'Celilo' has been a most successful white trumpet, possessing a flower reminiscent of 'Cantatrice' in shape, but it is both whiter in colour and more long-lasting.

Thus the influence of Guy Wilson persists in the cultivars of today, many having direct links to his favourite 'Empress of Ireland'. In others, the links are less immediately obvious: for example, in 'Celilo' from 'Petsamo' × 'Beersheba', the seed parent originating from 'Niphetos' crossed with none other than 'Kanchenjunga'.

A summary of the white trumpet cultivars in this section, arranged in the order they are mentioned in the above account, is provided in Table 10.1 at the end of this chapter.

## The Large-Cupped Whites

In part, the ancestry of the large-cupped whites is the same as that of the white trumpets, the common factor being *N. moschatus* and, to a lesser extent, the other large white trumpet species. As outlined earlier, the earliest forms of white trumpets introduced into gardens during the late 19th century arose through a process of chance hybridisation between the various naturalised wild forms and their offspring. The large-cupped white cultivars on the other hand are the product of deliberate hybridisation by man. This process involved the crossing of wild white trumpet forms with *poeticus* daffodils, resulting in a new type of daffodil in which the corona was intermediate in length between that of its two parents. This cross also introduced the glistening white colour, formerly only linked with *N. poeticus* daffodils, into flowers of other divisions. The reason for the man-made nature of the Division 2 daffodils is to be found in the natural flowering times of the parent material. *N. moschatus* flowered early, and *N. poeticus* late in the season, often extending into June. It was not until the 19th century that hybridists discovered crude techniques for pollen storage. This, coupled with an ability to manipulate flowering times through the increasing use of glasshouses, ensured that the crosses required to create the Division 2 cultivars became easier to procure on a regular basis.

## The Leedsiiis

In the late Victorian classification of the genus, J.G. Baker divided daffodils into three great groups, the Magnicoronatae, the Mediocoronatae and the Parvicoronatae that corresponded to the trumpets, large-cupped and small-cupped daffodils of today. Each of these major groups was divided into sub-groups that were either given old Latinised names such as *Incomparabilis* or the names of hybridists of that period. One such sub-group within the Mediocoronatae was the Leedsii (after Edward Leeds), which consisted of white or pale citron cupped daffodils, all with white perianths. An unmistakable characteristic of this type of flower was its silvery white appearance, an early example being 'Mrs Langtry' (3W-W) raised by W. Backhouse and registered in 1884.

*Incomparabilis* daffodils occur naturally in the wild and subsequently arose as a result of hybridisation in cultivation as large-cupped cultivars from crosses between *N. poeticus* and trumpet species possessing some yellow, such as the relatively late flowering *N. bicolor*. The Revd Joseph Jacob also postulated that this type of daffodil may arise from *N. abscissus* (presumably more correctly *N. × abscissus*), which is also relatively late flowering, when crossed with *N. poeticus*; and that both of these crosses might account for the citron cupped forms found among the Leedsii. It is also known that some of the Leedsii daffodils, known as the Dinton Leedsii, were raised by Engleheart from *N. moschatus* crossed with *N. poeticus* 'Ornatus' (syn. 'Ornatus'). It is this that is the most likely source of the white forms of Leedsii.

Two Engleheart cultivars that were classified as Leedsii, and almost certainly had connections back to the Dinton Leedsii, were 'Naxos' (2W-W) and 'Tenedos' (2W-Y), both of which were registered in 1923. The latter was described as "an immense flower, often attaining a diameter of 5½ in [13.75 cm]"<sup>(32)</sup>. The flower opened with a primrose corona that soon passed to white, and the plant itself was vigorous, growing to over 60 cm tall, with big, broad foliage. 'Naxos' cost £4 per bulb in 1929 and, like 'Tenedos', had large flowers which approached trumpet proportions with broad, overlapping perianth segments. Both were widely used in breeding, the Brodie achieving considerable success from 'Naxos' as a pollen parent.

### **Other important early whites**

There were perhaps four cultivars of the 1920s and 1930s, along with some of Wilson's early introductions, which helped to set the standards for 2W-W daffodils. 'White Nile' (2W-W) was raised by the Brodie from 'Laughing Water' (3W-Y) × 'Mrs Robert Sydenham' (1W-W) and registered in 1922. Opening with a pale yellow corona, the whole flower soon became pure white. On seeing it flower at Brodie Castle, Wilson described it as: "A most aristocratic and altogether lovely flower upon which the eye rests with undisturbed delight."<sup>(33)</sup> In all, 'White Nile' received three Awards of Merit for exhibition and as a commercial cut flower.

'Niphetos' (2W-W) was raised by P.D. Williams and registered in 1927 but, in keeping with many other Williams' cultivars, its parentage went unrecorded. It was a superb exhibition flower in its day, for which it received an Award of Merit in 1932. 'Courage' was another fine white raised by Brodie and was thought by many to be his outstanding contribution to 2W-W daffodils although, oddly, it did not receive a major award. Unlike 'White Nile' and 'Niphetos', which had some pale yellow colour in the corona during the early stages of flower development, 'Courage' opened and remained pure white throughout its life. Wilson used 'Courage' with 'Empress of Ireland' to raise cultivars such as 'Queenscourt' (1W-W) and 'Birthright' (1W-W).

'Ludlow' was without doubt one of the finest 2W-W daffodils of its time and among the very best of the wide range of cultivars raised by Alex Wilson at Presteigne. It was raised from 'Naxos' crossed with 'Lysyvern' a named but apparently unregistered white trumpet daffodil raised by Brodie. 'Ludlow' was awarded a First Class Certificate in 1940 as an exhibition flower, having been judged Best Bloom at the London Daffodil Show two years earlier. In 1944, it received an Award of Merit (Haarlem) indicating its suitability for use as a cut flower. 'Ludlow' was ice-white throughout apart from an attractive green eye at the base of its trumpet-like corona.

## **Guy Wilson again**

In both numbers and quality, the large-cupped white cultivars of Guy Wilson almost provided a re-run of his success with the white trumpets. His first important cultivar in this sub-division was 'Slemish', registered in 1930. In 1923, Wilson's new home, The Knockan, was completed and he took up residence there. The great volcanic core of Slemish Mountain on which St Patrick is reputed to have herded sheep as a boy was clearly visible from the house; indeed, Wilson had sited it so that this would be so. What could be more natural than for him to name his first large-cupped white, raised at The Knockan, after his beloved and sometimes snow-capped mountain. 'Slemish' was raised from 'Findhorn' (1W-Y) × 'Beersheba' (1W-W) and first flowered in 1928. It was initially classified as a 1W-W, which is not surprising considering its trumpet parentage, its corona shape certainly being trumpet-like. However, being one of those marginal flowers that hover between Divisions 1 and 2, it was finally re-classified as a 2W-W. 'Slemish' received both an Award of Merit (1935) and a First Class Certificate (1939) as an exhibition flower. It was unusual in that its cup was whiter than its perianth, the reverse of what was usually encountered, and this gave 'Slemish' its unique character. Wilson described its colouring as of "spellbinding loveliness"<sup>(34)</sup>: it was awarded Best Bloom at the London Show in 1933 and won top place at the Daffodil Ballot in 1940 as the best exhibition 2W-W.

'Dunlewey' (2W-W) also flowered for the first time in 1928. A cultivar that has stood the test of time, it received an Award of Merit as a garden plant as late as 1953. This success was forecast by Wilson in 1945 when he suggested that 'Dunlewey' was "very free of bloom and increase ... a strikingly effective garden plant"<sup>(35)</sup>. 'Evening' (2W-W) is another most interesting cultivar. Registered in 1935, its fame did not arise among its own kind but as a parent capable of producing pink seedlings. Several of these appeared during the late 1930s when pink cupped daffodils were still a novelty, often from crosses with 'Mitylene' (2W-Y) – another cultivar that became well known for its ability to generate pink in its offspring. When crossed with cultivars other than 'Mitylene', it still produced pink, although its background is insufficiently documented for us to know with certainty if its ancestry lies in white trumpet species and *N. poeticus*. However, the circumstantial evidence does point to this through its one known parent, 'Blizzard', a 2W-W raised by Engleheart and registered in 1927. Thus, 'Evening' may well have been another product of the Dinton Leedsiiis.

Another fine white of this period was 'Zero' (2W-W, 1935). Wilson regarded it as of outstanding quality and it enjoyed a considerable measure of success in both Britain and the USA, although it never received an Award of Merit or a First Class Certificate. Wilson's view of its excellence was shared by many other daffodil experts. In England, C.B. Habershon described it as a "magnificent white flower of wonderful beauty and refinement"<sup>(36)</sup>, while the American hybridist Harry Tuggle felt that "'Zero' ranks first, opening chaste white and having good form and size"<sup>(37)</sup>. On one occasion, some plants of 'Zero' had been surrounded by hessian screens to protect blooms intended for a show. The screens were loosened, however, during a violent hailstorm, and the unholy combination of hailstones and flapping hessian reduced the flowers to pulp. Wilson and his assistant, John Shaw, went to view the scene after the storm had abated. On seeing the destruction, Wilson said: "Damnation, you might as well try to grow daffodils in hell", to which Shaw, with typical dour humour, replied: "Maybe you'll get trying." "Perhaps you will too", roared Wilson<sup>(38)</sup>. This last remark was followed by several minutes' silence during which Wilson continued to stare disconsolately at the ruined flowers. Suddenly a puckish grin crept over his face, his anger subsiding as quickly as had the storm. Periods of bad weather at critical stages of the growing season were a constant problem for Wilson. They often seemed to occur when he was trying to bring his flowers to the peak of perfection for the London Shows, the dates of which always favoured growers from more southerly locations. The frequent coldness of the north Antrim spring often led him to consider moving to the softer climate of County Down, even when he was almost 60 years of age. Family ties in the Broughshane area, however, always combined to prevent this.

Another fine cultivar, said to have been registered in 1935, is 'Ave' (2W-W). There is something of a mystery regarding this registration date for it appears to be not only incorrect but also

a virtual impossibility for the daffodil that we know today as 'Ave'. Wilson clearly indicated in his Record Book the link between 'Ave' and Seedling 32/75, which he specifically referred to in his notes as flowering first in 1942. In addition, the seed parent of 'Ave' is 'Truth', which Wilson recorded as flowering first in 1934; and obviously it could have no connection with the parentage of a cultivar registered only a year later. Finally, 'Ave' did not appear in Wilson's catalogue until 1949, which relates much more convincingly with 1942 than with 1935. The most likely explanation of this mystery is that the daffodil registered in 1935 as 'Ave' died out, and was replaced by the new hybrid from 'Truth' × 'Slemish': but Wilson probably omitted to inform the registration authority of this for the 1969 Register only listed the 1935 'Ave' although both are now shown. When the 1942 registered 'Ave' first flowered, Wilson described it as: "An absolutely snow-white, most lovely flower of perfect silken smoothness."<sup>(39)</sup> Although it possessed these excellent qualities, they were insufficient to warrant giving it a name, for it was also flimsy and lacking in vigour. In fact, it was so poor in these respects that Wilson almost discarded it. Yet, he was always reluctant to throw away seedlings that showed some good qualities. And so, after several seasons of indifferent performance, this seedling stock was planted in a corner at The Knockan described as the worst piece of ground available. There the stock remained for two years, almost forgotten, until 1948 when it flowered magnificently. By that time, it had acquired a vigour not previously evident and bore flowers of flawless smoothness, symmetry and substance.

As has been stated, 'Truth' first flowered in 1934 and was registered two years later. It was similar in many respects to its immediate predecessor, 'Zero', both having trumpet-like coronas and great vigour inherited from their common pollen parent 'Naxos', a cultivar with "stems of immense length"<sup>(40)</sup>. The ancestry of 'Truth' is interesting in that it contained both 'Madame de Graaff' and 'Beersheba' through two Wilson seedlings, one of which was "purest white and of cardboard-like substance", the other having "a wonderful waxy texture and a trumpet of absolute roundness at the mouth and beautifully flanged"<sup>(41)</sup>. Both, however, were short-stemmed and so Wilson used the long-stemmed 'Naxos' successfully to induce the vigour found in 'Truth'. 'Truth' was a favourite of Wilson's who confessed that "few of my seedlings have pleased me better"<sup>(42)</sup>. 'Truth' also received praise in the USA when it was described in an article entitled 'An expert looks at daffodils' as "the most superb white daffodil ever created – its undiluted purity of color, substance and form surpass that of any other"<sup>(43)</sup>. Its one failing was susceptibility to the fungal disease Basal Rot.

An unusual seedling was selected by Wilson in 1938, unusual in two respects: it flowered very early in the season and yet was of the highest quality – characteristics which co-habited very infrequently. It was raised from 'Niphetos' (2W-W) × 'Scapa' (1W-W) and was registered in 1945 as 'Parkmore' (2W-W). Two other important cultivars, both imposing plants, appeared during the 1940s. The first was 'Tibet' (2W-W), raised from 'Tunis' (2W-WWY) × 'Askelon' (1W-W) and registered in 1947; and the second 'Kibo' (2W-W) from 'Gracious' × 'Broughshane', registered one year later. Both possessed large imposing flowers held on tall, vigorous stems, those of 'Kibo' frequently reaching over 76 cm.

From the outset of his career in hybridisation, Wilson's main aim had been to improve the quality of white daffodils, step by step. In the final decade of his life all the groundwork which he had put into his search for perfection came to fruition with such large-cupped cultivars as 'Ardbane' and 'Castle of Mey' (1953), 'Easter Moon' and 'Knowehead' (1954), 'Glendermott' (1957) and 'Arctic Doric', 'Purity' and 'Stainless' (1960). 'Ardbane', raised from 'Saint Brendan' × 'Greenland', was a flower of outstanding quality, ice-white and with an attractive green corona base. 'Castle of Mey' had such quality in its parentage that it could hardly fail to be successful. It was raised from ('Slemish' × 'Broughshane') × 'Murmansk', which in turn was raised from 'Samite' × 'Slemish'. Its flower was pure white apart from the green corona base, a feature in white daffodils much loved by Wilson. What greater praise could be lavished upon it than that bestowed by a knowledgeable American admirer who described it as "a refined and polished 'Slemish'"<sup>(44)</sup>. In 1953, the year of its registration, it received the Best Bloom award at the London Show. 'Glendermott' and 'Knowehead' had 'Broughshane' as their pollen parent, which showed through in the vigour of these cultivars and the

trumpet-like appearance of their coronas. Both received Awards of Merit in 1969 as flowers for exhibition.

Another masterpiece of this period was 'Easter Moon' from 'Tryst' × 'Greenland'. When it first flowered, Wilson described it as:

"A very fine quality flower with a broad, perfectly smooth white perianth of grand substance and a not too large white cup with sage green base."<sup>(45)</sup>

'Easter Moon' had much success following its registration in 1954, being judged Best Bloom at the London Show in that year, and again in 1957. It was once regarded as:

"One of those rarest of rare treats, a distinctive flower of pure white with enchanting green lights at the base of its cup."<sup>(46)</sup>

Wilson predicted that 'Easter Moon' would be a great plant for breeding and it did go on to give rise to many fine seedlings.

Then, in the year before his death, Wilson registered his final three superb Division 2 cultivars, 'Arctic Doric', 'Purity' and 'Stainless'. 'Arctic Doric' was a vigorous plant with flowers of unadulterated whiteness. It received an Award of Merit in 1967 as a garden plant following trials at Wisley, in which it produced 102 flowers in the second year from an initial planting of 25 bulbs. It has the advantage of being an early flowerer. 'Purity' was also dazzlingly white, with its flowers being borne on stems of exceptional length, frequently measuring up to 63 cm. 'Stainless' was the whitest of the trio, possessing what is now termed blue whiteness. Its perianth segments were very smooth and somewhat reflexed, while the corona was fluted in a most elegant fashion.

The achievements of Guy Wilson in this sub-division were outstanding. From the time when he raised 'Slemish' he produced a succession of cultivars, each of which advanced flower quality, stem length, purity of colour and symmetry of form. By the end of his life, all the leading 2W-W cultivars bore his name. It could be said that Wilson not only raised the credibility of 2W-W daffodils, but that in his lifetime he made this sub-division almost exclusively his own.

### ***Other Irish cultivars***

Apart from the fine 2W-W daffodils of Wilson, at least three other Irish hybridists have raised noteworthy daffodils of this type. J.L. Richardson raised several important cultivars, of which 'Killaloe' (2W-W, 1937) and 'Glendalough' (2W-GWW, 1938) are fine examples, both having the same parentage of 'Slemish' × 'Cameronian'. 'Killaloe' was introduced in 1945 at £20 per bulb, by far the most expensive cultivar in his catalogue for that year. It was described as "one of the most striking Giant Leedsii"<sup>(47)</sup>, which Richardson frequently grew to a flower diameter in excess of 13.5 cm. It received an Award of Merit both as an exhibition flower and as a garden plant, together with a First Class Certificate in the former category.

Being from the same parentage, 'Glendalough', not unexpectedly, possessed many features similar to 'Killaloe', especially its flower size and smoothness of texture. In detail, the perianth was perhaps less white, while the corona was delightfully shaded green at its base. 'Namsos' (2W-W) was raised from 'Niphotos' × 'Kanchenjunga', the same cross that gave rise to perhaps Richardson's finest white trumpet, 'Petsamo'. He regarded 'Namsos' as an improved, larger version of its seed parent 'Niphotos'. 'Early Mist' (2W-W), from 'Glendalough' × 'Ardclinis', was registered in 1953. Richardson thought that it bore a striking resemblance to 'Cantatrice', describing it as a much-improved form of this cultivar. Of course it had no relationship to 'Cantatrice' and its corona was not of trumpet proportions. Yet, its quality is not in doubt and it was Best Bloom at the London Show in 1963. Perhaps 'Early Mist' will be best remembered as one of the parents of the very fine 'Canisp' (2W-W).

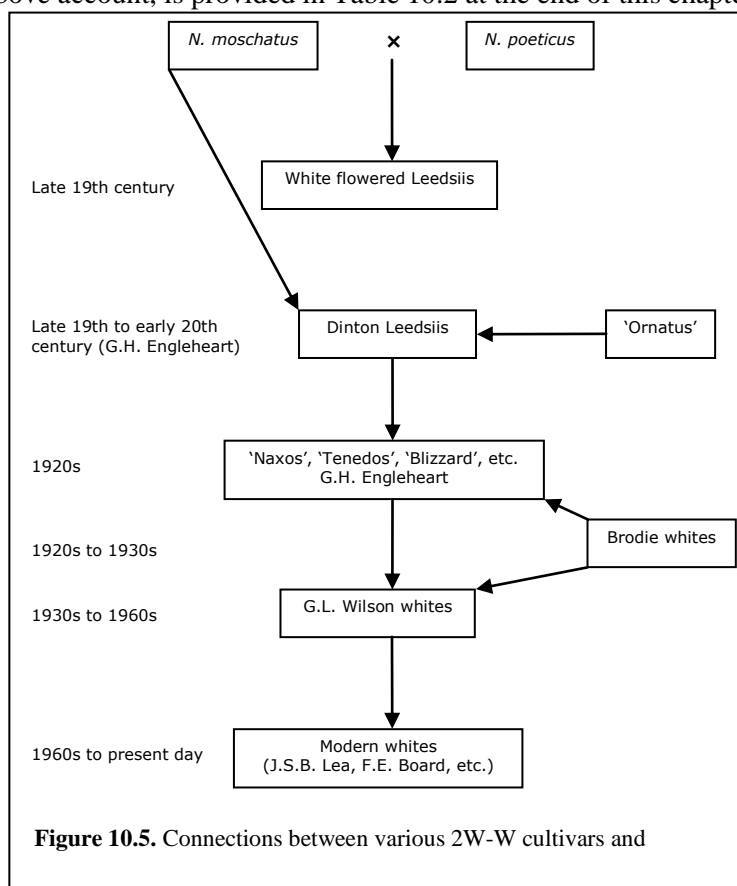
### ***Some modern large-cupped whites***

F.E. Board of Darley Dale in Derbyshire raised a most successful trio of large-cupped white daffodils, registered over a 20-year period from the mid-1950s. They were 'Dover Cliffs' (1956),

'Broomhill' (1965) and 'Misty Glen' (1976), and all were closely related to cultivars of Guy Wilson. 'Dover Cliffs' had 'Cantatrice' as its pollen parent, 'Broomhill' was from 'Easter Moon' × 'Knowehead', and 'Misty Glen' from 'Easter Moon' × 'Pigeon'. They were exhibition quality flowers of the purest white, apart from the green-centred corona found in 'Misty Glen' and 'Broomhill'. 'Misty Glen' regularly featured among the top half-dozen 2W-W show daffodils for which it received a First Class Certificate in 1974.

Another hybridist, J.S.B. Lea, undoubtedly a very successful raiser and exhibitor of daffodils with twelve Engleheart Cup wins to his name, produced a trio of winning large-cupped whites in 'Canisp' (1960), 'Ben Hee' (1964) and 'Inverpolly' (1980). Once again, the Irish connection was strong with Wilson's 'Easter Moon' and 'Ave' and Richardson's 'Irish Mist' featuring in their parentage. 'Canisp' is an excellent exhibition daffodil of near trumpet proportions and was probably the first white daffodil successfully to challenge the Irish monopoly of flowers of this colour. It has been judged Best Bloom on several occasions at the London Show. 'Ben Hee' flowers slightly later than 'Canisp': a pure white daffodil of more modest size, it has regularly featured in winning exhibits. 'Inverpolly' is the latest flowerer in the trio. It is a sister seedling of 'Ben Hee' with superb perianth quality. On opening, the corona is palest pink but quickly assumes the pure white colour of the perianth. It has been used as a breeding plant on account of its fine perianth quality, giving rise to some pink cupped seedlings which inherit this characteristic. Yet another fine white is 'Ashmore' raised by J.W. Blanchard and registered in 1974, and yet again the Irish connection is present with 'Easter Moon' and 'Chinese White' in its parentage. 'Ashmore' (2W-GWW) is a classically shaped flower of great consistency with broad, round and flat perianth segments and a short bowl-shaped corona with a green base. It was regularly found among the winners at the top shows and judged Best Bloom in 1975 and Best Division 2 Bloom in 1983 and 1984 at the London Show.

Connections between the various 2W-W cultivars and daffodil species is illustrated in Figure 10.5; a summary of the large-cupped white cultivars in this section, arranged in the order they are mentioned in the above account, is provided in Table 10.2 at the end of this chapter.





## The Small-cupped Whites

The first small-cupped white daffodils had their origins in the pale coloured Leedsii crossed with various forms of *N. poeticus*. The characteristics imparted by this cross to its offspring were most noticeably a corona length intermediate between that of the parents and the sparkling whiteness of the flowers similar to that seen in *N. poeticus*.

At the start of the 20th century, 3W-W daffodils were uncommon. This was because hybridists first had to create the Leedsii from which they came and there had been little time in which to achieve this. We must remember that interest in raising hybrids had emerged only a little over 50 years earlier. Some indication of this scarcity can be gauged from the catalogues of the time, Bourne's of Bletchley<sup>(48)</sup>, for example, listed 48 Leedsii in 1913 but only three of these fell into the current 3W-W classification. The role of the Revd G.H. Engleheart in the development of the white forms of Leedsii through *N. moschatus* crossed with *N. poeticus* has already been mentioned, and this work was progressing during the 1880s. It is, therefore, not surprising to find that two of the three small-cupped whites listed in the Bourne catalogue for 1913 were raised by him. These were 'Elaine' (1901) and 'Alpine Snow' (1913). The other cultivar of this type was 'Moonbeam' (1901) which was raised by Mrs R.O. Backhouse. Its parents were the 'Hon. Mrs Barton' (1884), a small-cupped white raised by W. Backhouse, crossed with *N. poeticus* var. *recurvus*.

### Guy Wilson's cultivars

Compared to his output in the white trumpet and large-cupped sub-divisions, Wilson's small-cupped whites were relatively few in number. Among them, however, was one of the most famous and successful daffodils of all time, 'Chinese White'. It reigned supreme among flowers of its type for many years gaining two Awards of Merit and two First Class Certificates. Four other small-cupped whites raised by Wilson were considered to be almost as good. These were: 'Cushendall', the first flower of this type that he named; 'Frigid' another of his early successes; 'Tobernaven' that was regarded by many as the natural successor to 'Chinese White'; and his final cultivar, the beautiful 'Angel'. As all the small-cupped whites have strong links with *N. poeticus*, its sub-species and hybrids, they all possess a purity of whiteness found in few other daffodils. Additionally, the *N. poeticus* link makes them flower at the end of the season. Wilson's cultivars all flowered in seasons 5 or 6 on a scale of 1-6, with 6 being classified as extra late.

'Cushendall' (3W-GWW, 1931) was raised from a small, weakly cultivar of Engleheart's named 'Emerald Eye' that Wilson crossed with the *poeticus* hybrid 'Dactyl'. It was described by Wilson when it first flowered in 1928 as:

"A very fine hybrid Leedsii with a broad, Poet-white perianth of fine substance, an eye frilled with pale cream and the largest central area of neon-green I've seen."<sup>(49)</sup>

It was a most effective and beautiful daffodil and, down to the present, few new introductions have had a superior green corona centre. 'Frigid' (3W-GGW, 1935) came from the same parents as 'Cushendall' and was a daffodil that Wilson greatly admired. It was introduced to commerce in 1941, when Wilson described it as "probably the whitest thing I have yet raised"<sup>(50)</sup>. Later, Jefferson-Brown said it was a sparkling flower, "enhanced by a touch of green that is set in the centre like a jewel"<sup>(51)</sup>. It was whiter than 'Cushendall' and also flowered marginally later at a time of year when the last of its ancestral *N. poeticus* species were in bloom. 'Chinese White' flowered first in 1937 when Wilson thought it an "exquisite flower" with a "broad, smooth, pure white perianth and wide, flat, crinkled white crown"<sup>(52)</sup>. It was raised from a cross that Wilson used extensively – 'Silver Plane' and the 'Silver Coin' seedling of P.D. Williams, now thought to be synonymous with 'Rinsey' (3W-W). In Wilson's opinion, 'Chinese White' featured alongside 'Cantatrice' and 'Empress of Ireland' as his top cultivars. There can be no doubt of its superb quality. It received two Awards of Merit and two First Class Certificates as an exhibition and commercial daffodil; in addition, it headed the Daffodil Ballot for small-cupped whites from 1946 to 1960 inclusive, and also in 1962 and 1963. One marked difference between 'Chinese White' and all the earlier small-cupped whites was that it was much larger. The flower that received the Award of Merit in 1946 measured 11.25 cm in diameter and was

borne on a stout 45 cm stem. The remarkably satiny texture of the perianth and symmetrical pleating of the corona gave 'Chinese White' a most distinctive appearance.

Towards the end of his life, Wilson thought that the original stock of 'Chinese White' had deteriorated and so he began a process of re-selection but by then the time was ripe for a successor to appear. Almost to order came 'Tobernaveen', which first flowered in 1954. It was bred from 'Chinese White' and it too possessed a large flower described as "a vastly improved 'Chinese White' of sparkling, frosty whiteness"<sup>(53)</sup>. As grown by Wilson at The Knockan, it was virtually unbeatable as a show flower. The final cultivar raised by Wilson in this sub-division was 'Angel' (1960). It first flowered two years prior to its registration but, as it was discovered among mixed seedlings, its parentage is unknown. Its characteristics are whiteness, symmetry and a fine deep green eye, traits that even today make it a frequent winner at the top shows. It was appropriate that Wilson's hybridisation work ended on such a high note in a sub-division in which for almost 30 years he had had no equal and few challengers.

### ***Other cultivars (1920-1960)***

The earliest cultivars of note during this period were 'Distingué' (3W-W) raised by H. Backhouse and 'Samaria' (3W-WWY) raised by the Brodie, both being registered in 1923. The former was tall and free-flowering with "exquisitely beautiful flowers"<sup>(54)</sup> composed of broad, long, pointed perianth segments of pure white and a shallow ivory coloured cup. 'Samaria' was pure white throughout its perianth and corona, not even possessing the touch of green frequently found in the cup base of this type of daffodil. Its perianth was broad and overlapping, giving it an almost circular appearance, but its outstanding characteristic was its extraordinary substance that gave the flower an extended vase life.

In 1939, Dr R.V. Favell of Penberth, St Buryan, Cornwall registered 'Bryher' (3W-GWW). Like 'Chinese White' it also had 'Silver Coin' in its ancestry and was an almost circular flower of purest white apart from a touch of emerald green in the eye. It was widely considered to be one of the most refined daffodils and enjoyed considerable success over a 20-year period. In 1948, the Brodie registered 'Dallas' raised from 'Cushendall'. It was similar to Wilson's 'Frigid' in appearance but flowered somewhat earlier in the season. It was a tall plant with snow-white flowers of exhibition quality for which purpose it received an Award of Merit in 1956. Almost without rival, however, for its substance and texture is 'Sacramento' (3W-W) raised by de Navarro and registered in 1949. It had 'Chinese White' as its seed parent and was a flower of near perfection, with snow-white, rounded perianth segments and an equally sparkling white cup with a green central eye.

J.L. Richardson raised two exceptionally fine small-cupped whites, both from 'Chinese White'. They were named 'Benediction' (3W-GWW) and 'Verona' (3W-W) and were registered together in 1958. In reality, it was the latter, rather than 'Tobernaveen', which replaced 'Chinese White' as the leading 3W-W and it went on to achieve international success over a long period. It still ranks among the best of its type over 50 years after its introduction. From the outset, Richardson was aware of its potential, describing it as "undoubtedly the finest 3c which has yet been seen ... a superb flower ..."<sup>(55)</sup>. Others were soon to join in the acclaim, calling it "an immaculate flower ... quite without fault"<sup>(56)</sup>. And so, as his final performance in a long-drawn-out drama, Richardson achieved lasting fame in a field so long dominated by the mastery of his friend and rival Guy Wilson, for he died in the year in which 'Verona' was introduced.

### ***Modern cultivars***

Several cultivars registered since 1960 have appeared among the winning cultivars at the leading shows although 'Verona' and occasionally 'Angel' provided ample competition. The most successful of the modern cultivars are perhaps 'Cool Crystal' (3W-GWW, 1966), 'Delos' (3W-GWW, 1968), 'Sea Dream' (3W-GWW, 1968) and 'Snow Magic' (3W-W, 1973). In the early 2000s, 'Cool Crystal' remained prominent. It was raised in the USA by Mitsch from 'Chinese White', to which it bears many similarities. Its substance is, however, better – it is whiter and its cup is more bowl-

shaped. Its main fault lies in its tendency to look downwards but it is, nevertheless, excellent for exhibition purposes, for which it received an Award of Merit in 1985. Another strong overseas competitor is 'Sea Dream', raised by J.A. O'More in New Zealand, which also has links with 'Chinese White'. It is widely regarded as one of the exceptional introductions from the southern hemisphere, being a consistent show flower of precision form. 'Delos', another fine introduction by the amateur hybridist de Navarro, had impeccable parents in 'Verona' and 'Tobernaven'. It was a frequent winner at leading shows, being a pure white flower of great quality. 'Snow Magic' was introduced by Carncairn Daffodils in 1973, with a parentage of 'Chinese White' × 'Easter Moon'. It is a snow-white flower, apart from the olive green eye to the corona, and consists of broad, overlapping perianth segments and a frilled cup.

A summary of the small-cupped white cultivars in this section, arranged in the order they are mentioned in the above account, is provided in Table 10.3 at the end of this chapter.

### **White Daffodils 1980-2010**

'Empress of Ireland' (G.L. Wilson, 1952) was the most successful white trumpet cultivar in shows during the early part of this period, a position it had held for many years previously. Even over half a century after its registration, it continued to enjoy success, coming second as a winner of first prizes in major competitions during 2003. Other cultivars shared in the success, chief among them being 'Silent Valley' (Bloomer, 1964), 'White Star' (Bloomer, 1970) and 'April Love' (Abel Smith, 1974). 'Quiet Waters' (Pearson, 1992) has impressed more recently. In 2003, 'Silent Valley' was the top show cultivar with 'Empress of Ireland' in second place and 'White Star' third. Approaching 2010, 'Silent Valley' dominated the top position but the vintage 'Empress of Ireland' continued to show its quality, with 'Quiet Waters' impressive and 'Nightflight' (Postles, 1996) another excellent contender.

There has been considerable competition among large-cupped daffodils, with 'Canisp' (Lea, 1960), 'Ben Hee' (Lea, 1964), 'Broomhill' (Board, 1965) and 'Misty Glen' (Board, 1976) all vying for major honours during the early part of this period; while 'Inverpolly' (Lea, 1961) and 'Tutankhamun' (Abel Smith, 1972) gained several Best Bloom awards. Later, 'Hanbury' (Postles, 1985) and 'Sheelagh Rowan' (Pearson, 1989) made considerable headway, with the American 'Phoenician' (Mitsch and Havens, 1995) also featuring. In 2003, 'Sheelagh Rowan' was the best exhibition cultivar with 'Misty Glen' a close second. More recently, little has changed with these two cultivars taking most of the major honours. 'Inverpolly' is still a top show daffodil with a host of other cultivars making brief and successful appearances in certain seasons.

Among small-cups, 'Verona' (Richardson, 1958) and 'Cool Crystal' (Mitsch, 1966) were almost without equal from 1980-2000 and were still first and second respectively in 2003. A recent exceptional competitor is 'Nice Day' (Postles, 1987), which is expected to have many successes in the future. In the last few years, little has altered, 'Verona' and 'Cool Crystal' continuing at the top, with 'Angel' (G.L. Wilson, 1960) also having success, and 'Nice Day' constantly challenging for top honours.

Just as the top exhibition yellow daffodils traced back almost exclusively to the outstanding hybrids of J.L. Richardson, so the best white daffodils trace back to the superb creations of Guy L. Wilson: especially to 'Empress of Ireland', 'Rashee', 'Ave', 'Panache', 'Easter Moon' and 'Chinese White'.

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<b>Cultivar Name</b>	<b>Parentage</b>	<b>Hybridist</b>	<b>Year</b>	<b>Awards</b>
'Bishop Mann'	Unknown	W.B. Hartland	1889	-
'Colleen Bawn'	Unknown	W.B. Hartland	1885	-
'Madame de Graaff'	'Empress' × <i>N. albescens</i>	de Graaff	1887	FCC
'White Knight'	'Madame de Graaff' OP	de Graaff	1907	AM(e)
'Beersheba'	'White Knight' × seedling	Engleheart	1923	AM(e), FCC(e), AM(H), FCC(H), AM(c)
'Mrs Ernst H. Krelage'	'Madame de Graaff' × 'King Alfred'	Krelage	1912	FCC(H), AM, FCC, AM(g)
'Peter Barr'	'Monarch' × 'Madame de Graaff'	Barr	1902	FCC
'White Dame'	'Madame de Graaff' × 'Lola'	G.L. Wilson	1922	FCC(e)
'Samite'	'Mrs E.H. Krelage' × 'Beersheba'	G.L. Wilson	1930	AM(e), FCC(e), AM(g)
'Kanchenjunga'	Seedling × 'Askelon'	G.L. Wilson	1934	AM(e), AM(H)
'Ardclinis'	'Mrs E.H. Krelage' OP	G.L. Wilson	1934	-
'Nevis'	'King of the North' × Seedling	Brodie	1916	-
'Askelon'	Seedling × 'Nevis'	Brodie	1923	AM(e)
'Cantatrice'	'Beersheba' × 'Eskimo'	G.L. Wilson	1936	AM(e), FCC(e), AM(H), AM(g), FCC(g)
'Broughshane'	'Trostan' × 'Kanchenjunga'	G.L. Wilson	1938	AM(e), AM(H), AM(g)
'Prestige'	'Candour' × 'Kanchenjunga'	G.L. Wilson	1946	AM(e)
'Vigil'	'Courage' × 'Kanchenjunga'	G.L. Wilson	1947	AM(e)
'Glenshesk'	'Courage' × 'Kanchenjunga'	G.L. Wilson	1950	AM(e)
'Empress of Ireland'	'Guardian' × 'Kanchenjunga'	G.L. Wilson	1952	AM(e), AM(H)
'Ulster Queen'	'Empress of Ireland' × 'Vigil'	G.L. Wilson	1962	-
'White Prince'	('Quartz' × 'Tenedos') × 'Guardian'	G.L. Wilson	1952	-
'Rashee'	'Cotterton' × 'Broughshane'	G.L. Wilson	1968	-
'Panache'	'Courage' × 'Broughshane'	G.L. Wilson	1962	FCC(e)
'Silent Valley'	'Rashee' × 'Empress of Ireland'	T. Bloomer	1964	-
'White Star'	'Rashee' × 'Empress of Ireland'	T. Bloomer	1970	AM(e)
'April Love'	'Ave' × 'Empress of Ireland'	Mrs Abel Smith	1974	-
'Burntollet'	'Glenshesk' ×	J.S.B. Lea	1974	-

	'Empress of Ireland'			
'Vigilante'	'Vigil' OP	B.S. Duncan	1977	-
'Ladybank'	'Empress of Ireland' × 'White Star'	B.S. Duncan	1981	-
'Majestic Star'	'White Majesty' × 'White Star'	T. Bloomer	1982	-
'White Convention'	'Pitchroy' × 'Panache'	J.S.B. Lea	1983	-
'White Empress'	'Rashee' × 'Empress of Ireland'	T. Bloomer	1970	-
'White Majesty'	'Rashee' × 'Empress of Ireland'	T. Bloomer	1970	-
'Celilo'	'Petsamo' × 'Beersheba'	M.W. Evans	1968	-

**Table 10.1.** White trumpet cultivars, arranged in order of mention in this chapter with details of parentage, breeder, year of registration and awards. (RHS Awards: FCC, First Class Certificate; AM, Award of Merit; AGM, Award of Garden Merit (1992 onwards). (c) for cutting; (e) for exhibition; (g) garden decoration. Dutch Awards: FCC(H), First Class Certificate, Haarlem; AM(H), Award of Merit (Haarlem). OP = open pollinated.) The source of information for this table is: Royal Horticultural Society (1969). *Classified List and International Register of Daffodil Names*. Royal Horticultural Society, London.

<b>Cultivar Name</b>	<b>Parentage</b>	<b>Hybridist</b>	<b>Year</b>	<b>Awards</b>
'Mrs Langtry'		W. Backhouse	1884	-
'Tenedos'		G.H. Engleheart	1923	AM(e), AM(H)
'Naxos'		G.H. Engleheart		-
'White Nile'	'Laughing Water' × 'Mrs R. Sydenham'	Brodie	1922	AM(e), AM(m, c), AM(m)
'Niphetos'		P.D. Williams	1927	AM(e)
'Courage'	Seedling × 'Askelon'	Brodie	1933	-
'Ludlow'	'Naxos' × 'Lysyvern'	A.M. Wilson	1937	FCC(e), AM(H)
'Slemish'	'Findhorn' × 'Beersheba'	G.L. Wilson	1930	AM(e), AM(H), FCC(e)
'Dunlewey'	'Mitylene' × 'Kantara'	G.L. Wilson	1934	AM(e), AM(g)
'Evening'	Seedling OP	G.L. Wilson	1935	-
'Blizzard'		G.H. Engleheart	1927	-
'Zero'	'White Frost' × 'Naxos'	G.L. Wilson	1935	-
'Ave'	'Truth' × 'Slemish'	G.L. Wilson	1935?	-
'Truth'	'Naxos' × Seedling	G.L. Wilson	1936	AM(e), AM(H)
'Parkmore'	'Niphetos' × 'Scapa'	G.L. Wilson	1945	AM(e)
'Tibet'	'Tunis' × 'Askelon'	G.L. Wilson	1947	AM(H), AM(g)
'Kibo'	'Gracious' × 'Broughshane'	G.L. Wilson	1948	AM(H)
'Ardbane'	'Saint Brendan' × 'Greenland'	G.L. Wilson	1953	-
'Castle of Mey'	Seedling × 'Murmansk'	G.L. Wilson	1953	-
'Easter Moon'	'Tryst' × 'Greenland'	G.L. Wilson	1954	AM(g)
'Knowehead'	'Cotterton' × 'Broughshane'	G.L. Wilson	1954	AM(e)
'Glendermott'	'Truth' × 'Broughshane'	G.L. Wilson	1957	AM(e)
'Arctic Doric'	Seedling × 'Snowline'	G.L. Wilson	1960	AM(g)
'Purity'	Seedling × 'Snowline'	G.L. Wilson	1960	AM(e)
'Stainless'	Seedling × Seedling	G.L. Wilson	1960	AM(g)
'Killaloe'	'Cameronian' × 'Slemish'	J.L. Richardson	1937	AM(e), FCC(e), AM(g)
'Glendalough'	'Slemish' × 'Cameronian'	J.L. Richardson	1938	-
'Namsos'	'Niphetos' × 'Kanchenjunga'	J L. Richardson	1944	AM(e), AM(H)
'Early Mist'	'Glendalough' × 'Ardclinis'	J.L. Richardson	1953	-
'Dover Cliffs'	'Riber' × 'Cantatrice'	F.E. Board	1956	-
'Broomhill'	'Easter Moon' × 'Knowehead'	F.E. Board	1965	AM(e), FCC(e)
'Misty Glen'	'Easter Moon' × 'Pigeon'	F.E. Board	1976	AM(e)

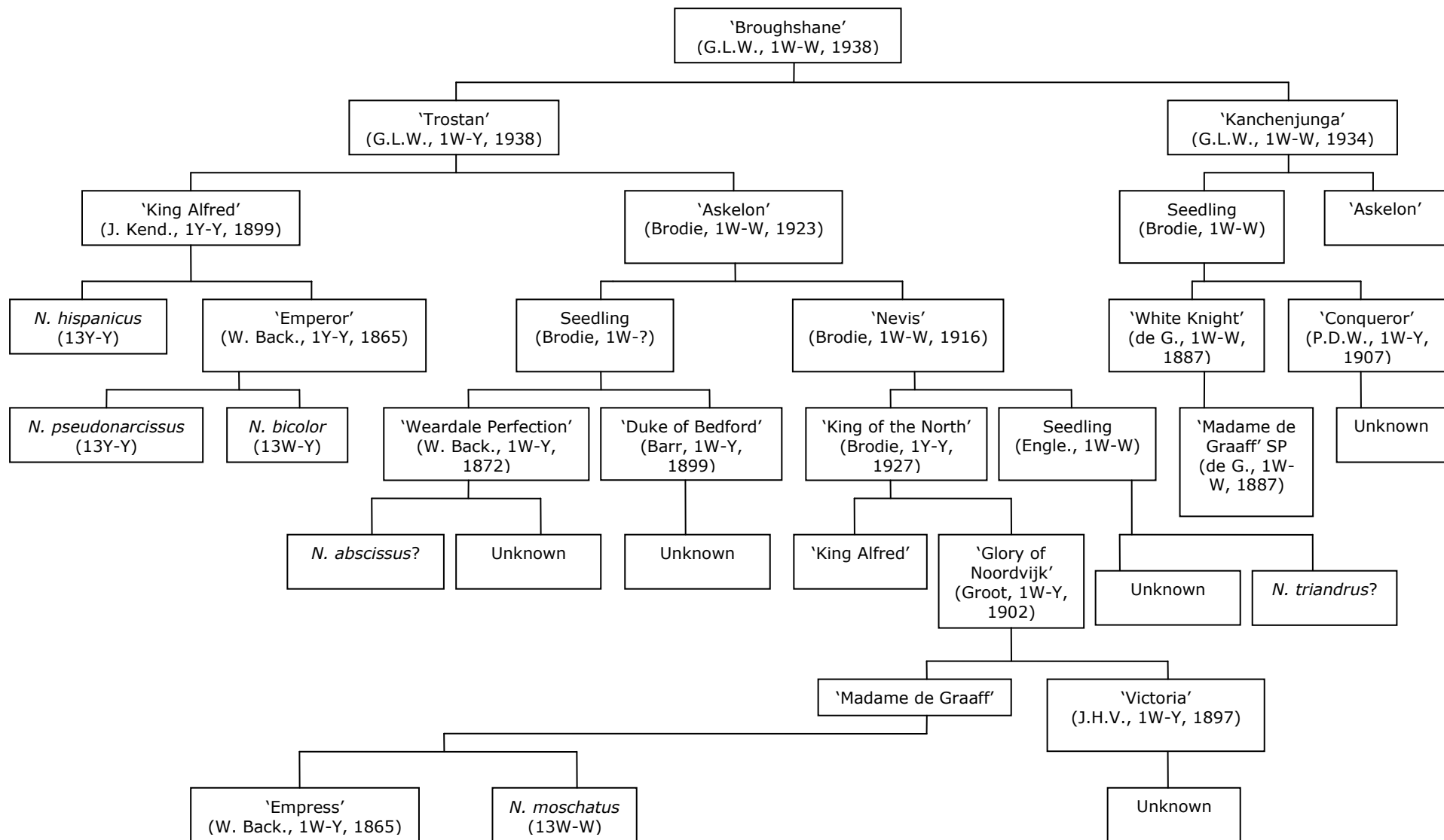


'Canisp'	'Ave' × 'Early Mist'	J.S.B. Lea	1960	AM(e), FCC(e)
'Ben Hee'	'Easter Moon' × 'Omeath'	J.S.B. Lea	1964	AM(e)
'Inverpolly'	'Easter Moon' × 'Omeath'	J.S.B. Lea	1980	AM(e)
'Ashmore'	'Easter Moon' × Seedling	J.W. Blanchard	1974	AM(e)

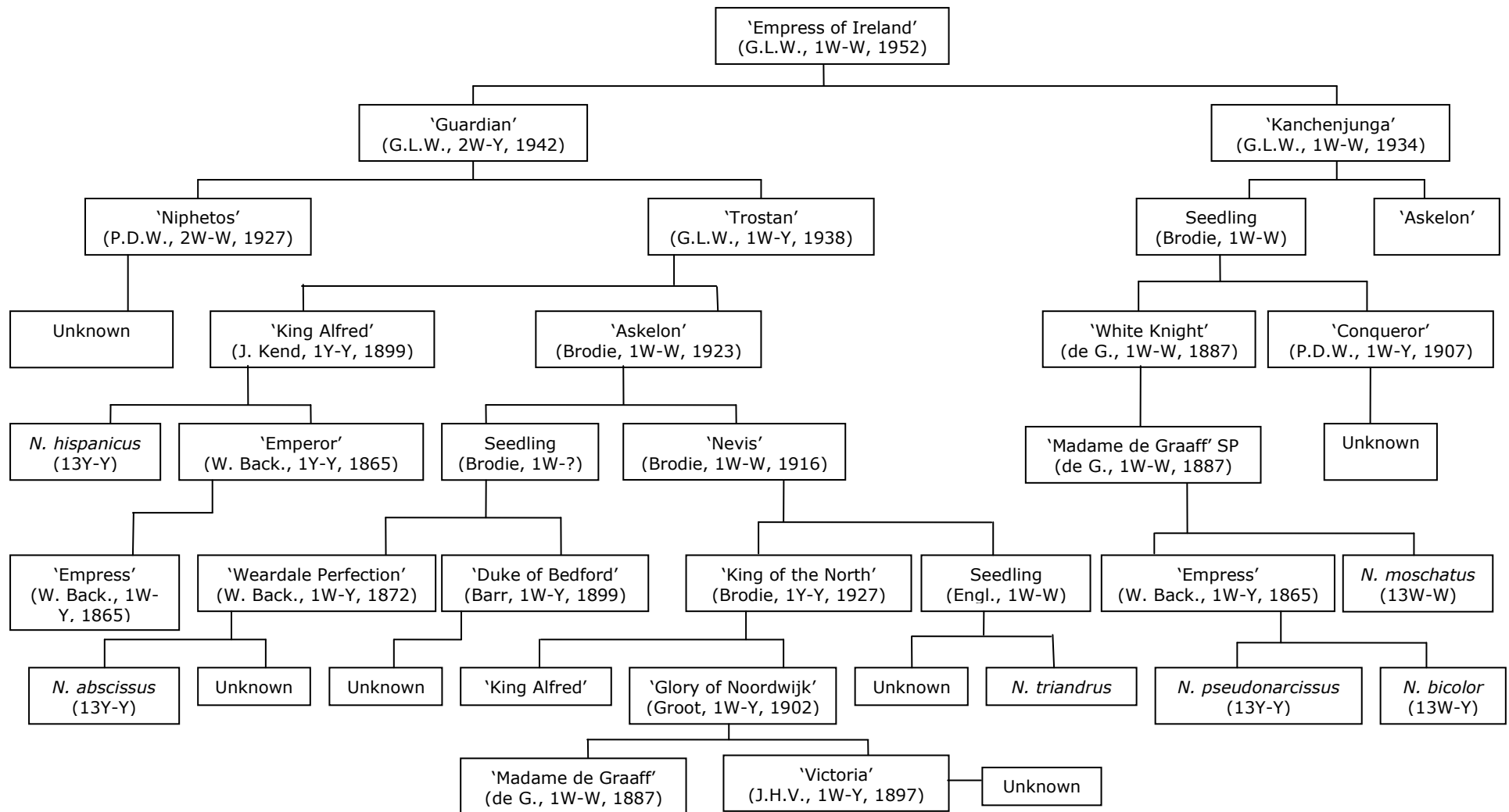
**Table 10.2.** Large-cupped white cultivars, arranged in order of mention in this chapter with details of parentage, breeder, year of registration and awards. (RHS Awards: FCC, First Class Certificate; AM, Award of Merit; AGM, Award of Garden Merit (1992 onwards). (c) for cutting; (e) for exhibition; (g) garden decoration; (m) market cultivar for cutting from the open. Dutch Awards: FCC(H), First Class Certificate, Haarlem; AM(H), Award of Merit (Haarlem). OP = open pollinated.) The source of information for this table is: Royal Horticultural Society (1969). *Classified List and International Register of Daffodil Names*. Royal Horticultural Society, London.

Cultivar Name	Parentage	Hybridist	Year	Award
'Elaine'		G.H. Engleheart	1901	FCC
'Alpine Snow'		G.H. Engleheart	1913	-
'Moonbeam'	'Hon. Mrs Barton' × <i>N. poeticus recurvus</i>	Mrs R.O. Backhouse	1901	FCC
'Chinese White'	'Silver Plane' × 'Rinsey'	G.L. Wilson	1937	AM(e), FCC(e), AM(H), FCC(H)
'Cushendall'	'Emerald Eye' × 'Dactyl'	G.L. Wilson	1931	AM(e), AM(H)
'Frigid'	'Emerald Eye' × 'Dactyl'	G.L. Wilson	1935	AM(e), FCC(e), AM(H)
'Tobernaveen'	Seedling × 'Chinese White'	G.L. Wilson	1960	-
'Angel'		G.L. Wilson	1960	-
'Distingué'		H. Backhouse	1923	-
'Samaria'	Seedling × 'Moonbeam'	Brodie	1923	AM(e)
'Bryher'	'Silver Coin' × 'Raeburn'	R.V. Favell	1939	-
'Dallas'	'Cushendall' × 'Silver Salver'	Brodie	1948	AM(e)
'Sacramento'	'Chinese White' × 'Green Island'	de Navarro	1949	AM(e)
'Benediction'	'Chinese White' × 'Bryher'	J.L. Richardson	1958	-
'Verona'	'Green Island' × 'Chinese White'	J.L. Richardson	1958	AM(e), FCC(e)
'Cool Crystal'	'Chinese White' × ?	G.E. Mitsch	1966	AM(e)
'Delos'	'Tobernaveen' × 'Verona'	de Navarro	1968	-
'Sea Dream'	'Nelly' × 'Chinese White'	J.A. O'More	1968	-
'Snow Magic'	'Chinese White' × 'Eastern Moon'	Carncairn	1973	-

**Table 10.3.** Small-cupped white cultivars, arranged in order of mention in this chapter with details of parentage, breeder, year of registration and awards. (RHS Awards: FCC, First Class Certificate; AM, Award of Merit; AGM, Award of Garden Merit (1992 onwards) . (e) for exhibition. Dutch Awards: FCC(H), First Class Certificate, Haarlem; AM(H), Award of Merit (Haarlem). OP = open pollinated.) The source of information for this table is: Royal Horticultural Society (1969). *Classified List and International Register of Daffodil Names*. Royal Horticultural Society, London.



**Figure 10.3.** The pedigree of 'Broughshane'. (Abbreviations for breeders: Barr = P. Barr; Brodie = Brodie of Brodie; de G. = S.A. de Graaff; Engle. = G.H. Engleheart; G.L.W. = G.L. Wilson; Groot = J. de Groot; J.H.V. = J.H. Veen; J. Kend. = J. Kendall; P.D.W. = P.D. Williams; W. Back. = W. Backhouse. SP = self pollinated.)



**Figure 10.4.** The pedigree of 'Empress of Ireland'. (Abbreviations for breeders: Barr = P. Barr; Brodie = Brodie of Brodie; de G. = S.A. de Graaff; Engle. = G.H. Engleheart; G.L.W. = G.L. Wilson; Groot = J. de Groot; J.H.V. = J.H. Veen; J. Kend. = J. Kendall; P.D.W. = P.D. Williams; W. Back. = W. Backhouse. SP = self pollinated.)

## CHAPTER 11 THE BICOLORS

The term bicolor is somewhat misleading in that it could be taken literally to mean two-coloured – any two colours. In daffodil parlance, however, the colours referred to are quite specific – white and yellow, the former being located in the perianth and the latter in the corona (W-Y). Many other types of daffodil are two-coloured, for example those that are yellow and orange, which are frequently referred to as ‘coloured’, or the white and pink daffodils which are called ‘pinks’. The term bicolor only takes on its true significance when it is realised that the progenitor of this group of hybrid daffodils is *N. bicolor*, formerly known as *N. pseudonarcissus* subsp. *bicolor*, a vigorous white and yellow daffodil. This particular daffodil has had a profound influence on the development of hybrids in many divisions, and not only among the bicolored cultivars, owing to its vigorous polyploid nature.

### Early Bicolor Cultivars

The earliest recorded bicolor cultivar is ‘Horsfieldii’ (1W-Y) which was raised around 1845 by John Horsefield, a Lancashire weaver and amateur botanist. The same daffodil has also been known as ‘Mrs Harrison Weir’ and ‘King of Daffodils’. Horsefield raised this cultivar from a cross now thought to be between *N. bicolor* × *N. pseudonarcissus* but it was very susceptible to Basal Rot and by the 1930s had almost disappeared.

The most famous bicolor cultivars generated during the Victorian period were ‘Empress’ and ‘Weardale Perfection’, both raised by William Backhouse, the former sometime before 1865. ‘Empress’ came from a cross between *N. pseudonarcissus* and *N. bicolor* and may be regarded as a larger form of its pollen parent. Early in the 20th century, it was regarded as “the favourite bicolor ... a most reliable variety”<sup>(1)</sup> and, remarkably, ‘Empress’ is still grown today. Hartland listed it in 1885 as ‘Giant Empress’, describing it as “very large and of rare beauty for cutting”<sup>(2)</sup>. ‘Weardale Perfection’ (Plate 11.1) was raised sometime before 1869 but did not flower until 1872 (some three years after the death of William Backhouse) when it was named by his son Charles James, who initially called it ‘Weardale’. Once its excellent qualities were recognised it was registered as ‘Weardale Perfection’. In 1900, Robert Burns Morgan gave a talk to the Weardale Naturalists’ Field Club on his visit to Backhouse’s home, St John’s Hall at Wolsingham, Co. Durham. There he saw “some of the finest daffodils that England can produce”<sup>(3)</sup> in what he described as the Weardale Collection. Morgan went on to say that: “The finest daffodil in the collection is the famous ‘Weardale Perfection’, which sells at the big price of £10 to £12 per bulb.” It was a plant of great vigour and was later widely used by other breeders to impart this quality into their hybrids. Guy Wilson for example regarded it highly.



**Plate 11.1.** ‘Weardale Perfection’ (1W-Y), raised by William Backhouse before 1869 and the earliest known tetraploid cultivar.

Another cultivar of this era was ‘Grandis’ syn. ‘Grandee’, raised by Edward Leeds from *N. bicolor* and an unknown pollen parent, possibly *N. pseudonarcissus* or *N. hispanicus*, sometime before 1877, and registered in 1884. ‘Grandis’ was the latest of all the bicolors then known to flower,

being highly valued for this characteristic, but it was also a flower of high quality with a pure white perianth of overlapping segments of wonderful substance. The flowering time of 'Grandis' fitted in well with the other sorts then available, 'Horsfieldii' flowering early, while 'Empress' was mid-season. 'Victoria' (1W-Y) was also a popular bicolor cultivar that arose during the last years of the 19th century. It was raised in Holland by van Veen but its parentage went unrecorded.

It is interesting to note that 'Horsfieldii', 'Empress' and 'Grandis' are all triploids. It is almost certain that 'Empress' received 14 chromosomes from a triploid clone of *N. bicolor* (21) and 7 from a diploid partner. Subsequently, 'Empress' was used widely in hybridisation, giving rise to a new race of polyploid cultivars – presumably owing to non-reduction in the chromosome number at meiosis. These three cultivars possessed one quality that many of those immediately succeeding them did not have, namely a good, clean colour contrast between corona and perianth. The yellow of the corona was strong and the white of the perianth was of a pure tone but, in many of the cultivars that followed, the yellow of the corona suffused into the basal parts of the perianth or was a much paler shade, both characteristics being regarded as unhelpful to the further improvement of bicolor cultivars.

These changes may have resulted from the different types of parent from which the bicolors of these two periods came. The earliest bicolors of Horsefield, Backhouse and Leeds all involved the use of *N. bicolor* itself, which possesses good colour and shows little or no suffusion of the corona and perianth colours. The succeeding and generally inferior types tended to result from crosses made between yellow trumpet cultivars and those that were white: the intention was to breed more refinement into the former and/or more vigour into the latter. Guy Wilson perhaps best interpreted the situation when he discussed his own early experience of breeding bicolors. His fine bicolor, 'Queen of Ulster' (1W-Y), came from progeny of 'Grandis', namely 'Darius' (1Y-Y) crossed with 'Weardale Perfection' (1W-Y), which is likely to have had *N. bicolor* in its ancestry. Thus, Wilson's bicolor arose from a strong background of bicolor cultivars and *N. bicolor*, and not from a combination of white and yellow cultivars. Wilson maintained that: "Bicolors often turn up in seedlings from the mating of yellow and white trumpets."<sup>(4)</sup> He cited two examples, 'Manna' (1W-Y) and 'Tapin' (1W-Y), raised by Richardson from 'Cleopatra' (1Y-Y) × 'White Knight' (1W-W), pointing out that both were pale in colour. 'Manna' and 'Tapin' were registered in 1927, while 'Queen of Ulster' was even earlier, 1923. These cultivars, therefore, represent some of the earliest efforts in the 20th century to improve this type of daffodil: but the substantive improvements came considerably later.

Another 19th century bicolor worthy of mention is 'Duke of Bedford' (1W-Y), registered in 1899 by Barr and Sons. This cultivar is still relatively easy to obtain and is widely grown. It has flowers of remarkably good substance with a deep lemon yellow corona. Unfortunately, its perianth segments let it down, being twisted, barely overlapping and creamy-white in colour, with yellow staining around their bases. Owing to the shortage of good bicolors at the start of the 20th century, it was highly thought of over a considerable period of time. Writing in 1934, E.A. Bowles concluded that: "Very few good bicolors with deep yellow trumpets have been raised lately, so 'Duke of Bedford' still holds its own as a fine variety."<sup>(5)</sup>

## 20th Century Bicolors

Of all the groups of daffodil cultivars, the development of the bicolors is perhaps the most unusual for a number of reasons. Although their progenitor, *N. bicolor*, has featured extensively in the massive programme of hybridisation that has gone on over the past 200 years, and has exerted an enormous influence on modern cultivars, it has produced relatively few of its own kind. Even among the largest group of hybrids, the large-cupped bicolors, the number of outstanding cultivars amounts to perhaps no more than 20. Furthermore, several of these have gone on to play a more important role in the development of other types of daffodil than that of their own sort. Examples of this are to be found in 'Lord Kitchener' (2W-Y), 'Mitylene' (2W-Y) and 'White Sentinel' (2W-Y), prominent in the development of the pinks, and 'Content' (1W-WWY) with its influential role among the reverse bicolors. On the other hand, these cultivars played little or no part in the advancement of the bicolors themselves. Unlike the development of many other groups, the 'milestone' cultivars in the

development of the bicolors are not easy to spot; nor is there a common thread running through this development that binds it neatly together into a homogenous whole. Thus, the history of bicolor improvement has been marked by the occasional appearance of cultivars of outstanding merit, which tended to reign supreme for considerable periods as the top exhibition daffodils of their type. Examples are to be found in Divisions 1-3: 'Newcastle' (Division 1, Dunlop, 1957), 'Tudor Minstrel' (Division 2, Richardson, 1948) and 'Aircastle' (Division 3, Mitsch, 1958). These featured among the leading exhibition blooms for many years, reflecting the slowness with which new and improved cultivars came along to take their place.

### ***The trumpet bicolors***

Perhaps the first high-quality bicolor trumpet raised in the 20th century was 'Content' (1W-WWY), registered in 1927. It was one of the few cultivars raised by P.D. Williams of which the parentage is known: 'Lord Antrim' (1Y-Y) × 'Beersheba' (1W-W). When Guy Wilson first listed 'Content' in his 1939 catalogue he revealed that: "The last time I ever saw the late P.D. Williams in 1935 he told me with great pride of this unique and lovely flower which had appeared among his seedlings." "The flower is different from anything else I have seen", he continued, "and would almost require a class to itself."<sup>(6)</sup> The flowers are at their most lovely in the first few days after opening when they are a uniform soft greenish primrose in colour. Gradually, as they age, they whiten, except for the lemon yellow rim to the trumpets. 'Content' won Awards of Merit as an exhibition daffodil and as a cut flower, but its lasting fame is to be found in its partnership with 'King of the North' (1Y-Y), which led to the establishment of the reverse bicolor cultivars, initially through 'Spellbinder' (1Y-W).

During the 1930s and 1940s, Guy Wilson played a major role in improving bicolor trumpet daffodils with his quartet of 'Effective' (1WWY-Y, 1931), 'Rathkenny' (1W-Y, 1938), 'Foresight' (1W-Y, 1944) and 'Preamble' (1W-Y, 1946). 'Effective' was raised from an open pollinated 'Jack Spratt', an earlier Wilson bicolor cultivar, on which he thought it was a great improvement. 'Effective' was one of the first in an improving series of brilliantly contrasted bicolors. Its exact colouring was unlike that of other bicolors of the time, for rather than having suffused yellow in the inner parts of the perianth segments, it had a clear halo of yellow in that position – thus the somewhat unusual colour coding of 1WWY-Y. It received an Award of Merit as an exhibition daffodil in 1935.

'Rathkenny' stands out as the first Wilson bicolor to show the degree of colour contrast that he sought and that had proved to be so elusive. Its trumpet was deeply coloured and the yellow did not pass into the perianth segments, which consequently appeared as white as any seen up to that time. Its parents were (Seedling × 'Vestal Virgin' 1W-W) × 'Kenbane' 1W-W (Figure 11.1 at the end of this chapter). On receiving its Award of Merit as an exhibition daffodil in 1938, the official description stressed the strong colour contrast between the perianth and the bright, chrome yellow trumpet. Reference has already been made to the basic differences in the parent material used to produce bicolored daffodils in the mid-19th century compared to 50 years later. Therefore, it is interesting to refer to the pedigree of bicolors raised during the 1930s, especially as this date coincided with the appearance of the first sharply contrasting flowers. The pedigree of 'Rathkenny' (Figure 11.1 at the end of this chapter) shows it to have a strong *N. bicolor* background reaching back to *N. bicolor* itself, some five generations earlier.

Interestingly, and in total contrast, there appeared only four years after 'Rathkenny' an extremely pale bicolor (Seedling No. 24/158), later registered as 'Bridal Robe' (Figure 11.2 at the end of this chapter). Many pale bicolors have been classified over the years as white daffodils and this would have been more realistic in the case of 'Bridal Robe' (1W-Y), for given a slightly higher temperature than normal, as encountered under cold glass, its colour appeared as pure white. Is the reason for the colour difference apparent from their pedigrees? Superficially, both appear to be similar but on closer examination it becomes obvious that white trumpet cultivars are found more frequently in the forebears of 'Bridal Robe' than is the case with 'Rathkenny', there being eight in the ancestry of the former but only two in that of the latter.

The two bicolors that could be described as Wilson's greatest contribution to this sub-division were those that appeared next as Seedlings 26/4 and 27/3, later named 'Foresight' and 'Preamble'. 'Foresight' first flowered in 1937. Raised from an open pollinated 'Bonython' (1W-Y) of P.D. Williams, it was so named on account of its characteristic early flowering. Wilson's only comment at the time was that it was "a well-built early bicolor trumpet" with a "flat, right-angled perianth"<sup>(7)</sup>. Later, when introducing the cultivar in his catalogue, he claimed that it was:

"A flower of first rate form and good quality, with broad, flat, milk white perianth and well proportioned, neatly flanged golden trumpet: the stem is just a trifle on the short side but, as it is an absolutely first early flower and probably a good forcer, it will in time be of value for market."<sup>(8)</sup>

'Foresight' was indeed an early flowering cultivar, blooming towards the end of February in the south-west of England, where trials at Rosewarne EHS also showed it to be an excellent cut flower, confirming Wilson's earlier prediction. This quality is due not only to its fine texture but also to its great durability, which gives it a good vase life of up to eight days. It was a major exhibition cultivar for many years, heading the Daffodil Ballot as the best bicolor trumpet from 1946 to 1950 inclusive. It received an Award of Merit (1945) and First Class Certificate (1947) as an exhibition daffodil, together with an Award of Merit from Haarlem in 1957 as a cut flower. It was also recommended as a commercial cut flower in England following the aforementioned trials at Rosewarne EHS.

'Preamble' was Wilson's outstanding achievement among the bicolors, being raised from 'Niphetos' x 'Kanchenjunga', the pollen parent having distant connections with *N. bicolor* on both the maternal and paternal sides. In his notes at its first flowering, Wilson was reserved in his praise of the new seedling, saying only that it was a "fine bicolor trumpet"<sup>(9)</sup> yet only a few years later when first appearing in his catalogue he described it as "a beautiful exhibition quality first early bicolor"<sup>(10)</sup>. Five years later, Wilson's praise for 'Preamble' increased when he wrote:

"A first class and faultless exhibition flower ... it remains in perfect condition for an exceptional time and the flowers are so consistently good that practically every bloom is of perfect show quality. Voted best exhibition bicolor trumpet by the RHS panel of experts, 1952."<sup>(11)</sup>

It received an Award of Merit in 1948 as an exhibition flower and a First Class Certificate for the same purpose in the following year. In 1950, it received an Award of Merit from Haarlem indicating its potential as a commercial cut flower, later verified by the results of trials at Rosewarne EHS<sup>(12)</sup>. The position of 'Preamble' as the leading bicolor cultivar is indicated by its top placing in the Daffodil Ballot between 1952 and 1958, it only being the advent of 'Newcastle' that toppled it from this position. 'Spitzbergen' (1W-Y), raised at Waterford by J.L. Richardson, was registered in 1943. Its parents were 'Cameronian' (1W-W) x 'Slemish' (2W-W), a somewhat unusual marriage for bicolor offspring, but the seed parent traces back to 'Weardale Perfection' and thence probably to *N. bicolor* itself. It, too, was an extremely durable flower, with a good colour contrast between the smooth white perianth and the clear lemon yellow corona. During this period, there was one important competitor from overseas in 'Bonnington' (1W-Y). It was raised by C.E. Radcliff in Tasmania from 'W.F. Gates' (2Y-Y) x 'Mrs Moody' (1W-W). Registered in 1936, it became a notable exhibition daffodil and the leading bicolor in the southern hemisphere for many years. In 1957, the registration of one of the most outstanding bicolors took place when W.J. Dunlop named 'Newcastle' (Plate 11.2).



**Plate 11.2.** 'Newcastle' (1W-Y), a most successful show daffodil raised by W.J. Dunlop (1957).



It was raised from 'Niphetos' (2W-W) × 'Kanchenjunga' (1W-W), the pollen parent no doubt contributing to the large flower size of 'Newcastle': the flower, which received an Award of Merit in 1957, measured 11.25 cm in diameter. The cross may appear to have been a strange one to have produced such a strongly contrasted bicolor, except that 'Kanchenjunga' contained both 'Conquerer' (1W-Y) and *N. bicolor* in its ancestry. The colouring of 'Newcastle' is exceptionally good with a pure white perianth and a deep golden-yellow corona that does not fade with age. The whole flower has a fine form, being nicely proportioned, and is of exceptional substance and waxy texture. In 1972, proud though scarcely objective, Dunlop said of 'Newcastle' that it was "much the finest exhibition bicolor trumpet"<sup>(13)</sup>. In fact, he was correct: for many years it was consistently the leading daffodil of its type and among the best ten exhibition daffodils of all types. It was Best Bloom in London on three occasions, at the Daffodil Shows of 1962 and 1969 and at the Daffodil Competition in 1970.

Dunlop raised other fine bicolor trumpets but none achieved the outstanding success of 'Newcastle' over such a prolonged period. Others of note include 'Ballygarvey' (1949), 'Ballywalter' (1953) and 'Downpatrick' (1959). 'Ballygarvey' was raised from two earlier bicolor cultivars, Guy Wilson's 'Effective' (1931) and Dr N.Y. Lower's 'Sincerity' (1930). It too had excellent colour contrast between its pure white perianth held at right-angles to the deep golden trumpet with its attractively rolled rim. 'Ballywalter' came from the pale bicolor 'Trostan' and the white trumpet 'Kanchenjunga'. It was of similar form and quality to 'Ballygarvey', but its corona was of a much paler lemony-yellow reminiscent of its seed parent. 'Downpatrick' is, if anything, even larger than 'Newcastle' but its trumpet colour is much paler. It has had a considerable degree of success as an exhibition flower, receiving an Award of Merit in 1971 and also gaining First Prize in the Open Single Bloom Class at the London Daffodil Show.

One of the most successful exhibition cultivars in New Zealand was 'Stormy Weather' (1W-Y), a bicolor raised by D.S. Bell and registered in 1957. Other good bicolor trumpets have come from New Zealand, including 'Outward Bound' (1955) raised by George Lewis, 'Pennant' (1964) raised by G.W.E. Brogden, and Miss M. Verry's 'Verlene' (1965). All were exhibition flowers of considerable merit. In America, Grant Mitsch raised 'Frolic' (1W-Y, 1958) from ('Beersheba' × 'Kandahar') × 'Kanchenjunga'. It is a pale, delicately coloured daffodil. Mitsch was also responsible for the very fine 'Prologue' (1W-Y, 1962). This came from 'Foresight' × 'Trousseau' and is reminiscent of its seed parent, although it is taller and more vigorous. Like 'Foresight', it is also an early flowerer and exhibits considerable durability to the harsh weather conditions often prevalent at that time of year.

Returning to England, Michael Jefferson-Brown's 'Tradition' (1W-Y) was registered in 1965 and received an Award of Merit as an exhibition daffodil in the same year. While its parentage is unrecorded, its flowers, borne on strong stems, are of consistent quality and good colour contrast. A cultivar often found among the top show bicolor trumpets was 'Pennine Way' raised by F.E. Board. It was registered in 1965 but, again, its parentage is unknown. Another cultivar registered in 1965 was 'Descanso' (1W-Y), raised from 'Polindra' × 'Frolic' in the USA by Murray Evans. It has a fine, exceptionally white perianth that gives a good colour contrast with its lemon-yellow, straight-sided corona.

Two good Australasian trumpet bicolors were registered in 1966: 'Bar None' and 'Cyros'. The former was raised in New Zealand by Phil Phillips. Its flower has a smooth-textured white perianth of good substance, and a mid-yellow corona that is flared and frilly at its rim. It successfully established itself as one of the leading exhibition bicolors in New Zealand. 'Cyros' was raised in Tasmania by William Jackson Jnr from 'Lod' (1W-Y) × 'Rowella' (1W-Y), and is a daffodil of border-line dimensions between Divisions 1 and 2. It is a flower of excellent show quality with a broad, pure white and slightly reflexing perianth and a deep lemon-yellow corona, which is slightly expanded and rolled at its rim. The entire flower is of excellent texture.

Raised in Waterford by J.L. Richardson from an open-pollinated 'My Love' (2W-Y) and registered in 1966, 'Cristobal' (1W-Y) was an extremely vigorous plant. Its flowers are of exhibition quality and large, with imposing, broad, overlapping perianth segments of pure white, and a corona of

deep lemon-yellow, neatly rolled and serrated at its rim. 'Ivy League' (1W-Y, 1972), on the other hand, was another of Murray Evans' fine bicolors, and was raised from 'Effective' × 'Festivity' (2W-Y). A vigorous grower, it is capable of producing many exhibition standard blooms, although it does require warm spring weather for the perianth to whiten properly. It is a very neat flower in appearance. Without doubt, the most successful exhibition bicolor since 'Newcastle' is 'Bravoure' (1W-Y, 1974) (Plate 11.3), raised by van der Wereld in the Netherlands from unknown parents. Although 'Newcastle' reigned supreme until the early 1990s, it has now been superseded by 'Bravoure' as the main exhibition cultivar.



**Plate 11.3.** 'Bravoure' (1W-Y), raised by J.W.A. van Wereld (1974).

'Owston Wood' (1976), 'Willow Green' (1978) and 'Chief Inspector' (1982) have been other recent trumpet introductions of quality. 'Owston Wood' was raised by W.A. Noton from 'Newcastle' × 'Ballygarvey' and is a flower with excellent colour contrast, although the stems are shorter than the optimum length for an exhibition daffodil. 'Willow Green' came from 'Brabazon' (1Y-Y) × 'Preamble' and is one of Mrs Abel Smith's fine cultivars. It is a vigorous plant that produces early flowers with an excellent colour contrast. Tom Bloomer raised 'Chief Inspector' in Northern Ireland from 'April Harvest' (1W-Y) × 'Newcastle'.

### **The large-cupped bicolors**

The first notable bicolor of this type to be raised in the 20th century was 'Lord Kitchener' (1905), which received an Award of Merit in its year of introduction. It was raised by Mrs R.O. Backhouse from 'Minnie Hume' (3W-W) × 'Weardale Perfection'. The pollen parent was one of the finest bicolor trumpets of its day and had been raised by Mrs Backhouse's father-in-law, William Backhouse, in the mid-19th century. It was a plant of great vigour, much used in breeding and once described as "one of the finest and largest of all trumpet daffodils"<sup>(14)</sup>. The perianth of 'Lord Kitchener' is a creamy rather than a pure white colour and the corona is of soft yellow with a frilled edge but, unfortunately, the colour tends to fade as the flower ages. While important as a bicolor in its day, the major importance of 'Lord Kitchener' was its role in the breeding of pink cupped daffodils, which came about because of its ancestry of white trumpet and *N. poeticus* through its seed parent 'Minnie Hume'.

The next important large-cupped bicolors were 'Mitylene' and 'White Sentinel', which appeared during the 1920s. They were sister seedlings, raised by Engleheart from a cross between 'Beacon' (3W-R) and a seedling (2W-W). Both were excellent bicolors, 'Mitylene' receiving four Awards of Merit and a First Class Certificate, covering usage as exhibition, commercial cut flower and garden plant; 'White Sentinel' got an Award of Merit as an exhibition flower. 'Mitylene' was described by Guy Wilson as: "A grand and most striking show flower, quite distinct from other Leedsii and a really magnificent garden plant."<sup>(15)</sup> 'White Sentinel' was especially important in the history of the development of pink daffodils for, while 'Lord Kitchener' produced progeny with a hint of pink, it was 'White Sentinel' that provided the breakthrough to true pink when it gave rise to 'Rose of Tralee' in 1937. 'White Sentinel' could be traced back through its maternal parent to *N. poeticus* and, through its pollen parent, to white trumpets. Thus, having a similar background to 'Lord Kitchener', it was able to produce pink cupped progeny.

A trio of P.D. Williams' cultivars were next to appear on the scene: 'Polindra' (1927), 'Brunswick' (1931) and 'Greeting' (1934). Unsurprisingly, coming from this source, the parentages are unknown. 'Polindra' was a daffodil of exceptional quality with broad, flat perianth segments of

pure white, great substance and smooth texture. The flowers were carried on strong stems of 60 cm or more in height, the whole plant being exceedingly vigorous. It received many honours, including an Award of Merit and First Class Certificate as an exhibition flower, and similar awards from Haarlem as a cut flower together with an Award of Merit as a garden plant. It is said that P.D. Williams held 'Polindra' in the highest regard. G.L. Wilson, writing twelve years after its introduction, said: "When exhibited in single bloom classes it has always won."<sup>(16)</sup> which was a remarkable achievement. 'Brunswick' also received an Award of Merit and a First Class Certificate as an exhibition flower, and an Award of Merit as a garden plant. It was once said that: "This is one of those rare flowers whose serene and perfect loveliness fills one with unalloyed delight."<sup>(17)</sup> It was a perfectly proportioned flower with a cold-white perianth, and the corona white at its base but shading to a greeny lemon at its rim. An early flowering cultivar, 'Brunswick' had extraordinary durability, frequently outlasting later flowering cultivars. 'Greeting' was perhaps the least illustrious of the trio, receiving but a single Award of Merit as an exhibition flower. Nevertheless, it was a daffodil of fine quality and wax-like substance, characterised by a slightly reflexing and starry perianth and a small, goblet-shaped corona of clear lemon yellow. 'Brunswick' has for many years been an established cut flower cultivar in the south-west of England, while 'Polindra' was recommended for the same purpose following trials at Rosewarne EHS.

Since the late 1930s, Irish hybridists have played a major role in breeding improved large-cupped bicolors. Important cultivars raised by them include 'Green Island' (2W-GWY, Richardson) and 'Statue' (2W-Y, Richardson) in 1938, 'Guardian' (2W-Y, Wilson) in 1942, 'Bizerta' (2W-Y, Richardson) in 1943, 'Tudor Minstrel' (2W-Y, Richardson) in 1948, 'Woodgreen' (2W-WYY, Dunlop) in 1956, and 'Irish Minstrel' (2W-Y, Richardson), 'Careysville' (2W-Y, Richardson) and 'Dunmurry' (2W-Y, Dunlop), all in 1958.

'Green Island' was one of Richardson's favourite daffodils that he raised from 'Gracious' (2W-WWY) × 'Seraglio' (3Y-YYO). Its perianth segments were so broad they almost formed a circle of pure white, surmounted by a bowl-shaped corona of green, white and lemon. It was introduced in 1942 at £18 per bulb, the most expensive in the Richardson catalogue at that time. Already it had received a Preliminary Commendation from the Royal Horticultural Society and had been judged Best Bloom at the London Daffodil Show in 1940. At its introduction, Richardson described 'Green Island' as "a sensational flower of large size, great substance and waxen smooth texture"<sup>(18)</sup>.

During its existence, a daffodil may play several important roles, initially as an exhibition flower through which it gains recognition and widespread acceptance. Later its value as a breeding plant may be recognised. Finally, as the price of the bulbs falls to a level at which they become an economic proposition for larger scale planting, it may achieve a prolonged life as a commercial cut flower or garden plant. Relatively few cultivars have the necessary qualities to perform successfully each of these roles: indeed, such success is surely a measure of a cultivar's outstanding excellence. 'Green Island' was one such cultivar, getting an Award of Merit as an exhibition flower in 1946, receiving a similar award from Haarlem in 1965, and being recommended as a cut flower cultivar following trials at Rosewarne EHS. Its value as a breeding plant is well known, for it has given rise to new daffodils of quality across several divisions, including the large-cupped 'Rose Caprice' (2W-P), the small-cupped 'Verona' (3W-W) and 'Syracuse' (3W-WWY), and the Division 4 'Double Event' (4W-Y). Its show successes continued over a long period and it is only in recent years that it has been superseded in this role by newer cultivars.

Two cultivars that later held leading positions as exhibition flowers were also raised by Richardson – 'Tudor Minstrel' and 'Irish Minstrel'. The former was raised from ('Mitylene' × 'Penquite') × 'Cardigan' (2W-Y). By the time of its introduction in 1951 at £25 per bulb, it had already gained an Award of Merit as an exhibition daffodil and was unbeaten in single bloom classes. With characteristic brio Richardson described it as "a most outstanding novelty, far ahead of anything of its time ... an immense flower over five inches [12.5 cm] across"<sup>(19)</sup>. 'Tudor Minstrel' went on to gain a First Class Certificate as an exhibition flower in 1956 and an Award of Merit as a garden plant in 1963. 'Irish Minstrel' was raised from 'Green Island' × 'Tudor Minstrel', receiving Awards of

Merit as an exhibition flower in 1960 and as a garden plant in 1968. It possesses a pure white perianth that is broad and flat and of thick waxy substance, the corona being deep yellow and beautifully frilled at the rim. It persisted as the leading show cultivar in this sub-division until the early 1990s. Introduced in Richardson's catalogue in 1959, 'Irish Minstrel' received much recognition as a fine daffodil both as an exhibition flower and garden plant, including an Award of Garden Merit in 1993.

Others raised by Richardson among this group are 'Statue', 'Bizerta' and 'Careysville'. 'Statue' was raised from 'Mitylene' × 'Fortune' and, as its name suggests, it is an imposing plant. Its flowers are up to 13 cm in diameter with broad white segments and a well-proportioned, clear lemon-yellow corona. 'Bizerta' came from 'Niphetos' crossed with an unnamed pollen parent. Its corona colouring is particularly distinctive, opening in a lemon shade, but then darkening to gold shaded with orange, only the rim remaining paler; finally, the whole corona passes to orange as the flower ages. An open pollinated 'Broughshane' gave rise to 'Careysville'. The colouring of this cultivar has been described as unique and it is certainly unusual, the corona being buff-yellow. These three cultivars all received Awards of Merit as exhibition daffodils.

Guy Wilson's contribution to this sub-division was 'Guardian' from 'Niphetos' × 'Trostan'. It was a short-necked, vigorous cultivar, ideal as a garden plant and cut flower, for which purposes it won Awards of Merit in 1949 and 1952 and was recommended for commercial use following trials at Rosewarne EHS. Wilson had noted early in its existence its possible usefulness in breeding, and it is in this respect that it is best remembered today – as a parent of 'Empress of Ireland'.

The remaining cultivars, 'Woodgreen' and 'Dunmurry', were raised by W.J. Dunlop, the former from 'Brunswick' × 'Parkmore' and the latter from 'Niphetos' × 'Kanchenjunga'. 'Woodgreen' flowers very early, its broad perianth segments being pure white, while its yellow corona is flushed and rimmed with greenish lemon yellow. 'Dunmurry' has an excellent colour contrast, its white perianth and deep gold corona being well-defined. It has a fine waxy texture: its breeder saw it as an almost perfect exhibition flower.

Two important large-cupped bicolors, which emerged in the USA as a result of the work of G.E. Mitsch, were 'Festivity' (2W-Y) in 1954 and 'Oratorio' (2W-Y) in 1959. 'Festivity' was raised from 'Bodilly' (2W-Y) × 'Brunswick' and consistently produces large flowers, with broad, smooth perianth segments of fine texture and a rather long corona of clear yellow. Mitsch regarded 'Festivity' as one of the best flowers he had raised up to that point in time and was described as "outstanding for its deep rich colouring and neat proportions"<sup>(20)</sup>. It was also rated best daffodil of its type by the American Daffodil Society, both for exhibition and garden purposes. Mitsch thought that it had probably won more prizes than any of his introductions with the possible exception of 'Daydream'. 'Oratorio' was raised from 'Polindra' × 'Green Island' and is a plant of extraordinary vigour. It possesses a remarkable pure-white perianth, the segments, which have a great degree of overlap, giving the flower an almost perfectly circular outline. It gave rise to a very interesting offspring when crossed with 'Accent' (2W-P), which was registered in 1975 as 'Yellowthroat' (2W-Y): in this cultivar, the corona changes from orange yellow to cream in its upper parts, while retaining its deep base. Lastly, in 1976, W.A. Noton registered a fine bicolor named 'Cool Autumn' (2W-Y), raised from 'Homage' (2W-W) × 'Tudor Minstrel'. It is a most lovely flower with very broad white perianth segments that act as a perfect foil for the greenish yellow corona.

### ***The small-cupped bicolors***

There are very few small-cupped bicolors and even fewer of outstanding quality. This state of affairs is only to be expected, when the background from which the bicolor characteristic comes is taken into consideration. The situation is somewhat analogous to that of getting the red colouration from *N. poeticus* into cultivars of trumpet proportions. Two of the earliest cultivars of interest were raised by Guy Wilson during the 1940s – 'Sylvia O'Neill' (3W-WWY, 1940) and 'Reprieve' (3W-GWY, 1947). The former was raised from a cross much used by hybridists in the 1930s, namely 'Silver Plane' (3W-Y) × 'Rinsey' (3W-W). It was a vigorous plant that produced large flowers,

frequently of up to 11.5 cm in diameter. The perianth segments were pure white, rounded, overlapping and of smooth texture, while the shallow white corona had a daintily frilled lemon rim. 'Reprieve' was so named because it flowers at the very end of the season. This makes it a particularly valuable cultivar for extending the season into late May and early June, when its only companions are likely to be 'Frigid' and some of the *poeticus* daffodils. 'Reprieve' was raised from 'Silver Coin' (3W-W) × 'Crimson Braid' (3W-YR), and has a faultless perianth of satin smoothness, its white colouration being tinged with green. The small corona has a deep green centre, merging into white, and finally to cool lemon-yellow at its rim.

J.L. Richardson raised 'Crepello' (3W-GWY, 1957) and 'Syracuse' (3W-WWY, 1958), the latter being for many years among the top exhibition daffodils of its type. 'Crepello' came from 'Bryher' (3W-GWW) × 'Chinese White' and was considered by Richardson to be "a flower of superb quality"; its perianth was pure white and of "immense substance and lovely waxy texture"<sup>(21)</sup>. The small corona was almost totally white, except for its much frilled rim that was picked out in greenish lemon. In addition to being a fine show flower in its time, it was also given an Award of Merit as a garden plant in 1967. 'Syracuse' was raised from two immaculate parents in 'Green Island' and 'Chinese White'. Like 'Crepello', it is predominantly white, except for the greenish yellow edge to the corona. For many years and until recently, it remained one of the leading exhibition daffodils of its type, receiving an Award of Merit for this purpose in 1961.

One of the best known and most successful of all small-cupped exhibition cultivars arose in the USA at the hands of Grant Mitsch. It was named 'Aircastle' (1958) and was a true, unadulterated bicolor with a white perianth, and a pale lemon corona that had a marginal band of deeper colour. The whole form of the flower is excellent, the segments being very rounded and flat. 'Aircastle' had the distinction of being the first American cultivar to receive the Best Bloom award at the London Daffodil Show, an achievement that it later repeated. Mitsch subsequently used 'Aircastle' in his breeding programme, which resulted in the appearance of 'Pure Joy' (2W-Y, 1971), its seed parent being 'Easter Moon'. It is somewhat similar to 'Aircastle' in colour and was held in high regard by Mitsch who remarked that it had captivated many visitors to his nursery. Finally, a particularly fine exhibition cultivar was Mrs Abel Smith's 'Park Springs', registered in 1972. It was raised from 'Ethel' (3W-Y) × 'Syracuse' and is another of those bicolors in which the dominant corona colour is white (3W-WWY). In recent years, it has shown its great consistency by being a regular winner of the top show awards.

## **Bicolors (W-Y), 1980-2010**

Among bicolor trumpets 'Newcastle' (Dunlop, 1957) held almost total sway until 1993-1994, after which it was succeeded by 'Bravoure', which was raised in the Netherlands by van der Wereld in 1974. This situation persisted, with 'Bravoure' in first place in 2003 while 'Newcastle' remained in third. Other cultivars, however, were emerging as contenders for the major places, including 'Cristobal' (Richardson, 1968), 'Clubman' (Jackson's Daffodils, 1995) and 'Queen's Guard' (Duncan, 1997). More recently 'Cristobal' and 'Bravoure' have continued to win prizes, with 'Queen's Guard' being joined by 'Pops Legacy' (Bender, 1985) and 'Apple Honey' (Postles, 1995), in close contention.

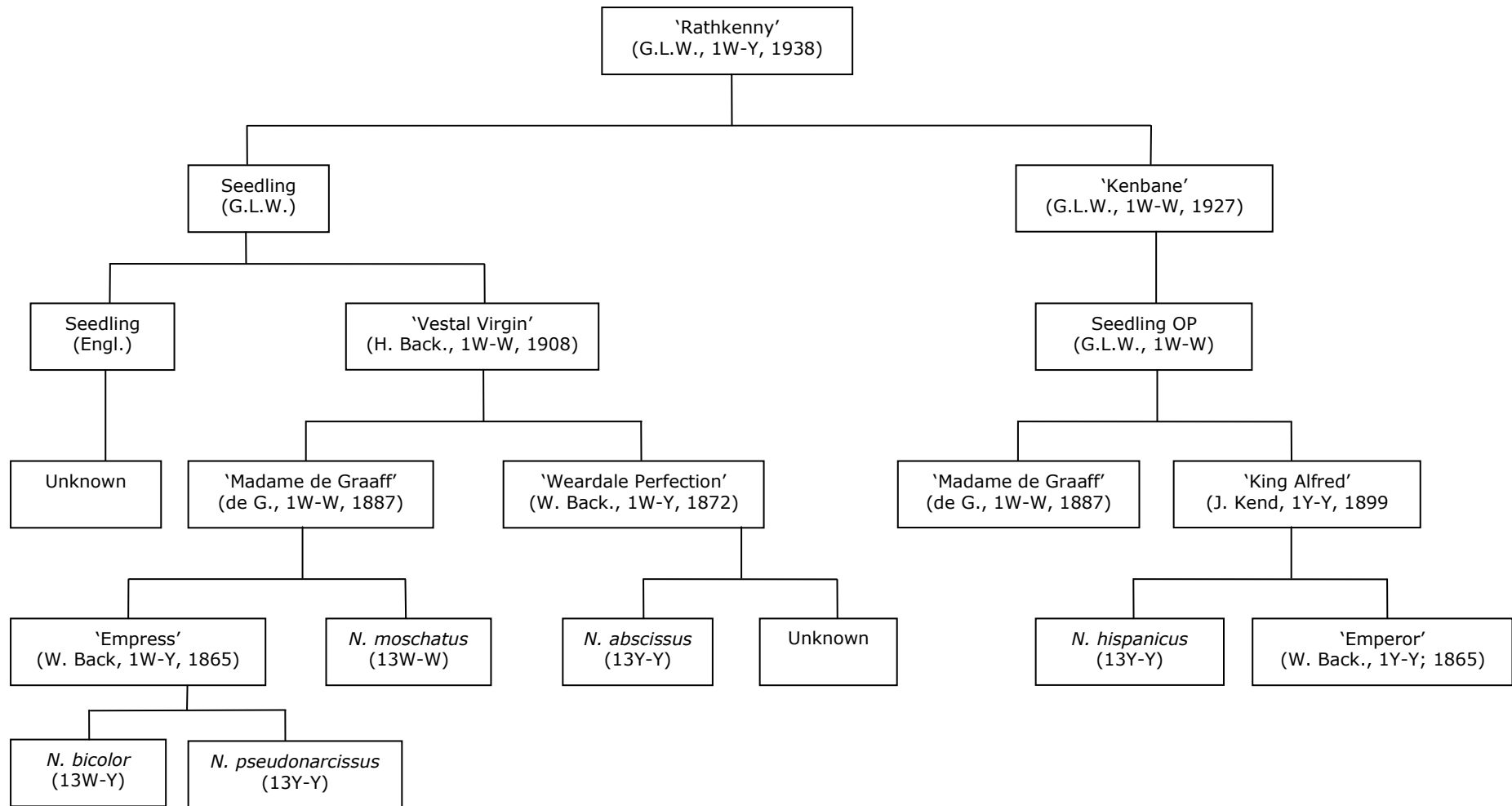
Until 1992, 'Tudor Minstrel' (Richardson, 1948) was the leader among the large-cupped bicolors, as it had been for over a decade. Since then 'Fiona McKillop' (Verge, 1987) has been the top prize winner. It retained this position in 2003, although it was then joined by the emerging cultivars 'Holme Fen' (Pearson, 1993), 'Honeybourne' (Postles, 1994) and 'Soft Focus' (Duncan, 1999). 'Fiona McKillop' and 'Honeybourne' are currently the leading cultivars with 'Corky's Song' (Postles, 1997) in attendance.

The small-cupped bicolors, 'Aircastle' (Mitsch, 1958) and 'Park Springs' (Abel Smith, 1972) continued winning major prizes well into the 1980s and the former featured early in this century. 'Dunley Hall' (Lea, 1971), 'Evesham' (Lea, 1990) and 'Moon Shadow' (Postles, 1992) tended to

dominate the 1990s and still occupied the top three places in 2003, when the last-named was well ahead of its rivals. Nevertheless, 'Silken Sails' (Mitsch, 1964) was capable, on occasion, of challenging the best. Today, 'Aircastle' is the top cultivar, with 'Moon Shadow' and 'Evesham' always in contention while 'Park Springs' is the top cultivar in the non-predominant 3W-WWY class. This section has many high standard cultivars but, with established daffodils like 'Aircastle' and 'Evesham' continuing to do well, progress for newcomers has been difficult. Having said that, in recent years 'Astrid's Memory' (Postles, 2003) has made a big impact.

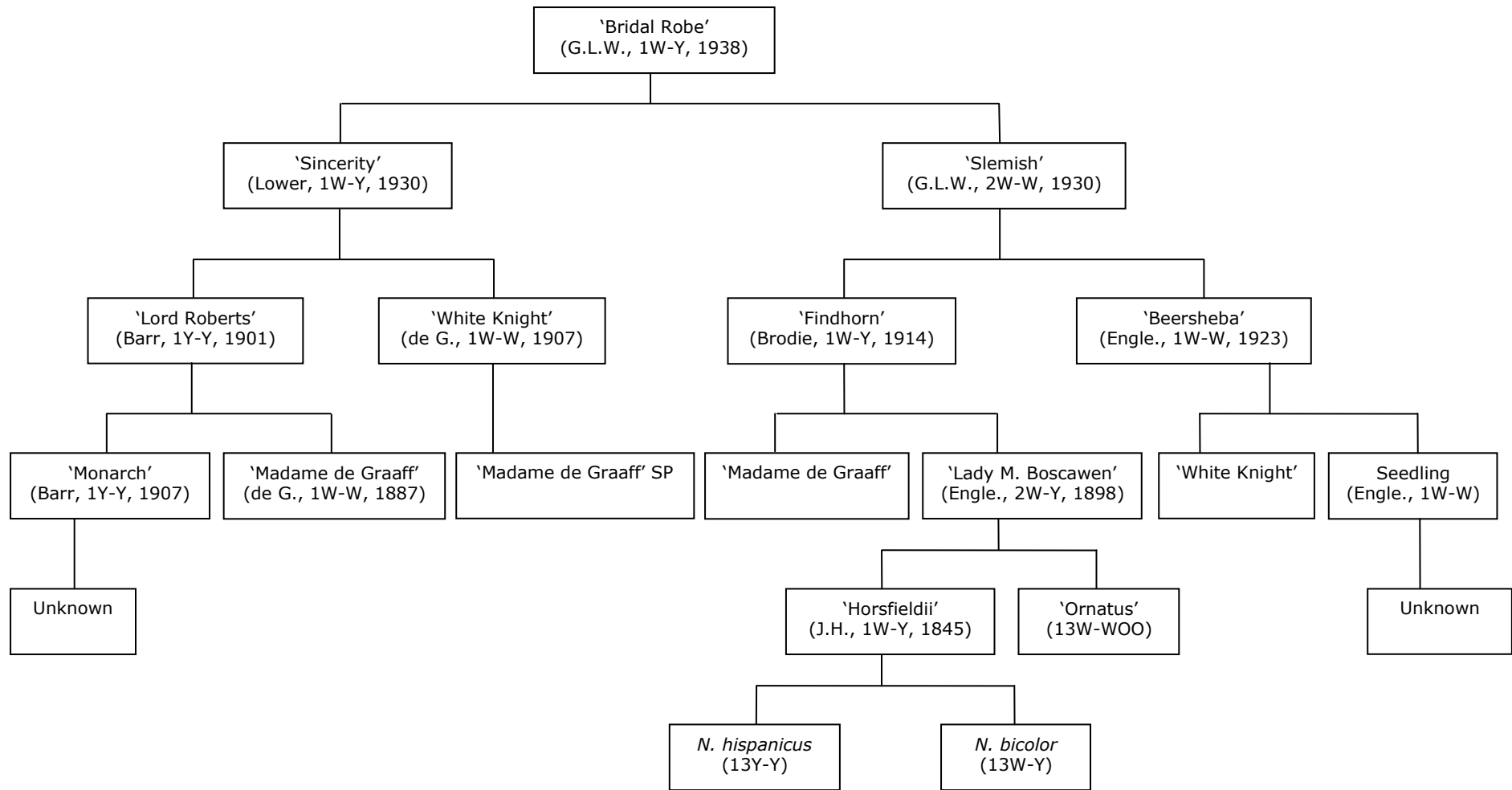
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**Figure 11.1.** Ancestral influences on colour strength in bicolors. Pedigree of 'Rathkenny', strong colouring. (Abbreviations for breeders: de G. = S.A. de Graaff, Engle. = G.H. Engleheart, G.L.W. = G.L. Wilson, H. Back. = H. Backhouse, J. Kend. = J. Kendall, W. Back. = W. Backhouse. OP = open pollinated.)





**Figure 11.2.** Ancestral influences on colour strength in bicolors. Pedigree of 'Bridal Robe', weak colouring. (Abbreviations for breeders: Barr = Barr and Sons, Brodie = Brodie of Brodie, de G. = S.A. de Graaff, Engle. = G.H. Engleheart, G.L.W. = G.L. Wilson, J.H. = J. Horsefield, Lower = N.Y. Lower. SP = self pollinated.)

## CHAPTER 12 THE REVERSE BICOLORS

Normal bicolored cultivars have been known for many years. One of the earliest and most famous was ‘Empress’ (1W-Y), which was raised around 1865 by William Backhouse. It has a flower in which the perianth is white and the corona is yellow. Among daffodil hybridists the term bicolor, which literally means two-coloured, is used exclusively to describe this particular colour combination of white and yellow. There are, of course, many other types of two-coloured daffodils, those most commonly encountered having a white perianth and a corona of orange, red or pink. The normal bicolored combination is also well known in nature. The best example, and certainly that most widely used in early breeding, is *N. bicolor*. This daffodil was the pollen parent from which ‘Empress’ was raised and it is found in the ancestry of many other Division 1 and 2 daffodils with white perianths and yellow coronas. In the reverse bicolor daffodils, the colours are switched: the perianth colour is yellow and that of the corona is white, although it often opens in a yellowish shade before fading to white, this being most intense on the inside of the corona and under warm weather conditions. This type of colouration is extremely rare in nature and was unknown among cultivars until relatively recent times.

### The Role of *Narcissus triandrus*

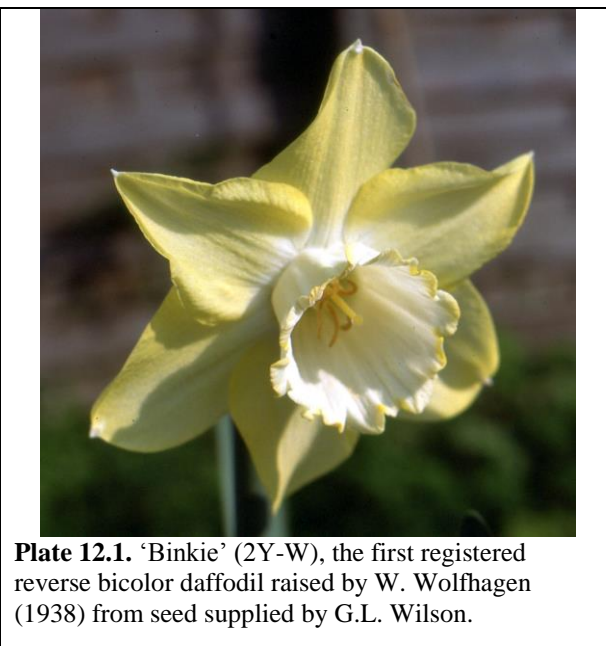
Among the species, the only recorded example of a reverse bicolor is *N. triandrus* var. *pulchellus*, which has a perianth of yellow and a corona of creamy white. There are no records of this variety as a truly wild plant and, although it was apparently common in Victorian gardens, it is almost impossible to find nowadays. Jefferson-Brown suggests that it may have died out in cultivation or possibly awaits re-discovery in some old garden<sup>(1)</sup>. This situation is strange as var. *pulchellus* has an extremely lengthy history in gardens, being one of four colour variants of *N. triandrus* known to Parkinson in 1629<sup>(2)</sup>. Among these four varieties was one with the normal bicolor combination of white perianth and yellow corona. This was referred to by the cumbersome yet descriptive name of *Narcissus juncifolius chalice luteo reflexis foliis albidus* – the daffodil with rush-like foliage, yellow cup and white, reflexed petals. Also listed was its opposite, which Parkinson called *Narcissus juncifolius chalice albo reflexis foliis luteis*, which is the reverse bicolor form. During the second half of the 19th century, Burbidge stated<sup>(3)</sup> that this was the only variety of *N. triandrus* to be grown and not surprisingly was the *triandrus* found on nurseries at that time, almost to the exclusion of all others. It was, for example, reported as growing strongly and healthily on the nursery of R. Parker at Lower Tooting in 1874. This was confirmed somewhat later by that well known daffodil authority E.A. Bowles<sup>(4)</sup>, who wrote that it was a more vigorous and easily grown variety than others in this section, while J.G. Baker<sup>(5)</sup> had *pulchellus* at the top of his list of principal *triandrus* varieties. By 1885, it was the only form of *N. triandrus* listed by Hartland<sup>(6)</sup>, who described it as “most interesting and novel”, no doubt on account of its unusual colouring. Because of its vigour, unusual colouring and ready availability, it is likely that it featured prominently in breeding during the late 19th and early 20th centuries. In fact, we know that *N. triandrus* was being widely used at that time and it is possible that the foundations for the reverse bicolor cultivars, which were to make their appearance much later, were being laid over a century ago through the use of *N. triandrus* var. *pulchellus*. A. Fernandes believed that this vigorous *triandrus* was a hybrid from a cross between *N. triandrus* var. *concolor* and *N. triandrus* var. *cernuus* – the latter now being known as *N. triandrus* subsp. *pallidulus* (which he named *N. × pulchellus*). Hybrids from this cross can appear as reverse bicolors and the hybridity may account for their widely reported vigour. In *The International Daffodil Register and Classified List 2008*<sup>(7)</sup> it is listed, however, as *N. triandrus* var. *pulchellus*.

### The Reverse Bicolor Cultivars

The breakthrough that brought this type of daffodil to the attention of the gardening public occurred when Guy Wilson made the cross between ‘King of the North’ (1Y-Y) and ‘Content’ (1W-WWY). This resulted in ‘Spellbinder’ (1Y-W), which was registered in 1944. Only one other reverse

bicolor cultivar had been registered prior to this event. This was 'Binkie' (2Y-W) (Plate 12.1), raised by W. Wolfhagen in Tasmania in 1938. Indeed, 'Binkie' can also be considered to be a Guy Wilson cultivar, for it was he who made the cross that produced the seed from which it was raised in Tasmania. This seed was subsequently sent to Wolfhagen from Northern Ireland.

In further breeding aimed at raising more reverse bicolors, Wilson used both 'Spellbinder' and 'Binkie', and new cultivars such as 'Cocktail' (2Y-W, 1954) and 'Lemon Doric' (2Y-W, 1955) resulted. 'Binkie' is widely accepted in daffodil literature as being the first reverse bicolor cultivar but, unfortunately, its parentage is unknown. Guy Wilson was certainly using 'King of the North' as a seed parent during the late 1920s and early 1930s, but did not own a plant of 'Content' (registered in 1927 by P.D. Williams) at that time. It was from this cross that all reverse bicolors appear to have been derived, either directly or through the earlier involvement of one or other of them.



**Plate 12.1.** 'Binkie' (2Y-W), the first registered reverse bicolor daffodil raised by W. Wolfhagen (1938) from seed supplied by G.L. Wilson.

As Wilson did not own plants of 'Content' when he made the cross that produced the seed sent to Wolfhagen from which 'Binkie' was raised, it can only be concluded that pollen came from Williams; or that its male parent was something else, as Wilson only obtained 'Content' in 1937, and introduced it in his catalogue in 1939 as a new variety. This was one year after the registration of 'Binkie'. Thus, if 'Content' was used, it must have been as pollen obtained from P.D. Williams. Wilson's Seedling Record Books show that the pollen parent used most frequently in these early crosses with 'King of the North' was 'Sorley Boy' (1Y-Y), a combination that certainly produced sulphur-coloured seedlings similar to those which later appeared among the progeny of 'King of the North' × 'Content'. The only other pollen parent used by Wilson with 'King of the North' during the period that could have given rise to 'Binkie' was 'Hebron' (1Y-Y), raised by Brodie and registered in 1923. As the cross which gave rise to 'Spellbinder' was made in 1931, the seed sent to Tasmania could have had the same parents – but only if Williams gave Wilson pollen of 'Content'. There is, however, no record of this.

It is known, therefore, that the majority of reverse bicolor cultivars came from 'King of the North' × 'Content': but a few, including the all-important 'Binkie', may have come from 'King of the North' × 'Sorley Boy' or, possibly, 'Hebron'. Is there anything in the ancestry of these cultivars that traces back to *N. triandrus*? 'Hebron' can be disregarded for its parentage is known to be 'White Emperor' (1W-W) × 'King Alfred' (1Y-Y): neither has any known connection with *N. triandrus*. The parentage of 'Victoria' (1W-Y), which occurs in the ancestry of 'King of the North', is unknown as is that of 'Monarch' (1Y-Y), which is to be found three generations back in the family tree of 'Content'. These cultivars may conceivably have had some link with *N. triandrus*, if only because the dates of their registration were 1907 and 1897 respectively. Also found in the ancestry of 'Content' is a seedling raised by Engleheart that is known to have *N. triandrus* in its parentage. Engleheart's seedling was crossed with 'King of the North' by Brodie to produce a white trumpet seedling thought to have later been named 'Nevis'. 'Nevis' gave rise to 'Beersheba' (1W-W), the pollen parent of 'Content'. So here lies a direct link back to *N. triandrus*, and what more likely variety than the widely-grown and vigorous var. *pulchellus*?

It is perhaps relevant to note here that both 'Content' and 'Sorley Boy' are related to 'Monarch'. When the former was hybridised with 'King of the North', there resulted not only the reverse bicolor seedlings which have ensured this cross a place in daffodil history, but also several

sulphur-yellow ones from which 'Moonstruck' (1Y-Y), for example, was named. Similar sulphur-coloured seedlings are known to have come from 'King of the North' × 'Sorley Boy', so why not also the reverse bicolor 'Binkie'? And what influence, if any, did 'Monarch' have in all of this?

## A Remarkable Journey

Over a period of several years, until 1924, Guy Wilson kept comprehensive records of visits made to shows and the trial grounds of other hybridists. These Record Books were probably largely unread other than by Wilson himself until the late 1970s when, temporarily, they came into the hands of the author. These records contain a remarkable entry relating to a visit made in 1923 to Sutton Court in Herefordshire, the home of Mr R.O. Backhouse. Wilson wrote of:

“A remarkable seedling – many have been remarkable but this one was a reverse bicolor, supposed to be a cross between 'Monarch' and one of the old whites of the *cernuus* type. The flower was fully as large as 'Monarch' but of drooping habit. It had, however, a well-built, broad, full lemon-yellow perianth and a white or faintly lemon-white trumpet. It really looked more beautiful than one would have expected.”<sup>(8)</sup>

Wilson also recorded a further visit to Sutton Court in the following year, when he was accompanied by J. Lionel Richardson. On this occasion: “There were also some reverse bicolors in addition to the one we saw last year.”<sup>(9)</sup>

It is unlikely that 'King of the North' had any connection with these seedlings, although it is known to have existed for quite some time prior to its registration in 1927. It would not have been widely available before this event, however, and for the same reason 'Content' (which was registered in 1927 too) is also unlikely to have been involved. Could 'Monarch' be a common factor in the production of reverse bicolors? Was *cernuus* important in this and was *N. triandrus* another vital ingredient? What is certain is that Wilson saw and noted these curious flowers in 1923 and 1924 and, 20 years later, registered a similar cultivar of his own. Could it be that when Wilson started to use 'Content' in his breeding programme he realised that three generations back in its ancestry lay 'Monarch', and that this recalled the memory of the remarkable Backhouse seedlings? It is also interesting to note that *cernuus* type daffodils occurred on at least four occasions in the ancestry of 'King of the North' and 'Content', while in addition the latter was probably related to *N. triandrus* var. *pulchellus*. The other unanswered question relating to Wilson's journeys to Sutton Court in the early 1920s is why these seedlings, unique at that time, were not registered and introduced. Even when 'Spellbinder' arrived 20 years later, this type of daffodil was far from unanimously popular with show judges. It took many more years for the reverse bicolors to become universally accepted and their position in the 1940s was somewhat analogous to the position of the split corona daffodils a short while ago.

## 'Spellbinder'

Whatever the truth about the origins of the reverse bicolor cultivars, it was Wilson who first made the cross between 'King of the North' and 'Content' that produced 'Spellbinder' and introduced the trumpet reverse bicolors to commerce. 'Spellbinder' was a unique daffodil when it first appeared – the only named trumpet cultivar to exhibit this curious colouring. On opening, the whole flower is a wonderful and entirely distinct greeny-lemon colour and appears to be almost luminous. After a few days, especially if the weather is warm, the trumpet begins to whiten: most markedly on the inside, which normally turns completely white apart from a greeny-lemon tinge that persists around the flanged rim.

When first introduced, reverse bicolor cultivars were not popular with show judges, but this did not deter Wilson from using 'Spellbinder' in his exhibits. It received an Award of Merit in 1948 as an exhibition daffodil, though even then the judges' decision was by no means unanimous. Nothing, however, can disguise Wilson's own joy at the seedling that was to become 'Spellbinder'. When recalling its flowering as an unnamed seedling, he thought that:

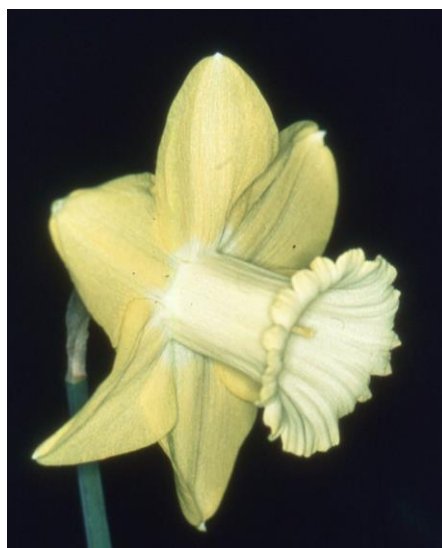
“Amongst a large batch of seedlings flowering for the first time this season, the most striking break was a series of very attractive and novel large, cool, clear, greeny-lemon trumpets bred from ‘King of the North’ × ‘Content’ – some were selfs, others very pale with a marked frill of deeper lemon at the mouth of the trumpet, [and] one or two were actually reverse bicolors – the most striking being a wonderful large trumpet.”(10)

Thus was the birth of ‘Spellbinder’ recorded and a new era in the history of daffodils inaugurated. Its pedigree is summarised in Figure 12.1 located at the end of this chapter.

## The American Reverse Bicolor Cultivars

Since the advent of ‘Spellbinder’, reverse bicolors have become established, accepted, admired and, as always, improved. The latter has occurred largely as the result of the work of

Grant Mitsch in Oregon, USA. Mitsch repeated the Wilson cross of ‘King of the North’ and ‘Content’ on a massive scale, sowing some 10,000 seeds that resulted. From among these came the 1Y-W daffodils ‘Lunar Sea’ (1954), ‘Entrancement’ (1958), ‘Nampa’ (1958) and ‘Honeybird’ (1965) (Plate 12.2). Mitsch also used pollen from ‘King of the North’ × ‘Content’ seedlings on ‘Binkie’, and from this cross raised some very exciting cultivars including ‘Bethany’ and ‘Nazareth’ (1958), ‘Daydream’, ‘Halolight’ and ‘Moonlight Sonata’ (1Y-W, 1960), ‘Limeade’ (1962) and ‘Charter’ (2Y-WWY, 1964). All are large-cupped cultivars, with the exception of ‘Moonlight Sonata’, which is a trumpet daffodil. While all these cultivars are good, ‘Daydream’ is outstanding: a sturdy daffodil, and not only a regular winner at top shows but also an excellent garden plant. It has received both an Award of Merit and a First Class Certificate as an exhibition flower.



**Plate 12.2.** ‘Honeybird’ (1Y-W), raised in the USA by G.E. Mitsch (1965).

## Some Other Modern Reverse Bicolor Cultivars

Several particularly fine cultivars have been raised in recent times. These include ‘Gin and Lime’ (1Y-W), ‘Grand Prospect’ (2Y-W) and ‘Altun Ha’ (2YYW-W) (Plate 12.3). ‘Gin and Lime’ was registered in 1973, having been raised from ‘Goldcourt’ (1Y-Y) and ‘Moonstruck’, and is now among the finest reverse bicolor daffodils. ‘Grand Prospect’ was registered one year later, its parents being ‘Camelot’ (2Y-Y) and ‘Daydream’. This cultivar is one of those reverse bicolors that takes several days to develop its full colouration, but once this has happened it is very fine indeed. Again, ‘Altun Ha’ raised by John Pearson from ‘Camelot’ × ‘Daydream’ is undoubtedly one of the most outstanding cultivars of recent times.



**Plate 12.3.** ‘Altun Ha’ (2YYW-W), a most outstanding cultivar raised by A.J.R. Pearson (1987). (Reproduced by kind permission of the American Daffodil Society, [Daffseek.org](http://Daffseek.org). Photograph by Noeline McLaren.)

## Reverse Bicolors (Y-W), 1980-2010

### ***The trumpet reverse bicolors***

‘Honeybird’ (Mitsch, 1965) was the leading show cultivar until 1987 when ‘Gin and Lime’ (Carncairn Daffodils, 1973) took over the leading position, it in turn being succeeded by ‘Lighthouse Reef’ (1YYW-WWY, Pearson, 1995) by 2003, with others such as ‘Chiloquin’ (Mitsch, 1968), ‘Trumpet Warrior’ (1YYW-WWY, Mitsch/Havens, 1990) and ‘English Caye’ (1YYW-WWY, Pearson, 1997) also having some success. ‘Lighthouse Reef’ has continued at the top until the present time with ‘Young American’ (1YYW-WWY, R. and E. Havens, 1988) and ‘Sargeant’s Caye’ (1YYW-WWY, Pearson, 1998) hard on its heels. ‘Gin and Lime’ is still a winner but is less well colour-contrasted than many of the newer reverse bicolors.

### ***The large-cupped reverse bicolors***

‘Daydream’ (Mitsch, 1960) dominated the show bench until the arrival of ‘Altun Ha’ (Pearson, 1987) which is without doubt one of the finest recent introductions in any division having a consistency that should see it winning prizes for many years to come. In 2003, for example, it won 21 major first prizes while its nearest rival gained just five. Its main rivals at that time were ‘Carib Gipsy’ (2Y-WWY, Pearson, 1987), ‘Twilight Zone’ (2YYW-WWY, Brogden Bulbs, 1991) and ‘Goff’s Caye’ (2YYW-W, Pearson, 1992). ‘Altun Ha’ remains totally dominant today with ‘Carib Gipsy’, ‘Goff’s Caye’, ‘Helford Dawn’ (Scamp, 1996) and ‘Caribbean Snow’ (Pearson, 1998) sharing the minor places.

### ***The small-cupped reverse bicolors***

This is a sparsely populated section with only ‘Cornell’ (Mitsch, 1984) and ‘Chortle’ (Jackson’s Daffodils, 1993) showing any real form.

What had probably originated in a variety of *N. triandrus* common in Victorian gardens, but nowadays almost unobtainable, took on cultivar status at Sutton Court in Herefordshire in the early 1920s where it was seen and noted by the shrewd Guy Wilson. He ‘stored’ that knowledge and quietly used it over many years in his breeding programme. By the late 1930s and early 1940s it had manifested itself in public on opposite sides of the world as ‘Binkie’ in Tasmania and ‘Spellbinder’ in Northern Ireland. It was ‘Spellbinder’ and the efforts of Guy Wilson in particular that established this type of daffodil, which by the 1960s had become loved and bred the world over. The milestones in the development of reverse bicolor daffodils are summarised in Table 12.1.

#### **Milestones in Reverse Bicolor Development**

1629

Description by John Parkinson<sup>(11)</sup> of *Narcissus triandrus* var. *pulchellus* known at that time as *N. juncifolius chalice albo reflexis foliis luteis*.

Late 19th century

*N. triandrus* var. *pulchellus* recorded by William Robinson, W. Baylor Hartland and others as being a popular, widely grown daffodil in Victorian gardens.

1923-1924

Guy L. Wilson’s visits to Sutton Court, Herefordshire where he saw the first reverse bicolor cultivars.

1937

Cross made between ‘King of the North’ and ‘Content’ which led to ‘Spellbinder’.

1938

Registration of ‘Binkie’ raised by W. Wolfhagen in Tasmania from seed supplied by Guy L. Wilson.

1944

Registration of ‘Spellbinder’.

*1954-1965*

Registration of G.E. Mitsch's most famous 1Y-W and 2Y-W cultivars raised from 10,000 seeds that came from an extensive programme of crossing 'King of the North' with 'Content'. He also used pollen of seedlings produced by the above programme on 'Binkie' to raise a further series of reverse bicolors.

*1987*

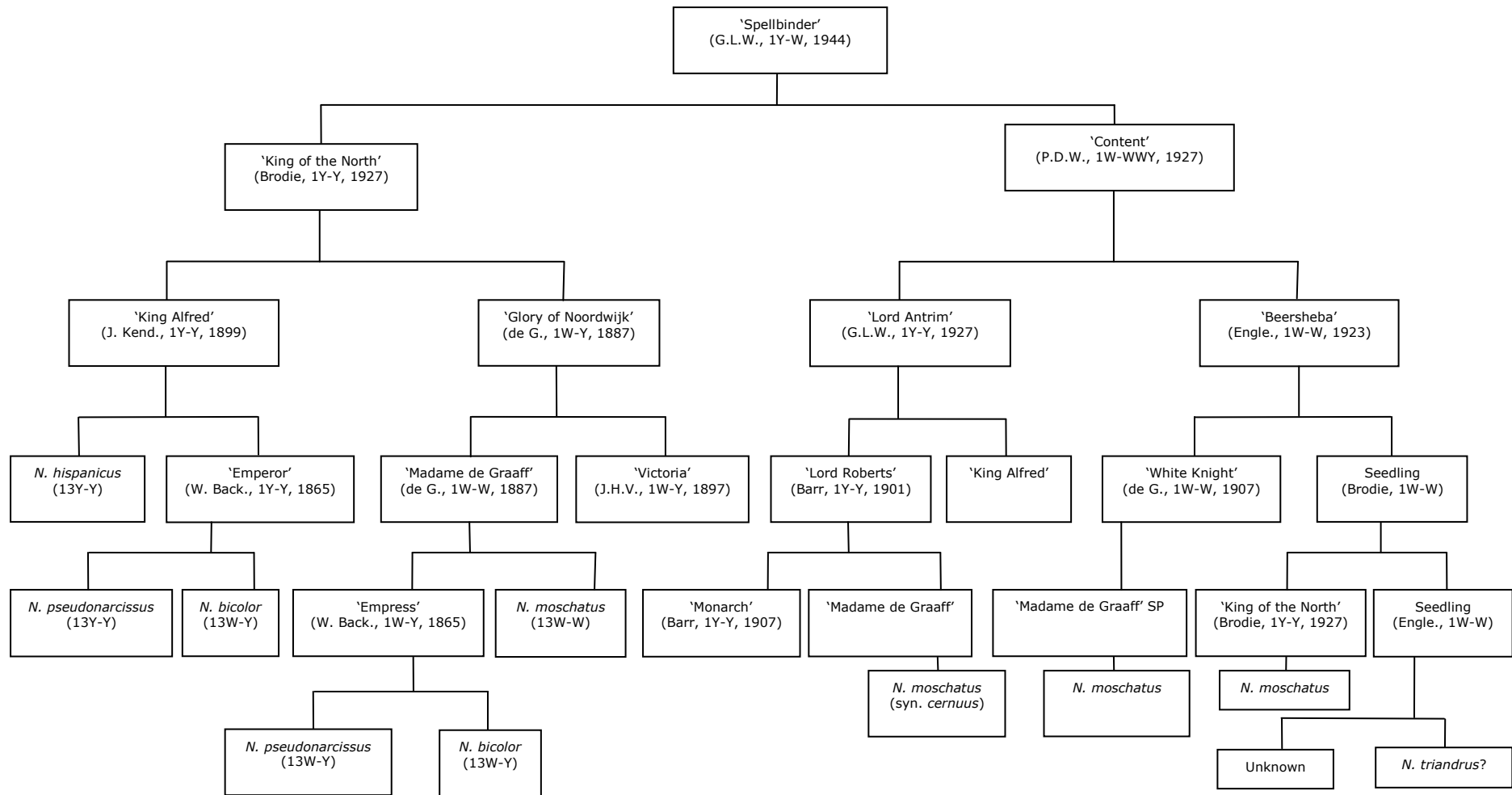
Registration of 'Altun Ha', a 2Y-W of almost unbeatable quality, raised by A.J.R. Pearson from 'Camelot' and Mitsch's 'Daydream'.

**Table 12.1.** Milestones in the development of reverse bicolor daffodils.

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**Figure 12.1.** Pedigree of 'Spellbinder', which shows a strong *N. cernuus* background and possible *N. triandrus* input. (Abbreviations for breeders: Barr= P. Barr, Brodie = Brodie of Brodie, de G. = S.A. de Graaff, Engle. = G.H. Engleheart, G.L.W. = G.L. Wilson, J.H.V. = J.H. Veen, J. Kend. = J. Kendall, P.D.W. = P.D. Williams, W. Back. = W. Backhouse. SP = self pollinated.)

## CHAPTER 13 THE DOUBLE DAFFODILS

Double forms of daffodil have been known to botanists and intrigued horticulturists for several centuries. The earliest recorded double daffodils were mutants of various *Narcissus* species and, until relatively recently, these were the only ones known. The great change came in the early part of the 20th century as a result of the pioneering work of W.F.M. Copeland, for it was from 'Mary Copeland', one of his cultivars, that the crucial breakthrough came. This occurred accidentally when a plant of 'Mary Copeland' growing at Prospect House, Waterford was noticed by Lionel Richardson because it possessed a developing seed pod, an unusual sight among the early doubles. Richardson carefully tended this developing pod and from the resultant seed raised a double seedling, No. 427 that, although inconspicuous by modern standards, nevertheless possessed one unique quality: unlike all its predecessors it proved to be fully fertile as a seed parent. Eventually, this seedling was registered as 'Falaise'. Richardson crossed 'Falaise' with daffodils from several divisions and of many colours, producing a whole series of wonderful new garden hybrids that gave both him and Ireland a lead in this field of work which went unchallenged for several decades.

### Double Daffodils in History

Double forms of daffodil have been known in gardens for almost as long as the more usual single forms. Some are unusual in colouring, such as 'Whiteadder' (Plate 13.1) with its flower of strongly suffused lime-green; then there are the strangely-shaped flowers which emerged at Gibside Hall, Co. Durham in 1995, following the removal of scrub during garden restoration. Both were found in estate gardens of 18th century origin.

Several of these doubles were recorded by Parkinson<sup>(1)</sup> as being well known in English gardens during the early 17th century. These included daffodils that he referred to as *N.*

*pseudonarcissus gallicus minor flore pleno*, *N. pseudonarcissus aureus maximus flore pleno fine Roseus Tradescanti*, *N. totus albus flore pleno Virginianus* and *N. pseudonarcissus aureus Anglicus maximus*.



**Plate 13.1.** 'Whiteadder', greenish in colour and thought to be a double sport of *Narcissus pseudonarcissus*, known on the Whitehall Estate in Berwickshire since about 1750.

Parkinson regarded *N. pseudonarcissus gallicus minor flore pleno* as a Continental form of the true double daffodil *N. pseudonarcissus plenus* but it is now thought to have been a *N. triandrus* hybrid, which has also been known as *N. 'Eystettensis'* and *N. pseudonarcissus 'Capax Plenus'*. Its common name is Queen Anne's Double Daffodil, named after Queen Anne of Austria. This daffodil is well worth growing not only for its historic interest (for it is one of the earliest recorded garden doubles, known to have been in cultivation before 1601), but also for its delightful soft-yellow colour and superb symmetry. The corona has been replaced by six layers of segments, each layer superimposed directly upon the underlying perianth segments. Each succeeding layer of segments is slightly smaller than the one beneath, producing a flower of beautiful star-like appearance. The exact

nature of Parkinson's *Virginianus* is not known but it is thought likely from his description to have been the double white form of *N. poeticus*, now known as 'Flore Pleno' (Hort.). Parkinson described this daffodil as:

"Bearing one faire double snow white flower laid open flat and composed of six rows of leaves ... from the middle of this flower thrusteth forth a small long pointed fork or horn, white as the flower is."<sup>(2)</sup>

One of the earliest and most widely known doubles was *Anglicus maximus* that, owing to its widespread distribution, has acquired the name of the Common Double Daffodil. A large deep-golden yellow, rose-like flower, it was much admired by Burbidge who thought it "well deserves culture as one of the most effective of the monstrous [double] kinds"<sup>(3)</sup>. The first record of this daffodil is of it being in the possession of a Fleming, Vincent van Sion, a resident of London during the early 17th century. Bulbs were acquired by both Parkinson and a London florist, G. Wilmer. Parkinson recorded receiving these bulbs in 1629 from "Vincent Sion, borne in Flanders, dwelling in the banks [Thames] side in his lives [sic] time, but now dead, an industrious and worthy lover of faire flowers"<sup>(4)</sup>. For many years, this daffodil was known by the name of its original owner, both as 'Van Sion' and 'Vincent Sion' or as Wilmer's Great Double Daffodil, after the man who first acquired it for use in the flower trade. In the early 19th century, it was regarded as synonymous with 'Telamonijs Plenus', a double form of *N. pseudonarcissus* – a view which is again current. However, it is still sold under its original name of 'Van Sion' and, rightly so, for it is different from 'Telamonijs Plenus' – but this is a personal view.

Another famous early double was *Roseus Tradescanti*, Tradescant's Double Daffodil described over three centuries ago as "a free growing plant well worth general cultivation"<sup>(5)</sup>. It was in connection with this daffodil that the process of flower-doubling in *Narcissus* was first discussed by S. Hibberd in 1874. In his view:

"The doubling of *Narcissus* is an interesting phenomenon because certain species run into the double state easily, while others appear quite incapable of such an extravagance. It is generally considered that doubling consists in the conversion of stamens and pistils into petals and this undoubtedly takes place in the doubling of daffodils: but the petals added to the original form usually exceed in number organs regarded as their origin; and indicate not only a metamorphosis, but also a multiplication of the several parts of the flower."<sup>(6)</sup>

Hibberd also noted that as part of the doubling process the flower not only produced extra petals, correctly called petaloids, from the sexual organs, but often also gave rise to green leaf-like structures among the petaloids. Burbidge thought that this lack of correlation between the number of parts in double flowers and the original number in the corresponding single form may have been due to the former being aggregations of several flowers.

One of the striking personalities among Victorian horticulturalists, the Revd C. Wolley-Dod, also had something to say on the process of doubling in daffodils, as indeed he had on many other aspects of gardening. He engaged in a prolific correspondence with Burbidge on the subject. Wolley-Dod was convinced that soil conditions played a major role in inducing the doubling process, and that a reversion to the original soil conditions would change them back to singles again. Wolley-Dod's interest in this subject was so intense that on 19 March 1884 he is known to have written to Burbidge no fewer than four separate letters on daffodil doubling. One of these began: "Do not answer this." and another "I do not expect you to answer all my letters."<sup>(7)</sup> In yet another, Wolley-Dod wrote:

"I am all Daffodils at the present time and here have little to distract me from them, but how you find time to write me all the letters you do in the midst of all your other business is a lesson to me [as to] what busy men can do. I repeat I have the greatest respect for and belief in your infinite knowledge and powers of recognition of all the cultivated forms of Daffodils, and I carefully attend to what you say."<sup>(8)</sup>

Such fulsome sentiments did not, however, dissuade him from his own views.

Wolley-Dod attacked Burbidge's views on 'the doubling question' because they did not coincide with his own. Wolley-Dod's views on doubling in daffodils are clearly outlined in a letter that he wrote from his home Edge Hall, Malpas, Cheshire on 2 February (year not stated):

"I take special interest in all forms of trumpet daffodils. The various ways in which *Narcissus pseudonarcissus* doubles began to be an object of my special enquiry last year, and a very interesting and wide subject it is. I am now nearly convinced that the commonest form of doubling results from the dying down one year of plain and single *pseudonarcissus* to come up another as *Telamonius Flore Pleno*."<sup>(9)</sup>

Wolley-Dod distributed 2,000 single bulbs between 200 and 300 locations in an attempt to prove this point. He referred in one of his letters of 19 March 1884 to an orchard at Farnham Royal in Buckinghamshire where the common single daffodil grew in the surrounding fields, but in the richer conditions of the orchard they had all become doubles. He concluded: "You may disbelieve me if you like but as Haworth said posterity will do me justice."<sup>(10)</sup> In a further letter of 15 May 1884 the 'doubling question' was raised again when Wolley-Dod mentioned a Mr Brierley of the Post Office, Knowle, Warwickshire and a Mr Silver of The Gardens, Chirk, Ruabon, North Wales. They were "two of the most intelligent amongst my doubling correspondents"<sup>(11)</sup>, both apparently having had success in changing single to double daffodils in rich soil conditions. Wolley-Dod persisted in trying to justify his stand on the doubling of daffodil flowers in a letter of 27 February 1884:

"If ever I express any peculiar opinions about Daffodils, it is either founded on experience or for the sake of exciting inquiry, as Haworth said when he described five species, none of which he had ever seen."<sup>(12)</sup>

He was, however, under no illusion that his views received little or no support from the daffodil experts of his day, likening this situation to Dr Harvey's discovery of the circulation of the blood, a proposition initially scoffed at before being recognised as a fact by later generations. He went on to say that Burbidge, Baker and others in high authority had said that doubling was a preposterous suggestion, but that in due course "the rising generation (Engleheart and Scott Wilson) will find out that it is a fact"<sup>(13)</sup>. In fact, Wolley-Dod craved the support of his contemporaries for his ideas and became annoyed when this did not materialise writing in a letter to Burbidge:

"I respect and admire the great extent of your daffodil knowledge but I am vexed with your incredulity on the doubling question, which amounts in plain English to this, that all men who say they have produced double daffodils from single-flowered bulbs are either fools or liars. I reply F.W.B. according to my feelings on the subject."<sup>(14)</sup>

Evidently, Burbidge had consulted a Dutchman for his opinion on Wolley-Dod's ideas and Wolley-Dod had heard of this, for he wrote: "Your cross-examination of the Dutchman does not weigh much in my mind."<sup>(15)</sup> Peter Barr joined in the discussion and in a letter dated 7 May 1884 wrote:

"I do not know what your ideas may be on the doubling theory but Wolley-Dod is so earnest he has confided in me some of the evidence as he feels sure, though I may not believe, my son will be compelled by the force of evidence that will come before him. The only thing I cannot get over is that a single *pseudonarcissus* should turn to a double."<sup>(16)</sup>

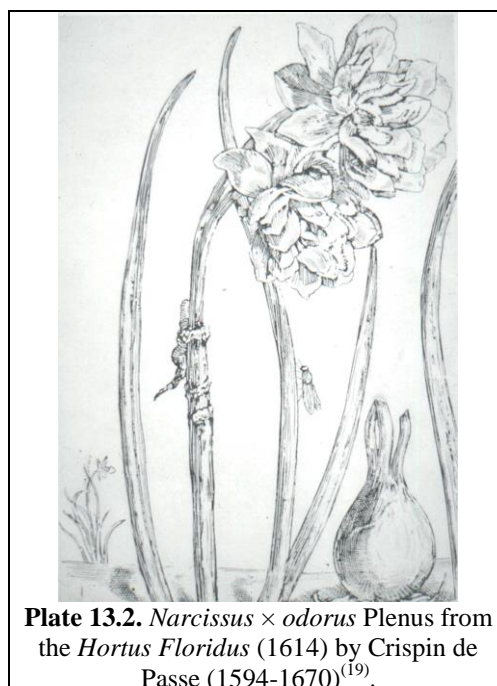
The doubling question finally had a twist in its tail, for in yet another letter (24 March, year not given) to Burbidge, Wolley-Dod said that his own garden worked in reverse to the theory that he had put forward with such vigour, everything becoming single "daffodils ... even primroses". He went on to say that he had received a dozen double *N. pseudonarcissus* from a man named Hind, which by the following year had turned to singles: "I sent half a dozen for change of air to double again and this year he sent them back doubled."<sup>(17)</sup> Act of God or biology gone haywire – who can tell? Perhaps Wolley-Dod best summed it up himself when he wrote to Burbidge of:

"The three stages of Narcissomania – positive Daffodil, comparative Daffodilly and superlative Daffodowndilly and I have certainly reached the Daffodowndilly stage."<sup>(18)</sup>

It is remarkable that such heated and protracted correspondence was conducted during the late Victorian period, a time when in fact double daffodils rarely featured among the types then grown. Nevertheless, the subject was considered to be of sufficient importance for the Royal Horticultural Society's Scientific Committee to appoint a sub-committee in 1884 to investigate the doubling of daffodil flowers and their reversion from the double to the single condition. When this sub-committee was re-appointed in 1885, a circular was distributed inviting interested parties to join the investigation. The sub-committee's brief was to collect evidence of flower-doubling and reversion; to identify gardens where fine examples of doubling occurred; to designate these as 'experimental stations'; and to compile a list of regulations enabling controlled experiments to be carried out.

Apart from the double forms of the species already mentioned and cultivars, such as the Phoenix daffodils and 'Rip van Winkle', few others were known in the late 19th and early 20th centuries. Prior to 1908, for example, only four cultivars are known with any certainty to have originated from man-made crosses. These were 'Argent' (4W-Y, 1902), 'Dubloon' (4Y-Y, 1907) and 'Plenipo' (4Y-Y, 1907), by Engleheart and 'Volcano' (4Y-O), raised by Barr and Son and registered in 1908. All came from 'Ornatus' × 'Telemonius Plenus', the double form of *N. pseudonarcissus*. Perhaps it was the very scarcity of doubles at that time which so excited interest for, apart from those known to Parkinson, only a handful of others existed between the early 17th century and the early 1900s when the work of hybridists produced its first results.

In addition to those doubles already dealt with in some detail, others that were known and grown during that period included the following. The double form of the Sweet Scented Daffodil, *N. × odorus* L. Plenus (Hort.) (Plate 13.2), had been known in cultivation over a considerable period. It is a mutant derived from the fragrant, yellow, single hybrid of *N. pseudonarcissus* × *N. jonquilla*. It was grown as a decorative garden plant and somewhat later as a forced cut flower under the name of the Double Campernelle. Another daffodil frequently encountered as a forced cut flower in the 19th century was the Double Roman, considerable quantities of its bulbs being imported from the Netherlands at that time for this purpose. It is thought to have first arrived in the Netherlands from Constantinople (now Istanbul) around 1600, and was known botanically as *N. italicus* Ker-Gawler. Queen Anne's Double Jonquil (*N. jonquilla* 'Flore Pleno') is a form of the common Jonquil. It bears solitary yellow flowers resembling a feathery ball on 30 cm stems. Among the best of the early double daffodils that appeared



**Plate 13.2.** *Narcissus × odorus* Plenus from the *Hortus Floridus* (1614) by Crispin de Passe (1594-1670)<sup>(19)</sup>.

during the late 18th century were those derived from *N. × incomparabilis*, which bore the family name of Phoenix. Burbidge knew these in 1875 as *N. incomparabilis* flore pleno, with clear yellow flowers; *N. incomparabilis* aurantius flore pleno in which the yellow petals were interspersed with bright orange petaloids – the 'Butter and Eggs' (Plate 13.3) of old cottage gardens; 'Orange Phoenix' with creamy white segments and vermillion tinted petaloids; and *N. incomparabilis* albus flore pleno, a beautiful creamy white variant. Other authorities have given these doubles a variety of names over the years and these are summarised in Table 13.1.



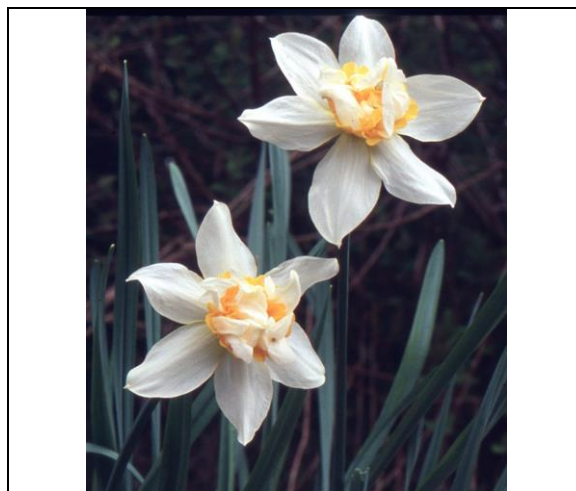
Plate 13.3. 'Butter and Eggs' (4Y-O), known since before 1777.

1. F.W. Burbidge	2. W.B. Hartland	3. Royal Horticultural Society	4. American Daffodil Society
<i>incomparabilis</i> flore pleno (4Y-Y)	<i>incomparabilis</i> flore pleno = 'Butter and Eggs'	<i>incomparabilis</i> var. plenus = 'Butter and Eggs' = <i>aurantius</i> var. plenus 4?	<i>aurantius plenus</i> = 'Butter and Eggs' (10Y-Y)
'Orange Phoenix' (4W-O)	'Orange Phoenix' = 'Eggs and Bacon' (4W-O)	<i>Aurantius</i> Flore Pleno = 'Orange Phoenix' = 'Eggs and Bacon' = <i>albus plenus aurantius</i> 4?	'Eggs and Bacon' (4W-WOO)
	'Sulphur Phoenix' = 'Codlins and Cream'	<i>albus plenus sulphureus</i> = 'Codlins and Cream' 4?	'Codlins and Cream' (4W-Y)
<i>incomparabilis albus</i> flore pleno (4W-W)			
<i>incomparabilis aurantius</i> flore pleno (4Y-O)			

**Table 13.1.** The nomenclature and colour classification of early double daffodils of the Phoenix group and their synonyms according to four authorities. (The authorities are: 1. J.G. Baker in F.W. Burbidge (1875). *The Narcissus: its history and culture*, 74. L. Reeve and Co., London; 2. W.B. Hartland (1885). *Ye Original Little Booke of Daffodils*, a trade catalogue. Published by W.B. Hartland, Cork, p. 25; 3. Royal Horticultural Society (1969). *Classified List and International Register of Daffodil Names*, Royal Horticultural Society, London, pp. 7, 20, 21, 45, 63, 92, 153, 236; and 4. American Daffodil Society (1978). *Daffodil Data Bank*. American Daffodil Society, Des Moines, pp. 33, 49, 71.)

It would appear that Burbidge's Flore pleno which he described as a yellow double, was a variable daffodil that at one end of its range of variability became a yellow and orange double. Burbidge regarded this latter form as a distinct type, which was his *Aurantius* flore pleno. There is no doubt from contemporary descriptions that variability existed within the different forms, for Hartland commenting on 'Butter and Eggs' said:

“There are two or three forms, some with lighter and more double flowers and narrow foliage. The Dutch form is broad and coarse in the foliage, not such a good yellow or so full in the centre.”<sup>(20)</sup> Similarly with *Albus flore pleno*, which Burbidge described as all white: except that in the form known as ‘Sulphur Phoenix’ (Plate 13.4), the petaloids were sulphur-yellow, while Hartland described the form ‘Codlins and Cream’ as having “the most beautiful soft, creamy white blooms . . . . If grown under glass the blooms are pure white.”<sup>(21)</sup>



**Plate 13.4.** ‘Sulphur Phoenix’ (4W-Y), known since before 1820.

One of the leading personalities of late 19th century commercial daffodil production was W.B. Hartland of Cork and it was through his *Ye Original Little Booke of Daffodils* that many of the double daffodils of that time became known to the gardening public. He listed several doubles and was quick to point out that “all double flowers are reckoned by botanists monstrosities in nature”<sup>(22)</sup>, although it is obvious that he and other horticulturists thought the forms then available to be highly desirable garden plants, the cultivation of which should be encouraged. One such example was ‘Rip van Winkle’, advertised as Hartland’s New Dwarf Double Daffodil that he recommended, “should be in all collections throughout England, France and the Channel Islands”.<sup>(23)</sup> He even went so far in 1885 as to encourage its planting by offering it at the modest price of 9d per bulb in order to bring it “within the range of most amateurs”<sup>(24)</sup>. The precise origin of this daffodil is unclear. It did not appear among the earliest recorded doubles, for it was not among those described by Parkinson. Neither was it known in the 19th century prior to its introduction by Hartland, for it was new to Burbidge. It may be that Hartland discovered it during his plant-hunting expeditions in old Irish demesnes and around religious establishments, or it may have occurred as a mutant in his own nursery. Whatever the truth of the matter, Hartland introduced ‘Rip van Winkle’ as his New Dwarf Double Daffodil – a sensation in its day – from which he intended to gain maximum publicity. To this end, he despatched a box of blooms in March 1885 to the Princess of Wales at Buckingham Palace. She thanked him for “sending such lovely daffodils from the Green Isle and at such an early period of the year when blooms were only to be had in England under glass”<sup>(25)</sup>. Burbidge, commenting on ‘Rip van Winkle’ to Hartland, wrote: “I dare not tell you what I really think of it, it would make you feel too proud.”<sup>(26)</sup> Times and tastes change, however, and the sensation of yesteryear becomes the commonplace of today. More recently, ‘Rip van Winkle’ has been described as “resembling a small dandelion with twisted yellow petals tinged green”<sup>(27)</sup>.

For all its early acclaim it was not ‘Rip van Winkle’ which provided the link between the pre-20th century doubles and the magnificent cultivars raised in ever increasing numbers from the 1930s onwards. This distinction went to *N. × incomparabilis* in its form known as ‘Eggs and Bacon’, which was a parent of ‘Mary Copeland’ (Plate 13.5), this in turn being the seed parent of ‘Falaise’. This cultivar subsequently proved to be the breakthrough hybridists had been waiting for. It was the springboard for all modern doubles that have formed such an important facet of recent daffodil improvement, especially in Ireland during the second half of the 20th century.



**Plate 13.5.** ‘Mary Copeland’ (4W-O), raised by W.F.M. Copeland (1914).

## The Early Garden Hybrids

Early double cultivars known to have arisen from a deliberate act of cross-pollination were extremely few in number prior to the registration of the first daffodil of this type raised by W.F.M. Copeland. They numbered but four as already mentioned, namely 'Argent', 'Dubloon', 'Plenipo' and 'Volcano'. During the first quarter of the 20th century, it was Copeland who made the initial moves towards improving doubles through breeding. Unfortunately, in common with several hybridists of that period, the breeding records of his work were incomplete, and so the parentage of most of his cultivars is unknown. In all, Copeland registered several double daffodils including 'Royal Sovereign' (4W-Y, 1908), 'Valhalla' (4Y-Y, 1909), 'Mary Copeland' (4W-O, 1914), 'Tintoretto' (4Y-R, 1914), 'Honeycomb' (4W-Y, 1920), 'Irene Copeland' (4W-Y, 1923), 'Feu de Joie' (4W-O, 1927), 'Milk and Honey' (4W-Y, 1927) and 'Mrs William Copeland' (4W-W, 1930). Of these, information on parentage is available for only two: 'Mary Copeland' was from a Poet × 'Eggs and Bacon'; and the parents of 'Mrs William Copeland' were 'Venus' (2W-W) × Seedling, which was known to be a double. Copeland's doubles did not offer new colour combinations, but they all showed much improved form and were considered definite advances on their predecessors.

Copeland's motives for attempting specifically to improve double daffodils were, as far as is known, never made clear by the breeder himself. He was certainly aware that they were difficult and perhaps it was this that presented him with a challenge. Of the doubles which he registered, two have survived to the present day as daffodils of considerable commercial importance – the white and yellow 'Irene Copeland' and the white and orange 'Mary Copeland', a moderate area of the latter still being grown, especially in the Netherlands. The parentage of 'Mary Copeland' links it to the historic mutant doubles of the 18th century through its pollen parent 'Eggs and Bacon'. The importance of 'Mary Copeland' as an exhibition daffodil has long since passed, and its role as a commercial cut flower must now be of limited duration. Although it will continue to be a popular garden plant for many years to come, its enduring fame lies in the fact that it was the cultivar that formed the link between past and future when it produced the seed that gave rise to 'Falaise'.

## J. Lionel Richardson and the Waterford Doubles

The basis of the modern double daffodil was laid with the raising of 'Falaise' at Waterford, without doubt one of the milestones in the history of daffodil breeding. In view of the considerable effort that had been devoted to attempts to improve doubles, particularly by Copeland, it is ironical that the breakthrough came not from the hybridist's planned and deliberate cross but, as Richardson thought, due to 'Falaise' being scented. "I imagine the original flower was bee pollinated with pollen from a 'poeticus'."<sup>(28)</sup> In Richardson's Cross Book, reference is made under entry 1119 to "Mary Copeland (selfed)"<sup>(29)</sup>. The year was 1929 and the sight of a swelling seed pod on the normally infertile 'Mary Copeland' was so unusual as to arouse Richardson's considerable interest. Consequently, the plant was most carefully tended during the further development of the seed pod, the stem bearing it being immediately secured to a stout cane. The Cross Book shows that the pod eventually gave rise to eight seeds, which were gathered and sown as soon as they ripened on 11 July 1929. These eight seeds produced six seedlings, one of which was to become 'Falaise' (Plates 13.6 and 13.7).





stock consisted of 105 bulbs of various sizes produced from one double-nosed bulb and one offset recorded in 1935 as Seedling 427.

'Falaise' may have been lacking in vigour but it was unique among all the double daffodils of that time because of its great fertility as a female parent. Consequently, 'Falaise' was crossed with cultivars from all the major divisions, the result being an incomparable series of double cultivars. In fact, it was present in the parentage of all 45 of Richardson's doubles, either directly or through its early offspring, 'Gay Time'. Although 'Falaise' probably first flowered in 1934, it was not introduced until 1945. It was then described as:

"A quite unique flower ... the petals are of the purest white and the flower has the true *poeticus* scent. The centre is bright orange-scarlet which makes a most striking contrast against the rather long pure white petals."<sup>(33)</sup>

Richardson did not elaborate on his judgement that 'Falaise' was "quite unique" but he must have been using it in his breeding programme at that time for two of its important offspring, 'Double Event' and 'Gay Time', were registered as early as 1952. By modern standards, the flower of 'Falaise' is not spectacular and the plant itself is rather weak, only its exceptional fertility setting it apart. 'Falaise' gave rise directly to 32 double cultivars, many of which proved to be of outstanding quality. One such daffodil was 'Gay Time' and it, like its seed parent, proved to be highly fertile. Thereafter, it was extensively used by Richardson to raise a new family of doubles.

The first double to be raised from 'Falaise' was introduced in 1953 as 'Double Event' (4W-Y). Its pollen parent was 'Green Island' (2W-GWY). Initially, it was priced at £12 per bulb, a relatively high figure for a new double at that time. In outline, 'Double Event' is very rounded owing to the degree to which the broad perianth segments overlap one another. These are overlaid by a series of six to ten segments of a similar creamy-white colour, but less broad, more markedly pointed and also slightly twisted. Intermixed with these are golden yellow, cream-edged petaloids. 'Double Event' proved to be an excellent exhibition daffodil, for which purpose it received an Award of Merit in 1952 and a First Class Certificate in 1956, when it was described as "this outstanding bicolored double *Narcissus*"<sup>(34)</sup>.

'Gay Time' (4W-R) was introduced in 1955 at the very moderate price of £4 per bulb, especially when 'Deodora' and 'Rose Caprice', which were also new introductions in that year, cost £20 each. Time has shown this cultivar to be one of the most important of Richardson's doubles because of its role in breeding new cultivars of this type that will ensure it a place in the history of daffodil breeding long after the more highly priced 'Double Event' is forgotten. 'Gay Time' received an Award of Merit as an exhibition flower in 1955 but, more recently, trials at Rosewarne Experimental Horticulture Station have indicated a possible future as a cut flower cultivar. While the results of these trials were published in 1972, Richardson had pointed to this possibility in his initial catalogue introduction for 'Gay Time' in 1955, when he suggested that it "should be valuable as a cut flower"<sup>(35)</sup>. Its parentage was 'Falaise' × 'Limerick', the latter being a small-cupped white and red which gave to 'Gay Time' small central segments of bright orange-red, which contrasted strongly with the pure white outer petals.

'Acropolis' (4W-O) (Plate 13.8) also arose from 'Falaise' × 'Limerick' and has been described as "a sensation in its day"<sup>(36)</sup>. Its flowers are much more heavily petalled than those of its predecessors, the segments of the outer ring being very broad and round. All are of great substance and pure white, with the exception of the small central petaloids that are of intense orange, giving 'Acropolis' an outstanding colour contrast. It was awarded a First Class Certificate as an exhibition flower in 1959 and, shortly afterwards, received



**Plate 13.8.** 'Acropolis' (4W-O), one of the progeny of 'Falaise' raised by J.L. Richardson (1955).

both an Award of Merit and a First Class Certificate from Haarlem. In addition to the very fine quality of its flowers, 'Acropolis' is an extremely vigorous cultivar, regularly bearing these flowers on 50-55 cm tall, stiff stems.

Three fine doubles were registered in 1956 – 'Candida' (4W-Y), 'Hawaii' (4Y-O) and 'Tahiti' (4Y-O). 'Candida' was raised from 'Falaise' crossed with the large white trumpet 'Petsamo', the pollen parent of which was 'Kanchenjunga'. Such a background was doubtless responsible for its outer petals of remarkable substance. It received an Award of Merit in 1960 and a First Class Certificate in the following year as an exhibition flower. 'Hawaii' and 'Tahiti' were the first doubles to be registered from the cross between 'Falaise' and 'Ceylon' (2Y-O), both having flowers of large size and golden-yellow outer segments, centrally interspersed with smaller bright orange petaloids. This cross also gave rise to 'Fiji' (4Y-Y) registered in 1956, and to 'Tonga' (4Y-R) in 1958. 'Papua' (4Y-Y) was raised from 'Falaise' and that superb yellow trumpet 'Kingscourt'. It was introduced in 1962 and has proved to be an excellent garden plant, being awarded a First Class Certificate for this purpose following trials at the Royal Horticultural Society's gardens at Wisley.

One of Richardson's truly outstanding doubles is 'Unique' (4W-Y), which came from 'Falaise' and an unknown pollen parent. Although registered in 1961, it was never listed in the catalogues issued by Mrs Richardson between the time of her husband's death in that year and her retirement in 1973. Since that time, however, 'Unique' has enjoyed almost unrivalled success as one of the top exhibition cultivars. At the London Show in 1978, it appeared in a group of three doubles that took first prize; it won the Open Single Bloom section and was in the winning combinations for both the Richardson and the Bowles Cups. At that time, McCabe wrote that 'Unique' was: "A truly magnificent flower and I can foresee it being in short supply for many years to come as I fear demand will outstrip supply."<sup>(37)</sup> The final cultivar raised by Richardson from 'Falaise' was 'Monterrico'. It deserves special mention as a very large double of fine substance. Its outer petals are very broad and overlapping and of the purest white, while the smaller central petaloids are a distinct orange shade, inherited from its pollen parent 'Arbar'.

Reference has already been made to the importance of 'Gay Time' in the breeding of double cultivars. It was responsible for several outstanding offspring, of which the most impressive are 'Gay Challenger' (4W-O), 'Ocarino' (4Y-Y) and 'Gay Song' (4W-W). 'Gay Challenger' had 'Arbar' as its pollen parent and was registered in 1962. At that time, it was easily the largest double daffodil available, the flower regularly measuring up to 12.5 cm in diameter. Its quality, substance and balance are excellent and its colour is a combination of purest white and deep orange. All these fine qualities led to the award of a First Class Certificate in 1972 as an exhibition flower. When introduced in Mrs Richardson's catalogue for 1966, 'Ocarino' was described as "one of the first all-yellow doubles raised from 'Gay Time' × 'Spanish Gold'"<sup>(38)</sup>. The smaller segments were said to be of "deep Maximus gold". 'Ocarino' is one of the latest doubles to flower and is remarkable for its deep colour, fullness of flower and the wonderful thick substance of its outer petals. 'Gay Song', introduced in 1970, was raised from 'Gay Time' × 'Brussels'. It was described as "one of the largest and imposing white doubles yet introduced, a flower of gigantic proportions and wonderful substance"<sup>(39)</sup>. The flower is for the most part pure and glistening white, with the faintest touch of pale primrose towards its centre, and it is carried on a strong stem.

The later years of J.L. Richardson's remarkable career were directed towards major improvements in two groups of daffodils, the pinks and the doubles. His initial success with the doubles occurred as the result of one of those quirks of nature with which the history of plant breeding is littered. It gave him 'Falaise', the springboard for all his later dramatic improvements in this division. His subsequent and intense breeding programme produced doubles of greatly improved form compared with what had gone before and in a range of colour combinations not previously seen. Only one colour combination evaded him – pink and white which was, however, produced by his wife after his death, using his cultivars as parent material. Richardson's work with the doubles achieved such an outstanding 'quantum leap' in the amazingly short period of about 15 years that his cultivars became

known to daffodil enthusiasts the world over as the ‘super doubles’, and led to a great awakening of interest in this type of flower.

## **In Lionel’s Footsteps**

From the time ‘Falaise’ first appeared, Lionel Richardson’s breeding work with doubles produced daffodils not only with improved form but also in a quality and colour range not previously seen. These colour combinations included W-R (‘Acclamation’, 1968), W-O (‘Big Boy’, 1969), W-Y (‘Candida’, 1956), W-W (‘Gay Song’, 1968), Y-Y (‘Fiji’, 1956), Y-O (‘Ascot’, 1962) and Y-R (‘Double Vision’, 1973). One major, if relatively recent, colour combination found in single daffodils was, however, missing. This was white and pink and it became Mrs Richardson’s goal to fill this gap. In her earliest work at Waterford in pursuit of this aim she used either ‘Falaise’ or a seedling from ‘Falaise’ × ‘Broughshane’ as the seed parent, and single cultivars with strongly coloured pink cups, such as ‘Rose Caprice’ and ‘Debutante’, as pollen parents. None of the double seedlings resulting from these crosses were considered satisfactory, the quality of the pink colour being poor in all instances. Those from ‘Falaise’ × ‘Rose Caprice’ had inner petals of peach; those from (‘Falaise’ × ‘Broughshane’) × ‘Debutante’ were pinky-buff; while the petaloids of the best seedlings raised from ‘Falaise’ × ‘Debutante’ were of a more apricot shade.

Following these early failures, Mrs Richardson pursued a suggestion to use the double cultivar as the pollen parent and a strong pink cupped daffodil as the seed parent. The cultivars chosen for this experiment were ‘Marietta’ (2W-P), in which the cup colour was especially strong, and ‘Irani’ (4W-Y). At the time, she did not hold out much hope of success for, although some modern doubles set seed, few produce viable pollen. Seeds were produced, however, from this particular cross and in due course a seedling appeared that possessed pure white outer petals and pale pink petaloids. This same cross subsequently gave rise to four white and pink seedlings, which were registered as ‘Pink Champagne’ and ‘Samantha’ in 1972, and ‘Pink Gin’ and ‘Viennese Rose’ in 1976. When first seen in public they were regarded as a considerable advance on their predecessors, all being vigorous plants bearing high-quality flowers. ‘Pink Champagne’ was an indisputable pink, while ‘Samantha’ possessed a delightful sweet scent.

While it cannot be claimed that Mrs Richardson was responsible for raising the first white and pink double daffodils, she did raise several of the earliest cultivars to possess high quality. Not only were these pinks important in their own right, they helped to retain Ireland’s pre-eminence in breeding doubles, the work of current hybridists, such as Duncan, being strongly influenced by the work of the Richardsons of Waterford. One of Mrs Richardson’s most important doubles may, however, prove to be the white and orange ‘Gay Kybo’, raised from ‘Gay Time’ × ‘Rameses’ and registered in 1980. Clive Postles thought that it was the finest white and red double raised to date and Don Barnes commented that it was “a remarkable double daffodil which is always symmetrical from outer perianth to the centre of the bloom”<sup>(40)</sup>. It is an excellent exhibition cultivar, for which purpose it received an Award of Merit in 1987. This exceptional 4W-O daffodil ranks alongside ‘Unique’ and ‘Acropolis’ as one of the best double cultivars with a white perianth.

## **Recent Advances in Pink Doubles in Ireland**

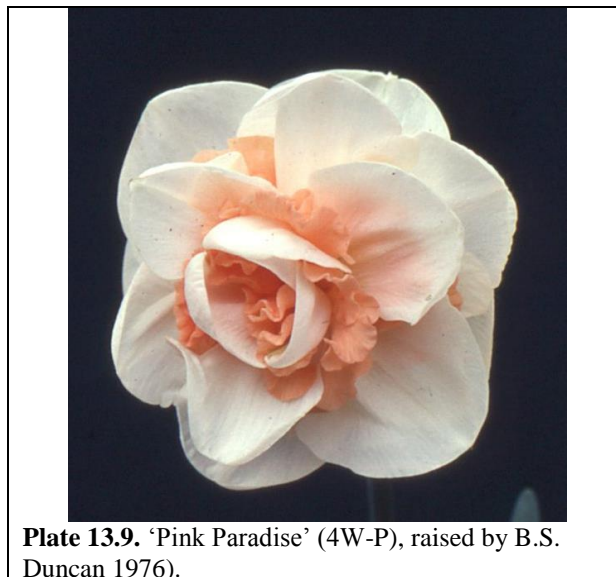
Brian Duncan commenced daffodil breeding in 1964 and it is largely as a result of his work that the pink doubles have been further improved. Early in his career, Duncan became hopeful of the possibility of advancement with pink doubles and, as early as 1968, he made his first cross that turned this hope into reality. On 20 April 1968, he applied pollen of ‘Polonaise’ (2W-P) on to Richardson’s Seedling R3509 (4W-Y), which had been raised from ‘Falaise’ × ‘Debutante’. Three pods were harvested, yielding 53 seeds from which 16 seedlings were produced. Two of these, numbered 81 and 93, were selected for naming and registration as ‘Pink Paradise’ (Plate 13.9) and ‘Pink Pageant’ respectively.

‘Pink Pageant’ was introduced in 1976 at £75 per bulb and was described by its raiser as: “One of the most exciting seedlings about which several widely travelled experts have enthused. A

large flower, much brighter and of neater show form than any pink doubles we have seen.”<sup>(41)</sup> In 1977, ‘Pink Pageant’ was exhibited at the London Show when it was said to be:

“The best [pink double] we have seen. This will become a flower arranger’s dream. I suspect it will be the first pink double to be seen as a garden flower of distinction and it would not surprise me if it becomes a popular market flower in the course of time. Lest we forget, the flower has been named ‘Pink Pageant’.”<sup>(42)</sup>

‘Pink Paradise’ appeared in the Rathowen catalogue, four years after its sister seedling, at £65 per bulb. Up to that time, it had been seen less frequently at the major shows than had ‘Pink Pageant’, chiefly owing to the depredations of *Narcissus Fly*. It was deemed, however, to be a superior flower, the perianth being whiter and of better texture, while the petaloids were of a purer pink tone without any hint of copper or salmon tints. Both cultivars are fertile as seed and pollen parents. A further seedling, D130, from the same cross that produced ‘Pink Pageant’ and ‘Pink Paradise’, had central petaloids showing distinct lilac tones. Duncan’s work with pink doubles showed early promise through several cultivars and seedlings of outstanding merit. His programme included crosses using ‘Double Event’ and ‘Polonaise’, ‘Pink Pageant’ and Seedling D241 (‘Passionale’ × ‘Polonaise’), ‘Pink Paradise’ with the same seedling, R3509 × D241, and many more besides, including double seedlings of American origin. This has given rise to more fine double cultivars such as ‘Dorchester’ (4W-P, 1987).



**Plate 13.9.** ‘Pink Paradise’ (4W-P), raised by B.S. Duncan 1976).

## Other Important Modern Doubles

‘Kinbrace’, while perhaps not being considered a truly modern cultivar (it was registered as long ago as 1968), has to be mentioned as it was among the very first of the white and pink doubles to be seen. Indeed, only a handful of cultivars of this type appear to have preceded it: ‘Pink Cloud’ (1942), ‘Prince Charming’ (1958) and ‘Pink Chiffon’ (1963), all raised in the USA; and Lea’s ‘Elphin’ (1968). ‘Kinbrace’ (4W-P) was raised from an unnamed seedling (‘Falaise’ × ‘Rose Caprice’), which was a 2W-P crossed with ‘Fiona’ (2W-P). It was raised by John Lea, who introduced it in 1968 when it was considered to be of sufficiently high quality to receive a Preliminary Commendation on its first appearance. The raiser described ‘Kinbrace’ in 1983 as: “A magnificent, large flower with white perianth and clear, bright-pink inner segments . . . . As most flowers have a stigma and often pollen, it can be used for breeding and is now a proved parent of the best pink doubles.”<sup>(43)</sup> This description could equally be applied to the best offspring from ‘Kinbrace’ raised by Lea that was named ‘Delnashaugh’ and registered in 1978. It, like its seed parent, was fertile both as a seed and pollen parent, a characteristic almost certainly passed down through ‘Falaise’. Lea thought that ‘Delnashaugh’ was a very exciting pink double. When it was first exhibited at the American Daffodil Society Convention in Philadelphia it created great interest. Its inner segments are of deep china-pink evenly interspersed among the white petaloids, giving a very balanced appearance to the flower. It is of large size and good substance, which, despite its weight, is perfectly poised on a strong stem and neck. ‘Delnashaugh’ has a long vase life during which the pink colour does not fade. Like ‘Kinbrace’, it too is fertile, both as a seed and pollen parent.

Dating back almost as far as ‘Kinbrace’ is a double daffodil with a remarkable history and persistence to survive. It was registered as ‘Beauvallon’ (4Y-ORR), having been raised by David Lloyd from a cross made in 1958. The seed parent was a Richardson seedling (2Y-R) that had been obtained in 1957 during a visit to Waterford and had been noted for its large size and deep red cup.

Some years earlier, Matthew Zandbergen of Sassenheim, the Netherlands had purchased the stock of 'Tahiti' (4Y-O) from Richardson and, in 1958, he put on a large display of this cultivar at the London Daffodil Show. While looking at this display Lloyd noticed an anther on one of the flowers of 'Tahiti' and, with Zandbergen's permission, removed it. Subsequently, the pollen was applied to the stigma of the 2Y-R seedling, which in due course produced 28 seeds. The seeds were sown in a box where they remained for several years, largely owing to shortage of space in the garden. Only one seedling managed to survive this confinement and its reward was to be planted out. Following a further two or three years, it produced a small solitary flower measuring approximately 5 cm in diameter. It was double and coloured yellow and red. Noticed and admired by Mrs Richardson and Jack Goldsmith, it was taken to Prospect House to be grown on. Eventually, on Mrs Richardson's retirement, the stock was passed to Brian Duncan and it was at this point that a visiting plant-health inspector detected the presence of virus in it. In 1978, tests on the stock were carried out at the Glasshouse Crops Research Institute, Littlehampton, Sussex, and three viruses were detected – Narcissus Latent Virus, Narcissus Mosaic and Narcissus Yellow Stripe. The only possible cure was to propagate new plants from meristematic (actively multiplying) cells, for it is only these in infected plants that do not have infective virus particles present in their sap. By 1980, seven micro-plants had been propagated from meristematic tissue and, when tested, were found to be virus free. Once these had grown large enough, they were further propagated by twin-scaling in order to increase the stock rapidly. Most of the new bulbs were returned to Duncan, who re-introduced the newly invigorated 'Beuvallon' in 1987, 29 years after those 28 seeds had been sown.

In recent years, hybridists in the USA have been putting considerable effort into the breeding of double daffodils, several interesting cultivars appearing. One such is 'Replete' (4W-P), which was raised by Murray Evans and registered in 1975. It was raised from 'Pink Chiffon' (4W-YYP) × 'Accent' (2W-P) and, although not quite of exhibition quality, it has succeeded in adding a new dimension to the pink and white doubles on account of the fullness of its flowers and the deep reddish-pink shade of the petaloids. Brian Duncan has made a considerable impact with his 'Pink Pageant' and 'Pink Paradise', but his success has not been confined to the white and pink doubles. The appearance of 'Smokey Bear' (4Y-O) in 1984 at £80 per bulb marked the introduction of one of his most expensive cultivars. It was raised from 'Papua' (4Y-Y) × 'Vagabond' (2Y-R), both parents being J.L. Richardson cultivars. At its best, 'Smokey Bear' is a very intensely coloured daffodil with deep-yellow flushed petals and orange petaloids. However, the colour can vary considerably according to the type of season and the stage of development of the flower, often appearing much paler than the ideal. 'Smokey Bear' had considerable success at major shows, for example winning First Prize for Single Blooms in London in both 1981 and 1982, and is widely recognised as one of the best doubles of its type. The flower is very long-lasting and is carried on a strong stem. It has been used in hybridisation as it is fertile both as a pollen and a seed parent.

## **Double Daffodils 1980-2010**

For exhibition purposes, double daffodils are divided into two groups, those with white perianths and those with yellow perianths. The former group was dominated throughout the 1980s and 1990s by 'Unique' (Richardson, 1961), followed closely by his wife's 'Gay Kybo' (Mrs Richardson, 1980). 'Unique' has had outstanding success, being the top exhibition cultivar among all divisions on no less than seven occasions. More recently, 'Dorchester' (Duncan, 1987) has come into the picture and these cultivars held the top three places in major competitions in 2003. Today, 'Gay Kybo' is still number one with 'Jersey Roundabout' (Vandervliet, 2006) taking second place ahead of 'Dorchester'. 'Unique' is surely destined to fall away after so many years at the top.

In the group with yellow perianths, 'Tahiti' and 'Fiji' (both Richardson, 1956) were the top doubles during the 1980s. By 2003, 'Crowndale' (Postles, 1995) was the top show flower, other successful cultivars being 'Dunkery' (Lloyd, 1998), 'Crackington' (Blanchard, 1986), 'Marjorie Treveal' (Ward, 1991) and 'Poppy's Choice' (Scamp, 1996). At present 'Crowndale' remains the leading cultivar, with 'Marjorie Treveal' and 'Crackington' in second and third place. It is thought

that ‘Tasgem’ (Cross, 1984) and ‘Kiwi Sunset’ (Koanga Daffodils, 1995) could make inroads in the future.

During this period, daffodils that do not fit into either of the above groupings have started to appear. One such cultivar to make its mark is ‘Menabilly’ (Scamp, 1994), a 4O-O raised from ‘Ocarino’ × ‘Ambergate’.

A summary of the most important milestones in the development of double daffodils may be found in Table 13.2.

Year	Comment	Daffodil name
Prior to 1601		<i>N. ‘Eystettensis’</i>
1629	Described by J. Parkinson in <i>Paradisi in Sole Paradisus Terrestris</i> (1629)	<i>N. pseudonarcissus</i> ‘Plenus’, <i>N. poeticus</i> ‘Flore Pleno’, ‘Van Sion’ and Tradescant’s Double
About 1760	Described by F.W. Burbidge in <i>The Narcissus: its history and culture</i> (1875)	Phoenix group
1884	Introduced by W.B. Hartland	‘Rip van Winkle’
1902-1907	First doubles from a man-made cross (G.H. Engleheart)	‘Argent’, ‘Dubloon’ and ‘Plenipo’
1908-1930	Cultivars registered by W.F.M. Copeland	‘Royal Sovereign’ (1908) to ‘Mrs William Copeland’ (1930) and including ‘Mary Copeland’ (1914)
1929	Chance cross by an bee in garden of J.L. Richardson at Waterford	Seedling later named ‘Falaise’
1942	First W-P double raised in USA	‘Pink Cloud’
1952	First of the ‘super double’ offspring of ‘Falaise’ registered	‘Double Event’ and ‘Gay Time’
1968	First British white and pink double raised by J.S.B. Lea	‘Kinbrace’
1976	B.S. Duncan’s first pink doubles registered	‘Pink Pageant’ and ‘Pink Paradise’
1980	Last of the Richardson ‘super doubles’ registered	‘Gay Kybo’
1994	The first all orange double is registered	‘Menabilly’

**Table 13.2.** The chronology of appearance and breeding of some important double daffodils.

The story of double daffodils is a fascinating one, from the time in the early 17th century when Parkinson first drew the attention of garden lovers to the unusual species mutants of those distant times. Almost three hundred years were to pass before Hartland refocused the thoughts of daffodil lovers with his strange ‘Rip van Winkle’. But like ‘Rip van Winkle’, double daffodils went into a further period of rest before being awoken in the early 20th century by the enthusiasm, dedication and love shown for this neglected genre by William Copeland. It was he who produced ‘Mary Copeland’ that luckily gave rise to ‘Falaise’, the mother of all subsequent double cultivars, in a multi-colour range. The story of the advent of ‘Falaise’ itself must surely be one of the most fascinating in the whole history of the development of ornamental plants, with all the mystery and good fortune that surrounded this event. If the story had ended there that would have seemed, in many ways, a satisfactory conclusion. But it did not and rather than being the end of a great story it was only the beginning which resulted in all the beautiful and varied flowers available today.

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## CHAPTER 14

### THE PINK DAFFODILS

Although daffodils of this type are generally referred to as 'pinks', this colour is confined to the corona, which may be entirely pink or contain a certain amount of pink, usually present around the rim where it is most frequently accompanied by white or yellow. The perianth colour is generally white but in some recent cultivars, it is yellow. The majority of pink daffodils are to be found in Division 2 as a result of their ancestry, although some are found in Division 1 and some in Division 3. Many of the trumpets were raised in Australia, especially in the early days of breeding. As yet, small-cupped pinks are few in number. Recently, some important and extremely successful pink cultivars have been raised in other divisions, principally among the *cyclamineus* hybrids (Division 6), in which work by Irish hybridists has played an important role.

#### The Species Daffodils and Pink

The pink daffodil is very much the product of hybridists, as there is no record of such daffodils in the wild. This is despite the fact that the species thought to be mainly involved in the production of this colour in cultivars are found growing together, among the mountains of the Central Spanish Pyrenees. These are the white trumpet species and *N. poeticus*.

The flowering season for the white trumpet species *N. albescens*, *N. alpestris* and *N. moschatus* is early at 1 or 2 on a scale running from 1 (very early) to 6 (very late). The other partner in the cross that led to pink cultivars, *N. poeticus*, is at the other end of this scale in its flowering time. *N. alpestris* was the white trumpet species cited in the work of Anderson and Hornback<sup>(1)</sup> as having the characteristics which, when combined with those of *N. poeticus*, was most likely to give rise to pink. It is known, however, that *N. albescens* was directly involved in the parentage of the first pink cultivar, 'Apricot', and that *N. moschatus* was also in the ancestry of cultivars which gave rise to pink. It is also a fact that the early flowering *N. moschatus* is on occasions, which may be infrequent, able to hybridise in the wild with the late flowering *N. poeticus*, giving rise to the hybrid *N. × boutignyanus*. This hybrid has a white perianth and a short-ish corona of bright or pale yellow but, as far as is known, the cross has never produced pink colouration in the wild. It was in cultivars from the late 19th century onwards that this colour first began to appear. The flower forms of these original species parents, the white trumpet species and the shallow crowned *N. poeticus* with some red colour, provide a good clue not only to the origins of the pink, but also to why the majority of cultivars are large-cupped.

#### The Early Cultivars and Possible Origins of Pink

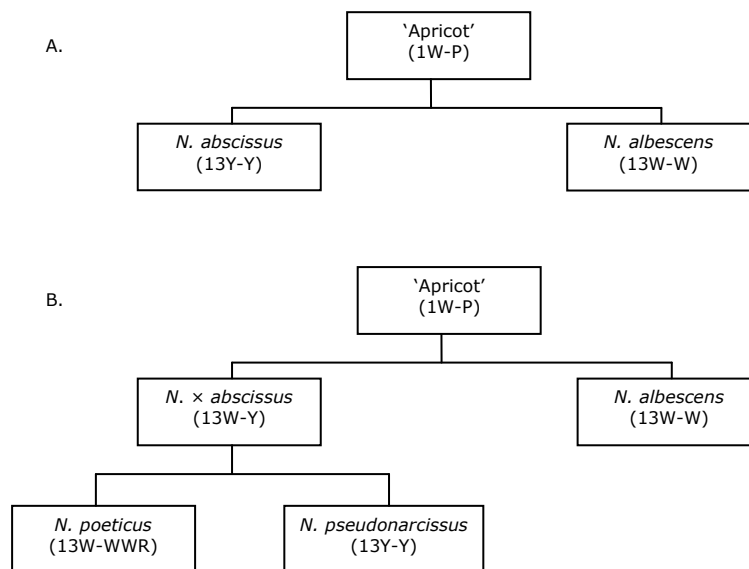
The first recorded cultivar to have pink was registered as 'Apricot' in 1898. Between that date and 1930, only 22 further pink daffodils were named. By comparison, between the late 1930s when 'Rose of Tralee' appeared and the 1970s, J. Lionel Richardson alone raised 56 pink cultivars, 45 of which were registered between 1958 and 1975. Early progress in producing pinks was therefore slow, although it was during these years that there appeared several of the important pinks that subsequently produced, from the late 1930s onwards, a torrent of rapidly improving daffodils of this type. The early years of breeding pinks were also characterised by a tendency on the part of the breeders to see pink in the cups of daffodils where it barely existed. It was the possibility of pink which spurred on hybridists – a mere blush of pink in the dying flowers of some white sorts or an apricot-buff tinge in some with yellow cups immediately excited great interest. Nevertheless, such a hint of pink suggested that there was something quite new and worthy of vigorous pursuit until, in terms of purity and freshness, the pinkness in daffodil flowers approached that in roses. In intensity, the search for the true pink daffodil was similar to searches in other spheres of horticulture, examples being the blue rose and the black tulip.

The search began with ‘Apricot’ (1898) (Plate 14.1), a white and pale-pink trumpet (1W-P), raised by de Graaff in the Netherlands. The pink was so faint that under certain climatic conditions it failed to develop, only colouring to any noticeable degree in warm spring weather. Its parentage has been shown to be *N. abscissus* × *N. albescens*, which does not include the background of white trumpet combined with *N. poeticus* now known to be essential as a pre-requisite for the production of pink. Certainly, the white trumpet element was present in the form of *N. albescens* but the yellow trumpeted *N. abscissus* appears out of place. What then could the other partner have been in this first cross that gave rise to pink? An explanation requires recognition of the confusion between *N. abscissus* and the specific hybrid *N. × abscissus*, which arose from *N. poeticus* × *N. pseudonarcissus*. Both the species hybrid had been named *abscissus* because of their ‘clipped trunk’ or sharply cut-off corona.



**Plate 14.1.** ‘Apricot’ (1W-Y), raised by de Graaff (1898), the first cultivar to show pink colouration. (Reproduced by kind permission of the American Daffodil Society, [Daffseek.org](http://Daffseek.org). Photograph by Hein Meeuwissen.)

During the late 19th century, ‘clipped trunk’ daffodils were collected in large numbers in the Pyrenees, being listed in British catalogues as *N. muticus* – a name often treated as synonymous with *N. abscissus*. However, *N. muticus*, which means blunted and refers to the corona shape, was clearly not *N. abscissus*. The catalogues of the time often describe it as being variable and containing bicolors, the latter possibly originating in a cross between a yellow trumpet and *N. poeticus*. This is highly significant: if the other parent was the specific hybrid *N. × abscissus* and not *N. abscissus*, then the problem of the source of pink colouration in early cultivars such as ‘Apricot’ is solved (Figure 14.1).



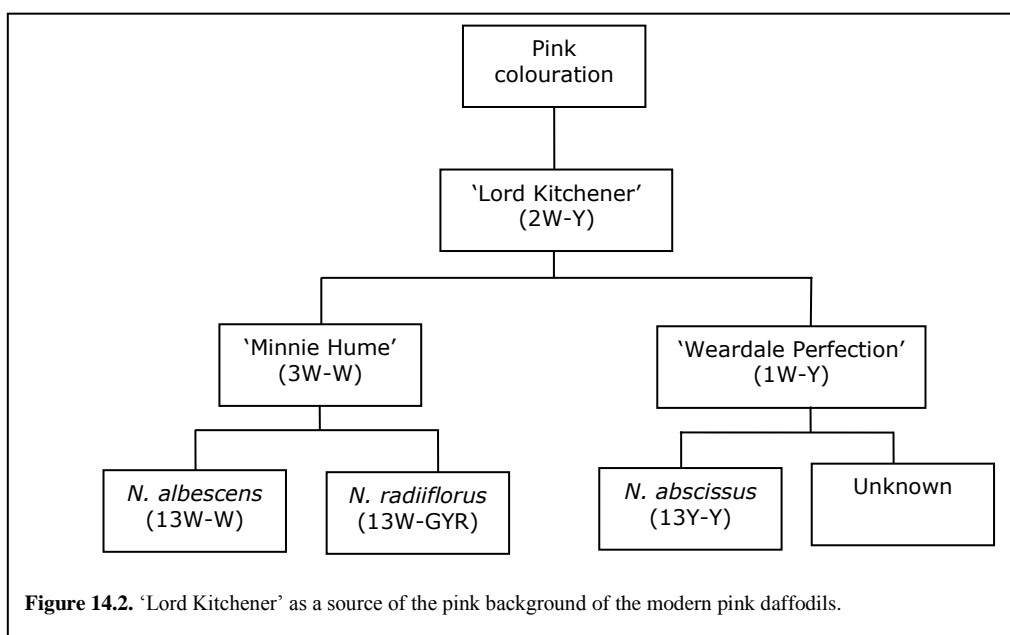
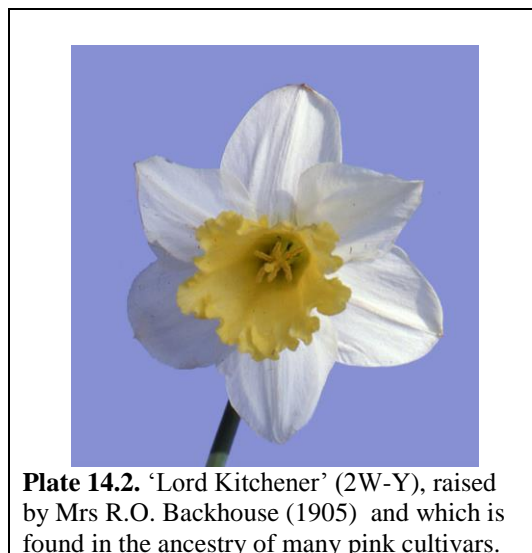
**Figure 14.1.** Origins of pink colouration in ‘Apricot’. A. Impossible, B. Probable.

### Origins of the Pink Colouration in ‘Apricot’

The belief that pink colour in daffodils was an achievable aim of breeding had existed for a decade prior to the appearance of ‘Apricot’. Max Leichtlin, a botanist of Baden Baden, had predicted in 1888, for example, the future occurrence of a red trumpeted daffodil that would derive this colour from the red rimmed cup of *N. poeticus*. Professor V.H. Booth later confirmed Leichtlin’s view on the source of red and various intermediate colours such as orange and pink as being *N. poeticus*, the only

species in the entire genus then known to possess the necessary pigment beta-carotene<sup>(2, 3, 4)</sup>. In 1889, F.W. Burbidge, in a lecture to the Royal Horticultural Society<sup>(5)</sup>, gave a prophetic view of the future colouring of daffodils, stating that pink was a decided possibility along the path used to raise red daffodils. While this particular objective has yet to be achieved, daffodils of true pink colour are now commonplace.

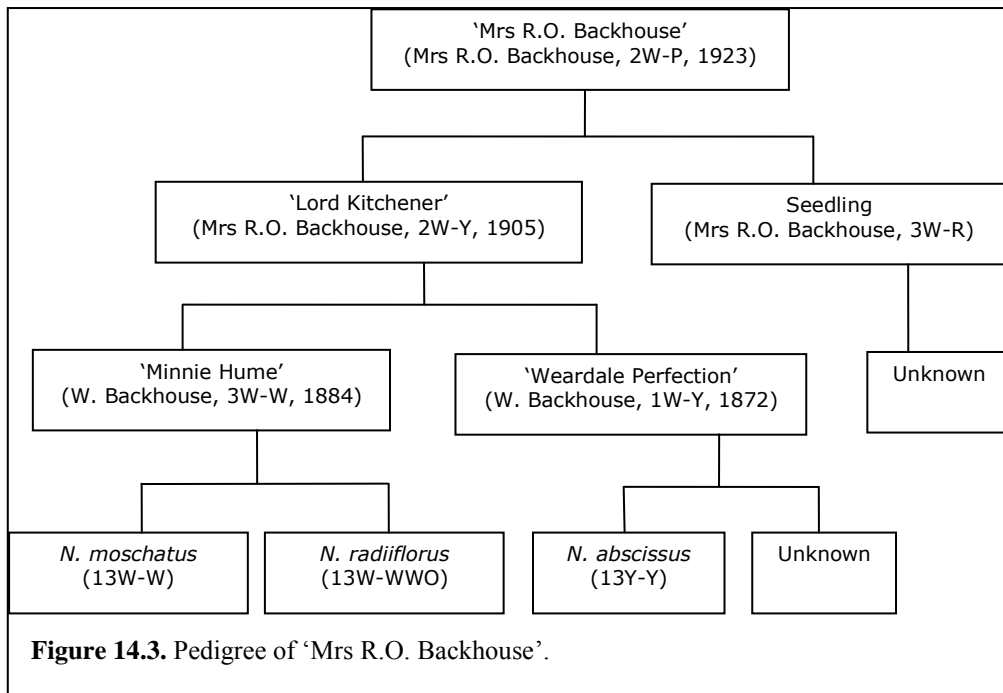
Following ‘Apricot’, the next important pink was ‘Miss E.M. Bowling’ (2W-P), raised by W.B. Cranfield and registered in 1918. While this cultivar did not have a telling effect on the breeding of pink daffodils, it was of a purer and more consistent pink colour, which helped to stimulate interest at a time when it might otherwise have waned. The parentage of ‘Miss E.M. Bowling’ is interesting in that, in common with many other early pinks, it contained ‘Lord Kitchener’, often noted by hybridists as being one of the most potent sources of this colour. This must have seemed very strange at the time as ‘Lord Kitchener’ is a white and yellow daffodil. Armed with present-day knowledge on the origins of pink, however, the reasons for the potency of ‘Lord Kitchener’ in this respect become clear (Figure 14.2, Plate 14.2).



## Background of the Modern Pinks

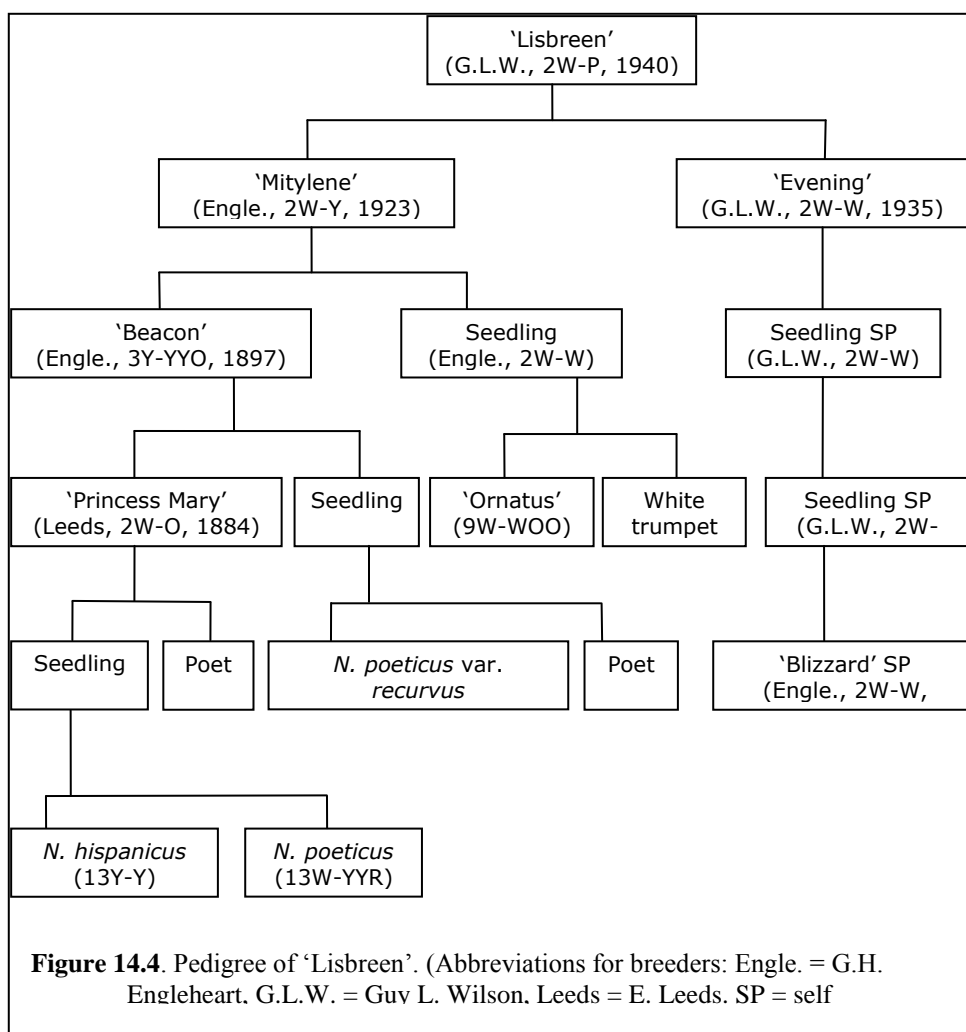
It was the cultivar ‘Mrs R.O. Backhouse’ (Figure 14.3, Plate 14.3) that first excited the interest of the general gardening public in the novelty of this colour in daffodils. It quickly became, and has remained for almost 90 years, the most widely known and grown of all pink daffodils. Owing to its distinct pinkness, ‘Mrs R.O. Backhouse’ was widely used in breeding but, unfortunately, it possessed the defect of a curved, poorly shaped perianth that made both it and many of its progeny less than first-class for exhibition purposes. Consequently, some hybridists decided to take a different approach to the breeding of improved pinks. The Brodie of Brodie and Guy Wilson had noticed that

the sister cultivars, 'Mitylene' and 'White Sentinel', were apt to 'throw' occasional pink seedlings. These two cultivars are, like 'Lord Kitchener', large-cupped white and yellow daffodils.



**Plate 14.3.** 'Mrs R.O. Backhouse' (2W-P), the first pink daffodil to become well known to the general gardening public.

They are known to trace back to *poeticus* through 'Beacon' on the maternal side, the pollen parent being a white seedling, a combination providing the correct background for pink. Brodie and Wilson independently crossed 'Mitylene' with 'Evening', a large-cupped white, to produce two fine pink and white cultivars, namely 'Wild Rose' and 'Lisbreen' (Figure 14.4), which were subsequently used extensively in the breeding of improved pinks. Lionel Richardson used the former with pollen from 'Rose Caprice' to raise 'Debutante', while 'Lisbreen' crossed with 'Rose of Tralee' gave rise to 'Rosewall'. Later, this cultivar was crossed with 'Salmon Trout' to raise a series of pink daffodils with good colour and exceptional perianth quality. These included 'Knightwick', 'Leaping Salmon', 'Marietta' and 'Rhine Maiden'.



The parentage of 'Lord Kitchener' has already been discussed and, while the reason for its ability to give rise to pink colouration is now understood, this was clearly not the case when breeders first started to use it for this purpose. Similarly, it was not always obvious why 'Mitylene' and 'White Sentinel' also had this ability. The true nature of the forebears of these two cultivars did not in fact become known until 1982, when almost 400 letters addressed to F.W. Burbidge, mostly referring to daffodil matters, were discovered at Trinity College, Dublin. One of these from the Revd G.H. Engleheart, dated 3 April 1894<sup>(6)</sup>, gave the parentage of the "dainty and shapely white cupped forms of *N. Leedsii*" as none other than the group of daffodils that became known as the Dinton Leedsis. Engleheart bred these from *N. moschatus* × 'Ornatus'. It was one of these "dainty and shapely white cupped forms of *N. Leedsii*" which, when crossed with 'Beacon', gave rise to both 'Mitylene' and 'White Sentinel', and thus had a background almost identical to 'Lord Kitchener'. It was this background that made these cultivars such prolific sources of improved pinks, although it was not until 1946 that the scientific basis for this ability was proven. Thus, the speculative predictions of Leichtlin and Burbidge became hard fact.

## Pink Daffodils in Australia

It was in Australia, during the 1920s and 1930s, that some of the most active breeding work took place in producing pink daffodils. During this period, only a handful of pink daffodils were raised in the British Isles and, in many respects, the Australians were then the pioneers in this aspect of breeding. It was probably as a direct result of this that strong links began to be forged between hybridists from the British Isles and their Australian counterparts. Guy Wilson visited the country in 1929 and as early as 1933 was flowering seedlings of 'Pink 'un' in Ulster, having obtained the cultivar from Leonard Buckland of Camperdown, Victoria. In 1934, Wilson received his first

consignment of bulbs from C.E. Radcliff of Hobart, Tasmania, including the most famous Australian-raised pink cultivar, 'Pink o' Dawn' (1W-P), whose parentage was 'Mrs Moody', a white trumpet, crossed with 'Lord Kitchener'. This seemingly odd source of pink cultivars was as much a cause of surprise to Radcliff as it was to British hybridists and he expressed his astonishment at the time, confessing that he could not understand how pink seedlings arose from a cross between a white trumpet and a white and yellow bicolor. 'Pink o' Dawn' was the best known of several important pinks raised by Radcliff, others being 'Dawnglow' (1W-P, 1936), 'Rosario' (2W-P, 1940), 'Karanja' (1W-P, 1950) and 'Pink Monarch' (2W-P, 1950). Also prominent among early Australian hybridists were Alister Clark (1865-1949) of Bulla, Victoria, William Jackson (1865-1948) of Dover, Tasmania, and Oscar Ronalds (1873-1955) of Tarago, Victoria. Clark's most important cultivar showing pink was 'Mabel Taylor' (2W-WPP, 1955), while that of Ronalds was named after his wife, 'Mrs O. Ronalds' (2W-P, 1956). Both cultivars were widely used in the breeding programme of British hybridists from the time of their introduction.

One of the most noticeable differences between many of the early Australian-raised pinks and those being raised in the British Isles during the same period was that many of the former were trumpets rather than the more usual large-cupped daffodils. It is known that several British breeders wished to pursue this line, Guy Wilson, for example, stating that he hoped to raise a pink trumpet daffodil of the size and quality of his most famous white, 'Empress of Ireland'<sup>(7, 8, 9)</sup>. To this end, he imported not only Australian cultivars but also seedlings and, in 1945, he obtained seedlings from Radcliff, Jackson, Clark, Roblin of West Ulveston, Tasmania, and Bisdee of Bagdad, Tasmania; he continued to do so annually, until 1956. Eventually, the most important development in the improvement of pink daffodils shifted from Australia to the British Isles and, in particular, to Ireland.

## Science Helps Solve the Mystery

In 1946, two Americans, E. Anderson and E. Hornback, published some research results in an article entitled 'A genetical analysis of pink daffodils', which appeared in the *Californian Horticultural Society Journal*<sup>(10)</sup>. Their work had involved experiments with hybrids raised from 'Tunis' and 'Mrs R.O. Backhouse', the results of which led them to believe that the likely sources of pink were to be found in *N. poeticus*, which contained the necessary pigment, and some other daffodil which imparted stability to this colour. They had observed the relative stability of the pink colour in cultivars, whereas the red in the corona of *N. poeticus* faded as the flowers aged. Anderson and Hornback concluded that the modern hybrids got their pink colour through a re-combination of characters from parental or ancestral material, the quantity and distribution of colouring pigment coming from *N. poeticus*, while the ecru tint and its stability came from some other source. The two researchers analysed the hybrids from the 'Tunis' and 'Mrs R.O. Backhouse' cross in order to determine the flower characters associated with pink colouration. The factors considered were the width and length of perianth segments, corona length and the degree of crimping along the corona margin. They demonstrated that pink was strongly linked to flowers that had straight-edged coronas, i.e. those with least crimping. There was also a link with poor floppy perianths, and with narrow as opposed to flaring coronas. The other basic partner in the production of pink, the partner to *poeticus*, was therefore a daffodil with a long, straight-edged corona and narrow, poor quality perianth segments. The species showing these characteristics most clearly was *N. alpestris* which, although classified as a white trumpet, does show a flush of faint pink turning to purplish brown in the dying flower. Thus, it would appear that pink daffodils have originated from crosses containing *N. poeticus*, which contributes the red pigment, and *N. alpestris*, which was capable of diluting the red into a pink tint that was stable. The re-combination of characters necessary for the production of pink may be represented as follows:

<i>N. poeticus</i>	<i>N. alpestris</i>
High concentration of pigment	Low concentration of pigment
Pigment restricted to corona	No pigment in corona
Pigment orange-red, fading	Pigment pinkish, stable

Pink Cultivar

High concentration of pigment  
Pigment restricted to corona  
Pigment pinkish, stable

The scientific evidence of 1946 and the information contained in the Engleheart letter of 1894 on the parentage of the white Dinton Leedsii dovetail neatly together. They can also be seen to be mutually supportive, although clearly the re-combination of characters does not always occur in the first generation – it sometimes takes several generations for the pink colour to become evident.

### **Early Irish Pink Daffodils 1930-1947**

Prior to 1930, only one cultivar raised in Ireland, and thought worthy of naming, showed pink colouring in its corona. This indicates just how unusual this type of daffodil was, considering that almost 100 years of hybridisation had preceded its appearance. This cultivar was raised by Lionel Richardson, who named it ‘Fanny Currey’ (2W-YYP, 1925) in honour of the Lismore daffodil grower instrumental in encouraging him to take up daffodil breeding. Indeed, throughout the whole of the period from 1930 to 1947 there were only a handful of pinks raised in Ireland by Richardson and Wilson. Among them, however, were some cultivars that proved to be crucial in laying the foundations for further development. Two such cultivars that constantly re-appeared in later breeding programmes were Richardson’s ‘Rose of Tralee’ (2W-P, 1937) and Wilson’s ‘Interim’ (2W-YYP, 1944) (Figure 14.5).

‘Rose of Tralee’ was raised from an open pollinated ‘White Sentinel’ and possessed both desirable and undesirable characteristics. Like many of the progeny of ‘White Sentinel’, it had a fine perianth of flat, overlapping segments. The long corona was of almost trumpet proportions that opened a strong apricot salmon colour. Unfortunately, the perianth segments had a tendency to be notched and had a degree of pink staining at their bases, this incidentally being a characteristic that may be exploitable in future breeding in transferring the pink from corona to perianth. Also, the corona colour tended to pale, noticeably as the flower developed. It did have the ability, however, to impart strong colour to its offspring, among which the most outstanding were ‘Salmon Trout’ (Figure 14.6) and ‘Passionale’. ‘Interim’ was raised from ‘Cushlake’ (3W-WWO, 1934) × ‘Dava’ (2W-W, 1931). It had a slightly reflexed perianth, greenish at its base passing to creamy-white. Its corona was pale yellow, shading to deep coppery-peach towards the rim, the colour extending for about one-third of its length. The most important offspring of ‘Interim’ was undoubtedly ‘Irish Rose’ (2W-P, 1953).

### **The Work of J. Lionel Richardson 1948-1960**

J. Lionel Richardson did more than any other hybridist to improve pink daffodils and establish Ireland as the major centre for this activity, a position that it has retained unchallenged until recent times. The year 1948 marked the beginning of a remarkable period in the development of pinks, for it was then that ‘Salmon Trout’ was registered. It was a sensational advance on all its predecessors and was of outstanding quality. Introduced to commerce in 1954 at £40 per bulb, it was already a top exhibition daffodil, having been awarded a First Class Certificate; it had featured in all Richardson’s winning Engleheart Cup entries between 1949 and 1953. It was universally acknowledged as the best pink daffodil seen up to that time, a faultlessly large flower up to 11.25 cm in diameter. It was ‘Salmon Trout’, along with ‘Rose Caprice’ (2W-P, 1952) (Figure 14.7), which removed Australia from its pre-eminent position in the breeding of pink daffodils, establishing this facet of hybridisation firmly in the northern hemisphere, and in Ireland in particular.

The cross between Brodie’s ‘Wild Rose’ (2W-P, 1939) and ‘Rose Caprice’ was much used by Richardson in attempting to produce pinks of greater size and brighter colouring. It proved to be a successful strategy, one of the best offspring being ‘Debutante’ (2W-P, 1956), a vigorous cultivar with a cup of bright, glowing pink free of all peachy shades. Not only was Richardson’s breeding enhancing the quality of those flowers with entirely pink coronas, but he also introduced several fine-rimmed kinds, of which ‘Infatuation’ (2W-YYP, 1954) was one of the best to appear during the

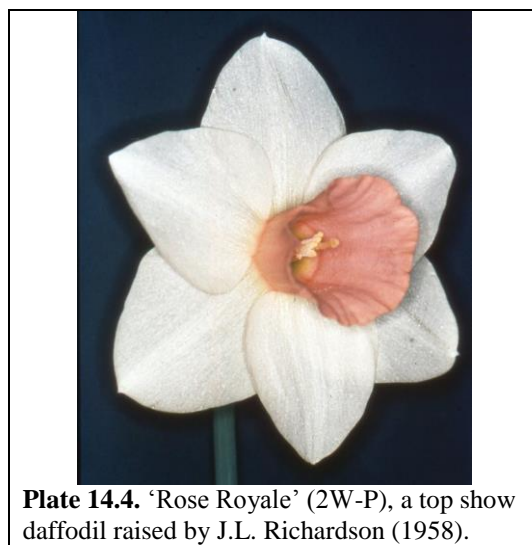


1950s. It proved to be an excellent daffodil in classes in which pink was not predominant and was widely used in breeding.

The most important offspring of 'Infatuation' was 'Romance' (2W-P, 1959). In 1965, when she introduced it at £50 per bulb, Mrs Richardson described it as "one of the most attractive and outstanding flowers in its class"<sup>(11)</sup>. 'Romance' was of such remarkable quality and raised such interest among daffodil enthusiasts that an exhibit of its pedigree was shown at the London Daffodil Show in 1968 (Figures 14.8 and 14.9). The exhibit took the form of a collection of actual flowers of the cultivars that had featured in the ancestry of 'Romance' and, if these were unobtainable, as was the case with some of the older cultivars, photographs or illustrations were used instead. The purpose of the exhibit was to demonstrate the origins of pink colouration, together with the usefulness of the data on parentage that had recently been gathered and stored in the American Daffodil Society's computerised database. The exhibit aroused considerable interest and led to much speculation among the daffodil fraternity on the parentage of older cultivars, knowledge of which had been lost in the mists of time, and also on the origins of the pink colour itself. The work of Anderson and Hornback on the origins of pink was published in a relatively obscure journal; although it appeared in 1946 (some 22 years before the 'Romance' exhibit), its findings were unlikely to have been known to daffodil enthusiasts prior to the appearance of a shortened version in the *American Daffodil Society Journal* in 1974<sup>(12)</sup>.

Four generations back in the ancestry of 'Romance', on both the maternal and paternal sides, is 'White Sentinel'. The true background of 'White Sentinel' and its ability to give rise to pink was, of course, unknown in 1968, Engleheart's letter to Burbidge not coming to light until 14 years later. However, other correspondence of Engleheart's quoted by other writers, particularly de Navarro and Coleman in their article 'The origins of *N. 'Romance'*'<sup>(13)</sup> had alluded to the background of 'White Sentinel' as possibly being suitable for the production of pink seedlings. They referred to a letter from Engleheart to Brodie in 1917: in it, both 'White Sentinel' and 'Mitylene' were said to have been raised from 'Beacon' crossed with the best of the Dinton Leedsiiis. In a further letter in 1920, Engleheart gave some clues to the breeding of the Dinton Leedsiiis. They came, he said, from *N. poeticus* 'Ornatus' crossed with such white Ajax (trumpet daffodils) as were then available. He named these as: *moschatus* of the Dutch; *cernuus*; a white Ajax or two found in old gardens, especially Irish gardens; and entries in Barr's early lists, which were then mostly extinct. It was not, however, until the discovery in 1982 of Engleheart's letter of 1894 to Burbidge that the precise parentage of those white forms of the Dinton Leedsiiis was established<sup>(14)</sup>. It was this distinct group which formed the ancestry of cultivars like 'White Sentinel' and 'Mitylene', and which provided them with the necessary background for pink.

Several other notable introductions took place about the time that 'Romance' was first seen, probably the most important being 'Rose Royale' (2W-P, 1958) (Plate 14.4). It was raised from Seedling ('Rose of Tralee' × 'Lisbreen') × 'Salmon Trout'. It was regarded by many as the most important pink since the introduction of its pollen parent some ten years earlier. 'Rose Royale' has an ice-white perianth of exceptional quality and a cup of clear rose pink. It obtained an Award of Merit as an exhibition flower in its year of introduction, followed by a First Class Certificate in 1972, and was voted Best Bloom at the London Daffodil Show in 1976. The outstanding rimmed pink 'Rainbow' (2W-WWP, 1961) was introduced in 1968. It was a most striking daffodil, the colour classification hardly doing justice to the wonderful shades detected in its corona. It was given an Award of Merit as an exhibition flower in 1967 and has since been a consistent show winner at the highest level. In 1991, it received the highest award of First Class Certificate as an exhibition flower.



**Plate 14.4.** 'Rose Royale' (2W-P), a top show daffodil raised by J.L. Richardson (1958).

Another outstanding cultivar raised from the same parents as ‘Rainbow’ (‘Interim’ × ‘Rose Caprice’) is ‘Highland Wedding’ (2W-GWP, 1969). It may be regarded as an improvement on ‘Rainbow’ in terms of colour, its perianth being whiter, while the corona rim is a more intense and purer pink. ‘Fair Prospect’ (2W-GPP) was raised from ‘Infatuation’ × ‘Debutante’ and, when introduced commercially in 1970, cost £50 per bulb. It was described by Mrs Richardson at the time as the “finest pink of its type yet raised”<sup>(15)</sup>, having a faultless white perianth and coral pink corona. Before leaving the pink daffodils of Lionel Richardson, mention must be made of one other, ‘Kelpie’, registered in 1961 as a white and pink *cyclamineus* hybrid, the only flower of its type raised by him. Apparently, its advent failed to cause a stir: it gained neither show successes nor awards and was never listed in the Richardson catalogues. Looking back this seems strange as it was the first of its type to be raised in Ireland, and was the forerunner of a group of daffodils that have brought that country considerable success and fame more recently – with cultivars such as ‘Delta Wings’, ‘Foundling’, ‘Lavender Lass’ and ‘Lilac Charm’.

The impact of Lionel Richardson’s work in the improvement of pink daffodils was immense. His successes stemmed primarily from three of his own cultivars – ‘Rose of Tralee’ (1937), ‘Rose Caprice’ (1952) and ‘Infatuation’ (1957) – and it is significant that all three arose from parents in which the pink was latent. Richardson also employed the best cultivars of other hybridists in his breeding work, chiefly Wilson’s ‘Lisbreen’ and ‘Interim’, and Brodie’s ‘Wild Rose’. All his painstaking work came to fruition in the space of a few years between 1958 and 1973 with a flood of superb pink cupped cultivars, the like of which had never been seen before.

### Guy Wilson’s Pink Daffodils

Although numerically Wilson registered almost as many pink cultivars as Richardson, the comparison ends there. Wilson would have been the first to admit that for most of his career his major interests lay elsewhere. Nevertheless, five of his cultivars were important because of their extensive use in breeding or their excellence on the show bench and in the garden. Their names are also indelibly written into the history of daffodils.

The first cultivar of this important group was ‘Lisbreen’ (2W-GPP, 1940) (Figure 14.4), the first Wilson daffodil to have a true pink cup, described as “clear rosy shell pink with a green base”<sup>(16)</sup>. It received an Award of Merit in 1944 as an exhibition flower but it was, perhaps, its use by Richardson in breeding that gave it a more lasting claim to fame. ‘Interim’ (2W-YYP, 1944) (Figure 14.5) also had a considerable influence on the breeding of improved pinks. It featured prominently in the pedigrees of 13 new cultivars, including important advances such as Richardson’s ‘Rainbow’, ‘Accent’ raised by Mitsch in the USA, and Wilson’s own ‘Irish Rose’. Although the pink was confined to its rim, ‘Interim’ did have the ability to impart solid pink to the coronas of its offspring, ‘Irish Rose’ being a particularly good example. The third important pink to appear was ‘Irish Rose’ (2W-P, 1953) itself. Its parentage was ‘Interim’ × ‘Evening’ and, when it first flowered in 1947, Wilson described it as the best pink daffodil he had seen. Ten years later, it received an Award of Merit as an exhibition flower.

The pink daffodil for which Guy Wilson will best be remembered, however, is ‘Passionale’ (2W-P, 1956), raised from Richardson’s ‘Rose of Tralee’ and his own ‘Irish Rose’. It received Awards of Merit both as an exhibition flower and as a garden plant, the latter following trials at Wisley where it showed its excellent flowering ability, producing 82 blooms in its second year from the 25 bulbs initially planted. Another daffodil, which regularly featured among the winners at the top shows over many years, like ‘Passionale’, was ‘Drumboe’ (2W-WWP, 1960), raised by Wilson from ‘Tryst’ × (‘Cotterton’ × ‘Broughshane’). This is a fine daffodil in which the large flaring corona is delicately edged with pale pink. The white perianth consists of very broad, flat segments that are of thick, velvet-smooth texture. The high quality of this flower was never in doubt from the moment it first bloomed. Wilson then described it as having a “quite flawlessly textured, pure white perianth. Large-medium crown of pale pinky-biscuit colour, slightly spotted at the mouth. Superb quality, waxy substance, size and vigour.”<sup>(17)</sup>

## Mrs J. Lionel Richardson 1961-1973

When Lionel Richardson died in 1961, his wife decided to continue hybridising daffodils, using as parent material mainly those cultivars developed by her husband. This work continued for twelve years until 1973 when Mrs Richardson officially retired from daffodil breeding, although she continued to hold seedling stocks until 1977. During this period she registered eleven pink cultivars whose parents were among the best pink cultivars raised by her late husband, including 'Romance', 'Rose Caprice' and 'Rose Royale'. Some of Mrs Richardson's pinks, especially 'Gracious Lady' (2W-P, 1974), have shown excellent exhibition form, and 'Gracious Lady' is judged by many to be the finest of all the pinks raised at Waterford. One result of Mrs Richardson's decision to carry on hybridising in 1961 was the development of a link between what had previously been achieved in the south of Ireland and the work of an up-and-coming generation of breeders in Northern Ireland. Her presence on the daffodil scene was marked by continuing success for the name of Richardson in the most prestigious shows and competitions, and this set new targets on which the younger breeders in Northern Ireland set their sights. They used several of Mrs Richardson's seedlings in breeding; one of her cultivars, 'Polonaise' (2W-P, 1974), played an important role in the advent of the much improved pink doubles 'Pink Pageant' and 'Pink Paradise' (both 4W-P, 1976). Their full parentage is ('Falaise' × 'Debutante') × 'Polonaise'.

## Some Recent Pinks

The more recent pink daffodils fall into two distinct groups: those that are well known with white perianths, and a newer group in which the perianth colour is yellow. Among the former are found some exceptionally fine rimmed cups. The most important of the white and pink cultivars is 'Dailmanach' (2W-P, 1972), raised by J.S.B. Lea from 'Inverpolly' (2W-W) crossed with a pink seedling. Today, 'Dailmanach' stands out from all its rivals as the most consistent winner of first prizes at the most prestigious daffodil shows. Its perianth is a glistening white and consists of flat and very broad segments. The pink of the corona is true throughout, and at its deepest towards the rim with its beautifully serrated edge. The development of the pink colour is very consistent and, unlike that of many similar cultivars, appears to be unaffected by weather conditions. 'Dailmanach' had the distinction of being the first pink cultivar to be awarded the medal for the Best Bloom at the Royal Horticultural Society's Daffodil Show in 1972, and repeated the feat in 1979. On the other side of the world, it was awarded the Ramsey Cup in New Zealand.

Other good pink cultivars raised by Lea from 'Inverpolly' are 'Glen Rothes' (2W-P, 1976) and 'Balvenie' (2W-GPP, 1976), in which the pollen parents were, respectively, 'Fionn' (2W-P) and 'Merry Widow' (2W-P). 'Glen Rothes' is a lovely medium-sized flower in which the three-quarter length corona is rich pink to its base. Its white perianth is perfectly smooth, the individual segments being broad, flat and slightly pointed at the tip. It is a consistent, strong-stemmed daffodil. 'Balvenie' is a vigorous cultivar in which the neatly (i.e. evenly) frilled corona is deep pink towards the rim, but becomes paler as it passes finally to the bright green eye. The white perianth is composed of broad, overlapping segments that are beautifully proportioned in relation to the corona. Both 'Glen Rothes' and 'Balvenie' featured in several of Lea's winning Engleheart Cup entries.

Two beautiful pinks resulted from the breeding work of Brian Duncan in Northern Ireland: 'Fragrant Rose' (2W-GPP, 1978) and 'Pismo Beach' (2W-GWP, 1978) (Plate 14.5). 'Fragrant Rose', as the name would suggest, is highly perfumed and has the unique distinction of being the sole cultivar in Division 2 to possess such an unusual scent. This is closer to that of 'Super Star Rose' ('Tropicana' in the USA) than to the perfume normally associated with daffodils. Unlike Lea's 'Balvenie' described



**Plate 14.5.** 'Pismo Beach' (2W-GWP), a beautifully rimmed pink raised by B.S. Duncan (1978).

above, 'Fragrant Rose' is a cultivar in which the predominant corona colour is pink. It was raised from Richardson Seedling No. 3517 ('Roseworthy' open pollinated) crossed with 'Merlin' (3W-YYR). Both 'Roseworthy' and 'Merlin' have ancestral links with *N. poeticus*, which must in part be responsible for the perfume of 'Fragrant Rose': but why it should be so altered in this instance is not known. Its perianth is composed of thick, waxy segments that are broad, overlapping and flat. The corona is a vivid pink for most of its length, paling somewhat towards the green eye. The plant is tall and vigorous and the flower quality is very consistent. Duncan's second outstanding pink was the beautifully rimmed 'Pismo Beach' (2W-GWP, 1978), raised from 'Syracuse' (3W-WWY) crossed with 'Jewel Song' (2W-P). Its perianth is pure white and, although its quality is not entirely consistent, it is crowned by a quite superb corona. This is basically white but with an inner grey-green eye, and a sharply contrasted rim of apple blossom pink approximately 5 mm in width. Another quality pink is 'China Doll' (2W-GWP, 1985) which, like 'Pismo Beach', is a delightfully rimmed flower. It was raised by Clive Postles of Droitwich and made an impact as a reliable flower of exhibition quality.

A remarkable event in the history of the development of pink daffodils was witnessed in 1968. It was then that 'Milestone' (2Y-P) was registered as the first cultivar with this particular and unusual colour combination. It was bred by Grant Mitsch in Oregon, USA, who maintained that it arose from an open pollinated 'Leonaine' (2W-P), the ancestry of which included such cultivars as 'Mrs R.O. Backhouse', 'Wild Rose' and 'White Sentinel'. According to Mitsch:

"There may be a plethora of pinks but distinctiveness is certainly not lacking here. Nature occasionally makes combinations which we in our good judgement would refrain from considering. Pink and yellow might not appeal as an attractive alliance but the soft chamois yellow ... perianth serves as a foil for the ... apricot cream."<sup>(18)</sup>

It was without doubt unlike anything seen previously.

In 1977, nine years after the registration of 'Milestone', the first daffodils of this type to be raised in the British Isles were registered. These were 'Brindisi' (2YYW-P) and 'Undertone' (2Y-P), followed a year later by 'Pink Mink' (2Y-P). The origins of these cultivars are not altogether clear, but they appear to have been bred from Richardson Seedling No. 3477, which arose from an open pollinated 'Damocles' (1Y-Y) which, in turn, came from 'Pretoria' (1Y-Y) × 'Goldcourt' (1Y-Y). Two crosses were made with this seedling using another Richardson Seedling, No. 3341 (which was a 2W-P) and Guy Wilson's 'Passionale' as pollen parents. These three cultivars form a series in which 'Brindisi' has the deepest colouring. At the other end of the spectrum is the larger but delicately coloured 'Undertone', with 'Pink Mink' being intermediate in both size and colour. Since then there has been considerable improvement in both the number and quality of the Y-P daffodils, with much better colour definition. The best of today's cultivars are indicated below.

### **The trumpet pinks (W-P)**

These have been slow in coming owing to the difficulty of transferring one of the sources of pink, the red in *N. poeticus* that has a very small corona, into a daffodil of trumpet dimensions. Success is, however, beginning, with cultivars such as 'Pink Silk' (1W-P, Havens, 1980), the superb 'Chanson' (1W-P, Duncan, 1997) and his 'Korora Bay' (1W-P, Duncan, 2000). 'Pink Silk' and 'Chanson' are the current top cultivars, with 'Cryptic' (1W-P, Jackson's Daffodils, 1983) also being successful; other good show cultivars include 'American Dream' (1W-P, R. and E. Havens, 1989) and 'American Shores' (1W-P, R. and E. Havens, 1992).

### **The trumpet pinks (Y-P)**

One interesting addition to this section is 'Filoli' (1Y-YPP, Postles, 1991), raised by J.S.B. Lea, which is giving rise to progeny with a variety of very unusual colour combinations and shades. This section is starting to gather momentum with cultivars such as 'American Heritage' (1YYW-P, R. and E. Havens, 1993) (Plate 14.6) and 'Jauno' (1Y/WP-P, Duncan, 2006) (Plate 14.7) showing two or more colours in the perianth.



**Plate 14.6.** ‘American Heritage’ (1YYW-P), raised in the USA by R. and E. Havens (1983), with two colours arranged concentrically in the perianth. (Reproduced by kind permission of the American Daffodil Society, [Daffseek.org](http://Daffseek.org). Photograph by Kirby Fong.)



**Plate 14.7.** ‘Jauno’ (1Y/WP-P), raised by B.S. Duncan (2006), with three colours in the perianth but not arranged concentrically.

### ***The large-cupped pinks (W-P)***

‘Passionale’ (G.L. Wilson, 1956) and ‘Dailmanach’ (Lea, 1972) dominated this section during the 1980s and 1990s, with ‘Pol Voulin’ (Lea, 1983) having successes late in this period. In 2003, ‘Dailmanach’ still reigned supreme but competition was growing, with ‘Pol Crocan’ (Lea, 1989), ‘Sweet Georgia’ (Postles, 1992), ‘Eastern Promise’ (Postles, 1994), ‘Lakeland Fair’ (Baxter, 1994), ‘Cape Point’ (Duncan, 1996) and ‘Amazing Grace’ (Duncan, 2001) all winning major prizes. ‘Dailmanach’ is still the current number one with many of those already mentioned remaining in contention. Recent newcomers include ‘Claverley’ (Postles, 1993), ‘Entrepreneur’ (Postles, 2002) and ‘John Peace’ (Postles, 2006). Among the non-predominant or rimmed pinks, ‘Rainbow’ (Richardson, 1961) has been the most consistent performer, being top cultivar in all divisions on four occasions. In 2003, ‘Rainbow’ was still top prize winner in its group but others making a mark included ‘High Society’ (Duncan, 1979), ‘China Doll’ (Postles, 1985), ‘June Lake’ (Duncan, 1990) and ‘Savoir Faire’ (Duncan, 1992). ‘Rainbow’ remains the current leading rimmed-pink, with ‘High Society’ and ‘Savoir Faire’ as strong contenders.

### ***The large-cupped pinks (Y-P)***

Interest in the yellow-pinks gathers pace, though there are still relatively few cultivars. Among the prize winners have been ‘Kelanne’ (2YYW-P, Bloomer, 1982), ‘Nacre’ (2Y-P, Murray W. Evans, 1986), ‘King’s Pipe’ (2Y-P, Scamp, 1994), ‘New Dawn’ (2Y-P, Postles, 1995) and ‘Pink Perry’ (2Y-P, Duncan, 1997). ‘New Dawn’, ‘Oregon Pioneer’ (2Y-P, Mitsch, 1984) and ‘American Frontier’ (2Y-P, R. and E. Havens, 1994) are currently all good show flowers in this improving section.

### ***The small-cupped pinks (Y-P)***

At the start of the 1980-2010 period, numbers in the small-cups section were still small. Brian Duncan’s ‘Cupid’s Eye’ (3Y-GYP, 1987), ‘Eyeglass’ (3W-P, 1999), ‘Eyelet’ (3W-P, 1999) and ‘Eyrie’ (3W-YYP, 1999) subsequently established themselves as prize winners, along with Guy Wilson’s ‘Grey Lady’ (3W-WWP) – registered as far back as 1935. Today, ‘Cupid’s Eye’ continues at the top, with ‘Lieberlied’ (3W-WWP, R. and E. Havens, 1995) and ‘Dena’ (3W-WWP, Duncan, 2005) challenging.

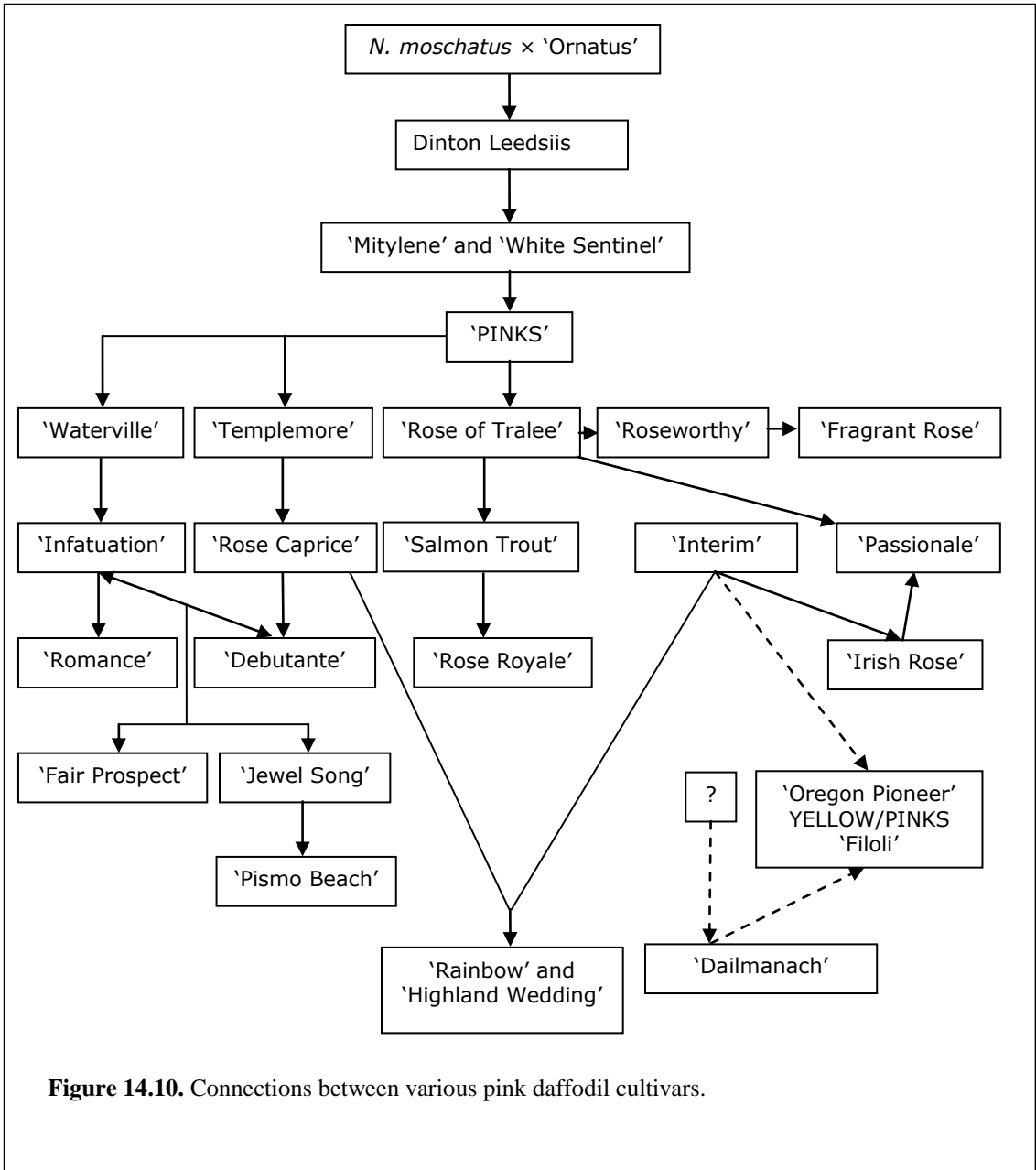
## Major Events in the History of Daffodils with Pink Coronas

The following gives a chronological sequence of the major events during the development of daffodils with pink coronas. While involved with a local junior school over a 10 year period I became convinced of the link between gardening and music; pupils told they would be planting something or looking through the compost heap for creepy-crawlies were difficult to keep seated. I noticed they often sang to themselves while doing these things and concluded it was the result of happiness. Music and gardening appear deeply rooted in the human psyche. Now, whenever I listen to The Planets by Holst and the finale, Neptune The Mystic, begins I think of the pink daffodils and whenever I think of pink daffodils Neptune springs to mind. The beginning of the pink daffodils was indeed surrounded by mystery, just as the origins of the giant planet were, both being forecast years in advance of their manifestation. Burbidge foretold the coming of pink daffodils almost ten years before the first one appeared. Even when this event occurred it was not the full blown pink of modern cultivars, more a suggestion, a mere hint to whet the appetite of the early hybridists. Yet it was enough for them to pursue with vigour. Burbidge's forecast itself was mysterious enough for, in 1889, he was unlikely to be aware of what had taken place in a remote Cistercian monastery at Brunn some 30 years earlier. The appearance of 'Apricot', the first cultivar showing the merest hint of pink, and the widespread publication of the Cistercian monk, Mendel's findings almost coincided at the beginning of the 20th century, a century which was to see the transference of true pink into most cultivar divisions. A further mystery in those early days was: where was the pink colouration coming from? – it often appeared from parents showing no signs of pink themselves and it was only when they were linked with a *poeticus* ancestry that the source became clear. This was further confounded by the failure to clearly differentiate between *abscissus*<sup>(19)</sup> and  $\times$  *abscissus*<sup>(20)</sup> and to realise that the term 'muticus'<sup>(21)</sup> was not only a synonym for the former but also for the latter, as clearly indicated in Victorian trade literature. Thus *muticus* of that era contained hybrids with *poeticus* links, providing a pathway to pink.

### Timeline for the Development of Pinks

1888-89	Predictions of Max Leichtlin and F.W. Burbidge on the possibility of producing pink through the use of <i>N. poeticus</i> .
1880s	The first practical step in what was to prove to be the main pathway to modern pinks. This occurred when G.H. Engleheart crossed <i>N. moschatius</i> with 'Ornatus' to produce the Dinton Leedsii. It was these that gave their offspring 'Mitylene' and 'White Sentinel' their pink potential.
1898	The registration of the first pink cultivar 'Apricot' now classified as 1W-Y.
1923	Registration of 'Mrs R.O. Backhouse', the cultivar that first brought pink-centred daffodils to the notice of the general gardening public.
1937	The first of Lionel Richardson's important pinks, 'Rose of Tralee', was registered.
1946	The genetical analysis by Anderson and Hornback in the USA of the factors involved in the production of pink.
1958	'Rose Royale' registered.
1959	'Romance' registered.
1961	'Rainbow', one of the best of the pink rimmed cultivars, was registered.
1968	Exhibit of the 'Romance' pedigree was mounted at the London Daffodil Show.
1968	Registration of 'Milestone' (2Y-P, G.E. Mitsch) – the first of the yellow-pink cultivars.
1972	Registration of 'Dailmanach', currently the most successful show pink.
1982	The discovery, in Dublin, of Engleheart's letter confirming the origin of the Dinton Leedsii.
1997	The registration of 'Chanson', an exceptional pink trumpet, which won first prize at the London Daffodil Show in 1994, 1996, 1998-2001, 2003 and 2004.

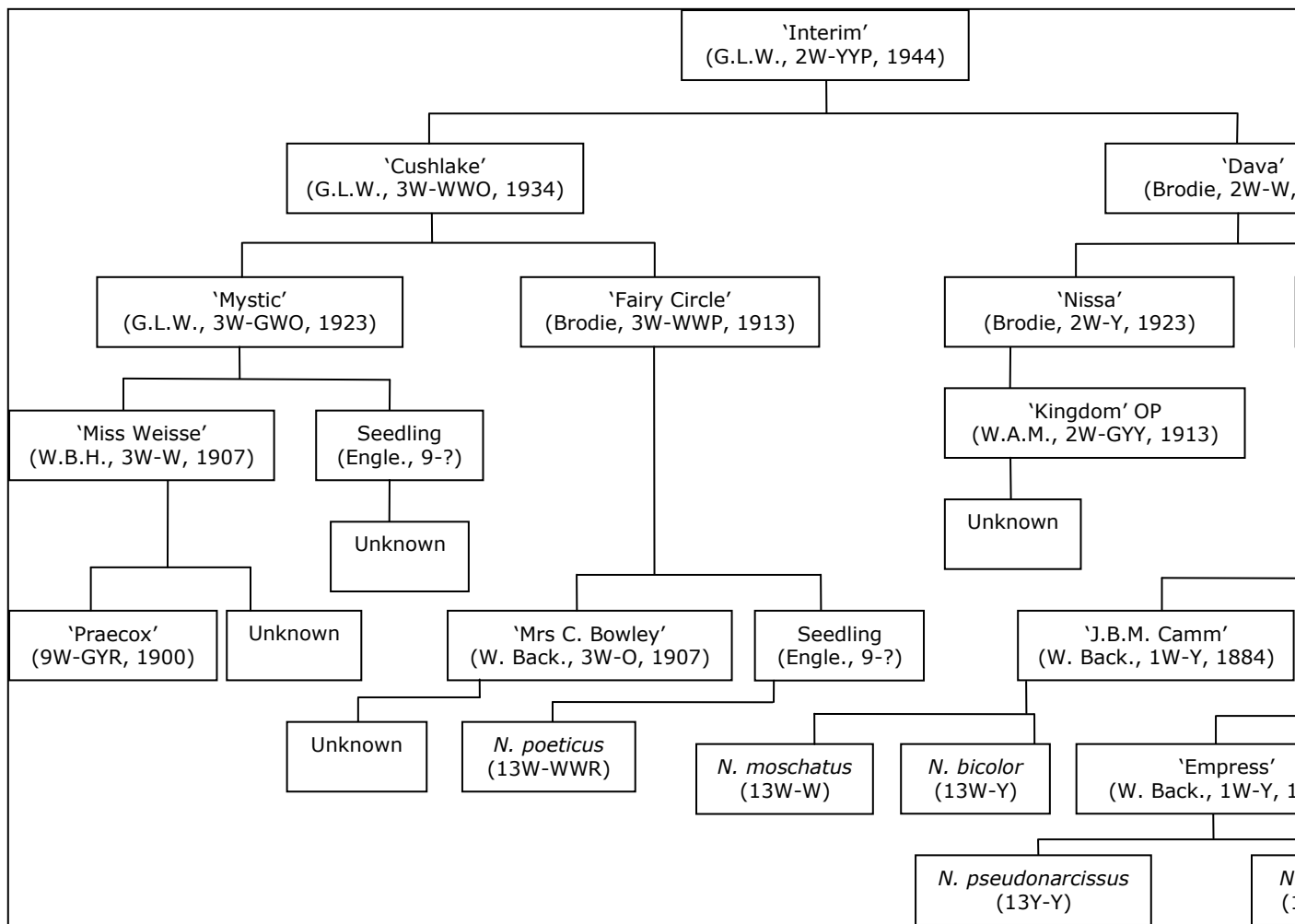
**Figure 14.10** Summarises the major breeding links in the development of pink cultivars that have been discussed in this chapter.



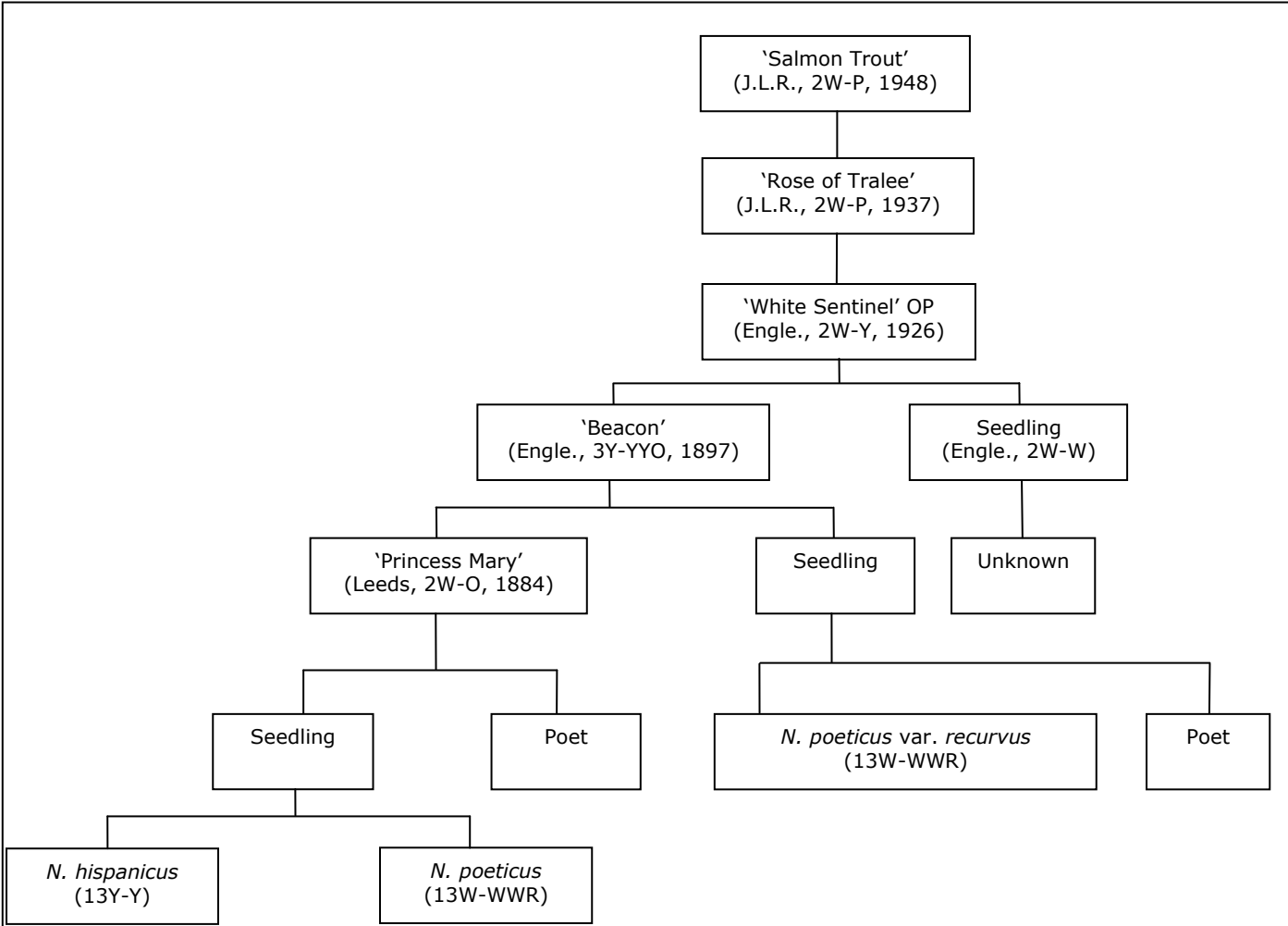
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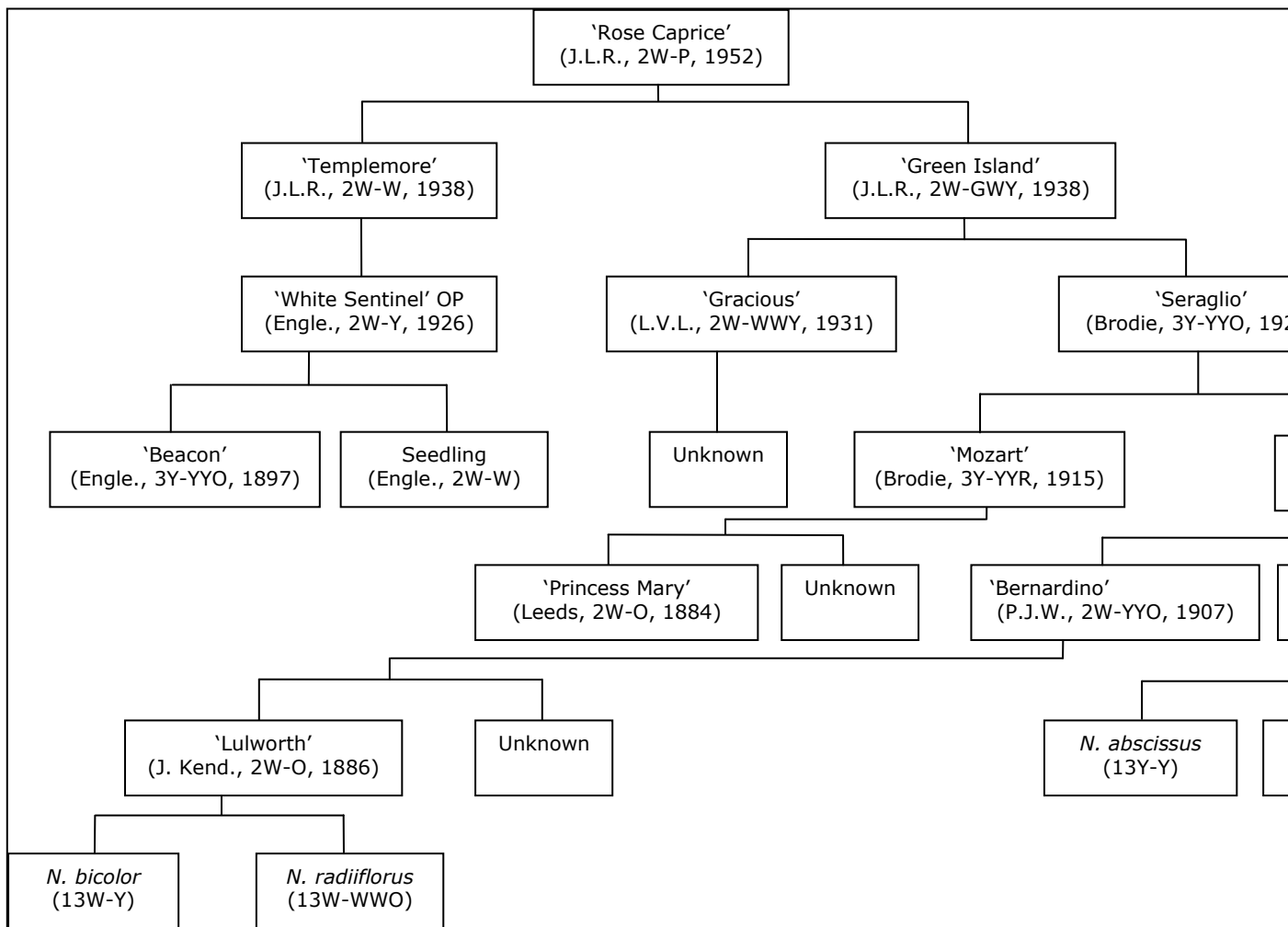




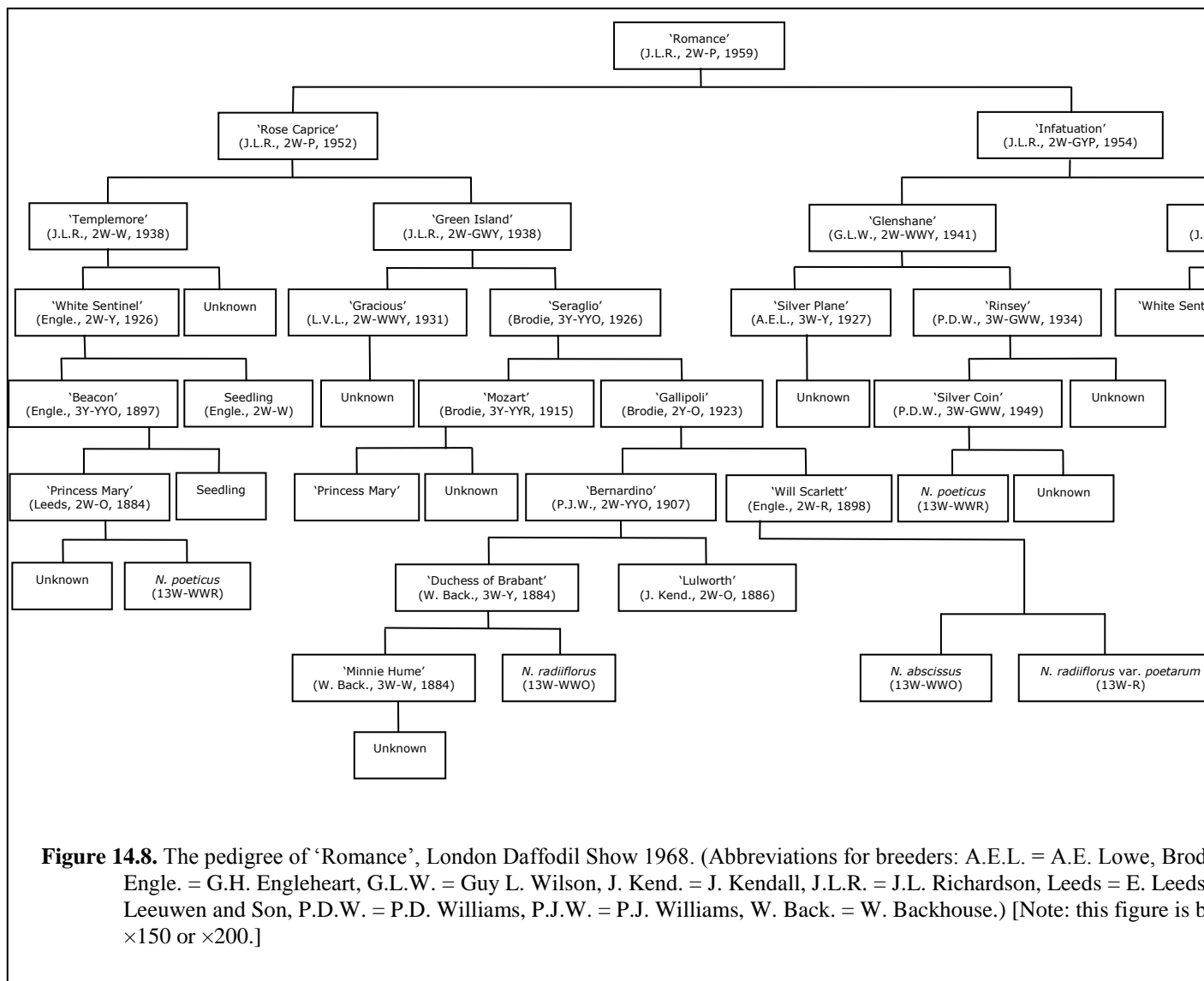
**Figure 14.5.** The pedigree of 'Interim'. (Abbreviations for breeders: Brodie = Brodie of Brodie, de G. = S.A. de Graaff, Engle. = Engle. G.L.W. = Guy L. Wilson, W.A.M. = W.A. Milner, W. Back. = W. Backhouse, W.B.H. = W.B. Hartland. OP = open pollinated)



**Figure 14.6.** The pedigree of 'Salmon Trout'. (Abbreviations for breeders: Engle. = G.H. Engleheart, J.L.R. = J.L. Richardson, Leeds = E. Leeds. OP = open pollinated.)



**Figure 14.7.** The pedigree of 'Rose Caprice'. (Abbreviations for breeders: Brodie = Brodie of Brodie, Engle. = G.H. Engleheart, J.L.R. = J.L. Richardson, Leeds = E. Leeds, L.V.L. = L. van Leeuwen and Son, P.J.W. = P.J. Williams. OP = open pollination)



## CHAPTER 15

### THE WHITE AND ORANGE/RED DAFFODILS

All the daffodils in this group possess white perianths and coronas that are wholly or partly orange or red. Almost without exception, they belong to Divisions 2 or 3 on account of the strong influence of *N. poeticus* or *N. radiiflorus* in their ancestry, from which the orange or red corona colour is derived. Daffodils in which the orange or red is uniform throughout the entire corona are to be found in both divisions and in such cases one particular colour is said to be predominant (e.g. ‘Mahmoud’, 3W-R). In other cultivars, orange or red may be the main, but not the only colour found in the corona (e.g. ‘Doctor Hugh’, 3W-GOO), though one or other still predominates. In a third group of cultivars the arrangement of the corona colours is very similar to that found in the majority of forms of *N. poeticus*, with the orange or red forming a rim at the edge of the corona as, for example, in ‘Silent Cheer’ (3W-YYR) and ‘Mullion’ (3W-YYO). Clearly, in these cases the orange and red are non-predominant. The majority of these rimmed cultivars occur within Division 3, but they are also found with reasonable frequency among the Division 2 daffodils, both old and new – as, for example, in ‘Warlock’ (2W-YYO, 1927) and ‘Northern Sceptre’ (2W-YYR, 1975). Very occasionally, the normal succession of colours within the corona is altered, as in ‘Leonora’ (3W-OOY), which has a yellow rim, the orange being confined to the lower part of the cup.

Apart from orange or red, the main colours found in the coronas of these daffodils are white and yellow. White is found in cultivars with an ancestry in which *N. poeticus* has featured strongly, as in ‘New Moon’ (3W-WWO) and ‘Gilfach’ (2W-WWO). Sometimes, the white is accompanied by a green eye, also from *N. poeticus*, as in ‘Dreamlight’ (3W-GWR). Yellow came originally into this type of daffodil from *N. pseudonarcissus* or *N. hispanicus* as in the seedling that was the seed parent of ‘Princess Mary’ (2W-O), raised by Edward Leeds prior to 1877 and registered in 1884. ‘Princess Mary’ was the seed parent of ‘Beacon’ (3W-R), raised by Engleheart in 1897. This in turn gave rise to ‘Folly’ (2W-O), which was subsequently used extensively in breeding along with such cultivars as ‘Sunstar’ (3W-R) and ‘Hades’ (2W-R) – giving rise to ‘Mahmoud’ (3W-R), ‘Limerick’ (3W-R) and others.

#### Influential Early Cultivars

The late 19th century saw the introduction of several cultivars that have had an influential role in the development of the modern white and orange/red daffodils. Probably none was more important than ‘Princess Mary’, which had flowers of high quality, a characteristic that it was capable of transmitting to its offspring. In 1884, in its form and general smoothness, ‘Princess Mary’ was ahead of its time. The plant was also noted for its poor constitution, however, and offered little hint, if any, of the very important role it was to play in breeding. Its colour coding has been somewhat indeterminate and has varied from 2Y-YYO (ADS *Daffodil Data Bank*, 1984<sup>(1)</sup>) to 2W-O (RHS *The International Daffodil Register and Classified List 1998*<sup>(2)</sup>). Catalogue descriptions in the late 19th and early 20th centuries often gave the perianth colour as creamy-white or creamy-yellow and the corona as yellow suffused with orange. In 1897, Engleheart registered ‘Beacon’, which he had raised from ‘Princess Mary’, and, once again, the current colour coding, particularly in regard to the perianth, appears to be at variance with contemporary catalogue descriptions, in which the perianth colour was usually said to be creamy or pale sulphur and the corona fiery or brilliant red. P.D. Williams crossed ‘Beacon’ with *N. poeticus* var. *recurvus* to give ‘Folly’, in which the perianth colour is indisputably “pure white ... the large expanded cup is solid, bright red”<sup>(3)</sup>. ‘Folly’ was registered in 1926 and gained an Award of Merit as an exhibition flower in the same year and then followed this up ten years later with a First Class Certificate as a garden plant.

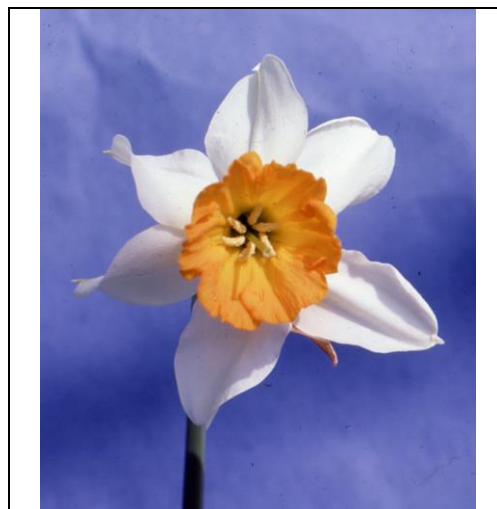
Returning to the late 19th century, we find the important (if somewhat controversial) ‘Will Scarlett’ (2W-O), raised by Engleheart and registered in 1898 (Plate 15.1). It was bred from an *abscissus* type daffodil, said by P.D. Williams to be “a large form of *N. muticus* sent home by Mr.

Wolley-Dod's collector crossed with *N. poeticus poetarum*<sup>(4)</sup>. When first introduced, 'Will Scarlett' was regarded as a sensational flower, for never before had there been a daffodil cultivar with such an intensity of orange/red colour in the corona. No doubt on account of this quality alone, it was awarded a First Class Certificate when exhibited at the Royal Horticultural Society's Show in 1898. The esteem in which hybridists held this cultivar as a potential breeding plant was indicated in the same year when J. Pope, a daffodil raiser of King's Norton, Warwickshire, paid £100 for three of the six bulbs existing at that time. Although this was a very considerable sum of money in those days, Mr Pope was later reported to be well satisfied with the results of his transaction. From the outset of its use in breeding, 'Will Scarlett' was one of the most controversial of all daffodil cultivars, simply because its outstanding cup colour went along with a perianth of very dubious quality. The latter was composed of segments that were narrow and twisted, lacking in substance and frequently notched and misshapen. The Brodie, one of the most prominent hybridists in the early years of the 20th century, said of 'Will Scatlett':

"We often find ourselves wishing that this astonishing flower had never been invented ... when crossed with Poets it often gives startlingly bright colours and, although the majority of its children suffer from poor perianths, an occasional good flower well repays for many disappointments."<sup>(5)</sup>

Another hybridist, F.H. Chapman, shared Brodie's opinion and, if anything, was still more scathing of 'Will Scarlett': "When it was first obtained people eagerly began using it ... the result being, as one can easily understand, utter rubbish."<sup>(6)</sup> On looking back, however, the judgement passed on 'Will Scarlett' by those early hybridists appears somewhat harsh for, although its use undoubtedly led to many failures, its few successes had far-reaching effects on the progress of white and red daffodils. In fact Chapman himself raised a cultivar named 'Crimson Braid' from 'Will Scarlett' × *N. poeticus* var. *hellenicus*. It was a 3W-YJR, registered in 1918, and it received both an Award of Merit and a First Class Certificate as an exhibition flower in the same year. 'Crimson Braid' was subsequently used extensively by Guy Wilson in his breeding work.

Another cultivar to have a far-reaching effect on the direction taken by the white and red daffodils was 'Hades' (2W-R) (Plate 15.2), raised by Mrs R.O. Backhouse before 1921 and registered in 1925. While its parentage is not known with any certainty, Mrs Backhouse was hybridising with 'Will Scarlett' in the period prior to the appearance of 'Hades', and it is known to be a parent of several of her white and red cultivars of that period. As there is considerable similarity between the coronas of the two cultivars, it is not too far-fetched to suggest a link.



**Plate 15.1.** 'Will Scarlett' (2W-O), raised by G.H. Engleheart (1898). Its bright cup colour made it a much sought after cultivar.



**Plate 15.2.** 'Hades' (2W-R), raised by Mrs R.O. Backhouse before 1921.

Lionel Richardson purchased a single bulb of 'Hades' from R.O. Backhouse in 1925, one of the most important acquisitions made throughout his entire career. From it he raised the fine small-cupped 'Limerick' (3W-R, 1938), holder of an Award of Merit and a First Class Certificate as an exhibition daffodil and an Award of Merit as a garden plant. He also produced the incomparable 'Kilworth' (2W-YOO, 1938) (Plate 15.3), seed parent with 'Arbar' (2W-O, 1948) (Plate 15.4) in one of the most important of all daffodil marriages. 'Limerick' raised from 'Folly' × 'Hades' proved to be

an important advance for, unlike many of the earlier cultivars with orange/red coronas, it showed considerable resistance to ‘burning’ when exposed to strong sunshine. It was probably the first white and red small-cupped cultivar raised in Ireland to show this quality, which may have come from ‘Hades’, for ‘Mahmoud’ (3W-R), raised about the same time from ‘Folly’ × ‘Sunstar’, was much more prone to this type of damage.



**Plate 15.3.** ‘Kilworth’ (2W-YOO), raised by J.L. Richardson (1938).



**Plate 15.4.** ‘Arbar’ (2W-O), the famous cultivar that acted as the pollen parent in the cross with ‘Kilworth’.

Two other cultivars were raised prior to 1921 at Sutton Court by Mrs R.O. Backhouse, each with some outstanding qualities. They were ‘Coronach’ (3W-R) and ‘Sunstar’ (3W-R), both registered in 1927. The former was one of the earliest white and red daffodils outside the *poeticus* division to possess a perianth of dazzling whiteness that provided a fine contrast to its deep red corona. ‘Sunstar’ had a fine overlapping perianth and a flower of exceptional substance. Another cultivar of the same period that later played an important part in Lionel Richardson’s breeding programme was ‘Warlock’ (2W-YYO, 1927), raised by P.D. Williams from ‘Chaucer’ (9W-R) crossed with a seedling of unknown parentage. At this point, it is important to recall P.D. Williams’ aversion to ‘Will Scarlett’, its poor perianth quality being so distasteful to him that he never used it in breeding, saying that he would not have such a daffodil on his land. It is known, however, that he acquired some of the best Backhouse seedlings to put into his breeding programme; so he may have used it, unwittingly, through an offspring, although it is unlikely that it was involved in the ancestry of ‘Warlock’. The perianth of ‘Warlock’ was in fact little better than that of ‘Will Scarlett’, its outstanding feature being a fine corona of golden-yellow shading into orange in its upper third.

The final link in the chain that provided Richardson with so many fine white and red daffodils came from the Brodie in the cultivar named ‘Forfar’ (3W-O), raised from (‘Beacon’ × ‘Fortune’) × ‘Sunstar’ and registered in 1930. ‘Forfar’ was a flower of good substance and overlapping perianth segments of creamy-white, its crowning glory being its bright orange/red corona. ‘Warlock’ and ‘Forfar’ became linked in the development of white and red daffodils at Waterford when Richardson raised ‘Monaco’ (2W-O) from ‘Warlock’ × ‘Penquite’, and later crossed ‘Monaco’ with ‘Forfar’ to produce ‘Arbar’, pollen parent in one of the most important partnerships in the history of daffodil breeding with ‘Kilworth’.

### The Early Work of J.L. Richardson

Richardson’s earliest white and red cultivars resulted from the judicious purchase of six seedling stocks from hybridists in England and Scotland, paid for largely by the sale of bulbs of ‘Glorious’ to Dutch growers. It is difficult to say which of these acquisitions has had the most influence on modern breeding. It may have been ‘Hades’ that gave rise to ‘Kilworth’: but would ‘Kilworth’ have been so influential in the evolution of white and red daffodils without ‘Arbar’, whose pedigree included ‘Coronach’, ‘Forfar’ and ‘Warlock’? It would be more realistic to say that all

played a part in the development of a range of large- and small-cupped white and red daffodils that Richardson used as the basis for his later outstanding creations. The value of ‘Kilworth’ and ‘Arbar’ is not in dispute, but several other early Richardson cultivars were responsible for producing improved forms, for example ‘Mahmoud’, from which came the outstanding ‘Merlin’ and ‘Limerick’ that were used to give strong, sun-proof colour in ‘Tulyar’ (3W-R, 1952). The relationships between the early white and red cultivars and hybrids bred by Richardson are shown in Figure 15.1.

Richardson’s important cultivars began to appear in the late 1930s, ‘Blarney’ (3W-OOY) being registered in 1935, and ‘Mahmoud’ (3W-R) and ‘Monaco’ (2W-O) in 1937. ‘Blarney’ is one of Richardson’s most distinctive and attractive daffodils, with a pure white perianth and a corona that has a narrow primrose rim over a salmon-orange base. It was a top show cultivar in its day, receiving both an Award of Merit and a First Class Certificate as an exhibition daffodil. Introduced to commerce in its year of registration, the perianth of ‘Monaco’ is also a clear white, while the corona is expanded and of mid-orange. ‘Mahmoud’ was introduced three years after ‘Monaco’ and is still regarded as a flower of exceptionally fine form, which has resulted in its continued use in breeding even though its red corona is not sun-proof. Its flower has a snow white perianth and a fluted, almost flat corona of bright, deep ruby red, which led to it being described as of a “jewel-like quality”<sup>(7)</sup>.

‘Kilworth’ and ‘Limerick’ were both registered in 1938, the former being an outstanding daffodil – reflected in its price of £15 per bulb on its introduction in 1942. The corona colour is an intensely vivid and sun-proof red, set off by an eye of green and, on the outside, by broad white perianth segments. Between 1946 and 1952, it received an Award of Merit and a First Class Certificate for exhibition, a First Class Certificate as a garden plant, and an Award of Merit and First Class Certificate from Haarlem ensuring its use, if not its success, in breeding. All that was required for success was to find a suitable partner. ‘Limerick’ was probably the finest white and red daffodil raised during the 1930s in Division 3: it had the whitest perianth of any cultivar of this type known up to that time. Its segments were broad and overlapping and made a fine colour contrast with the deep, cherry red corona, which was tolerant of bright sunshine. As measures of its fine, all-round qualities, it obtained an Award of Merit and a First Class Certificate as an exhibition flower, an Award of Merit as a garden plant, and it was recommended as a commercial cut flower following trials at Rosewarne Experimental Horticulture Station. While ‘Limerick’ has been little used, unaccountably, in the improvement of daffodils of its own kind, it was widely used, particularly by Richardson, as a means of intensifying colour in other groups, such as the doubles. It was, for example, the pollen parent of the outstanding ‘Acropolis’ and ‘Gay Time’. ‘Matapan’ (3W-R) was introduced in 1943, having been judged Best Bloom at the London Show two years earlier. Recent trials have shown it to be a daffodil of exceptional substance, while its fine colour contrast of *poeticus* white and deep orange/red makes it one of the finest daffodils in its sub-division. It had the advantage of early flowering compared to any similar daffodil, blooming up to two weeks before ‘Limerick’.

The final daffodil in this important group of early Richardson cultivars was ‘Arbar’ (2W-O), which was not registered until ten years after ‘Kilworth’. Subsequently, they joined in one of the most fruitful pairings in the history of daffodil breeding. In appearance, ‘Arbar’ was not unlike its seed parent ‘Monaco’, having a similar pure white perianth and bright orange corona, but its dimensions were much larger. Introduced in 1949, it received an Award of Merit as an exhibition flower in that year, having featured in Richardson’s winning Engleheart Cup group in 1948. Now the scene was set for a partnership between ‘Kilworth’ and ‘Arbar’ that was to revolutionise white and red daffodils.

## The ‘Kilworth’ and ‘Arbar’ Cross

The registration of ‘Arbar’ in 1948, ten years after the appearance of ‘Kilworth’, and the subsequent crosses between these cultivars from 1948 to 1956 marked a turning point in the development of white and red daffodils. The partnership engendered a larger number of excellent white and orange/red cultivars than have come from any other daffodil pairing. Unfortunately, Lionel Richardson’s final account of his work as a hybridist appeared in 1954, i.e. before the results of the first ‘Kilworth’ and ‘Arbar’ cross were known. There was, therefore, no reason for him to disclose



why he chose these two cultivars as parents because the success that they were to achieve as breeding plants was at that time unknown. The reasons for his choice can only be surmised but an examination of the characteristics of both cultivars indicates that such a pairing was a logical decision for an experienced hybridist. Both were vigorous plants. ‘Kilworth’ possessed strong and sun-proof colour in its corona, though it did have a less than perfect perianth, which showed some yellow staining at its base. ‘Arbar’, on the other hand, had a very white perianth but its cup colour was weaker. Richardson obviously saw the possibility of combining these good qualities, while simultaneously eliminating those that he considered unsatisfactory. By carrying out the cross on a large scale, he enhanced the chances of a satisfactory outcome. Not in his wildest dreams, however, could he have envisaged the extent of its success.

The ‘Kilworth’ and ‘Arbar’ cross was carried out on five occasions, a total of 2,400 seeds being sown, and it was from the largest sowing of 1,063 seeds in 1950 that most of the improved white and red daffodils came – in Divisions 2 and 3. There is little doubt that Richardson was correct in his choice of parents for, from the 2,400 seeds, 28 seedlings were considered to be of sufficient distinction to be registered – about five times the usual ratio of cultivars registered to seeds sown (Table 15.1). Richardson must have anticipated a successful outcome for, following the first pairing in 1948, he repeated it in 1950, and again in 1952 before the seedlings from the first cross had flowered; two final crosses were made in 1954 and 1956. This process might be termed saturation crossing, certainly as far as daffodil breeding is concerned. It has probably occurred on only two other occasions: with ‘King of the North’ × ‘Content’, first carried out by Guy Wilson and later repeated by G.E. Mitsch in the USA; and with Richardson’s own cross between ‘Green Island’ and ‘Chinese White’. It is unusual for hybridists to repeat successful crosses several years after making the first cross, primarily because better results are more likely to occur through the use of recent, improved cultivars that have appeared in the interim. This normally accepted practice did not, however, hold good with ‘Kilworth’ and ‘Arbar’. The wisdom of Richardson’s decision to repeat the cross on several occasions was amply demonstrated by the range of registration dates of their progeny: from the brilliantly coloured ‘Rockall’ in 1955 to ‘Anthea’ 20 years later, and the established favourite in the non-predominant large-cupped sub-division, ‘Ringleader’, which was registered as recently as 1972. Thus, Richardson established the value of repeated, large-scale crossing of the same two cultivars over a period when he might reasonably have expected their potential to be over. This practice was further endorsed when John Pearson consistently repeated the cross ‘Camelot’ × ‘Daydream’, earlier carried out elsewhere. The full list of registered cultivars from the ‘Kilworth’ and ‘Arbar’ cross is a formidable one (Table 15.1 below).

<b>Cultivar</b>	<b>Classification</b>	<b>Year</b>
‘Ancona’	2W-O	1961
‘Anthea’	2W-YRR	1975
‘Artillery’	3W-R	1961
‘Avenger’	2W-R	1957
‘Carnival’	2W-O	1958
‘Corsair’	2W-R	1955
‘Don Carlos’	2W-O	1962
‘George Leak’	2W-O	1960
‘Hotspur’	2W-O	1959
‘Kilmurry’	3W-O	1967
‘Lochinvar’	2W-O	1955
‘Lorenzo’	2W-O	1959
‘Mikado’	2W-O	1959
‘Montevideo’	2W-O	1968
‘Nantucket’	2W-O	1959
‘Norval’	2W-O	1959
‘Orion’	2W-O	1959
‘Parsifal’	2W-R	1962

'Parthia'	3W-R	1962
'Pirate King'	2W-O	1956
'Privateer'	3W-O	1958
'Relko'	2W-O	1972
'Ringleader'	2W-YYO	1972
'Rockall'	3W-R	1955
'Royal Regiment'	2W-O	1961
'Stromboli'	2W-O	1959
'Toreador'	3W-R	1961
'Victory'	2W-R	1961

**Table 15.1.** Cultivar progeny from the cross 'Kilworth' × 'Arbar' made by J.L. Richardson.

All have been successful show flowers in their time and, indeed, several are still greatly in evidence today, the most outstanding receiving the highest awards available to garden plants (Table 15.2).

Cultivar	Award	Year
'Avenger'	A.M.(e), F.C.C.(e)	1965, 1969
'Don Carlos'	A.M.(e), A.M.(g)	1964, 1971
'George Leak'	A.M. Haarlem	1969
'Kilmurry'	A.M.(e)	1969
'Norval'	A.M.(e)	1967
'Orion'	A.M.(e), A.M.(g)	1962, 1979
'Pirate King'	A.M.(e), A.M.(g)	1957, 1966
'Rockall'	A.M.(e), F.C.C.(e)	1959, 1965

**Table 15.2.** The most successful of the progeny from the 'Kilworth' × 'Arbar' cross made by J.L. Richardson. (A.M.(e) = Award of Merit (exhibition flower), A.M.(g) = Award of Merit (garden plant), F.C.C.(e) = First Class Certificate (exhibition flower).)

The selected progeny from 'Kilworth' × 'Arbar' were all considerable improvements on their predecessors and inherited one or more fine characteristics from each parent. 'Norval' and 'Rockall' had the pure white perianth of 'Arbar' and the solid deep red and sun-proof cup of 'Kilworth'. Along with 'Norval' and 'Royal Regiment', 'Lorenzo' possessed the best-quality perianth segments in the series. Those which are broadest and most overlapping are seen in 'Avenger', 'Hotspur', 'Norval' and 'Royal Regiment', while the large flower size attributable to 'Arbar' is found in 'Kilmurry', 'Mikado' and 'Rockall'. There is no doubt that the advent of these cultivars completely revised the standards by which white and orange/red daffodils were judged; in time they too were used by Richardson to improve standards still further. By crossing 'Avenger' with 'Kilworth' he raised 'Barbados' (2W-R, 1963), a daffodil with fine form, balance and colour contrast between its pure white perianth and fiery red corona. Mrs Richardson regarded it as "a super 'Avenger'"<sup>(8)</sup>. The same cross produced 'Fire Rocket' (2W-O), registered in 1967. Such an outstanding cultivar as 'Rockall' was bound to feature as a parent in breeding programmes and, by crossing it with 'Kilworth', Richardson raised a fine new generation of cultivars, including 'Rameses' (2W-O, 1960), 'Leonora' (3W-OOY, 1963), 'Honduras' (2W-O, 1968), 'Rossini' (2W-O, 1968) and 'Random Light' (2W-O, 1973). Finally, 'Kilworth' × 'Norval' gave rise to 'Prometheus' (2W-R, 1969).

The hybridists who followed Richardson also exploited his cultivars. Almost all the white and red cultivars of J.S.B. Lea, for example, contained either 'Kilworth' or 'Arbar' or both (or their progeny) among their parents. In the latter group, 'Rockall' featured prominently. Today's breeders continue to use the offspring of 'Kilworth' and 'Arbar' in their work, 'Don Carlos' being in several of B.S. Duncan's important introductions, including 'Doctor Hugh' (3W-GOO, 1975), 'Dunskey' (3W-R, 1977), 'Shandon' (2W-GOO, 1979) and 'Slowcoach' (3W-GYO, 1979). Several seedlings have also been raised from 'Norval' and 'Rockall'.

## Other Important Richardson Cultivars

Richardson raised other important white and red cultivars, of which the best known are ‘Blarney’s Daughter’ (2W-OOY, 1948), ‘Merlin’ (3W-YJR, 1956) and ‘Rameses’ (2W-O, 1960). ‘Blarney’s Daughter’, as the name suggests, was raised from ‘Blarney’ crossed with pollen from a seedling of similar type. It strongly resembles its seed parent in colour but the corona is much larger and more cup-shaped (rather than flattened). Its pure white perianth is thick-textured, the corona being deep apricot orange with a distinct bright gold rim. It received an Award of Merit in 1953 as an exhibition flower. ‘Merlin’, although registered over 50 years ago, is an outstanding daffodil and was a leading exhibition cultivar well into the 1990s, for which purpose it received an Award of Merit in 1962. It is an equally good garden plant, for which it received a similar award in 1970 following trials at Wisley. Its flower consists of a very white perianth composed of broad and rounded segments. The corona is large, flat and basically yellow, apart from the well-defined and intensely coloured red rim. The origins of ‘Rameses’ are also found in the ‘Kilworth’ and ‘Arbar’ cross, for the former cultivar is its seed parent and ‘Rockall’ the pollen parent. Until the 1990s, it was a leading exhibition cultivar in its sub-division. It was Best Bloom at the London Daffodil Show in 1960 and received an Award of Merit as an exhibition flower three years later. The flower is a combination of purest white and fiery orange, borne on a strong and vigorous plant.

## Guy L. Wilson’s Rimmed Cultivars

Wilson’s work in breeding large-cupped white and red daffodils was limited in extent. In over 50 years, he registered only eleven cultivars, none of which can claim influence in the advancement or improvement of this group. His pioneering work contributed to the small-cupped section and, especially, to rimmed cultivars, which he was largely responsible for creating. He raised the standards of this group to a new peak of perfection by which the results of later breeding work were judged.

The first of these cultivars to appear was ‘Mystic’ (3W-GWO), which initially flowered in 1917 and was registered in 1923. Wilson raised ‘Mystic’ from a small-cupped white daffodil of W.B. Hartland known as ‘Miss Weisse’ and a seedling that he described as “a cool-eyed Poet of Engleheart”<sup>(9)</sup>. The result was a most beautiful daffodil that had an ivory coloured perianth suffused with a tinge of green. The corona was flat and wide, apple green at its centre, shading into a band of white before reaching the rim of pinky orange. ‘Mystic’ was only one of several seedlings raised from ‘Miss Weisse’ and Engleheart’s *poeticus* seedling, but even at its first flowering Wilson realised that he had broken new ground. It was, he said: “A truly exquisite flower in which cool, quiet and extremely delicate colouring has attained a superlative degree of refinement.”<sup>(10)</sup>

During the 1920s, Wilson attempted to develop the ‘Mystic’ type of flower. Here was a new type of daffodil that had been readily accepted by daffodil enthusiasts and show judges alike, having received an Award of Merit as an exhibition flower in 1928. In this endeavour, Wilson decided to use ‘Mystic’ as the pollen parent and chose Engleheart’s *poeticus* hybrid ‘Dactyl’ (9W-GYR) as its partner. The first of the new generation of rimmed cultivars to appear from this cross was ‘New Moon’ (3W-WWO), registered in 1930. It possessed the largest flower of any in the series from ‘Dactyl’ × ‘Mystic’, having a wide, spreading perianth, and a broad, saucer-shaped corona that was entirely white apart from the conspicuous marginal bank of golden orange.

‘Grey Lady’ (3W-WWP) was registered in 1935. At its first flowering, some five years earlier, Wilson had described it as a daffodil with “a lovely snow white perianth and an eye edged with clear salmon red, and with a grey green centre”<sup>(11)</sup>. In form, ‘Grey Lady’ was unlike any others in the series, closely resembling *N. poeticus* with its pure white, somewhat reflexing perianth and small, shallow, red rimmed cup. It received an Award of Merit as an exhibition flower in 1940 when it was described as: “A dainty, small crowned Leedsii variety of the ‘Mystic’ type.”<sup>(12)</sup> ‘Dreamlight’ (3W-GWR) was a sister seedling to ‘Grey Lady’, which Wilson felt was “a very good flower with a snowy, blue-white perianth and very pale citron eye with a dark cerise rim”<sup>(13)</sup>. The flower was somewhat larger than that of ‘Grey Lady’ but the flower stems were short at only 37.5 cm. It had, however, a spectacular corona, consisting of a pale green eye leading to a well-defined central band of white and

a rim described as “fire red”<sup>(14)</sup>. ‘Dreamlight’ received two Awards of Merit, as an exhibition flower in 1938 and from Haarlem in 1949. ‘Columbine’, registered in 1934, differed from other cultivars in the series in that the orange corona rim was much broader, while the typically reflexed *poeticus* type perianth was gently waved. The final cultivar in the series was ‘Misty Moon’ (3W-WOO), registered in 1936. Its perianth was very *poeticus*-like – pure white, smooth, rounded and slightly reflexed. Its corona had a mere hint of green in the eye, passing to white and, finally, to the distinct, fluted orange rim. The appearance of ‘Misty Moon’ did nothing to dampen Wilson’s enthusiasm for this type of daffodil. He raised several others later in his career, including ‘Clockface’ (3W-YYO, 1947), ‘Fairy Tale’ (3W-YYO, 1952) and ‘Lough Areema’ (3W-GWO, 1952). A summary of the cultivars in the ‘Dactyl’ × ‘Mystic’ series is given in Figure 15.2.

## Other Irish-raised Cultivars

The hybridists of more recent times in Ireland have had only moderate success in breeding white and red daffodils, at least in terms of numbers of cultivars registered. However, compared with their predecessors, the best of those that have come forward have lacked nothing in quality. Among the best are ‘Enniskillen’ (3W-R, 1952) and ‘Irish Splendour’ (3W-R, 1962), both raised by Dunlop, ‘Maid of Ulster’ (2W-YYR, 1964) (Plate 15.5) from Bloomer, Harrison’s ‘Northern Sceptre’ (2W-YYR, 1975), and Duncan’s ‘Doctor Hugh’ (3W-GOO, 1975).



**Plate 15.5.** ‘Maid of Ulster’ (2W-YYO), a beautiful rimmed daffodil raised by T. Bloomer (1964).

White and red daffodils were Dunlop’s favourite type and main area of breeding. His early work resulted in some fine cultivars, such as ‘Glenwherry’ (3W-R, 1947) and ‘Kildrum’ (3W-R, 1950), both of which had that old favourite ‘Sunstar’ in their parentage. It was, however, ‘Enniskillen’, registered in 1952, which was his first outstanding contribution to white and red daffodils. In choosing its parents it may have appeared that Dunlop was taking a backward step for both ‘Folly’ and ‘Hades’ had been around a long time and had been crossed, in fact, many years earlier by Lionel Richardson to produce ‘Limerick’. Rather than being a backward step, however, the cross proved to be a leap forward: for ‘Enniskillen’ was a flower of “startling brilliance”<sup>(15)</sup>, with its smooth overlapping perianth of purest white and its corona of greenish-gold in the centre, passing to deep sealing-wax red. Yet Dunlop’s finest achievement with this type of daffodil was ‘Irish Splendour’ (3W-R), raised from ‘Red Hackle’ crossed with a seedling of unknown origin. It had flowers of vivid colour and superb quality. It is capable of producing some of the largest flowers in its sub-division for, when well grown, its perianth can measure 12.5 cm across. Because of its fine qualities, several attempts have been made to use ‘Irish Splendour’ in breeding. It has been used most often as the pollen parent but with little success: the reason for this is now known to be the exceedingly low viability of its pollen.

One of the outstanding modern rimmed cultivars is ‘Maid of Ulster’ (2W-YYR), a highly desirable daffodil of breathtaking beauty when well grown. It was raised from ‘Fermoy’ × ‘Arbar’ by Tom Bloomer and was registered in 1964. Its vivid colour contrast – of smooth, white perianth and predominantly yellow corona with a deep red rim – makes it one of the brightest of all rimmed daffodils.

Bloomer also registered a substantial number of other large and small-cupped white and orange/red daffodils during the 1960s. Most of these appeared in 1964 in two series, with cultivar names prefixed ‘Silent’ and ‘Woodland’, although there was a considerable variation in the parental material used to produce both series. ‘Corofin’ (3W-YYR) × ‘Hamzali’ (3W-WYR) was, however, a

favourite cross of Bloomer's at the time, appearing in both series and also in the later 'Dress Circle' (3W-YYR, 1976). The white and orange/red members of these series are:

'Silent Beauty' (3W-YYR, 1964)	'Woodland Beauty' (3W-R, 1964)
'Silent Charm' (3W-YYR, 1962)	'Woodland Belle' (3W-YYR, 1964)
'Silent Cheer' (3W-YYR, 1964)	'Woodland Charm' (3W-R, 1964)
'Silent Glow' (3W-R, 1964)	'Woodland Elf' (3W-YYR, 1964)
'Silent Grace' (3W-YYR, 1964)	'Woodland Gem' (3W-YYR, 1970)
'Silent Morn' (3W-YYO, 1964)	'Woodland Jewel' (3W-R, 1970)
'Silent Wonder' (3W-YYO, 1964)	'Woodland Knight' (3W-YYR, 1964)
	'Woodland Splendour' (3W-R, 1970)
	'Woodland Star' (3W-R, 1962)

The best known of these are 'Silent Beauty' and 'Woodland Star'. The former was a striking exhibition daffodil of large size, with very broad, white perianth segments, and an expanded flat cup of deep yellow with a rim of intense red. 'Woodland Star' is a daffodil with many successes on the show bench, owing to its consistency and striking colour of white perianth and deep red expanded corona. 'Dress Circle' is a large daffodil of 'Merlin' colouring and of exhibition quality. Another fine addition by Bloomer to the white and orange daffodils is 'Bandolier' (3W-OOY), registered in 1977. It was raised from 'Irish Splendour' crossed with 'Orion' (2W-O). Because of its impeccable ancestry, 'Bandolier' has the qualities of attractive and sun-proof colouring. The flower stems are very vigorous at over 60 cm and the flowers last for a long time.

Another of these outstanding introductions from Ireland was 'Doctor Hugh', raised from 'Mahmoud' × 'Don Carlos' by Brian Duncan. It was named in memory of Dr Hugh Watson, who for many years was an influential daffodil enthusiast in Northern Ireland. It is interesting to note that although 'Mahmoud' was registered as long ago as 1937, its excellent qualities have in no way dated, for it possesses a perfection of form that even modern cultivars find difficult to surpass. This characteristic was passed on to 'Doctor Hugh', which acquired its good size from 'Don Carlos', one of the fine offspring from the 'Kilworth' and 'Arbar' cross of Richardson. The perianth segments of 'Doctor Hugh' have a *poeticus* whiteness and its corona is a brilliant orange-red with a green eye. It was described as a most impressive introduction of its type and the cultivar most likely to become the standard for future breeding.

## Lea's White and Orange/Red Daffodils

J.S.B. Lea was the outstanding hybridist of recent times, famed particularly for the intensity of colouring of his cultivars. In terms of numbers of introductions of improved white and orange/red and yellow and orange/red daffodils, he may be regarded as the natural successor to J.L. Richardson; it was he who shifted the sphere of influence for this type of daffodil from Ireland to England. The outstanding quality of his cultivars was reflected in his show successes, of which the award of the Engleheart Cup was the pinnacle of achievement. Lea won this trophy on no less than twelve occasions, ten of these triumphs being in consecutive years from 1975 to 1984. This achievement has only been bettered by J.L. Richardson himself, who won the Engleheart Cup 25 times with eleven consecutive wins between 1946 and 1956.

Lea's first registrations took place during the 1960s with such cultivars as 'Borrobol' (2W-R) and 'Loch Assynt' (3W-YYO) in 1963, and 'Ben Loyal' (2W-O) and 'Eribol' (2W-R) in the following year. All these owed much to the earlier work at Waterford and had cultivars such as 'Kilworth', 'Arbar' and 'Syracuse' in their parentage. 'Eribol' is particularly interesting for, while raised from Richardson's famous pairing of 'Kilworth' and 'Arbar', the role of these parents was actually the reverse of that which produced so much success for the Irish hybridist. During the 1970s, a considerable number of cultivars were registered which featured in Lea's successful Engleheart Cup entries of that period, including 'Rubh Mor' (2W-O, 1971) and the fine 'Cairntoul' (3W-YOO, 1978). Both owed much to Richardson cultivars, the latter being from 'Merlin' × 'Rockall', while the former

came from ‘Borrobol’ with its strong ‘Arbar’ background. ‘Cairntoul’ is a striking daffodil whose flower consists of a fine white perianth and a flat, bright-red corona carried on a tall, strong stem. It was the winner of the Single Bloom class in London in 1977 and featured in five successful Engleheart Cup entries. ‘Rubh Mor’ has very large flowers of pure white and bright orange/red, which are especially long lasting. It featured in four Engleheart Cup entries.

In the 1980s, new introductions included ‘Ben Vorlich’ (2W-YOO, 1987) and ‘Loch Alsh’ (3W-YYO, 1988). The Richardson influence featured strongly once again, with ‘Rockall’ present in the former, and ‘Arbar’ in the latter through its pollen parent ‘Loch Assynt’. As many of Lea’s fine white and orange/red cultivars are readily obtainable at reasonable prices, a comprehensive list of his cultivars is given in Table 15.3.

<b>Cultivar</b>	<b>Parentage</b>	<b>Colour</b>	<b>Registration</b>
‘Arndilly’	(‘Rose Caprice’ × ‘Rose of Tralee’) × (‘Rose Caprice’ × Seedling)	2W-R	1972
‘Badanloch’	Seedling × ‘Dalhauine’	3W-YYO	1979
‘Ben Loyal’	Seedling × (‘Arbar’ × ‘Fayum’)	2W-O	1964
‘Ben Rinnes’	(‘Kilworth’ × ‘Arbar’) × Seedling	3W-R	1972
‘Ben Vorlich’	Seedling × ‘Rockall’	2W-YOO	1987
‘Borrobol’	‘Arbar’ × (‘Red Hackle’ × ‘Carnsore’)	2W-R	1963
‘Cairntoul’	‘Merlin’ × ‘Rockall’	3W-YOO	1978
‘Colley Gate’	‘Merlin’ × ‘Rockall’	3W-YOR	1985
‘Cul Beag’	Seedling × (‘Arbar’ × ‘Arbar’)	3W-R	1963
‘Dalhauine’	‘Green Island’ × Seedling ((‘Easter Moon’ × ‘Homage’) × (‘Arbar’ × ‘Arbar’))	3W-R	1971
‘Eribol’	‘Arbar’ × ‘Kilworth’	2W-R	1964
‘Glendarroch’	‘Loch Assynt’ × ‘Purbeck’	3W-YOO	1987
‘Halgarry’	Seedling × ‘Colley Gate’	3W-YYR	1985
‘Hartlebury’	Seedling × Seedling	3W-ORR	1987
‘Loch Alsh’	Seedling × ‘Loch Assynt’	3W-YYO	1988
‘Loch Assynt’	‘Syracuse’ × (‘Arbar’ × ‘Arbar’)	3W-YYO	1963
‘Loch Broom’	Seedling × ‘Ohio’	3W-ORR	1979
‘Loch Brora’	(‘Arbar’ × ‘Arbar’) × (Seedling × ‘Brahms’)	2W-O	1979
‘Loch Coire’	(‘Loch Assynt’ × ‘Merlin’) × ‘Purbeck’	3W-R	1983
‘Loch Turnaig’	‘Eribol’ × Seedling (‘Rockall’ × Seedling (‘Matapan’ × ‘Loch Crewe’))	2W-R	1979
‘Rubh Mor’	Seedling × ‘Borrobol’	2W-O	1972
Seedling	Unregistered cultivar of unknown parentage		

**Table 15.3.** White and orange/red cultivars bred by J.S.B. Lea and still obtainable.

### Other Recent White and Orange/Red Cultivars

Of the white and orange/red cultivars registered since the late 1950s, there are several, in addition to those already mentioned, which became well known as exhibition daffodils. These are to be found predominantly among the small-cupped daffodils. The most successful of these have been ‘Kimmeridge’ (3W-YYO, 1966), raised by David Blanchard and ‘Purbeck’ (3W-YOO, 1971) and ‘Osmington’ (3W-R, 1974), both of which resulted from the work of John Blanchard. ‘Kimmeridge’ is well known for its fine glistening perianth. ‘Osmington’ regularly featured among the leading predominant cultivars at the premier shows; ‘Purbeck’, with its beautifully proportioned flowers of sparkling white perianth and orange-rimmed corona, is still prominent in this role. It is a show flower of very consistent form, being Best Bloom at the London Daffodil Show in 1973.

Among the more recent large-cupped daffodils, perhaps three may be singled out for special mention: 'City Lights' (2W-YYR, 1957), 'Kentucky Cardinal' (2W-R, 1966) and 'Thoresby' (3W-YYO, 1975). 'City Lights' was raised in New Zealand by D.S. Bell from 'Fairy Mother' × 'Green Island' and was a favourite exhibition daffodil in the non-predominant class in that country; it has a very rounded flower of exceptional substance. 'Kentucky Cardinal' was raised in England by de Navarro, having 'King Cardinal' and 'Brahms' as its parents. J.M. de Navarro directed considerable efforts towards the breeding of sun-proof reds and 'Kentucky Cardinal' is one of the fine results of this programme. The flower is smooth-textured with a pure white perianth, which forms a fine background for the brilliant red crown. It has the ability to retain its cup colour even under adverse weather conditions. 'Thoresby' was raised by Mrs Abel Smith from 'Hamzali' × 'Aircastle'. It was an exhibition daffodil of superb quality that was Best Bloom at the Daffodil Society Show in 1981.

### **White and Orange/Red Daffodils 1980-2010**

This combination of colours is most often found in Divisions 2 and 3, but progress has been made since the 1980's in Division 1 with cultivars from 'Crucial Point' (1W-O, J.Radcliff, 1987) to 'Role Model' (1W-O, Grant Mitsch Daffodils, 2010). Only one 1W-R has been registered to date ('Flaming Silk', J.R.Reed, 2007). The colour code formulae 2W-O/R, 2W-YYO/R, 3W-O/R and 3W-YYO/R indicates solid or rimmed cup colour.

#### ***The large-cupped orange/red daffodils (2W-O/R)***

A clear pattern of success was evident from 1980 to 1992 with two cultivars dominating this section. These were 'Hotspur' (Richardson, 1959) and 'Rameses' (Richardson, 1960). During the late 1990s, 'Young Blood' (Duncan, 1983) and 'Royal Marine' (Lea, 1989) became much more prominent. The leading cultivars in 2004 were 'Royal Marine', 'Young Blood' and 'Neon Light' (Postles, 1995) in first, second and third positions respectively. Other successful cultivars were 'Wychavon' (Lea, 1991) and 'Powerstock' (Blanchard, 1997) together with the much older 'Rameses'. This again linked back to the most productive cross of 'Kilworth' × 'Arbar', 'Rameses' being raised from 'Kilworth' × 'Rockall', the latter being a product of 'Kilworth' × 'Arbar'. 'Young Blood' is now the leading cultivar in this group, with the much older 'Hotspur' still maintaining its challenge along with 'Wychavon' and 'Magna Carta' (Duncan, 1987).

#### ***The large-cupped orange/red daffodils (2W-YYO/R)***

'Ringleader' (Mrs Richardson, 1972) has been the outstanding cultivar in the non-predominant section over the past 25 years and remained at the top in 2004. Older cultivars also held second and third places in 2004, these being 'Northern Sceptre' (Ballydorn, 1975) and 'Bandit' (Brodden, 1966). Newer cultivars beginning to make a mark were 'Glen Lake' (Kiernan, 1977), raised in Co. Longford, Ireland, and 'Fairlight Glen' (Burr, 1991). Since 2004, there has been little change in this class, with 'Ringleader' still the outstanding cultivar.

#### ***The small-cupped orange/red daffodils (3W-O/R)***

'Rockall' (Richardson, 1955) and 'Doctor Hugh' (Duncan, 1975) were invincible in this section throughout the period 1980 to 2000 and still held third and first place respectively in 2004. Second in 2004 was 'Cairntoul' (Lea, 1978), while the newer cultivars 'Crimson Chalice' (Duncan, 1987) and 'Hartlebury' (Lea, 1987) were beginning to enjoy success. 'Doctor Hugh' is currently the dominant leader in this class, with 'Cairntoul', 'Afficionado' (Jackson's Daffodils, 1987) and 'Cavalryman' (Duncan, 1997) vying for the minor places.

#### ***The small-cupped orange/red daffodils (2W-YYO/R)***

In this section, 'Merlin' (Richardson, 1956), which has been around for even longer than 'Ringleader', was still the leading cultivar in 2004. 'Merlin' had been accompanied throughout the 1980s and 1990s by 'Purbeck' (Blanchard, 1971), and in 2004 occupied second place with 'Royal Princess' (Abel Smith, 1985) third. Other cultivars that vied recently with the outstanding duo 'Merlin' and 'Purbeck' are 'Badanloch' (Lea, 1979), 'Loch Alsh' (Lea, 1988), 'Glen Alladale' (Lea,

1991) and 'Sugar and Spice' (Pearson, 1994). At present, 'Purbeck' and 'Shurdington' (Postles, 2004) are the top cultivars in this non-predominant class, with 'Merlin' still successful and 'Carole Lombard' (Postles, 1991) an up-and-coming contender.

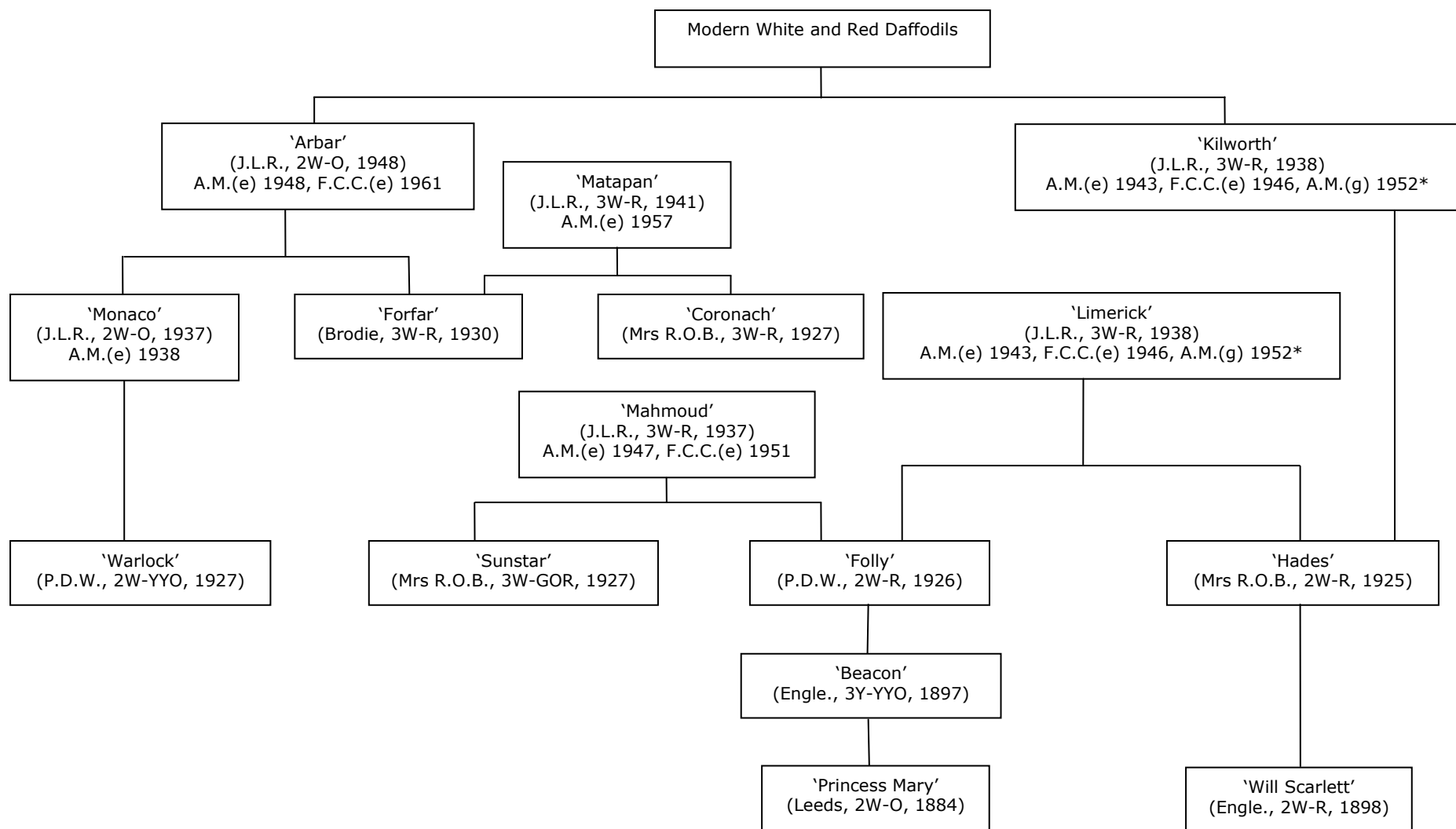
Unlike the double or the pink daffodils, there was not a single incident that defined the subsequent development in the white and orange/red daffodils; rather it was an amassing of several. In the case of the doubles, it had been the chance pollination of 'Mary Copeland' by some errant insect which fortunately knew its tetraploids from its diploids when it earlier decided to visit 'Dulcimer'. Perhaps it was the exquisite *poeticus* scent that made the choice inevitable. The errant insect cannot be blamed for the loss of two chromosomes in the resultant offspring 'Falaise', which made it a fertile mother. In the case of the pinks it was the bringing together, in ignorance, of the red of *poeticus* with the white of *moschatus* and its ilk.

With the whites and orange/reds it was a series rather than a single event that determined progress. It began in the mid-19th century when Leeds raised 'Princess Mary'. 'Will Scarlett' came next, with its stunning corona colour and deeply disturbing perianth. Many hybridists would have gladly condemned 'Will Scarlett' to a terrible place so perhaps it was inevitable that the next big player was 'Hades'. The final pieces of the jigsaw fell into place when Richardson brought 'Kilworth' and 'Arbar' together, not once but on several occasions. The presumed reasoning behind Richardson's decision to cross these two cultivars and then to repeat the cross several times, without knowing the results from his earliest efforts, had an inevitability rooted in the characteristics of both parents, which he had the ability to assess so accurately.

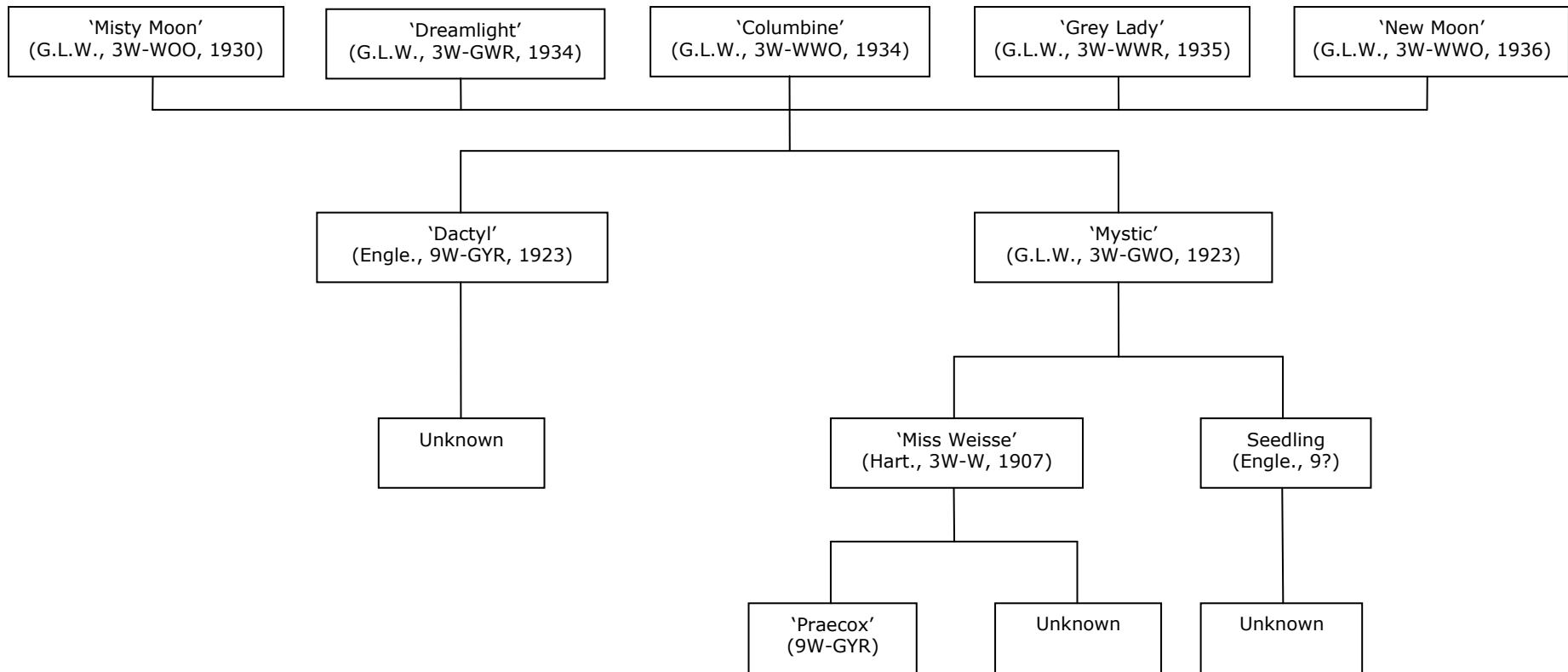


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**Figure 15.1.** The relationships between the early white and red cultivars and the hybrids of J.L. Richardson. (Abbreviations for breeders: Brodie = Brodie of Brodie, Engle. = G.H. Engleheart, J.L.R. = J.L. Richardson, Leeds = E. Leeds, Mrs R.O.B. = Mrs R.O. Backhouse, P.D.W. = P.D. Williams. A.M.(e) = Award of Merit (exhibition), A.M.(g) = Award of Merit (garden plant), A.M.(Haarlem) = Award of Merit (Haarlem), F.C.C.(e) = First Class Certificate (exhibition), F.C.C.(g) = First Class Certificate (garden plant), F.C.C.(Haarlem) = First Class Certificate (Haarlem), \* award made after trial at RHS Garden Wisley.)



**Figure 15.2.** Daffodil cultivars in the 'Dactyl' × 'Mystic' series. (Abbreviations for breeders: Engle. = G.H. Engleheart, G.L.W. = Guy L. Wilson, Hart. = W.B. Hartland.)

## CHAPTER 16

### THE YELLOW AND ORANGE/RED DAFFODILS

#### Beginnings

Daffodils of this colour combination originated in *N. pseudonarcissus* and *N. poeticus*, and in several other major cultivar groups. The wild hybrids from such crosses are of considerable antiquity, examples in horticultural literature dating back to the *Hortus Floridus* of de Passe in 1614<sup>(1)</sup>, and to Parkinson's *Paradisus Terrestris* (1629)<sup>(2)</sup>. The variability in the colours of hybrids from these parents is illustrated in Plates 18 and 19 of Burbidge's *The Narcissus: its history and culture* (1875)<sup>(3)</sup>. Breeding eventually combined a yellow perianth with a yellow corona, initially with a red rim. Later the red corona colour was developed until it predominated, giving rise to coronas which were wholly orange or red. Even more recently, the orange corona colour has been induced to appear in the perianths of a few cultivars, the cup colour of these usually being reddish. Owing to their trumpet and *poeticus* ancestry, many hybrids found in the wild have coronas intermediate in length between those of the trumpet *N. pseudonarcissus* and the shallow crowned *N. poeticus*. These wild hybrids have been known by many names, including *Narcissus* × *incomparabilis*, *N.* × *abscissus*, *N.* × *incomparabiliformis*, *N.* × *juratensis* and *N.* × *sabinii*. As *N.* × *incomparabilis* was the earliest name applied to wild hybrids resulting from crosses between *N. pseudonarcissus* and *N. poeticus*, this is the only valid name under the priority rule.

#### Early Cultivars

On account of their ancestry, most yellow and orange/red daffodils fall into the large-cupped category. Numerous examples also occur within Division 3 but trumpet daffodils in these colours are uncommon.

Several cultivars raised by William Backhouse appeared in the mid-19th century. These included 'Barrii Conspicuus' (3Y-YYO), 'C.J. Backhouse' (2Y-O) and 'Gloria Mundi' (2Y-O), syn. 'J.D.T. Llewelyn', all registered in 1884 although their origins date back to pre-1869. 'Blackwell' (2Y-O), though only registered in 1907, was already known by that name well before this date as this too had been raised by William Backhouse before 1869. Remarkably, 'Barrii Conspicuus', registered in 1884, is still relatively easy to obtain over 120 years later. Robert Sydenham described it in his *All About Daffodils* (1913)<sup>(4)</sup> as "still one of the most popular varieties grown", while the Bourne Catalogue of 1913<sup>(5)</sup> listed it as "an old but useful flower, strongly recommended". It had a broad perianth of pale yellow and a short, expanded corona of yellow, richly edged with dark orange-scarlet. 'C.J. Backhouse' was described as being "the best of its class"<sup>(6)</sup>. It was a showy yellow flower with bright orange-scarlet spreading two-thirds of the way down the corona. 'Gloria Mundi' possessed broad, overlapping perianth segments noted for their flatness. The corona was solid rich orange-scarlet, which in some seasons and some soils could appear very red indeed. 'Blackwell' was of similar colour with a characteristically crinkled corona. It was very early flowering for this type of daffodil and, consequently, was extensively used in forcing. Regrettably, very little is known of the parentage of the Backhouse cultivars, except for 'Barrii Conspicuus', which had *N. poeticus* var. *recurvus* as its seed parent. 'Barrii Conspicuus' has remained a popular and colourful garden daffodil to this day.

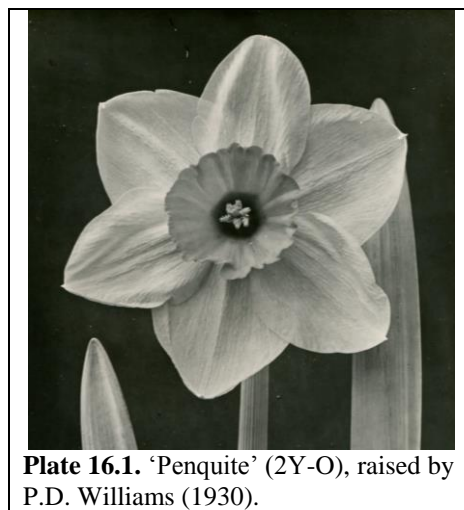
Somewhat later to appear was Engleheart's 'Helios' (2Y-O, 1912), which was introduced at the London Daffodil Show in 1912 where it gained, unanimously, an Award of Merit. Its appearance caused a sensation due to the size, substance and great durability of its flowers. The perianth segments are deep yellow and overlapping, and the corona a uniformly deep orange.

## P.D. and J.C. Williams

The Williams, who were cousins, are best remembered for their work in raising brightly-coloured yellow and orange/red daffodils, P.D. Williams being especially noteworthy in this respect. Particularly important are his cultivars ‘Killigrew’ (2Y-O, 1907), ‘Damson’ (2Y-R, 1925), ‘Gulliver’ (3Y-YYO, 1927), ‘Porthilly’ (2Y-O, 1927), ‘Tregoose’ (2Y-O, 1927), ‘Penquite’ (2Y-O, 1930), ‘Trevisky’ (2Y-O, 1930) and ‘Scarlet Elegance’ (2Y-YRR, 1938). J.C. Williams raised the influential ‘Croesus’ (2Y-YYO, 1912) and ‘Hospodar’ (2Y-O, 1914). No records remain of the parentage of the P.D. Williams’ hybrids, if indeed any ever existed: but it is known that ‘Croesus’ came from ‘Princess Mary’ × Seedling (which contained ‘Princess Mary’), while the parentage of ‘Hospodar’ was ‘Firebrand’ × ‘King Alfred’. According to Lionel Richardson, writing in 1954 of his experiences in raising new daffodil cultivars:

“It was not until 1922 that I really started raising in earnest when I visited the gardens of some of the well-known raisers such as the late P.D. Williams in Cornwall . . . . From Mr. Williams I purchased some of his highly-coloured red and yellow seedlings and with these I laid the foundation of my breeding stocks, which today are producing the most brightly-coloured seedlings yet seen.”<sup>(7)</sup>

The three stocks that Richardson acquired from P.D. Williams were ‘Penquite’, ‘Porthilly’ and ‘Tregoose’. ‘Penquite’ (Plate 16.1) had a stiff and sturdy flower, with rounded and overlapping perianth segments of soft lemon-yellow and a fluted, bowl-shaped cup in orange. It was a good show flower in its time and received an Award of Merit for this purpose in 1932. If it had a fault, this lay in its rather indifferent growth, which gave rise to poor bulbs and a slow rate of bulb increase. ‘Porthilly’ had pale-lemon perianth segments, with unusual whitish tips that developed into a pale central streak. The corona was bright orange-red and fluted. The only fault that Richardson ascribed to it was that it produced “ugly, long-necked bulbs”<sup>(8)</sup>. This apart, it was one of the very finest cultivars of its type available during the 1930s. It received an Award of Merit in 1933 and a First Class Certificate in 1936 as an exhibition flower, and an Award of Merit as a garden and market flower in 1939. Recent trials have shown it to be a much more vigorous plant than ‘Penquite’ although, by today’s more critical standards, the neck of the flower extends too much in water. Nor is its flower substance of sufficient quality for it to be recommended as a commercial cut bloom. As breeding parents, both ‘Penquite’ and ‘Porthilly’ behaved in much the same way as ‘Arbar’ – producing many fine offspring when used as the pollen source, but remarkably few when used as the seed parent. ‘Tregoose’ was considered to be of good quality when registered in 1927, for it received an Award of Merit as an exhibition flower in that year, and another from Haarlem in 1931. Yet, candidly outspoken as ever, Richardson later described it as “a roughish article with a muddy yellow petal”<sup>(9)</sup>. What was it, then, that induced Richardson to buy the stock in the first place? There were several features that made it attractive to him. It had, for example, one of the most solid orange cups of any contemporary daffodil; a flower of large size, “fully 4½” [11.25 cm] across”<sup>(10)</sup>, while the plant itself was exceptionally tall and vigorous.



**Plate 16.1.** ‘Penquite’ (2Y-O), raised by P.D. Williams (1930).

Of the J.C. Williams’ cultivars, it was ‘Croesus’ that received the honours in the form of an Award of Merit and a First Class Certificate. The Award of Merit was as a garden plant; the First Class Certificate was awarded in 1912 when the plant was first shown and in reality this award was as an exhibition flower though this was not specified as such because, at that time, the category did not exist. Nonetheless, it was his ‘Hospodar’ that earned a place in daffodil history through its offspring – ‘Diolite’, ‘Marksman’ and ‘Rustom Pasha’ raised by Miss G. Evelyn.

## Miss G. Evelyn's Famous Trio

Very few daffodil breeders, if any, have raised only a handful of cultivars and then seen three of them go on to receive six Awards of Merit and two First Class Certificates. This was the remarkable achievement of Miss G. Evelyn and her famous trio of 'Diolite' (2Y-YYO) (Plate 16.2), 'Marksman' (2Y-O) and 'Rustom Pasha' (2Y-O) (Plate 16.3), all of which were registered in 1930.



**Plate 16.2.** 'Diolite' (2Y-YYO), raised by A.M. Wilson/G. Evelyn (1930).



**Plate 16.3.** 'Rustom Pasha' (2Y-O), raised by A.M. Wilson/G. Evelyn (1930), a cultivar that showed considerable resistance to sun scorch.

Still more significantly, the trio played an immeasurably important role in the development of yellow and orange/red daffodils. All three were present in the *Classified List*<sup>(11)</sup> published in February of the following year, by which time Richardson had visited Miss Evelyn in Presteigne, Powys and acquired single bulbs of six cultivars including the three named above. The *Classified List* indicates that A.M. Wilson registered 'Marksman', he being a near neighbour of Miss Evelyn, residing in Presteigne from 1918, where he carried out an extensive programme of daffodil hybridisation. Indeed, there seems to have been a strong case for A.M. Wilson as the hybridiser of this trio of cultivars. Richardson certainly maintained that the hybridisation that gave rise to them was carried out by Wilson, who subsequently gave Miss Evelyn the seed to grow on.

'Marksman' and 'Rustom Pasha' first appeared in Richardson's catalogue in 1933<sup>(12)</sup>. 'Diolite' made its appearance in the following year. Richardson described 'Marksman' as "a flower of astonishingly brilliant colour", with its broad flat perianth of golden-yellow and crown of "fierce orange red". At £7 per bulb, it was one of the most expensive items in his list, 'Fortune' itself costing only slightly more. 'Rustom Pasha', a tall vigorous plant, was described in the 1933 catalogue as a large flower of "intense colour". By 1934, Richardson appreciated the ability of its corona to resist sun scorch: its "colour holds well in the sun"<sup>(13)</sup>. In 1935, he described it as "absolutely sun-proof"<sup>(14)</sup> and had come to realise its uniqueness in this respect. During his 1930 visit to Presteigne, Richardson purchased six single bulbs from Miss Evelyn, and later described this event as "the best day's buying I ever did, for they all proved outstandingly good flowers"<sup>(15)</sup>. The main quality of 'Diolite', and the one that particularly caught Richardson's attention, was the perfect smoothness of its perianth segments. Many of its offspring, such as 'Bombay' and 'Karachi', possessed this same characteristic. 'Marksman' was a fine cultivar too and won an Award of Merit as an exhibition flower and for cutting and an Award of Merit and First Class Certificate as a garden plant: but its most outstanding contribution to modern daffodils came when a cross with 'Diolite' produced 'Ceylon'.

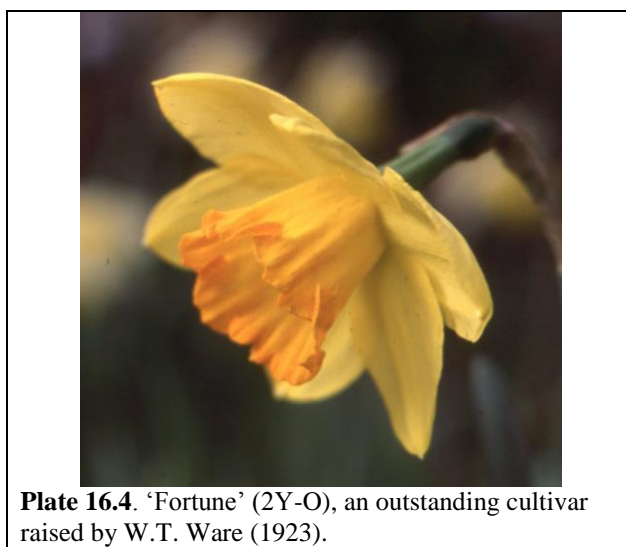
Mention must also be made of A.M. Wilson's role in the raising of another exceptionally fine yellow and orange daffodil, which he named 'Carbineer' (2Y-O). Its parentage was 'Gulliver' crossed with an unknown pollen parent. Richardson acquired stock of 'Carbineer' to further his breeding programme and, characteristically fulsome about his own success, was in no doubt of its quality:

"It is one of the best plants I have ever grown; it has everything to recommend it, a good solid durable flower, well-placed on a nice stiff stem held well above its foliage and, last but not least, a lovely bulb in the hand."<sup>(16)</sup>

'Carbineer' possessed pointed perianth segments of bright, deep lemon-yellow, which were broad and overlapping, and its fluted corona was orange/red. It received a plethora of commendations: an Award of Merit in 1931 and a First Class Certificate in 1938 as an exhibition flower; Awards of Merit as a garden plant and market flower in 1940; and also from Haarlem for the latter purpose in 1941. It still thrives today, being a standard cut flower variety. It featured very prominently in the Waterford breeding programme and helped to generate many notable cultivars, including 'Peiping' (2Y-O, 1939), 'Narvik' (2Y-O, 1940), 'Nigeria' (2Y-YYO, 1942), 'Revelry' (2Y-O, 1948), 'Palestine' (2Y-YOO, 1951), 'Border Chief' (2Y-O, 1953) and 'Vulcan' (2Y-O, 1956). 'Revelry', in particular, was a flower of outstanding smoothness. Richardson deservedly became famous for his development of yellow and orange/red daffodils. Together with his own frank attribution, the ancestry of his long list of cultivars clearly indicates that most of them arose as a result of his astute purchase of some seven or eight cultivars in Cornwall and Wales in the 1920s and early 1930s.

### 'Fortune' – The Magnificent

During the 1920s, one cultivar hit the headlines more than any other. Its name was 'Fortune' (2Y-O, 1923) (Plate 16.4) and fortunes, it was said, were made from its sale. Brodie paid its raiser, Walter Ware, £80 for two bulbs. Richardson announced that 'Fortune' was: "The most expensive bulb that I ever catalogued, namely £40 apiece in 1925, a lot of money in those days."<sup>(17)</sup> Guy Wilson talked of being able to hold bulbs of 'Fortune' in one hand that were worth more than a field of corn. Clearly, 'Fortune' was a magnificent cultivar. Together, its origins, survival, successes and use in breeding constitute one of the most unusual stories in the entire history of daffodil development.



**Plate 16.4.** 'Fortune' (2Y-O), an outstanding cultivar raised by W.T. Ware (1923).

'Fortune' was discovered in a bed of mixed seedlings in 1915 by Walter T. Ware, who grew daffodils for market on a large scale in the village of Inglescombe, near Bath, in Somerset as well as at other bulb farms in various parts of England. Apparently, although he was a successful grower of commercial flower crops, Ware's attempts at breeding produced no lasting successes – other, that is, than 'Fortune'. It was first exhibited in the year of its discovery at the Midland Daffodil Society's Show in Birmingham, featuring in an exhibit of twelve seedlings raised by the exhibitor that was awarded the Bourne Challenge Cup.

Clearly, having been found among mixed seedlings, the parentage of 'Fortune' is unknown. However, this did not prevent various theories being advanced as to its possible parents. Strong contenders for this honour were 'M.J. Berkeley' (1Y-Y) or 'King Alfred' (1Y-Y), crossed with a strongly-coloured cultivar, such as 'C.J. Backhouse' (2Y-O). Nevertheless, throughout the debate, Mr Ware and his son-in-law, C.C. Titchmarsh, insisted on various occasions that 'Fortune' had indeed been found in a bed of mixed seedlings; therefore, its parentage could not be ascertained. Mr Ware's manager, J. Firmin, however, thought that 'Fortune' came from a cross between 'Blackwell' (2Y-O) ×

‘Sir Watkin’ (2Y-Y). He recalled that while ‘Blackwell’ was frequently used by Mr Ware as a seed parent, it only ever produced one seed pod. Mr Firmin believed that ‘Fortune’ came from this pod.

In 1915, daffodil stocks throughout England were being ravaged by Stem and Bulb Eelworm (*Ditylenchus dipsaci*), and had been for several years. The problem was so serious that many hybridists were forced to abandon their work. Within a year of the introduction of ‘Fortune’, the Revd Joseph Jacob proposed to the Narcissus and Tulip Committee of the Royal Horticultural Society that an investigation into the problem be instigated. J.K. Ramsbottom, a student at Wisley, was appointed to carry out this work but, although reached with remarkable speed, his conclusions were not made public until May 1917. Meanwhile, Walter Ware had become increasingly worried about the possible fate of his small stock of ‘Fortune’ bulbs, as many of his other bulb stocks had already been badly affected. He had no wish to part with stock of such a potentially valuable cultivar but nonetheless decided, in the interests of the survival of ‘Fortune’, to let Brodie (in Scotland) have two bulbs. Ware died shortly after implementing this decision, Brodie having paid £80 for the two bulbs to the executors of Ware’s estate. In 1920, Brodie recouped this outlay when he sold a large offset to Dr N.Y. Lower for £50, and a smaller one to James Coey for £30. Perhaps owing to the isolation of Brodie’s land on the Moray Firth coast, which was far removed from other daffodil growing areas, his bulbs of ‘Fortune’ thrived. It was from these bulbs in Scotland that all subsequent bulbs of ‘Fortune’ arose, for Ware’s own remaining stock was destroyed by Eelworm. Brodie used ‘Fortune’ extensively in his breeding programme, as did many other hybridists. Such a fine parent, they believed, could not fail to produce even finer offspring. Brodie raised a series of 44 cultivars, all with ‘Fortune’ as either their seed or pollen parent. All had ‘Fortune’ as a suffix to their cultivar name, as in ‘Fortune’s Beauty’ (2Y-O, 1928), ‘Fortune’s Pride’ (2Y-R, 1928), ‘Fortune’s Crest’ (2Y-O, 1930) and ‘Fortune’s Sun’ (2Y-O, 1930). As good as these may have been, none was an improvement on their famous parent; nor have they stood the test of time as it has done. ‘Fortune’ itself remains one of the most widely-grown cultivars.

Few other daffodils have received as many awards as ‘Fortune’. These included:

- RHS Preliminary Commendation, 1923
- RHS First Class Certificate (exhibition), 1924
- RHS First Class Certificate (garden plant), 1924
- RHS First Class Certificate (for cutting), 1924
- Award of Merit (Haarlem), 1926
- First Class Certificate (Haarlem), 1927
- Forcing Award (Haarlem), 1934
- First Class Forcing Award (Haarlem), 1935
- RHS Award of Merit (Wisley Trials), 1947
- Standard Market Cultivar (Rosewarne EHS), 1963

Readily available through commercial catalogues and garden centres, the magnificent ‘Fortune’, whose birth was a mystery and whose survival was a near-miracle, still graces our gardens and homes today, almost a century after its first appearance.

## **In ‘The Far North’**

The Brodie of Brodie raised daffodils in the grounds of a castle of the same name at Forres in the north of Scotland from 1898 until 1943. During this period, he was responsible for raising several important yellow and orange/red daffodils. The ‘Fortune’ series has already been mentioned and, although these cultivars did not prove of enduring significance, they were very well known during the 1930s. Writing in 1933, A.F. Calvert said of them:

“Up to the present the Brodie’s flowers raised from ‘Fortune’ have received ten Awards of Merit from the Royal Horticultural Society and they have won dozens of prizes in open classes in competition against all other varieties.”<sup>(18)</sup>



Brodie's interest in brightly coloured daffodils had begun much earlier. His first important cultivar was registered in 1915, the year in which 'Fortune' made its first appearance. Its name was 'Mozart' (2Y-YYR), raised from 'Princess Mary' crossed with an unknown pollen parent. 'Gallipoli' (2Y-O) was registered in 1923 from very famous parents, 'Bernardino' × 'Will Scarlett'. It was a plant of great vigour and, in view of all the adverse comment about the influence of 'Will Scarlett' on perianth quality, 'Gallipoli' seemed to be unaffected in this respect, having a fine broad perianth of pale yellow. It had a most striking appearance on account of its large size and richly frilled corona, which was a "most gorgeously flushed, deep, glowing orange-red"<sup>(19)</sup>. 'Mozart' and 'Gallipoli' then came together to produce Brodie's most outstanding contribution to this class of daffodils, 'Seraglio' (3Y-YYO), which was registered in 1926. It received an Award of Merit in that year as an exhibition flower and was a daffodil of outstanding quality, with a smooth, broad perianth, good flower substance and great plant vigour. The perianth was pale yellow, while most of the corona was a much deeper shade, its upper part being a sharply-defined margin of bright orange-red. 'Seraglio' was widely used in breeding, and is best remembered today for its involvement in the parentage of 'Green Island'.

'Market Merry' (3Y-O) was registered in 1932, having been raised from 'Seraglio' × ('Tamerlane' × 'Fortune'). It was acquired and first released by Guy L. Wilson in 1935, who wrote at the time:

"I am pleased to be able to introduce this outstanding flower which is a great achievement and marks a notable advance ... it is the most richly coloured red and yellow Barrii I have yet seen."<sup>(20)</sup>

It was aptly named, for it proved to be an ideal market flower with its tall strong stems, freeness and earliness of flowering, and rapid increase in bulb numbers. Another fine offspring of 'Seraglio' followed hard on the heels of 'Market Merry', its pollen parent being 'Killigrew'. Brodie named it 'Dunkeld' (2Y-O, 1935). It, too, possessed the traits of vigour and freedom of flowering characteristic of its predecessor. The substance of the flower was first class. When first exhibited at Birmingham it was acclaimed as: "A magnificent flower which elicited enthusiastic praise and prophecy of high value as a market flower from leading growers."<sup>(21)</sup>

## The Waterford Flowers

The earliest success that Richardson had in the yellow and orange/red sub-divisions came with the registration of 'Bahram' (2Y-O) in 1935. Never falling prey to undue modesty, when introducing this cultivar in 1942 he described it as "perhaps the best red and yellow flower I have seen up to date"<sup>(22)</sup>. It was raised from 'Penquite' × 'Porthilly'; this, incidentally, probably being the only occasion on which 'Penquite' produced a top-class offspring when used as a seed parent. 'Bahram' has a perianth of clear lemon-yellow, and its corona colour is an intensely vivid, deep burnt-orange. If it had a fault it was that its perianth was creased and somewhat 'crêpey' by modern standards, but this did not prevent its recommendation for use as a commercial cut flower following trials at Rosewarne EHS. It received Awards of Merit from Haarlem in 1943, as an exhibition flower in 1948, and First Class Certificates in 1950 from Haarlem and in 1951 as an exhibition flower. Richardson used 'Bahram' widely in breeding, 'Revelry' (2Y-O, 1948), 'Border Chief' (2Y-O, 1953), 'Masai King' (2Y-O, 1953) and 'Royal Charger' (2Y-O, 1953) being but a few of its fine offspring.

Several other good, if less influential, cultivars appeared during the 1930s, including 'Krakatoa' (2Y-O), 'Red Goblet' (2Y-O), 'Royal Mail' (2Y-O) and 'Royal Ransom' (2Y-O), all of which were registered in 1937. 'Krakatoa' was Richardson's only success in the use of 'Fortune' as a parent. It first appeared at the London Daffodil Show in 1938, where it aroused considerable interest. There it was seen by Guy Wilson, whose own outstanding contribution in this sub-division, 'Armada' (which also had a 'Fortune' background), was flowering simultaneously in the seedling beds at Broughshane. The seed parent of 'Krakatoa' was 'Garibaldi' that had been raised by Alex Wilson from 'Hospodar'. 'Krakatoa' was introduced in 1946 at the high price of £25 per bulb. Richardson for one had no doubt of its worth. It was for him:

“Quite the most outstanding novelty which has been offered since ‘Fortune’ ... appeared over 25 years ago. On the few occasions on which it has been exhibited it has created a sensation. An immense flower, with [a] broad overlapping, deep golden-yellow perianth of fine substance and quality; the very widely expanded cup is bright flaming orange-red, beautifully flanged at the mouth.”<sup>(23)</sup>

‘Krakatoa’ had many successes in its day, including an Award of Merit and a First Class Certificate as an exhibition flower together with these same awards from Haarlem: but it has failed to stand the test of time to the same degree as its rival ‘Armada’, now a commercial cut flower cultivar.

The next group of yellow and orange/red daffodils appeared at Waterford during the 1940s and contained some very important cultivars that, moreover, had a degree of resistance to sun scorch not hitherto encountered.

Undoubtedly the most influential of these was ‘Ceylon’ (2Y-O, 1943) (Plate 16.5), followed closely by ‘Narvik’ (2Y-O, 1940). In addition to their own fine qualities, they were to play a leading role in the breeding of succeeding generations of this type of daffodil. Others that occurred during the same decade

were ‘Mexico’ (2Y-O, 1943), ‘Sun Chariot’ (2Y-O, 1943), ‘Alamein’ (2Y-O, 1944), ‘Firemaster’ (2Y-O, 1948) (which also showed extraordinary resistance to sun scorch) and ‘Revelry’ (2Y-O, 1948).



**Plate 16.5.** ‘Ceylon’ (2Y-O), raised by J.L. Richardson (1943).

When one recalls all the marvellous flowers of this type raised during the golden age of Irish daffodil breeding, ‘Armada’ is the Wilson cultivar that springs most readily to mind. Its counterpart at Waterford was certainly ‘Ceylon’, the appearance of which forced Richardson to revise his high opinion of ‘Krakatoa’ when he judged that “this is undoubtedly the most magnificently coloured red and yellow”<sup>(24)</sup>. Indeed, unlike so many of its predecessors, ‘Ceylon’ literally revelled in the sun, requiring both time and heat in order to reach its peak of colour intensity. These qualities made it an outstanding show flower, for which purpose it duly received an Award of Merit in 1946 and a First Class Certificate in 1948. Additionally, its vigour, rapidity of increase and length of flowering period soon prompted its widespread use as a garden plant; it gained similar awards for this purpose following trials at Wisley. ‘Ceylon’, being a 2Y-O daffodil, is a direct rival to ‘Armada’ in colouration and, like its rival, is also an early flowering cultivar. Both need to be seen in order to appreciate fully the warmth of colour that they impart to a garden in springtime. Richardson’s initial description of ‘Ceylon’, as being “of a marvellously deep, intense gold that has an almost metallic sheen and ... crown of dark, clear, intense cadmium orange-red”<sup>(25)</sup>, is perhaps not too far from the mark. ‘Ceylon’ was raised from ‘Marksman’ × ‘Diolite’, inheriting the fiery cup colour of the former and the magnificent perianth quality of the latter. As a garden plant, ‘Ceylon’ is remarkable for its intensity of colour and the durability of its flowers, this latter characteristic being confirmed during the Rosewarne EHS trials: during these its vase life was only bettered by two other cultivars out of a total of 198 tested. ‘Ceylon’ was not Richardson’s highest priced introduction but, at £35 per bulb in 1948, it reflected his high opinion of it as an exhibition daffodil and likely useful parent.

‘Narvik’, introduced at a much more modest price of £20, was raised from ‘Carbineer’ × ‘Porthilly’. This was another fine cultivar, which won an Award of Merit as an exhibition flower and an Award of Merit and a First Class Certificate from Haarlem. It is classified as a 2Y-O, but its goblet-shaped cup with its neatly scalloped edge is much deeper in colour than that of ‘Ceylon’. As

both appeared at about the same time, it is unsurprising that Richardson attempted to combine their excellent qualities as quickly as possible. He also used them in partnership with other cultivars to develop new colour combinations as, for example, in the beautiful ‘Perimeter’ (3Y-YYO, 1956).

Crosses involving ‘Ceylon’ and ‘Narvik’ gave rise to the outstanding cultivars of the 1960s, such as ‘Falstaff’ (2Y-O, 1960), raised from ‘Ceylon’ × (‘Narvik’ × ‘Marksman’), and ‘Pinza’ (2Y-YYO, 1962) from ‘Ceylon’ × ‘Narvik’. Other excellent kinds raised during the same period – using either ‘Ceylon’ or ‘Narvik’ in combination with other cultivars – were ‘Court Martial’ (2Y-O, 1956), ‘Patagonia’ (2Y-O, 1956) and ‘Vulcan’ (2Y-O, 1956). As garden plants, these cultivars possess the qualities of their parents, several receiving Awards of Merit for this purpose following trials at Wisley. The two cultivars with both ‘Ceylon’ and ‘Narvik’ in their parentage were the most outstanding among this group. ‘Falstaff’ gained an Award of Merit in 1963 and a First Class Certificate in 1968 as an exhibition flower, and remained one of the leading yellow and red exhibition daffodils into the 1990s. ‘Pinza’ received Awards of Merit as an exhibition flower in 1962 and as a garden plant in 1966. Both possessed a durability and smoothness that were, in fact, an improvement on their admirable parents. Another cultivar raised from ‘Narvik’ × ‘Ceylon’ was ‘Firecracker’ (2Y-O, 1953) which, although not of the same outstanding quality as ‘Falstaff’ or ‘Pinza’, possessed remarkably deep colouring. This became even more intense in several of its seedlings, such as ‘Fiery Flame’ (2O-O, 1962) and ‘Caracas’ (2O-O, 1963), the perianth segments of the former being glistening coppery-orange. ‘Firecracker’, therefore, opened up a new avenue in breeding that is still being actively pursued today.

The value of the early cultivar ‘Bahram’ was demonstrated when its offspring ‘Border Chief’ featured as the pollen parent in the cross which gave rise to Richardson’s last, and possibly most important, yellow and orange daffodil – ‘Irish Light’ (2Y-O, 1972). It was introduced by Mrs Richardson in 1971, ten years after her husband’s death, by which time it had received an Award of Merit (1970) as an exhibition flower. In addition, ‘Irish Light’ gained Best Bloom award in London (1970), Reserve Best Bloom award in London (1975), and Best Bloom award at Enniskillen in the following year. It is now established as the best of all the yellow and reds to come out of Waterford. Brightest in colour, show flowers of it being said to have “literally glowed”<sup>(26)</sup>, smoothest in texture and possessing a vigour rarely equalled, it, like ‘Falstaff’, was for long one of the leading yellow/orange exhibition daffodils. While ‘Irish Light’ had a long run among the best daffodils of its type, it was not the last important cultivar to come out of Waterford. Continuing her husband’s breeding lines after 1961, Mrs Richardson produced two fine cultivars in ‘Red Rum’ (2Y-R, 1973) and ‘Bold Lad’ (2Y-O, 1974). The latter was raised from ‘Royal Palace’ × (‘Firecracker’ × ‘Spelter’) and possessed the strong colour in both perianth and corona that it derived from its ‘Firecracker’ ancestry. ‘Red Rum’ came from ‘Tambourine’ crossed with the excellent ‘Falstaff’, its striking quality and colour being rewarded with the Best Bloom award in London in 1973.

## **Guy L. Wilson’s Yellow and Red Daffodils**

The results of Wilson’s work with yellow and red daffodils reflects the difficulties that breeders had in raising small-cupped flowers of this type, only five being registered compared with the 41 large-cupped cultivars. Among the latter group occurred one of Wilson’s most important contributions to daffodil improvement, but more of that later. Several of the yellow and orange/red cultivars raised by Wilson appear to have the potential for a prolonged existence as commercial cut flower varieties following trials at Rosewarne EHS. ‘Armada’ has been joined, therefore, as an established market daffodil by ‘Tinker’ (2Y-O, 1937), while ‘Fury’ (2Y-O, 1940), ‘Home Fires’ (2Y-O, 1950), ‘Fireproof’ (2Y-O, 1952) and ‘Red Squirrel’ (2Y-O, 1956) were also recommended for this purpose. ‘Rouge’ (2Y-O, 1936) and ‘Foxhunter’ (2Y-O, 1953) also proved to be fine large-cupped cultivars. In Division 3, only ‘Chungking’ (3Y-O, 1942) has had prolonged success, it too being recommended by Rosewarne EHS for use as a cut flower.

Many of Wilson’s daffodils raised during the late 1920s and 1930s had a background of ‘Fortune’, which is not surprising considering its successes. These include ‘Sunkist’ (2Y-O, 1935),

‘Sunproof Orange’ (2Y-O, 1935), ‘Dervish’ (2Y-O, 1937) and ‘Workman’ (2Y-O, 1940). Some of these cultivars, along with others such as ‘Goodwill’ (2Y-O, 1935), showed in their parentage an appreciation of P.D. Williams’ stock as useful breeding material – Wilson, like Richardson, employed his cultivars extensively during the 1920s. ‘Sunproof Orange’, which had both ‘Fortune’ and P.D. Williams’ ‘Cornish Fire’ in its pedigree, was the first cultivar raised by Wilson to show some measure of resistance to sun scorch. ‘Dervish’ was the first of Wilson’s yellow and red daffodils to gain a Royal Horticultural Society award and was the herald of the success that was to follow the registration of his next flower of this type, ‘Armada’.

## The ‘Armada’ Story

‘Armada’ (Figure 16.1, Plate 16.6) first flowered as Seedling 25/91 in 1936, a significant year in its raiser’s life as it also saw the first appearance of such outstanding daffodils as ‘Broughshane’, ‘Bastion’ and ‘Frigid’. The parentage of ‘Armada’ was Wilson’s Seedling 15/7 crossed with ‘Cornish Fire’. Its start in life was somewhat inauspicious for, unlike most of Wilson’s seedlings that later became successful cultivars, its initial appearance attracted scant attention from its breeder. With seedlings that were later to enjoy considerable success, it was usual for Wilson to write a description extending to several lines – as if he sensed their potential the instant he saw the first flower. The initial note concerning ‘Armada’ ran to



**Plate 16.6.** ‘Armada’ (2Y-O), raised by G.L. Wilson (1938).

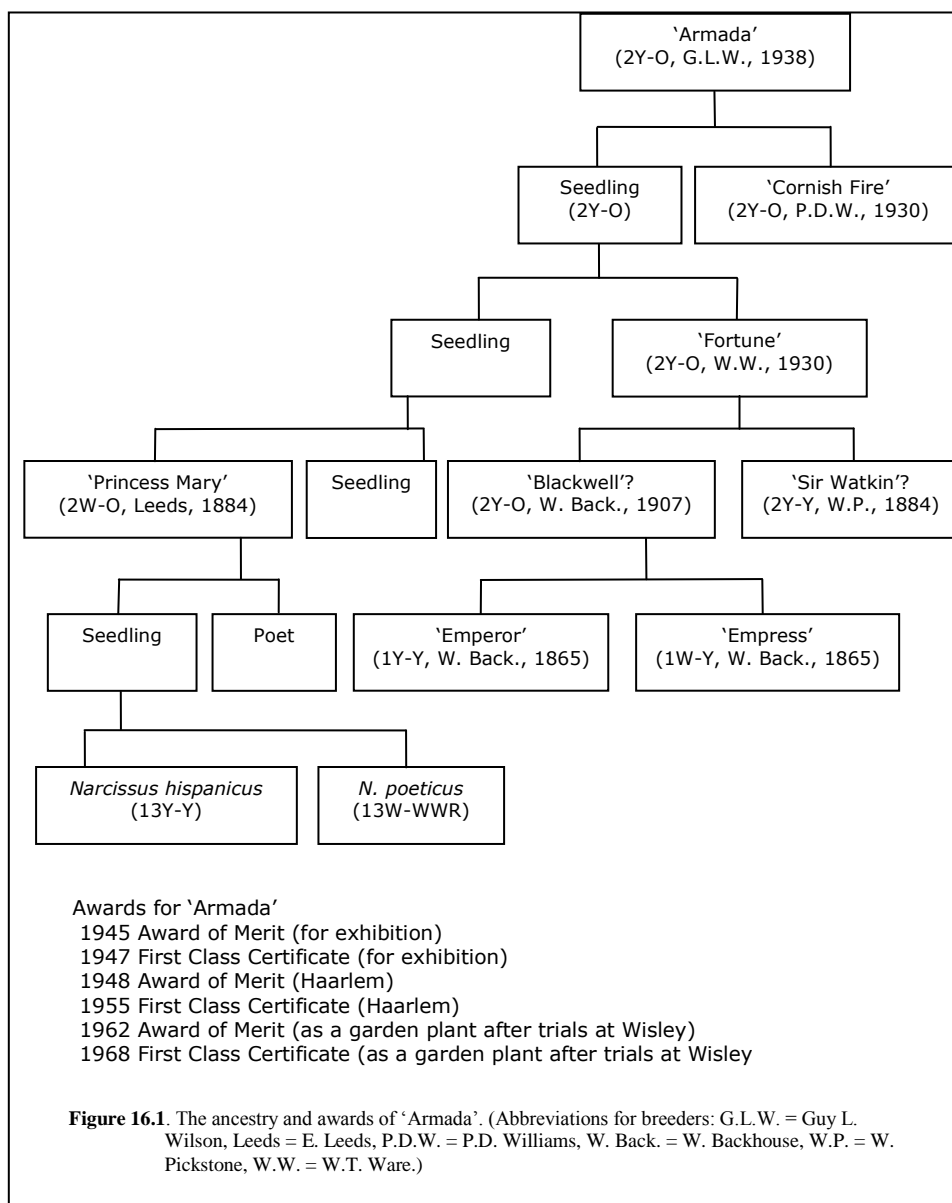
but five words – “shapely yellow and orange *Incomparabilis*”<sup>(27)</sup>. Perhaps it was one of those daffodils that did not show to best effect at first flowering but, if this was the case, it did not take too long to improve, for within two years Wilson was confidently telling Zandbergen of its excellence. From its earliest years, Guy Wilson’s business had an international flavour, a large proportion of his orders coming from overseas customers. Zandbergen, head of the Dutch bulb firm G. Zandbergen-Terwegen of Sassenheim, was one of his first foreign contacts and became a lifelong friend. It was Zandbergen’s practice to visit the London Daffodil Show each year, afterwards travelling back to Ulster with Wilson in order to see his latest seedlings, many of which he later introduced.

At the London Show of 1938, Lionel Richardson impressed everyone with a new cultivar named ‘Krackatoa’, a large-cupped yellow and red of startling brilliance. On the way to Broughshane, Wilson told Zandbergen that he thought he had a seedling that was almost as good, and immediately on arrival at The Knockan they went to look at the plant in question. Zandbergen later recalled his reaction on first seeing the seedling, which was to become the famous ‘Armada’: “I could not believe my eyes and I tried to persuade Guy to sell me the plant, but in vain.”<sup>(28)</sup> The following year saw the outbreak of World War II and the occupation of the Netherlands by the Germans. In subsequent years, Zandbergen often thought about the beautiful daffodil that he had seen at The Knockan in 1938, wondering what had happened to it. During 1943, Zandbergen managed to get a message out of the Netherlands by means of the Resistance Organisation, letting Wilson know that he was still alive. On receiving this message, Guy Wilson made a promise to himself that, should Zandbergen come through the hostilities unscathed, he would present him with the stock of ‘Armada’. During the war years, ‘Armada’ was exhibited, receiving an Award of Merit in 1945 as a show flower. On several occasions, other daffodil growers tried to persuade Wilson to sell the stock, but he always declined in view of his earlier decision. Shortly after the liberation of the Netherlands, Zandbergen managed to get a lift on a services aircraft and, having landed in England, immediately headed for Broughshane with the prime intention of buying just one bulb of the spectacular seedling he had last seen in 1938.

On his arrival, Wilson led him to a room and pointed to two parcels on a table, saying: “These are for you Matthew. I decided that if you came through the occupation safely I would give them to you as a sign of our friendship.”<sup>(29)</sup>

Zandbergen was surprised, to say the least, to find that the parcels contained a large number of bulbs of the seedling – now named ‘Armada’ – which he had waited so long and travelled so far to see. It became one of the most successful daffodils ever raised, being the recipient of no less than three Awards of Merit and three First Class Certificates. It fared no less well in the Rosewarne EHS trials, where its flower substance was described as very good. More importantly, however, it was its extreme earliness for a flower of this type that made it an outstanding prospect as a commercial cut flower crop. In 1967, it flowered as early as 28th February, at least one week ahead of possibly its greatest rival in this respect, ‘Ceylon’. This early flowering trait was commented upon by Wilson late in his life: “A group of ‘Armada’ is a magnificent and arresting sight in the garden at the beginning of the season.”<sup>(30)</sup> How right he was!

The ancestry of Armada and a full list of its awards are shown in Figure 16.1.



## Some Other Notable Wilson Cultivars

Another seedling that appeared at about the same time as ‘Armada’ was one raised from ‘Killigrew’ × ‘Cornish Fire’, later named ‘Rouge’. When introduced it was considered to be a striking novelty, showing a distinct break in colouring, for its widespread yellow perianth was overlaid with a pinkish-buff tint, which led Wilson to the choice of its name. The cup colour was a brilliant deep orange, the total colour effect being so unusual that Wilson felt that, whenever shown, it “elicits admiration and favourable comment”<sup>(31)</sup>. ‘Tinker’, a magnificent gold and scarlet-orange cultivar, was first seen in 1937, having been raised from ‘Damson’ × ‘Rustom Pasha’. The latter parent conferred intense and stable cup colour, obvious even under the most adverse weather conditions. In 1942, for example, Wilson recorded poor colour in his red cupped daffodils, which he ascribed to a spell of hot weather that had caused them to rush into flower too quickly before proper colour could develop. There was, however, one exception. Wilson noted that: “‘Tinker’ was finer than ever, being magnificently brilliant.”<sup>(32)</sup> The potential of ‘Tinker’ as a commercial cut flower was quickly realised; it received an Award of Merit from Haarlem in 1948 and later it came to rival ‘Armada’ as an established market variety in the bulb-growing districts of England, although it flowered a full fortnight later.

The first successful use of ‘Armada’ as a parent was in 1941 when the seedling later named ‘Home Fires’ flowered. It gained an Award of Merit as an exhibition daffodil in 1956, when it was described as “a well-formed, richly-coloured, large-cupped *Narcissus* of good substance ... borne on a sturdy 21” [52.5 cm] stem”<sup>(33)</sup>. Trials at Rosewarne EHS confirmed its excellent qualities, including its early flowering habit (which more or less coincides with that of ‘Armada’) and consequently it is now recommended as a commercial cut flower. Another cultivar similarly recommended was ‘Fury’ (2Y-O), raised from ‘Workman’ × ‘Carbineer’. When it first appeared in 1944, Wilson described it as a “very good, clear yellow-red of strong colour”<sup>(34)</sup>; and as late as 1959 he still described it as “one of the most intensely coloured flowers I have yet raised”<sup>(35)</sup>.

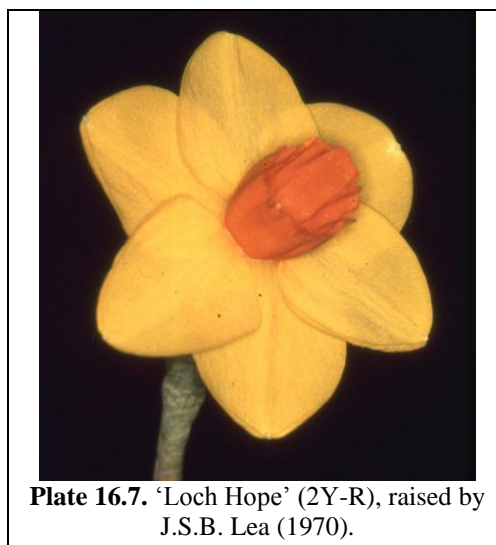
Among Wilson’s final yellow and red daffodils are three of note. These emphasised his ability to select seedlings that were not essentially exhibition flowers, but which possessed the necessary qualities required of a good decorative garden plant, with the possibility of an extended existence as a commercial cut flower. Two such sorts appeared in 1945 and 1946, and were later registered as ‘Foxhunter’ (2Y-O) and ‘Fireproof’ (2Y-O) respectively. The former came from ‘Armada’ × ‘Saltash’ and was first described by Wilson as a flower with a “brilliant clear-yellow perianth and bright orange-red crown”<sup>(36)</sup>. ‘Fireproof’ was bred with the stated objective of further improving resistance to sun scorch, its parentage being (‘Sunproof Orange’ × ‘Trevisky’) × ‘Rustom Pasha’. Wilson was entirely successful in his endeavour, recording that its “vivid orange-red cup ... was left entirely unprotected ... throughout the exceptionally sunny season of 1952 and suffered no fading or burning whatsoever”<sup>(37)</sup>. When first introducing this cultivar in 1953 he commented that, because of its vigour: “It should ultimately prove a fine market and garden variety.”<sup>(38)</sup> This it has done, being recommended by Rosewarne EHS.

Yellow and red daffodils in the small-cupped sub-division are much scarcer than their large-cupped cousins and those worthy of mention in the context of the history of daffodil improvement are even more difficult to find. Wilson raised only one cultivar that could be included in this category, namely ‘Chungking’ (3Y-O). It possessed flowers of very good substance. They were also capable of opening fully when picked in bud and then stored indoors, an important consideration for daffodils grown to produce cut flowers. This makes ‘Chungking’ a fine daffodil for this purpose, and it received an Award of Merit and a First Class Certificate from Haarlem together with a recommendation from Rosewarne EHS. It is not a successful garden plant, possessing no resistance to sun scorch. Its parentage is ‘Market Merry’ × ‘Clackrattle’ and there is no connection with any of the early sun-resistant cultivars. For several years, ‘Chungking’ proved to be a successful exhibition daffodil, heading the Daffodil Ballot for small-cupped yellow and red flowers from 1946 to 1952 inclusive.

## J.S.B. Lea

John Lea was the natural successor to Lionel Richardson in that he did more than anyone to improve further the yellow and orange/red daffodils after Richardson's death in 1961. All the following cultivars were registered within a 30-year period, commencing with 'Loch Stac' (2Y-R) in 1961. 'Loch Stac' was raised from 'Air Marshal' crossed with a seedling of unknown parentage. Its flowers, though rather small, consist of a deep golden perianth that is very flat and smooth, surmounted by a corona of vivid red. They are borne on strong stems and their quality is very consistent. The most richly-coloured yellow and orange daffodil by Lea is 'Torridon' (2Y-O), which came from ('Tolosa' × 'Spry') × 'Vulcan' and was registered in 1964. It was noted particularly for the exceptional smoothness of its perianth. It had the added quality of being almost sun-proof. 'Torridon' has been a highly successful exhibition cultivar, featuring in five of Lea's winning Engleheart Cup entries and, more recently, it has proved its worth as a parent.

The early 1970s saw the advent of such cultivars as 'Loch Hope' (2Y-R, 1970), 'Loch Owskeich' (2Y-O, 1971) and 'Achduart' (3Y-O, 1972). 'Loch Hope' (Plate 16.7) is one of the earliest of yellow and red daffodils to bloom, its parentage being ('Tanera' × 'Air Marshal') × 'Vulcan'. It is without doubt one of the finest yellow and red daffodils, having the rare distinction of being Best Bloom at the RHS London Daffodil Show in 1970, and again in 1980, punctuated with a Reserve Best Bloom place in 1978. 'Loch Owskeich' was raised from ('Bastion' × Seedling) × 'Caramba' and is a sister seedling of 'Loch Garvie' (2Y-O, 1971). Both are sun-proof but the flower of 'Loch Owskeich' is the larger, its intense orange cup being almost trumpet-like. It is a vigorous grower and its flowers are borne on strong stems. 'Achduart' is one of the relatively few small-cupped yellow and orange daffodils raised by Lea. It came from the same parents as 'Torridon'.



**Plate 16.7.** 'Loch Hope' (2Y-R), raised by J.S.B. Lea (1970).

Until the early 1990s, it was the top exhibition cultivar in its sub-division, receiving an Award of Merit on the first occasion it was shown in a winning Engleheart Cup group. 'Achduart' has gone one better than 'Loch Hope' in being awarded Best Bloom in London on three occasions – in 1974, 1981 and 1982, which is a rare achievement. Its flowers are of great consistency, having a soft-gold perianth and a nicely proportioned, vivid orange corona. The individual flowers are large and the plants of great vigour.

The late 1970s saw the appearance of 'Glenfarclas' (1Y-O, 1976), 'Creagh Dubh' (2O-R, 1978) and 'Loch Lundie' (2Y-O, 1978). 'Glenfarclas' broke new ground for Lea, being one of the relatively few yellow and orange daffodils of trumpet proportions. He later recalled the great interest it had aroused when exhibited among winning seedling entries at the RHS Daffodil Competition in London on no less than three occasions. It was raised from a prolonged series of crosses between yellow trumpet daffodils and yellow and orange daffodils from Division 2 (Figure 16.2).

While 'Glenfarclas' is classified as a trumpet daffodil, it does give rise to flowers in both Divisions 1 and 2 on account of its ancestral background. Its deep-golden perianth segments are of great substance and the bright orange trumpet is solidly coloured to its base. The plant itself is strong and vigorous and, as it sets seed well, it may prove a possible route to red trumpet daffodils.

'Loch Lundie' was raised from (Seedling × 'Tanera') × ('Chungking' × 'Spry'). It has a very striking colour contrast of soft, butter-yellow perianth and a strongly orange corona with a neatly serrated rim. It has been a successful exhibition daffodil and featured in three of Lea's winning Engleheart Cup exhibits from 1977 to 1979. Additionally, it was Best Bloom in the Daffodil Competition of 1978. 'Creagh Dubh', like 'Glenfarclas', also broke new ground for Lea, being one of a small group of daffodils with orange perianth segments and red corona. It arose from ('Chungking'

× ‘Spry’) × ‘Vulcan’ and three years after its introduction was in Lea’s catalogue at £60 per bulb. Owing to its coppery orange-red perianth, each segment of which has a paler central stripe, it caused great interest when first exhibited in 1976. The plant is vigorous, the flowers being borne on strong stems. It featured in the winning Engleheart Cup entry in 1980 and, because of its unusual colouring, Lea forecast an important future for it in breeding uniformly coloured orange or red daffodils. ‘Loch Carron’ (2Y-O) and ‘Loch Loyal’ (2Y-R) were both introduced in 1981, the former being a beautifully smooth flower of consistent show quality, while the latter is richly-coloured and striking. ‘Liverpool Festival’ (2Y-O, 1985) (Plate 16.8) is one of the latest flowering cultivars in this group. It has broad, flat perianth segments of golden-yellow and its bright orange cup has high resistance to sun scorch. It was raised from ‘Vulcan’ × (‘Tanera’ × ‘Sheildaig’) and was successfully shown at the Liverpool Garden Festival in 1984.



**Plate 16.8.** ‘Liverpool Festival’ (2Y-O), a fine cultivar raised by J.S.B. Lea (1985).

It was said in Lea’s obituary that: “We have lost one who was without question the most gifted and successful raiser and exhibitor of daffodils in Britain today.”<sup>(39)</sup>

## Other Recent Cultivars

During the broad period when John Lea registered his fine new cultivars, there also emerged several other good cultivars through the work of a handful of his contemporaries. The first of these was ‘Matlock’ (2Y-R, 1950), raised by D.B. Milne but with unrecorded parentage. While not of the best exhibition quality – it can appear rather rough – the flowers are both large and intensely-coloured, making ‘Matlock’ a fine garden plant. Another cultivar registered at about the same time was ‘Crater’ (2Y-GRR). It was raised by de Navarro but, again, its parentage is unrecorded. Although registered as far back as 1956, it has been a successful show cultivar, being very smooth and richly coloured. ‘Estramadura’ (2Y-O) is another fine de Navarro cultivar, raised from ‘Castile’ × ‘Caramba’ and registered in 1967.

An earlier success among the leading show yellow/orange daffodils was ‘Sealing Wax’ (2Y-O), raised by Barr and Sons who registered it in 1957. A tall and brilliantly coloured cultivar, it has recently been propagated by meristem tip culture, virus-free stock now being available. This has given a new lease of life to a daffodil that had formerly shown considerable signs of degeneration. ‘Moneymore’ (2Y-R) was raised in Ulster by W.J. Dunlop from ‘Workman’ × ‘Kellswater’ and was registered in 1960. It is a flower of exquisite neatness with a vividly-coloured perianth and corona. The texture of the flower is faultless, giving it an almost silken appearance. A cultivar that appeared among the show winners until the mid-1990s was ‘Shining Light’ (2Y-R), raised from ‘Dunkeld’ × ‘Revelry’ by F.E. Board and registered in 1965. The flowers of ‘Shining Light’ are of high quality: a smooth, slightly reflexing pale-yellow perianth forms a fine foil for the red goblet-shaped corona with its neatly serrated edge. It was Best Bloom at the Daffodil Society Show in 1983.

‘Kasia’ (2Y-OOR, 1971) and ‘Trelay’ (3Y-OOR, 1972) appeared in the 1970s on the other side of the world, raised respectively by William Jackson Jnr in Tasmania and Phil Phillips in New Zealand. Unfortunately, the parentage of these cultivars is unrecorded. ‘Kasia’ has been seen in many leading British shows and has enjoyed some successes, while ‘Trelay’ gained a considerable reputation for itself as a successful show flower in New Zealand.

Two fine cultivars were raised by Sir Frank Harrison at Killinchy in Northern Ireland: ‘Rio Rouge’ (2O-R) in 1974 and ‘Golden Amber’ (2Y-OOY) in 1975. ‘Rio Rouge’ is interesting in that it arose from ‘Foxhunter’ crossed with ‘Alight’, the seed of which had been bombarded with gamma



rays at the British Atomic Energy Establishment at Harwell with the intention of encouraging new colour breaks. 'Golden Amber' was a regular exhibition daffodil arising from an open pollinated 'Kilmorack'. Another Irish addition, in 1978, was 'Ulster Bank' (3Y-R), which is a borderline cultivar between Divisions 2 and 3 – although it is classified as the latter. It was raised from 'Carbineer' × 'Air Marshall', which is remarkable as the seed parent was registered as long ago as 1927. Nevertheless, it helped in the production of a daffodil with "a flower of amazing colour"<sup>(40)</sup>. This was reflected in the unusual colour coding of 3YO-ORR, ascribed to it at one time, indicating the pronounced orange flushing at the base of both perianth and corona<sup>(41)</sup>. It has proved an excellent show flower and has been extensively used in breeding work.

Two more fine cultivars raised during the 1970s were W.A. Noton's 'Barnsdale Wood' (2Y-R) and 'Mill Grove' (2Y-R), both of which were registered in 1976. The former came from 'Falstaff' × 'Shining Light', while the latter's parents were 'Revelry' × 'Craigwarren'. Other additions include J.S.B. Lea's 'Stourbridge' (2Y-YOO, 1974) from 'Loch Stac' × 'Majorca', and his successor Clive Postles' 'Broadway Village' (2Y-YRR, 1985) with 'Stourbridge' × 'Torrison' as its parents. 'Stourbridge' is a sun-proof daffodil of fine quality and great vigour. 'Broadway Village' is an early-season flowerer, with broad, flat perianth segments of great substance. The corona is rather flat and bright red in colour, apart from its yellow base and the whole plant demonstrates the vigorous characteristics of its seed parent.

## Rimmed is Beautiful

There is a particular beauty in daffodils in which the strongest colour is confined to the outermost extremities of the corona. This phenomenon originates in some types of *N. poeticus* and has been transferred during breeding into daffodils of Divisions 2 and 3 in particular. It occurs within these divisions in flowers that have white or yellow perianth segments and coronas of the same colour – apart from the rim and occasionally the eye. The rim colour is normally the orange or red hue found in *N. poeticus*, but it may also occur as pink when the red anthocyanin pigment has become diluted with white of trumpet origin – as found, for instance, in *N. alpestris* or *N. moschatus*. In the case of rimmed yellow and orange/red daffodils, a search for the initial hybridisation will invariably reveal *N. poeticus* and *N. pseudonarcissus*, or one of its associated yellow trumpet species such as *N. hispanicus*. Rimmed yellow and orange/red daffodils have been recorded almost from the outset of hybridisation during the daffodil revival of the mid-19th century. There have been many later examples, such as 'Aranjuez' (2Y-YYO) and 'Goyescas' (3Y-YYO), both of which were registered in 1933. The former is of Dutch origin and was raised by Warnaar of Sassenheim, although its parentage was not recorded. 'Goyescas' was raised by Brodie, having three famous cultivars in its parentage – 'Seraglio' × ('Beacon' × 'Fortune').

Past exhibition cultivars have been 'Ringmaster' (2Y-YYO, 1953), 'Balalaika' (2Y-YYR, 1956) and 'Front Royal' (2Y-YYO, 1958) among the large-cups, and 'Perimeter' (3Y-YYO, 1956) and 'Montego' (3Y-YYO, 1968) in Division 3. All, with the exception of 'Front Royal', were raised by J.L. Richardson. 'Aranjuez' featured in the parentage of three, namely 'Ringmaster' and 'Balalaika', both from 'Aranjuez' × 'Bahram', and 'Perimeter' from 'Aranjuez' × 'Narvik'. 'Montego' arose from an open-pollinated 'Merlin', itself a beautiful rimmed flower but with a white perianth. 'Front Royal' was raised by de Navarro from 'Carbineer' × 'Majorca'. Two other additions to this class are 'Gettysberg' (2Y-GYR, 1979), raised by de Navarro from ('Tehran' × 'Ceylon') × 'Majorca', and the American-raised 'Lapine'. Bred by Mitsch in Oregon from 'Aircastle' × 'Ardour', it was registered in 1982 as 3Y-YYO. It is a most distinctive daffodil with a flat, broad and overlapping perianth of bright-yellow, the colour continuing into the cup where it is crowned with a deep orange coronal band.

## Flowers of Ever Deeper Colour

For many years, hybridists have been fascinated by the deepening of corona colour and the transference of these orange and red shades from corona to perianth. After many years of effort, 'improvements' began to show, first in Divisions 2 and 3 and, more recently, in the trumpet daffodils.

The first signs of 'orange-ness' in the perianth began to appear during the 1930s in cultivars such as 'Rouge'. During the ensuing 40 years, there emerged several cultivars, outstanding in respect of colour, examples being 'Ambergate' (2O-O, 1950), 'Gypsy' (2O-R, 1964), 'Altruist' (3O-R, 1965), 'Sabine Hay' (3O-R, 1970) and 'Rio Rouge' (2O-R, 1974). 'Ambergate' and 'Sabine Hay' were raised by D.B. Milne, the former from ('Hades' × 'Killigrew') × 'Cornish Fire', and the latter from two unnamed seedlings. 'Gypsy' was a J.L. Richardson cultivar of unknown parentage, while 'Altruist' was raised by F.E. Board from 'Kindled' × 'Alport'. 'Altruist' was a top exhibition cultivar among those with coppery orange or brownish yellow perianths and a most striking flower.

The early search for the elusive red trumpet began during the early 20th century with R.O. Backhouse, who carried out hundreds of crosses between yellow trumpets and brightly-coloured yellow and red daffodils from Division 2. While no flowers were produced which attained trumpet proportions, he succeeded in raising several with orange or red coronas of almost trumpet length. He referred to these as his 'seven-eighths trumpets'. 'Backhouse's Giant' (2Y-O, 1948) was one such cultivar, in which the corona was more trumpet-like than that found in the normal Division 2 flower. This direction in breeding was continued by his son, W.O. Backhouse. Writing on the 'Origin of the red trumpets', W.O. Backhouse speculated that:

"Many people must have wondered why it happened that, although colour in the cup has been bred into most of the different classes of *Narcissus* hybrids, there has been one notable exception, the 1a's [trumpet daffodils]. There is naturally an explanation for this but the longer one lives the more elusive this explanation appears to be."<sup>(42)</sup>

The explanation, of course, as W.O. Backhouse was well aware, lay in the great difference in the corona size of *N. poeticus* – the source of red pigmentation – and that of the daffodil into which he was attempting transference, i.e. the trumpets. In breeding added colour into the trumpets, corona length was consequently diminished. Nevertheless, W.O. Backhouse continued with this line of breeding, utilising the material raised earlier by his father. His persistence paid off eventually when he raised and registered three cultivars that displayed more redness in their trumpet length coronas than had hitherto been seen. These were 'Tidd-Pratt' (1Y-O, 1953), 'Brer Fox' (1Y-O, 1959) and 'Uncle Remus' (1Y-O, 1979). Their corona colour was respectively described as strong orange, deep orange and deep scarlet-orange. Most unfortunately, their parentage is not known. More recently, Jefferson-Brown raised 'Hero', registered initially as 1O-R but re-classified in 1998 as 1Y-O. There is little doubt that this line of work will continue towards the goal of perfection.

## **Yellow and Orange/Red Daffodils 1980-2010**

As with the white and orange/red daffodils, the above colour combination is divided into several sections. The best of the trumpet section in recent years have consisted of flowers with yellow perianths and orange, or mostly orange, coronas. Cultivars at one time classified as having red coronas were generally and realistically changed to orange during the re-assessment process prior to the publication of the revised *International Daffodil Register and Classified List* in 1998<sup>(43)</sup>. There are no rimmed or non-predominant flowers among the yellow and orange/red trumpets at the present time. Both the large- and small-cups with yellow perianths have both predominant forms in which the corona is totally, or mostly, orange or red, and those which are non-predominant or rimmed, i.e. 2Y-O/R, 2Y-YYO/R, 3Y-O/R and 3Y-YYO/R.

### ***The trumpet yellow and orange/red daffodils (1Y-O/R)***

No outstanding daffodils have dominated this section over the entire period, as occurred with others. Two cultivars are, however, having considerable and continuing success at the present time: 'Corbiere' (Lea, 1988), which is a 1Y-YOO, and 'York Minster' (Lea, 1991) which, although classified as a 1Y-Y in the *International Daffodil Register and Classified List* in 1998<sup>(44)</sup> is, nevertheless, described as having a corona of deep orange. Both were placed among the top three exhibition cultivars in the years 2002, 2003 and 2004. Others making an impact were 'King's Grove' (Duncan, 1987) and 'Uncle Duncan' (Pearson, 1991) both of which are 1Y-O. While 'Corbiere' and

'York Minster' continue to lead in this section, 'Uncle Duncan' remains prominent and has been joined by 'Hero' (1Y-O, Jefferson-Brown, 1984).

### ***The large-cupped yellow and orange/red daffodils (2Y-O/R)***

Between 1980 and 1994, two cultivars, 'Torridon' (Lea, 1964) and 'Shining Light' (Board, 1965), shared the show honours. Subsequently a great many cultivars have featured as winners at the major shows. Most outstanding among these were 'Liverpool Festival' (Lea, 1974) (Plate 16.8) and 'State Express' (Duncan, 1983). Other contenders were 'Bunclody' (Lea, 1963), 'Loch Naver' (Lea, 1963), 'Pipe Major' (Board, 1965), 'Twicer' (Jackson's Daffodils, 1982), 'Lennymore' (Duncan, 1983), 'Broadway Village' (Postles, 1985), 'Casterbridge' (Blanchard, 1986), 'Patabundy' (Duncan, 1987), 'Mott's Mill' (Burr, 1988), 'Contravene' (Jackson's Daffodils, 1993), 'Banker' (Jackson's Daffodils, 1995), 'Celestial Fire' (Pearson, 1995) and 'Millenium Sunset' (Scamp, 1999).

In 2002, 'Causeway Sunset' (Turbitt) was introduced at £80 per bulb and caused quite a stir, featuring in many winning exhibits. It is certainly one to watch out for in the future, having been referred to as something really special that comes along once in a while. Currently, 'Banker' is the show-bench favourite (although slightly pale in the corona), with 'Liverpool Festival', 'Causeway Sunset', 'Lennymore' and 'Entente' (Jackson's Daffodils, 1996) as contenders.

### ***The large-cupped yellow and orange/red daffodils (2Y-YYO/R)***

This period has not been dominated by any particular cultivars but winners include 'Gettysburg' (de Navarro, 1979), 'Pacific Rim' (Mitsch/Havens, 1994), 'Fire Blade' (Postles, 1997), 'Outline' (Duncan, 2001) and 'Santana' (Postles, 2002). 'Cape Cornwall' (2Y-YYO, Scamp, 1996) is the current leader in this section with 'Pacific Rim' and 'Fire Blade' in hot pursuit.

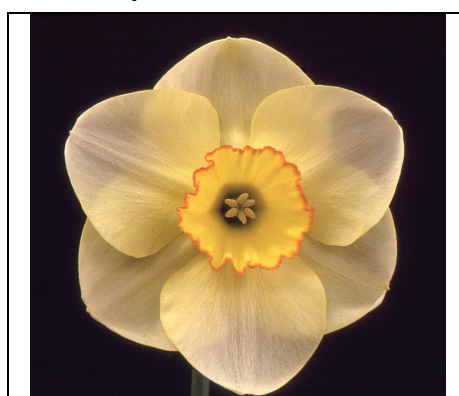
### ***The small-cupped yellow and orange/red daffodils (3Y-O/R)***

'Achduart' (Lea, 1972) was the best cultivar in a poorly-populated section, holding top position between 1980 and 1992, when 'Stanway' (Postles, 1979) took over. Later, 'Dateline' (Duncan, 1986) took an increasing share of the prizes, though in 2004 both retained leading positions. 'Achduart' remained in contention and other cultivars showed their worth including 'Solar Tan' (Duncan, 1984), 'Burning Bush' (Duncan, 1987), 'Samsara' (Postles, 1995), 'Tao' (Jackson's Daffodils, 1996) and 'Jake' (Duncan, 1997). 'Stanway' and 'Jake' are the current leaders, with 'Achduart' still challenging and 'Armidale' (Duncan, 2000) and 'African Sunset' (Duncan, 2004) showing great promise.

### ***The small-cupped yellow and orange/red daffodils (3Y-YYO/R)***

The top exhibition cultivar in the 1980s was 'Montego' (Richardson, 1968), with 'Badbury Rings' (Blanchard, 1985) taking over in the 1990s. It was still at the top in 2004, another consistent winner being 'Best Friend' (Postles, 2001) (Plate 16.9). Others which have featured in recent years are 'Painted Desert' (Throckmorton, 1974), 'Triple Crown' (Duncan, 1987), 'Ring Fence' (Duncan, 1996), 'Tiffany Jade' (Scamp, 1996) and 'Tehidy' (Scamp, 1997). 'Best Friend', 'Triple Crown' and 'Badbury Rings' are the current leaders with 'Ring Fence' and 'Pooka' (Duncan, 2000) close behind.

Deeper colour has been bred into the perianth of large- and small-cupped cultivars, giving 2O-O/R and 3O-O/R flowers. Among the former group, 'Limbo' (Duncan, 1984) and 'Honeyorange' (Duncan, 1997) are the best. With the small-cups, 'Bossa Nova' (Duncan, 1983) and the pioneer cultivar in this section, 'Sabine Hay' (Milne, 1970), are still the most popular, with 'Copper Rings' (Mrs Abel Smith, 1992) also successful.



**Plate 16.9.** 'Best Friend' (3Y-YYR), a rimmed cultivar raised by C. Postles (2001).

The beginnings of this chapter indicated the closeness of this group of cultivars to the species daffodils in the mid-19th century. In fact, it could be said that the species *N. poeticus* and *N. pseudonarcissus* had almost pre-empted the thoughts of the early hybridists by creating *N. × incomparabilis*. The various forms of this daffodil were described by Burbidge in 1875 when he wrote: “The typical form has primrose-tinted perianth segments and a clear yellow chalice-shaped cup.”<sup>(45)</sup> Burbidge, who was an excellent artist, presented several plates of the various forms of *N. incomparabilis* as it was known then, prior to the realisation of its hybridity. The single forms are to be found in Plates xviii and xix of his book *The Narcissus: its history and culture*. Not that these daffodils were new to British gardens in the last quarter of the 19th century, for they had been referred to almost three centuries earlier by Parkinson<sup>(46)</sup>. He described several forms that seemed to be in common cultivation in the gardens of that time. It was William Backhouse who began breeding new sorts and the link between the earlier collected wild forms and these mid-19th century hybrids is acknowledged in the name of one of the first garden raised sorts – *N. incomparabilis* ‘Stella’, although this did not have the yellow perianth of the cultivars dealt with in this chapter.

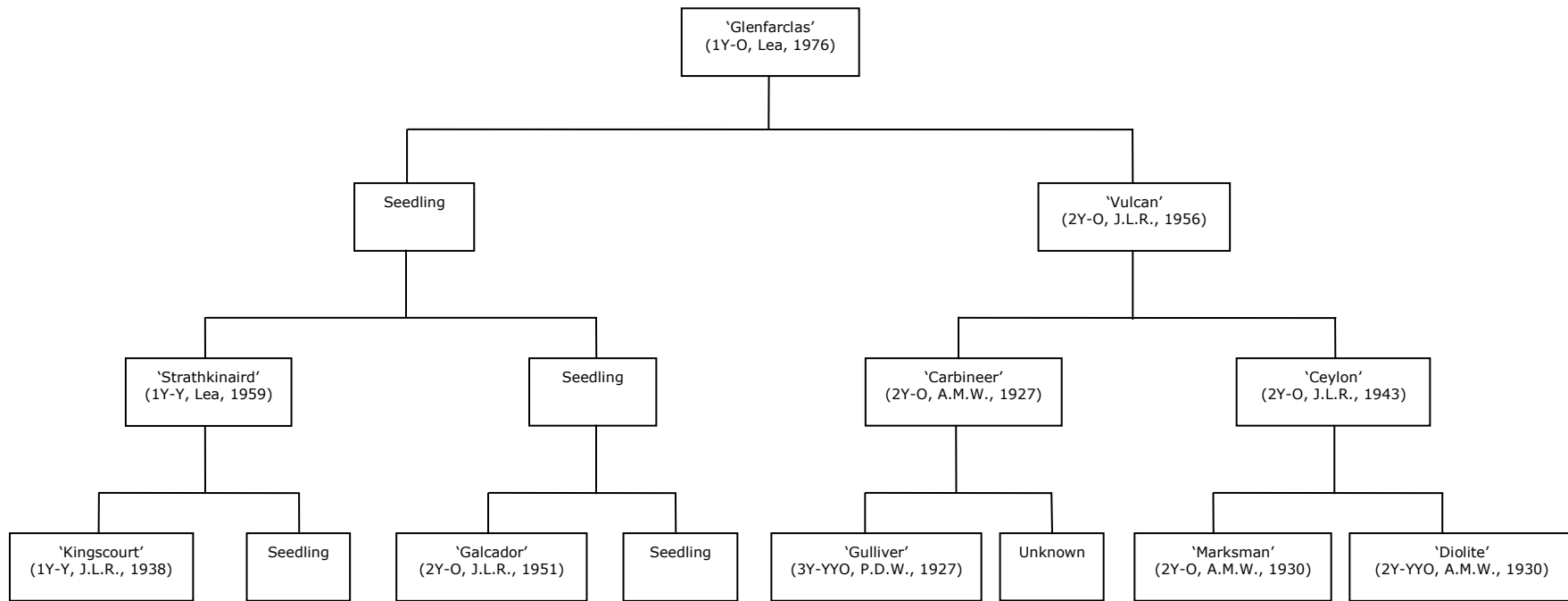
Much has happened since those early days of breeding, like the miracle of the survival of ‘Fortune’ and the appearance of wonderful new cultivars such as ‘Ceylon’ and ‘Armada’, and still improvements come.

The ultimate prize of the truly red daffodil is still in the future, but with the passing of each breeding season it becomes ever closer.

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**Figure 16.2.** The pedigree of 'Glenfarclas'. (Abbreviations for breeders: A.M.W. = A.M. Wilson, Lea = J.S.B. Lea, P.D.W. = P.D. Williams, J.L.R. = J.L. Richardson.)

## CHAPTER 17

### THE *POETICUS* CULTIVARS

*Narcissus poeticus*, its subspecies and varieties, from which the first *poeticus* hybrids were raised, is extremely important in the history of cultivar development. During the late 19th century, *N. poeticus* was used by hybridists in the creation of two major divisions: Division 2, from trumpet species crossed with *N. poeticus*, and Division 3, from Division 2 daffodils crossed with *N. poeticus*. In addition to influencing the size and shape of flowers, and particularly the relationship between the length of the perianth segments and the corona, *N. poeticus* also exerted considerable influence on flower colour and the time of flowering. This was as a result of *N. poeticus* (including *N. radiiflorus*) being the only known source of red pigment readily available to the early hybridists, although it is now known that *N. elegans* and *N. miniatus* also contain this pigment. The use of *N. poeticus* tended to give rise to late flowering hybrids.

In addition to *N. poeticus* itself, the forms principally used in breeding work were *N. poeticus* var. *recurvus*, more commonly known as Pheasants Eye, ‘Ornatus’ and *N. radiiflorus* var. *poetarum*. All imparted specific characteristics to their progeny. *N. radiiflorus* var. *poetarum*, for example, is a particularly potent source of red colouration, having a wholly red cup itself. *N. poeticus* var. *recurvus* is largely responsible for the sparkling whiteness seen in the perianth segments of many Division 2 and 3 daffodils. ‘Ornatus’ tends to confer relatively early flowering among its hybrids, which are generally regarded as the latest daffodils to bloom. Another characteristic which *N. poeticus* imparts to some cultivars within Divisions 2 and 3 (and also to *poeticus* hybrids) is the recurved perianth from the var. *recurvus*, and there seems to be little doubt that this is the sole source of this habit in some of the so-called *cyclamineus* hybrids. Moreover, *N. poeticus*, in combination with white trumpet species, has been the originating source of the pink cupped daffodils, especially in Division 2, and also of other daffodils in Division 4 in which pink petaloids have appeared.

However, while *N. poeticus* has undoubtedly played a major role in the development of many types of daffodil, its role in the improvement of its own kind has been negligible. In one respect, this may be difficult to understand: for among the species daffodils, *N. poeticus* is surely one of the most beautiful, with its wonderful contrast of sparkling white and brilliant red, frequently with the cooling influence of an intervening green eye in the corona. In addition, it has a wonderful, heady scent. Neglect in the development of *poeticus* hybrids has been influenced by their late flowering habit, which means that flowers of this type may not reach their prime in time for most shows. Additionally, there was some ambiguity of meaning and misinterpretation of the definition for daffodils of this type, which was clarified in 1998. Then, following the re-wording of the required characteristics for Division 9 *Poeticus* Daffodil Cultivars, the phrase “without admixture of any other”<sup>(1)</sup> was dropped; the key features, such as pure white perianth, red in the corona, fragrance, etc. were spelled out<sup>(2)</sup>. Consequently, and not surprisingly, there was an upturn in interest in this division.

Guy Wilson greatly admired the *poeticus* hybrids on account of their scent, sparkling whiteness and lateness of flowering, and believed that the last characteristic might constitute a means of extending the season in other divisions through their use in breeding. He was not hopeful of marked advancement, however, and as early in his career as 1935, commenting on the earlier work of Engleheart, said “he has achieved such beauty and perfection in his flowers that much further improvement is difficult to imagine”<sup>(3)</sup>. He added that the only likely improvement was in constitution through the use of reliable and vigorous sorts such as ‘Dulcimer’, a prophetic insight into its tetraploid status, which was not verified until half a century later. Wilson was simply stating what has been repeated since by virtue of the inactivity of later hybridists – that substantial improvements were unlikely through using *N. poeticus* species or hybrids, except the vigorous ‘Dulcimer’ and that improvement through the infusion of other types of daffodil would probably eliminate the required *N. poeticus* characteristics and, therefore, rule out their use as exhibition flowers. The effort was clearly



thought to be not worthwhile: but what a pity that neither Wilson, nor those who followed him, utilised his shrewd observation, made in 1935, concerning the tetraploid nature of ‘Dulcimer’.

## The Early Cultivars of Engleheart

Catalogues from the early years of the 20th century clearly show that Engleheart devoted a good deal of effort to the improvement of the *poeticus* hybrids. Among his introductions were: ‘Laura’ (1890), ‘Socrates’ (1890), ‘Dante’ (1896), ‘Homer’ (1898), ‘Cassandra’ (1899), ‘Virgil’ (1900), ‘Herrick’ (1901), ‘Acme’ (1907), ‘Chaucer’ (1907), ‘Comus’ (1907), ‘Epic’ (1907), ‘Horace’ (1907), ‘Juliet’ (1907), ‘Laureate’ (1907), ‘Rhymaster’ (1907), ‘Kingsley’ (1910), ‘Lullaby’ (1910), ‘Matthew Arnold’ (1910), ‘Ruskin’ (1910), ‘Symphony’ (1911), ‘Crossbow’ (1912), ‘George Herbert’ (1912), ‘Barcarolle’ (1913), ‘Black Prince’ (1913), ‘Stephen Phillips’ (1913), ‘Walt Whitman’ (1913), ‘Millie Price’ (1916) and ‘Orange Ring’ (1916). These formed the majority of all the cultivars available at that time, many catalogues listing only two or three cultivars from other hybridists, such as Barr and Sons and P.D. Williams. No wonder Guy Wilson was overawed by the efforts of Engleheart.

The *Bourne Gold Medal Daffodils* catalogue of 1913<sup>(4)</sup> indicated that several of the *poeticus* hybrids of Engleheart were considerable improvements. ‘Black Prince’, for example, was described as: “A distinctly new break in the *poeticus* section ... cup of very deep crimson, probably the darkest piece of colouring yet seen in Narcissi.” ‘Socrates’ was: “One of the most beautiful of the new *poeticus*, a noble flower measuring over 3” [7.5 cm] across.” ‘Stephen Phillips’ had “great substance and wonderful lasting qualities”, while ‘Symphony’ also possessed very large flowers. Other important Engleheart cultivars were ‘Sonata’ (1910), ‘Dulcimer’ (1913), ‘Raeburn’ (1913), ‘Sarchedon’ (1913) and ‘Dactyl’ (1923). Many modern catalogues fail to list a single *poeticus* hybrid, although some offer ‘Horace’, ‘Sarchedon’ and a few other old Engleheart cultivars, the sad remnants of a great era in *poeticus* hybrid development.

## Some Other Early *Poeticus* Hybrids

In addition to the great number of *poeticus* cultivars contributed by Engleheart, there were, in addition, perhaps six others of considerable importance, registered during the early part of the 20th century. The first of these was ‘Glory of Lisse’, raised by J. Segers, who hybridised daffodils at Lisse, the Netherlands between 1890 and 1925. By modern standards, the flower quality of ‘Glory of Lisse’ would be considered poor. The white perianth is stained yellow at the base and is creased, and often buckled, with barely overlapping segments. It did produce a vigorous plant, however, and a high number of flowers per bulb; the bulbs increased rapidly and the flowers had a long vase life. Consequently, it was widely grown as a commercial cut flower crop, gaining an Award of Merit for this purpose in 1908. ‘Actaea’ was another cultivar raised in the Netherlands by G. Lubbe of Oegstgeest and is the foremost *poeticus* cultivar used for commercial cut flower production, being especially suitable for forcing. It possesses a much larger flower (10 cm diameter) than most other *poeticus* hybrids, which has a sparkling white perianth and a bright yellow corona edged with red.

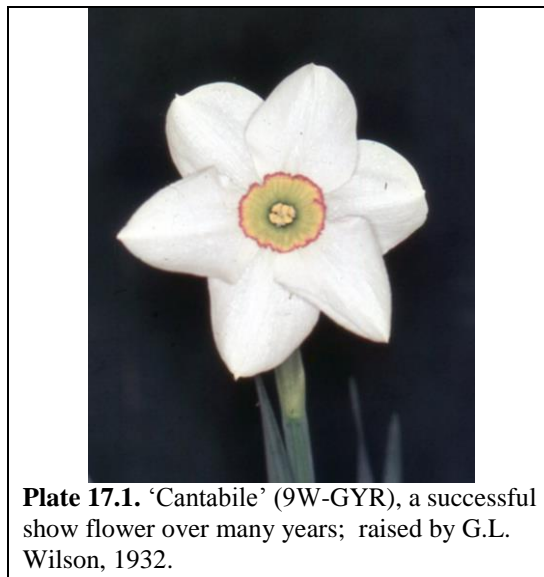
In 1927, the Brodie registered a fine exhibition-quality *poeticus* hybrid named ‘Smyrna’. It has especially broad and overlapping perianth segments of sparkling white, giving the flower a fine circular outline. Apart from a green eye, the corona is solid orange-red. ‘Smyrna’ is a vigorous cultivar, unlike many others that have solid red centres, and are often characterised by the weakness of their growth. It received an Award of Merit as an exhibition flower in 1933. Brodie also raised ‘Hexameter’, registered in 1927, from ‘Raeburn’ × ‘Dactyl’. It is one of only a few of the older *poeticus* hybrids still relatively easy to obtain, having stood the test of time for almost 80 years. It has a smooth, pure white perianth, the segments being round and overlapping. The corona is greenish-yellow with a deep red rim.

‘Felindre’, one of a pair of *poeticus* hybrids raised by A.M. Wilson, is still seen occasionally in collections. It is less perfect than ‘Smyrna’ or ‘Hexameter’ for, although it possesses a pure white, circular perianth, the segments tend to curl at the edges and are often notched at their base. The other

A.M. Wilson cultivar is 'Milan'. Over the years, it has been more widely grown than 'Felindre' and is still easily obtainable from specialist nurseries. It has a fine circular, pure white perianth and corona that shades from green in the centre to yellow, ending in a narrow red rim. The plant is vigorous and the flower stems are tall. It received an Award of Merit as an exhibition flower and is still considered to be among the finest of *poeticus* hybrids.

### **'Cantabile'**

Guy Wilson greatly admired the work of Engleheart, recording visits to his home at Dinton, Hampshire as high spots of his early career. Engleheart's greatest efforts at that time were devoted to the improvement of *poeticus* daffodils and Wilson was determined to follow his lead. Indeed, his first effort in this direction was an outstanding success, the only one he achieved in this division throughout the ensuing 29 years of daffodil breeding. Wilson's successful cultivar was registered as 'Cantabile' in 1932 and had as its parents, fittingly enough, 'Dactyl' × 'Raeburn', two of Engleheart's cultivars (Plate 17.1). The Daffodil Ballot gave 'Cantabile' a run of almost 20 years from 1946 to 1963 as supreme exhibition cultivar in its division, a position it has not entirely relinquished today.



**Plate 17.1.** 'Cantabile' (9W-GYR), a successful show flower over many years; raised by G.L. Wilson, 1932.

### **Modern *Poeticus* Hybrids**

Several of the modern hybrids have 'Cantabile' in their parentage. These include: 'Andrew Marvel' (1950), raised by de Navarro from 'Shenach' × 'Cantabile'; 'Quetzal' (1965) bred by Mitsch in the USA; and B.S. Duncan's 'Campion' (1980) from 'Milan' × 'Cantabile'. 'Andrew Marvel' is a flower of excellent quality with a pure white, slightly reflexing perianth of good substance. Its corona is narrowly rimmed with red. 'Quetzal' is somewhat similar to its seed parent, 'Cantabile', but is more rounded in outline as well as being a larger flowered, more vigorous plant. 'Campion' is one of the most vigorous and free flowering of all the *poeticus* hybrids. The flowers are medium-sized with an attractive perianth and a fine red-rimmed corona.

D.W. Gourlay's 'Perdita' (1963) is of unknown parentage, yet is a fine daffodil with a high-quality perianth that is smooth, flat and very round in outline. Tom Bloomer, following in Wilson's footsteps in Northern Ireland, registered 'Poet's Way' in 1975 and 'Poet's Wings' a year later, these being sister seedlings from 'Smyrna' × 'Lough Areema'. Both are fine-quality daffodils with red-rimmed cups, the latter having a beautifully recurved perianth.

### ***Poeticus* Cultivars 1980-2010**

Throughout the 1980s and 1990s the undisputed leader in this division was 'Cantabile' (G.L. Wilson, 1932) and it still features and wins at the top shows. It is, however, no longer the undisputed leader, with strong competition from newer successful cultivars, including 'Poet's Way' (Bloomer, 1975), 'Kamau' (Duncan, 1990) and 'Patois' (Duncan, 1992). Occasionally, a real old-timer, 'Sonata' (Engleheart, 1910), puts in an appearance and wins. Recently 'Blisland' (Scamp, 2000) has become the new star of this division, superseding 'Cantabile', which nevertheless is still capable of showing good form.

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## CHAPTER 18 SOME OTHER HYBRIDS OF GARDEN ORIGIN

### Division 5 – The *Triandrus* Hybrids

*Narcissus triandrus* is a species showing considerable variation; currently it is divided into three subspecies, namely *triandrus*, *lusitanicus* and *pallidulus*. It is subsp. *triandrus* that contains the varieties that have featured most in gardens and hybridisation over very many years. These are *triandrus* itself (sometimes known as *albus*), *concolor* (= *aurantiacus*), *loiseleurii* and *pulchellus*. Subsp. *pallidulus* var. *pallidulus*, often referred to as *cernuus*, has also featured prominently. Their flowers range from pure white to deep yellow, or combinations of these two colours. *N. triandrus* is widely distributed in Portugal and Western Spain, and with a single representation in France. This is the largest and whitest variety, now known as *N. triandrus* var. *loiseleurii*; it had previously been thought to have a distribution limited to Drenac in the Îsles of Glénan, 48 km off the coast of Finistère. It was discovered in the early 19th century by M. Bonnemaïson of Quimper in Brittany. In recent times, John Blanchard studied the plants growing on the Îsles of Glénan and reached the conclusion that they were no different from those found in Spain and Portugal, and should be treated, therefore, as *N. triandrus*. What DNA evidence there is tends to support this view. Other kinds of *N. triandrus* were known at much earlier dates. *N. triandrus* var. *albus* was known in the gardens of northern Europe in the early 17th century. It was first illustrated in part of the *Rariorum Plantarum Historia* of 1605<sup>(1)</sup>, which frequently seems to have been bound with the later *Curae Posteriores* (1611)<sup>(2)</sup> in which Clusius refers to it as *N. juncifolius flore albo reflexo*. Clusius received his specimens from Nicholas de Quelt who collected rare plants in Spain and the Pyrenees. The woodcut of Clusius shows only three stamens, the other three being short and hidden within the corona, where they apparently went unnoticed. Linnaeus continued the error when he copied the earlier description of Clusius. This white form was also illustrated in the *Hortus Floridus* (1614) of de Passe<sup>(3)</sup>. It was known to Parkinson in 1629 and features in his *Paradisus Terrestris*<sup>(4)</sup>. Parkinson also knew *N. triandrus* var. *concolor*, naming it the Yellow Turning Junquilia on account of its reflexed perianth segments.

One of the most interesting varieties, of considerable antiquity, is the reverse bicolor *N. triandrus* var. *pulchellus*, probably the only ‘wild’ daffodil of this colouration. It too was known to Parkinson in 1629 who termed it the Yellow Turning Junquilia with a White Cup. In the late 19th century, it was recorded as being widely-grown and one of the best *N. triandrus* for gardens due to its vigour and distinctive colouration. Peculiarly, in view of these characteristics, it now seems to have disappeared in its true form, although it has many ‘impostors’. Salisbury<sup>(5)</sup> knew the plant well in the later 18th century, stating that it had been grown in gardens in the vicinity of Halifax, West Yorkshire for many years, while in 1875, Burbidge illustrated *pulchellus* as his sole representation of *N. triandrus* stating that it was then the only form in cultivation in English gardens<sup>(6)</sup>. A variety with a pale sulphury yellow perianth and darker corona was *N. triandrus* var. *cernuus* (syn. *N. triandrus* subsp. *pallidulus* var. *pallidulus*), brought to England by Edward Gray in 1777 from Oporto, Portugal. These plants grew successfully in the garden at Chapel Allerton, West Yorkshire, where they set seed.

The characteristics of *N. triandrus* and its varieties are:

1. Perianth segments sharply reflexed.
2. Flowers drooping.
3. Three stamens are short and are situated within the corona at its base while three are long and extrude beyond its rim.
4. Two to three flowers per stem.

In the *triandrus* cultivars, the characteristics of *N. triandrus* should be predominant or, at least, clearly evident. These should include the reflexed perianth segments and drooping (pendant) flowers, of which there should be two or more per stem. Division 5 was formerly divided into two

sub-groups: one in which the corona is more than two-thirds the length of the perianth segments and the other in which it is less than two-thirds. In 1998, this subdivision was abandoned.

Several members of this group are miniature in stature and suitable for rock garden work and for planting in troughs and other restricted areas.

### **The *triandrus* cultivars**

Having been in cultivation in Europe for several centuries, it is not surprising that the *triandrus* cultivars were widely developed during the late 19th and early 20th centuries, especially by the Revd G.H. Engleheart. He raised several cultivars which were well known and widely grown during the early 1900s – ‘Alys’, ‘Earl Grey’, ‘J.T. Bennett-Poë’, ‘Reverend Charles Digby’ and ‘Viscountess Falmouth’ being registered between 1901 and 1913. ‘Earl Grey’ (5Y-Y, 1901) was raised from ‘Emperor’ × *N. triandrus* var. *albus* and was described as having the form of *N. triandrus* and the size of ‘Emperor’. ‘J.T. Bennett-Poë’ (5W-Y, 1904) was a flower of great beauty and elegance, with a cream perianth and straight corona of palest sulphur-yellow. The ‘Reverend Charles Digby’, which is a bicolor (5W-Y, 1903), was described in the early 1900s as beautiful and robust, with a spreading creamy-white perianth and a long, straight, primrose trumpet. ‘Alys’ (1913) was pure white with a typical drooping *triandrus* poise, while ‘Viscountess Falmouth’ (5W-W, 1903) has a creamy perianth and pure white corona. The main parents were the yellow *N. triandrus* and var. *concolor*, together with the white *N. triandrus* var. *albus* (var. *triandrus* as it is now) and var. *loiseleurii*. Consequently, most of the early cultivars were either all yellow or all white. Some of Engleheart’s early cultivars, such as ‘Reverend Charles Digby’ and ‘J.T. Bennett-Poë’ were bicolors (5W-Y) as was ‘Dawn’ (1907) raised from *N. triandrus* × *N. poeticus*.

A cultivar raised by Engleheart that has enjoyed prolonged success is ‘Harvest Moon’, a pale-coloured 5Y-Y registered in 1913 from *N. triandrus* var. *loiseleurii* × ‘King Alfred’. With ‘The Nun’ (5W-W, 1913), Engleheart was said to have broken new ground by producing: “One of a lovely new race of *triandrus* hybrids which are remarkable for their whiteness and silken texture of their petals.”<sup>(7)</sup> Other cultivars that have enjoyed considerable and prolonged commercial success include ‘Thalia’ (5W-W, 1916), ‘Tresamble’ (5W-W, 1930), ‘Niveth’ (5W-W, 1931), ‘Rippling Waters’ (5W-W, 1932) and ‘Liberty Bells’ (5Y-Y, 1950). During the whole of this period, flower colour was generally all yellow or all white, although some exquisite shades were produced – as in the unusual colour of pale canary yellow perianth and even paler coloured corona found in ‘Hawera’ (5Y-Y, 1938), still a highly popular cultivar today and rightly so. Only recently have other colour combinations been introduced into the *triandrus* cultivars, as in ‘Rosedown’ (5Y-O, 1949), ‘Samba’ (5Y-R, 1952), ‘Lavalier’ (5YYW-W, 1979), a fine, almost reverse bicolor, and ‘Akepa’ (5W-P, 1979), “the first outstanding pink *triandrus* hybrid” and “a goal long sought”<sup>(8)</sup>. ‘Rosedown’ and ‘Samba’, though having *triandrus* and *triandrus* var. *aurantiacus* (syn. *N. triandrus* var. *concolor*) in their respective parentages, are single-flowered and, therefore, do not possess the ‘desirable’ characteristic of two or more flowers per stem.

The top cultivars from 1980-2000 were ‘Rippling Waters’ (Barr and Sons), ‘Arish Mell’ (5W-W, D. and J.W. Blanchard, 1961) (Plate 18.1) and ‘Tuesday’s Child’ (5W-Y, D. Blanchard, 1964) (Plate 18.2), with ‘Ice Wings’ (5W-W, Coleman, 1958) being unrivalled during the later part of this period. By 2003, ‘Lemon Drops’ (5Y-Y, Mitsch, 1950), ‘Liberty Bells’ (5Y-Y, Rijnveld and Sons, 1950) and ‘Mission Bells’ (5W-W, Mitsch, 1984) were sharing this success and, since then, little has changed. ‘Arish Mell’ received both an Award of Merit (1961) and a First Class Certificate (1963) as an exhibition daffodil and was the first *triandrus* daffodil to achieve this distinction. It has two or three pure-white flowers per stem, suspended like shining bells. ‘Tuesday’s Child’ is an excellent bicolor with outspread white segments and a long, lemon-yellow corona.



**Plate 18.1.** 'Arish Mell' (5W-W), raised by D. and J.W. Blanchard (1961).



**Plate 18.2.** 'Tuesday's Child' (5W-Y), raised by D. Blanchard (1964).

For completeness, a chronological list of some better known Division 5 cultivars is given in Table 18.1 at the end of this chapter.

### **Division 6 – *Cyclamineus* Daffodils of Garden Origin**

The cultivars of Division 6 should have the “characteristics of *Narcissus cyclamineus* clearly evident”<sup>(9)</sup>. Previously sub-divided into two groups, this arrangement was dispensed with in the 1998 reclassification. As *Narcissus cyclamineus* is a species unencumbered by subspecies or varieties, its characteristics should be plain enough. Indeed, these are so unusual that there is no difficulty in identifying this daffodil – even from its earliest illustrations in, for example, *Le Jardin du Roy très Chrestien Henry IV. Roy de France et de Navare* by Vallet (1608)<sup>(10)</sup> and the *Theatrum Florae* by D. Rabel (1622)<sup>(11)</sup>, both of which were published in Paris. In this latter volume, it was named as *Narcissus hispanicus minor luteus ample calice foliis reflexis*, with an illustration used by De Candolle formally to identify the species in Redoubte’s *Les Liliacees* (1816)<sup>(12)</sup>. Lost to cultivation for many years, *N. cyclamineus* was re-introduced late in the 19th century after its re-discovery by Tait and Stamitz in Portugal in 1885, some 250 years after it was first recorded as a garden plant. So distinct and unusual are its characteristics that Dean Herbert, the 19th century daffodil authority felt, on seeing an early illustration of the species, that it is “an absurdity that will never be found to exist”<sup>(13)</sup>. Its distinctiveness lies mainly in the position of the perianth and the poise of the flower. The perianth is completely reflexed in an upward direction, lying almost in line with the downward pointing corona. There is only one flower per stem, and its colour is uniformly yellow and it has no scent.

In the *cyclamineus* cultivars, colours other than yellow have been introduced. These include white, orange, red and pink and were achieved through the introduction of *N. poeticus* and other ‘blood’. That misfits appeared in Division 6 almost goes without saying: several cultivars have unknown parents, while in others, the partially reflexed perianth would appear to have more to do with an ancestry of *N. poeticus* var. *recurvus* than with one of *N. cyclamineus* itself.

#### ***The cyclamineus cultivars***

As indicated above, *N. cyclamineus* was only re-discovered by Tait in Portugal in 1885. Consequently, there was little hybridisation work involving this species during the late 19th century when so much breeding activity was going on in other divisions. It is known that Tait crossed *N. cyclamineus* with ‘Soleil d’Or’ to give the *tazetta* hybrid ‘Cyclataz’, but there were few others. ‘Beryl’ (6W-YYO), registered in 1907 was one that became well known, being raised by P.D. Williams from ‘Chaucer’ (9W-R) crossed with *N. cyclamineus*. It was described in the 1913 edition of Robert Sydenham’s *All About Daffodils*<sup>(14)</sup> as having a sulphur-yellow perianth of reflexed, pointed

segments and a short chalice-shaped cup of rich orange. It was said to be a very distinct variety of unusual quality and this was reflected in the price of £1 10s (£1.50) per bulb. Its ‘distinctness’ perhaps indicates the rarity of *cyclamineus* hybrids in the early years of the 20th century. This state of affairs was confirmed in *The Bourne Gold Medal Daffodils* (1913)<sup>(15)</sup> in which Division 6 was the only one to contain no cultivars at all.

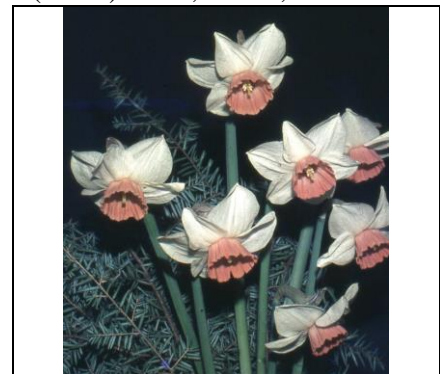
*N. cyclamineus*, being a dwarf species, whose flowers only reach a height of 15 cm, has given rise to miniature hybrids when crossed with other dwarf species or small cultivars. It has also led to cultivars of much taller proportions when crossed, for example, with *poeticus* hybrids or Division 2 cultivars. The development of colours in *cyclamineus* hybrids that differ from the yellow of the original species is also interesting in terms of time. Apart from ‘Beryl’ (6W-YYO, 1907) and ‘Larkelly’ (6Y-O, 1930), only two other colour combinations were developed during the first half of the 20th century. These were 6W-W as found in ‘Jenny’ (1943), and the 6W-Y as in cultivars like ‘Dove Wings’ (1949) and ‘February Silver’ (1949). All other *cyclamineus* cultivars were totally yellow, as in the species. During the ensuing 50 years (1950-2000) the percentage of all-yellow cultivars fell considerably, the new colour combinations which appeared being Y-R, W-P and variants such as Y-WWY and W-GPP. There were also the W-O cultivars, the first of the reverse bicolors (Y-WWY), as well as rimmed sorts such as W-GWP.

Numerically, and in terms of importance, hybridists in England, Ireland and the USA have all played a part. P.D. Williams was particularly influential in the earliest developments with cultivars such as ‘Beryl’, ‘Trewirgie’ (6Y-Y, 1928), ‘Larkelly’ (6Y-O, 1930), ‘Peeping Tom’ (6Y-Y, 1948) (Plate 18.3) and ‘Caerhays’ (6Y-Y, 1956). He was followed by C.F. Coleman, whose work in Kent led to the registration of ‘Jenny’ (6W-W, 1943), ‘Charity May’ (6Y-Y, 1948) and ‘Dove Wings’ (6W-Y, 1949). Coleman worked for many years to raise *cyclamineus* hybrids with red coronas, using cultivars such as ‘Carbineer’ (2Y-O) to impart strong colour and, in 1960, registered ‘Cock Robin’ (6Y-R). This particular line of development reached new levels of perfection in 1966 with the registration of ‘Jetfire’, raised in America by Grant Mitsch. ‘Jetfire’ had ‘Armada’ (2Y-O), ‘Carbineer’ (2Y-O) and ‘Market Merry’ (3Y-O), in its ancestry and possessed a corona of strong orange.



**Plate 18.3.** ‘Peeping Tom’ (6Y-Y), raised by P.D. Williams (1948). A very good cultivar for naturalising in grass.

The 1960s also saw the registration of what was probably the first 6W-P, ‘Kelpie’, raised by J.L. Richardson from ‘Cymbeline’ (2W-P) crossed with ‘Debutante’ (2W-P). Here, in fact, is one of those interesting cultivars classified as a *cyclamineus* hybrid but with no known *cyclamineus* connections. Interestingly, both parents have ‘Wild Rose’ (2W-P) in their ancestry, which leads back through ‘Mitylene’ (2W-Y) and ‘Beacon’ (3Y-YYO) to *N. poeticus* var. *recurvus* – a prime suspect as the source of the reflexed perianth characteristic in several Division 6 cultivars with no known connections to *cyclamineus* itself. ‘Kelpie’, although registered in 1968, did not appear in a Richardson catalogue up to and including the final one in 1973 when Mrs Richardson retired. She was responsible for the raising of another white and pink *cyclamineus* cultivar, registered in 1978 as ‘Little Princess’; unlike ‘Kelpie’, its ancestry is unknown. J. Lionel Richardson was instrumental in introducing two fine cultivars in



**Plate 18.4.** ‘Foundling’ (6W-P), raised by Carncairn Daffodils (1969)

‘Titania’ (6W-W, 1958) from ‘Trousseau’ crossed with ‘Jenny’ or ‘Dove Wings’ and ‘Joybell’ (6W-Y, 1969) from an open pollinated ‘Jenny’. However, the outstanding *cyclamineus* hybrid of the 1960s was ‘Foundling’ (2W-P, 1969) (Plate 18.4), raised by Kate Reade at Broughshane, Northern Ireland. Although, as its name suggests, its parentage is not known with certainty, it is thought to have originated from a cross between ‘Irish Rose’ × ‘Jenny’. For many years ‘Foundling’ has been a very successful exhibition daffodil for which purpose it received an Award of Merit in 1972 and, now the cost of bulbs has decreased, it promises to be a popular garden plant.

The work with pink Division 6 daffodils was further developed in Ireland during the 1970s by B.S. Duncan with cultivars such as ‘Lilac Charm’ (6W-GPP, 1973) (Figure 18.1), ‘Lavender Lass’ (6W-GPP, 1976), ‘Delta Wings’ (6W-P, 1977) and ‘Nymphette’ (6W-P, 1978). ‘Lilac Charm’, ‘Lavender Lass’ and ‘Nymphette’ have no obvious link with *cyclamineus*, but all have ‘Roseworthy’ (2W-P) as their seed parent. As in the case of ‘Kelpie’, ‘Wild Rose’ is to be found in their ancestry as pollen parent of ‘Roseworthy’ which, again, gives a link back to *N. poeticus* var. *recurvus*. Mitsch also introduced a number of white and pink cultivars such as ‘Carib’ (6W-P, 1979), ‘Plumeleteer’ (6W-P, 1984) and ‘Winter Waltz’ (6W-P, 1988), and, during the 1970s, the rimmed cultivars ‘Wheatear’ (6Y-WWY, 1976) and ‘Inca’ (6YYW-WWY, 1979). He also developed his work with the reverse bicolors by crossing ‘Nazareth’ (2Y-W) with *cyclamineus* daffodils to produce ‘Lemon Silk’ (6YYW-W, 1987). Back in Ireland, the white and orange ‘Dove of Peace’ (6W-O, 1980) was raised by Ballydorn Daffodils from ‘Buncrana’ × (‘Buncrana’ × Seedling), while a delightful rimmed pink, ‘Elizabeth Ann’ (6W-GWP, 1983), was bred by Brian Duncan from one of his own seedlings (probably ‘Rose of Tralee’ × ‘Rose Caprice’) × ‘Foundling’. The Netherlands was also involved in the production of *cyclamineus* cultivars, de Graaff registering the widely-grown, greatly loved and extremely early flowering ‘February Gold’ (6Y-Y) in 1923.

At the start of the 21st century, several of the older cultivars remain among the best exhibition daffodils. In 2003, for example, these included ‘Foundling’, ‘Trena’ (6W-Y, Verry, 1971), ‘Rapture’ (6Y-Y, Mitsch, 1976) and ‘Elizabeth Ann’. Among the new cultivars, only ‘Lemon Silk’ and ‘Sheer Joy’ (6W-W, Duncan, 1992) featured as winners at the major shows, with ‘Sheer Joy’ occupying premier place; more recently there has been little change.

A chronological list of some better known Division 6 cultivars is provided in Table 18.2 at the end of this chapter.

## Division 7 – Jonquil Daffodils of Garden Origin

The Jonquil hybrids have arisen chiefly from *N. jonquilla* itself and, to a lesser extent, from *N. assoanus* (formerly *N. juncifolius*). Some have *N. rupicola* in their parentage: in times past, *N. rupicola* appeared among the Jonquillae but is now within the Apodanthi. Another occasional parent is *N. × odorus*, the Campernelle Jonquil, and especially those forms known as ‘Rugulosus’ and ‘Rugulosus Maximus’. *N. × odorus* is a hybrid of considerable antiquity (having been recorded by Clusius as long ago as 1595<sup>(16)</sup>) and is a cross between *N. pseudonarcissus* and *N. jonquilla*. Although initially thought to be a species by Linnaeus, it has never been found as a truly wild plant. The Jonquils or Rush-leaved Daffodils have been in cultivation for a considerable period, being recorded in gardens since 1565, while the double form, Queen Anne’s Jonquil, was known to Parkinson in 1629<sup>(17)</sup> as *N. juncifolius* Flore Pleno. *N. assoanus* has been in cultivation for almost as long – since about 1576 – and has produced natural hybrids with *N. tazetta* that have been known as × *dubius* and × *magnenii*; the former has now been given specific status with two varieties, *N. dubius* var. *dubius* and var. *micranthus*.

The flowers of *N. jonquilla* and *N. assoanus* are of a particularly bright shade of yellow and this bright colour was transmitted to many of the early cultivars and, indeed, was almost a distinguishing feature between these and other multi-flowered hybrids. The colour white was introduced at an early stage in cultivar development, chiefly through the use of cultivars from other divisions that were either totally or partly white, although in recent times the white flowered member

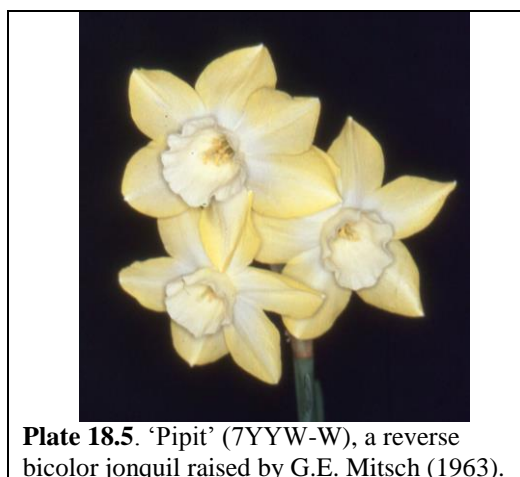


of the Apodanthi, namely *N. rupicola* subsp. *watieri*, has been used in breeding. As early as the 1940s, pink and orange colours were being introduced into the corona through cultivars such as ‘Wild Rose’ in the case of the former and *N. poeticus* in the latter. Since then reverse bicolors and hybrids in which the normal colour positions have been interestingly modified have appeared in increasing numbers. Most recent of all have been the pink and orange rimmed cultivars. These are to be found, for example, in ‘Flomay’ (7W-WWP, 1949), raised by A. Gray from *N. rupicola* subsp. *watieri* crossed with an unknown pollen parent, and in ‘Bobbysoxer’ (7Y-YYO, 1949) from *N. rupicola* × *N. poeticus* by the same hybridist.

The bicolor ‘Fairy Nymph’ (7W-Y) raised by Barr and Sons appeared in 1923 from ‘Maggie May’ (2W-Y) × *N. jonquilla*. One of the earliest bicolors was P.D. Williams’ ‘Snow Bunting’ (7W-Y, 1935) while its opposite came in the form of the well known ‘Dickcissel’ (7Y-W, 1963) raised by Mitsch from ‘Binkie’ × *N. jonquilla*.

R.V. Favell was extremely active in raising Jonquil hybrids, being responsible for one of the first to have a largely pink corona. It is the well known ‘Waterperry’ (7W-YPP, 1953) but its parentage is unknown. Favell is perhaps best known through the cultivar ‘Sweetness’ (7Y-Y, 1939) but his highest achievement was with the trio ‘Sweet Pepper’ (7Y-O, 1939), ‘Porthchapel’ (7Y-O, 1953) and ‘Suzy’ (7Y-O, 1954) in which the orange coronas were a significant improvement on earlier daffodils of this type.

Later, G.E. Mitsch was prominent in raising Jonquil hybrids in Oregon, USA. His earliest work involved crossing ‘Binkie’ (2Y-W) with *N. jonquilla* to produce ‘Dickcissel’ (7Y-W) and ‘Pipit’ (7YYW-W) (Plate 18.5) in 1963 and ‘Verdin’ (7Y-W) two years later. ‘Quick Step’ (7W-P) was registered in the same year, its parents being ‘Wild Rose’ × *N. jonquilla*. This cultivar was regarded as a significant advance by Mitsch who subsequently used it extensively in breeding to produce a series of cultivars although the desired pink did not always re-appear. Most important among these cultivars were ‘Step Forward’ (7Y-W, 1970), ‘Lemon Tarts’ (7YYW-W, 1979), ‘Wishing Well’ (7Y-W, 1979) and ‘Punchline’ (7Y-YYP, 1982).



**Plate 18.5.** ‘Pipit’ (7YYW-W), a reverse bicolor jonquil raised by G.E. Mitsch (1963).

As a result of the long association of *N. jonquilla* and *N. assoanus* with the gardens of Western Europe, hybridisation began at a much earlier date than was the case with some other species such as *N. cyclamineus*. The Revd G.H. Engleheart and P.D. Williams were the first to take up the challenge, raising cultivars such as ‘Buttercup’ (7Y-Y, 1890), ‘Lanarth’ (7Y-O, 1907) and ‘Hesla’ (7Y-Y, 1908). Indeed, many of these early cultivars are still to be found in gardens and some, like ‘Hesla’, are still reasonably easy to obtain, as are the ever popular ‘Suzy’, ‘Sweetness’, ‘Trevithian’ and ‘Waterperry’.

A number of the Jonquil hybrids are dwarf in stature and may be used in the rock garden, the best being ‘Baby Moon’ (7Y-Y), ‘Bobbysoxer’ (7Y-YYO), ‘Flomay’ (7W-WWP), ‘Lintie’ (7Y-YYO), ‘Little Prince’ (7Y-O), ‘Skiffle’ (7Y-Y), ‘Sun Disc’ (7Y-Y) and ‘Sundial’ (7Y-Y).

Currently, the most successful exhibition cultivars are ‘Bunting’ (7Y-O, Mitsch, 1965), ‘Stratosphere’ (7Y-O, Mitsch, 1968) (Plate 18.6), ‘Oryx’ (7Y-W, Mitsch, 1969), ‘Intrigue’ (7Y-W, Pannill, 1970), ‘Saint Piran’ (7W-Y, Scamp, 1993) and ‘Ladies Choice’ (7W-W, Duncan, 1995). ‘Oryx’ has been one of the best during the 1990s but newer sorts like ‘Ladies Choice’ and ‘Saint Piran’ are gaining more prominence. In 2003, however, ‘Stratosphere’ (1968) was still top.

In addition to the typical brightness of flower colour in these hybrids, other necessary characteristics of Jonquil cultivars include the following:

1. Perianth set at right angles to the tube.
2. Flowers themselves held at right angles to the stem especially in the upper part of the flower cluster.
3. Coronas are short, relative to the length of the perianth segments.
4. Flowers should possess the characteristic Jonquil scent.

Hybrids with two or more flowers per stem are preferred although several bear but a single flower.

In addition to the untypical, single flowered forms there is also a well known double flowered form called 'Pencrebar' (classified 4Y-Y on account of its doubleness) that is thought to be a dwarf form of Queen Anne's Double Jonquil only reaching a height of about 15 cm. It bears one or occasionally two flowers resembling yellow feathery balls.

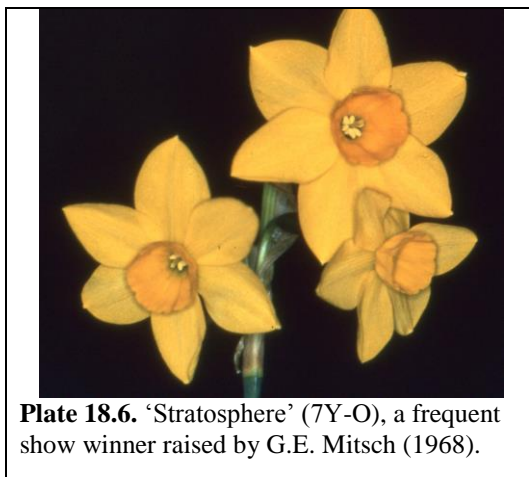
A chronological list of some of the better known Division 7 cultivars is provided in Table 18.3 at the end of this chapter.

## Division 8 - *Tazetta* Daffodils of Garden Origin

In many ways, the Tazettas resemble the Jonquils. They are a group of scented daffodils although the quality of the scent is different from that of the Jonquils. The flower stems are multi-headed as in the Jonquils but generally the Tazettas have more flowers per stem, numbering up to 20 and rarely being less than four. Although there are these flower similarities, the foliage is very dissimilar being thin, rush-like and dark green in the Jonquils but broad and greyish green in the Tazettas.

*N. tazetta* and its many relations have featured prominently in cultivation for several centuries. *N. tazetta* was described by Linnaeus in *Species Plantarum* (1753)<sup>(18)</sup> as *spatha multiflora* indicating its multi-headed character that separated the Tazettas and the Jonquils from the single flowered species that he recognised. By the time Linnaeus wrote *Species Plantarum*, the Tazettas had already been extensively developed for cut flower purposes especially in the Netherlands. Linnaeus was well aware of these developments for he had worked for a time in the garden of Dr Georg Clifford close to Haarlem, and in his *Hortus Cliffortianus*<sup>(19)</sup> acknowledged the range of Tazettas then available when he wrote: "It varies in the size of its flowers, being white or yellow in the nectary [corona] or petals or both, in varying doubleness, the size or shape of the cup and the number of flowers from each spathe." *N. tazetta* had in fact been in cultivation for well over two centuries before Linnaeus described it and by 1800 had been developed to such a degree, probably through a process of selection, that between 200 and 300 distinct 'varieties' were on offer from Dutch growers. Several of these older types are still freely available and widely grown today for commercial cut flower purposes, none more so than 'Soleil d'Or' (8Y-Y or Y-O), sometimes known as 'Grand Soleil d'Or'. It is a rich yellow throughout in colour or with an orange cup, flowering exceptionally early and being an excellent daffodil for forcing. It was probably introduced into the Isles of Scilly by Benedictine monks prior to 1534. Because of its long sojourn in cultivation, all the stocks of 'Soleil d'Or' had accumulated several viruses that adversely affected its vigour and productivity. It has been freed from these, however, by the process of meristem culture giving rise to 'Super Sol', which has more flowers of larger size on each stem and in which bulb production has been markedly increased.

Another of the older sorts that is still widely grown today is 'Paper White', a name synonymous with *N. papyraceus* (formerly *N. tazetta* subsp. *papyraceus*). In cultivation, it is most



**Plate 18.6.** 'Stratosphere' (7Y-O), a frequent show winner raised by G.E. Mitsch (1968).

frequently found in the form 'Grandiflora', which is the largest pure white *tazetta* capable of being forced to flower extremely early – before Christmas.

'Grand Monarque' or 'Grand Monarch' (8W-Y) has also been widely grown in the past although less so nowadays. It is a bicolor with white perianth and lemon corona and is distinguished by the exceptional size of its bulbs. Other old variants include 'Scilly White' (8W-W) registered in 1889, 'Grand Primo Citronière' (8W-Y) and Double Roman (syn. 'Romanus') a double flowered form of 'Paper White' brought to the Netherlands from Constantinople (now Istanbul) prior to 1600. There was also the Chinese variety known as 'Grand Emperor of China' that was introduced to England in 1889, it having a white perianth and orange corona. It also had a double form known as 'Flore Pleno' and these daffodils could well have been close relatives of 'Grand Monarque' as they too had similar huge bulbs. Another old type of similar colour was 'Gloriosus' (8W-O) and both it, and 'Grand Emperor of China', were described as having a deliciously fragrant perfume rather than the heavy, cloying scent associated with many Tazettas.

Of the true cultivars, the majority are now well in excess of 70 years old having been introduced before or during the 1930s. Yet many of these sorts have played and continue to play an important role in the floriculture of the south-west of England. Several are still widely grown and readily available today including 'Glorious' (8W-O, 1923), 'Saint Agnes' (8W-O, 1926) and 'Geranium' (8W-O, 1930). It is interesting to recall that it was a gift of 'Glorious' from Sir Frederick Moore which enabled J.L. Richardson to acquire many of the stocks of bulbs that were so essential to his early breeding work and his establishment as a hybridist of international renown. This came about as Richardson, quickly realising the potential of 'Glorious', acquired the remainder of the stocks of this cultivar from various sources, later selling large quantities of bulbs, particularly to the Netherlands, in order to finance his purchases of breeding stock including many of the best cultivars then available.

'Elvira' (8W-YYO, 1904) (Plate 18.7) is an interesting old cultivar on two counts. Firstly, it was one of the earliest members of a group of daffodils that became known as the Poetaz. Other similar cultivars included 'Jaune à Merveille' (8Y-YYO, 1906), 'Laurens Koster' (8W-Y, 1906), 'Chinita' (8Y-YYR, 1922), 'Glorious' (8W-O), 'Saint Agnes' (8W-O), 'Cragford' (8W-O, 1930) and 'Geranium' (8W-O). All of these cultivars arose from crosses between diploid or tetraploid *N. poeticus* and *N. tazetta* giving hybrids possessing either 17 or 24 chromosomes, these being almost completely sterile apart from the occasional production of non-reduced gametes. The second claim to fame of 'Elvira' is that it 'sported' to produce the widely grown cut flower cultivar 'Cheerfulness', a bicolored double (4W-Y) (Plate 18.8). 'Cheerfulness' in turn sported to give rise to the equally well known and widely grown 'Yellow Cheerfulness' (4Y-Y) and the somewhat less well known paler 'Primrose Cheerfulness' (4Y-Y).



Plate 18.7. 'Elvira' (8W-YYO), raised by R.A. van der Schoot (1904); a mutation of this cultivar produced 'Cheerfulness'.



Plate 18.8. 'Cheerfulness' (4W-Y), discovered by J.B. van der Schoot and registered in 1923.

The most successful show cultivars during the 1980s and 1990s have been three of considerable age – ‘Avalanche’ (8W-Y, Dorrien-Smith, 1906, but not registered until 1955), ‘Silver Chimes’ (8W-W, E. and J.C. Martin, 1916) and ‘Geranium’ (8W-O, J.B. van der Schoot, 1930) plus the more recent ‘Highfield Beauty’ (8Y-YYO, Mott, 1964). Even in 2003, three of the four remained at the top including the centenarian ‘Avalanche’ together with ‘Silver Chimes’ (most major successes in 2003) and ‘Highfield Beauty’ which continued its position from the 1980-2000 period.

In common with other species hybrid groups, Division 8 has its share of dwarf cultivars such as ‘Cyclataz’ (8Y-O, 1922), ‘Halingy’ (8W-Y, 1949) and ‘Shrew’ (8W-Y, 1950), most of these miniature hybrids having a dwarf species (*N. cyclamineus* or *N. minor*) in their parentage.

A chronological list of some better known Division 8 cultivars is given in Table 18.4 at the end of this chapter.

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Name	Parentage	Breeder	Colour Code	Year
'Earl Grey'	'Emperor' × <i>triandrus</i>	G.H. Engleheart	5Y-Y	1901
'Revd Charles Digby'	Unknown	G.H. Engleheart	5W-Y	1903
'Viscountess Falmouth'	Unknown	G.H. Engleheart	5W-W	1903
'J.T. Bennett-Poë'	'Emperor' × <i>triandrus</i>	G.H. Engleheart	5W-Y	1904
'Dawn'	<i>triandrus</i> × <i>poeticus</i>	G.H. Engleheart	5W-Y	1907
'Alys'	Unknown	G.H. Engleheart	5W-W	1913
'Harvest Moon'	<i>triandrus</i> var. <i>loiseleurii</i> × 'King Alfred'	G.H. Engleheart	5Y-Y	1913
'The Nun'	Unknown	G.H. Engleheart	5W-W	1913
'Bracken'	Unknown	F.H. Chapman	5W-Y	1913
'Thalia'	<i>triandrus</i> × Seedling	M. van Waveren and Sons	5W-W	1916
'Lady Northcliffe'	Unknown	Mrs R.O. Backhouse	5W-W	1923
'Acolyte'	Leedsii seedling × <i>triandrus</i>	P.D. Williams	5W-W	1927
'Moonshine'	Unknown × <i>triandrus</i>	de Graaff Brothers	5W-W	1927
'Pearly Queen'	Unknown	de Graaff Brothers	5W-Y	1927
'Treskewes'	'King Alfred' × <i>triandrus</i>	P.D. Williams	5Y-Y	1928
'Tresamble'	Unknown × <i>triandrus</i>	P.D. Williams	5W-W	1930
'Niveth'	Unknown × <i>triandrus</i>	H. Backhouse	5W-W	1931
'Rippling Waters'	Unknown	Barr and Sons	5W-W	1932
'Shot Silk'	Unknown	de Graaff Brothers	5W-W	1932
'Stoke'	Unknown	P.D. Williams	5Y-Y	1934
'Hawera'	<i>jonquilla</i> × <i>triandrus</i>	W.M. Thomson	5Y-Y	1938
'April Tears'	<i>jonquilla</i> × <i>triandrus</i> var. <i>concolor</i>	A. Gray	5Y-Y	1939
'Raindrop'	<i>triandrus</i> var. <i>loiseleurii</i> × <i>dubius</i>	A. Gray	5W-W	1942
'Phyllida Garth'	Unknown × <i>triandrus</i> var. <i>loiseleurii</i>	A. Gray	5W-W	1948
'Sennocke'	<i>triandrus</i> × <i>pallidiflorus</i>	F.R. Waley	5Y-Y	1948
'Tristesse'	'White Knight' × <i>triandrus</i> var. <i>loiseleurii</i>	D. Blanchard	5W-W	1948
'Rosedown'	Unknown × <i>triandrus</i>	A. Gray	5Y-O	1949
'Forty Niner'	Unknown	Oregon	5Y-Y	1950
'Liberty Bells'	Unknown	F. Rijnveld and Sons	5Y-Y	1950
'Thoughtful'	Unknown × <i>triandrus</i> var. <i>loiseleurii</i>	A. Gray	5Y-Y	1951
'Lemon Heart'	Unknown	Barr and Sons	5W-W	1952
'Samba'	Unknown × <i>triandrus</i>	Barr and Sons	5Y-R	1952

	var. <i>concolor</i>			
'Yellow Warbler'	'Fortune' × <i>triandrus</i>	G.E. Mitsch	5Y-Y	1954
'Mary Plumstead'	<i>jonquilla</i> × <i>triandrus</i> var. <i>loiseleurii</i>	A. Gray	5Y-Y	1954
'Shrimp'	<i>triandrus</i> × <i>assoanus</i>	A. Gray	5Y-Y	1955
'Lemon Drops'	'Fortune' × <i>triandrus</i>	G.E. Mitsch	5Y-Y	1956
'Ice Wings'	'Ischia' × <i>triandrus</i>	C.F. Coleman	5W-W	1958
'Tincleton'	Unknown	D. and J.W. Blanchard	5W-W	1960
'Arish Mell'	'Interim' × <i>triandrus</i> var. <i>loiseleurii</i>	D. and J.W. Blanchard	5W-W	1961
'Silver Bells'	('Daisy Schaffer' × 'Polindra') × <i>triandrus</i>	G.E. Mitsch	5W-W	1962
'Harmony Bells'	'Whiteley Gem' × <i>triandrus</i>	M. Fowlds	5Y-Y	1962
'Tuesday's Child'	'Interim' × <i>triandrus</i> var. <i>loiseleurii</i>	D. Blanchard	5W-Y	1964
'Lapwing'	'Silver Bells' × Unknown	G.E. Mitsch	5W-Y	1975
'Lavalier'	'Nazareth' × <i>triandrus</i> var. <i>concolor</i>	G.E. Mitsch	5YYW-W	1979
'Akepa'	'Accent' × <i>triandrus</i>	G.E. Mitsch	5W-P	1979
'Mission Bells'	'Silver Bells' OP	G.E. Mitsch	5W-W	1984
'Ringing Bells'	'Quick Step' × <i>triandrus</i>	Mitsch and Havens	5W-W	1984

**Table 18.1.** Chronological list of some better known Division 5 cultivars. (Column 1, Name. The daffodil name is usually the registered cultivar name; Column 2, Parentage. The parentage is given, if known; Column 3, Breeder. The name of the breeder, occasionally the registrant; Column 4, Colour code. The colour code classification (1998 version); Column 5, Year. Usually the date is that of registration but with older daffodils the date is of the earliest known occurrence. OP= open pollinated.)

<b>Name</b>	<b>Parentage</b>	<b>Breeder</b>	<b>Colour Code</b>	<b>Year</b>
'Beryl'	'Chaucer' × <i>cyclamineus</i>	P.D. Williams	6W-YYO	1907
'February Gold'	'Golden Spur' × <i>cyclamineus</i>	de Graaff Brothers	6Y-Y	1923
'March Sunshine'	Unknown	de Graaff Brothers	6Y-Y	1923
'Trewirgie'	Unknown	P.D. Williams	6Y-Y	1928
'Little Witch'	Unknown	Mrs R.O. Backhouse	6Y-Y	1929
'Larkelly'	Unknown × <i>cyclamineus</i>	P.D. Williams	6Y-O	1930
'Bartley'	Unknown × <i>cyclamineus</i>	J.C. Williams	6Y-Y	1934
'Mite'	<i>N. obvallaris</i> × <i>cyclamineus</i>	Sir J.A.R. Gore- Booth	6Y-Y	1935
'Jenny'	'Mitylene' × <i>cyclamineus</i>	C.F. Coleman	6W-W	1943
'Charity May'	'Mitylene' × <i>cyclamineus</i>	C.F. Coleman	6Y-Y	1948
'Cyclades'	'Goldbeater' × <i>cyclamineus</i>	D. Blanchard	6Y-Y	1948
'Greenshank'	'W.P. Milner' × <i>cyclamineus</i>	A.M. Wilson	6Y-Y	1948
'Peeping Tom'	Unknown × <i>cyclamineus</i>	P.D. Williams	6Y-Y	1948
'The Little Gentleman'	<i>cyclamineus</i> × Unknown	C.A. Nethercote	6Y-Y	1948
'Dove Wings'	'Mitylene' × <i>cyclamineus</i>	C.F. Coleman	6W-Y	1949
'February Silver'	Unknown	de Graaff Brothers	6W-Y	1949
'Jana'	<i>cyclamineus</i> × Unknown	A. Gray	6Y-Y	1949
'Woodcock'	Unknown	M.P. Williams	6Y-Y	1949
'Jack Snipe'	Unknown	M.P. Williams	6W-Y	1951
'Cornet'	<i>cyclamineus</i> × Unknown	M.P. Williams	6Y-Y	1953
'Estrellita'	'Mite' × 'Malvern Gold'	G.E. Mitsch	6Y-Y	1954
'March Breeze'	<i>cyclamineus</i> × Unknown	A. Gray	6Y-O	1954
'Roger'	'Beryl' × 'Nor Nor'	A. Gray	6Y-O	1954
'Mitzy'	<i>cyclamineus</i> × 'Rockery White'	A. Gray	6W-W	1955
'Caerhays'	Unknown × <i>cyclamineus</i>	P.D. Williams	6Y-Y	1956
'Baby Doll'	Unknown × <i>cyclamineus</i>	M.P. Williams	6Y-Y	1957
'Jetage'	<i>cyclamineus</i> × 'Rockery White'	A. Gray	6Y-Y	1957
'Mini Cycla'	<i>cyclamineus</i> × <i>asturiensis</i>	F.H. Chapman	6Y-Y	1957
'Titania'	'Trousseau' × 'Jenny'	J.L. Richardson	6W-W	1958



'Chickadee'	'Rubra' × <i>cyclamineus</i>	G.E. Mitsch	6Y-O	1959
'Bushtit'	'Mite' OP	G.E. Mitsch	6Y-Y	1960
'Cock Robin'	(Seedling × 'Carbineer') × <i>cyclamineus</i>	C.F. Coleman	6Y-R	1960
'Whang-hi'	'Beryl' OP	C.F. Coleman	6Y-O	1960
'Andalusia'	('White Sentinel' × 'Hades') × <i>cyclamineus</i>	C.F. Coleman	6Y-O	1961
'Satellite'	'Rouge' × <i>cyclamineus</i>	G.E. Mitsch	6Y-O	1962
'Jetfire'	(Seedling × 'Armada') × <i>cyclamineus</i>	G.E. Mitsch	6Y-O	1966
'Kelpie'	'Cymbeline' × 'Debutante'	J.L. Richardson	6W-P	1968
'Barlow'	'Cibola' × <i>cyclamineus</i>	G.E. Mitsch	6Y-Y	1969
'Foundling'	'Irish Rose' × 'Jenny'	Carncairn	6W-P	1969
'Joybell'	'Jenny' OP	J.L. Richardson	6W-Y	1969
'Trena'	'Assini' × <i>cyclamineus</i>	M. Verry	6W-Y	1971
'Lilac Charm'	'Roseworthy' × (Seedling × 'Rose Caprice')	B.S. Duncan	6W-GPP	1973
'Lavender Lass'	'Roseworthy' × (Seedling × 'Rose Caprice')	B.S. Duncan	6W-GPP	1976
'Carib'	('Mabel Taylor' × 'Interim') × <i>cyclamineus</i>	G.E. Mitsch	6W-P	1976
'Cotinga'	'Mitylene' OP × <i>cyclamineus</i>	G.E. Mitsch	6W-P	1976
'Rapture'	'Nazareth' × <i>cyclamineus</i>	G.E. Mitsch	6Y-Y	1976
'Wheatear'	'Mitylene' × <i>cyclamineus</i>	G.E. Mitsch	6Y-WWY	1976
'Delta Wings'	'Interim' × 'Joybell'	B.S. Duncan	6W-P	1977
'Golden Wings'	'Charity May' OP	Ballydorn	6Y-Y	1977
'El Camino'	'Honey Bells' × <i>cyclamineus</i>	G.E. Mitsch	6Y-Y	1978
'Little Princess'	Unknown	Mrs Richardson	6W-P	1978
'Nymphette'	'Roseworthy' × Unknown	B.S. Duncan	6W-P	1978
'Inca'	'Barlow' OP	G.E. Mitsch	6YYW-WWY	1979
'Chaffinch'	'Vulcan' × <i>cyclamineus</i>	G.E. Mitsch	6Y-Y	1980
'Dove of Peace'	'Buncrana' × ( 'Buncrana' × Seedling)	Ballydorn	6W-O	1980
'Reggae'	'Roseworthy' × 'Foundling'	B.S. Duncan	6W-GPP	1981
'Cazique'	(Seedling × 'Rima') × <i>cyclamineus</i>	G.E. Mitsch	6W-W	1982
'Itzim'	'Vulcan' seedling × <i>cyclamineus</i>	G.E. Mitsch	6W-R	1982
'Phalarope'	'Titania' × <i>cyclamineus</i>	G.E. Mitsch	6W-Y	1982
'Elizabeth Ann'	Seedling × 'Foundling'	B.S. Duncan	6W-GWP	1983
'Kaydee'	'Foundling' × 'Delta Wings'	B.S. Duncan	6W-P	1984
'Ouzel'	'Dipper' OP	G.E. Mitsch	6W-W	1984
'Warbler'	(Seedling × 'Flaming	G.E. Mitsch	6Y-Y	1984

'Lemon Silk'	Meteor') × <i>cyclamineus</i> 'Nazareth' × <i>cyclamineus</i>	Mitsch/Havens	6YYW-W	1987
'Sheer Joy'	'Joybell' × 'Lilac Charm'	B.S. Duncan	6W-W	1992

**Table 18.2.** Chronological list of some better known Division 6 cultivars. (Column 1, Name. The daffodil name is usually the registered cultivar name; Column 2, Parentage. The parentage is given, if known; Column 3, Breeder. The name of the breeder, occasionally the registrant; Column 4, Colour code. The colour code classification (1998 version); Column 5, Year. Usually the date is that of registration but with older daffodils the date is of the earliest known occurrence. OP = open pollinated.)

Name	Parentage	Breeder	Colour Code	Year
'Buttercup'	'Emperor' × <i>jonquilla</i>	G.H. Engleheart	7Y-Y	1890
'Lanarth'	Unknown × <i>jonquilla</i>	P.D. Williams	7Y-O	1907
'Hesla'	Unknown × <i>jonquilla</i>	P.D. Williams	7Y-Y	1908
'Golden Sceptre'	'Monarch' × <i>jonquilla</i>	de Graaff Brothers	7Y-Y	1914
'Fairy Nymph'	'Maggie May' × <i>jonquilla</i>	Barr and Sons	7W-Y	1923
'Golden Goblet'	Seedling × <i>jonquilla</i>	C.G. van Tubergen	7Y-Y	1927
'Polnesk'	Unknown × <i>jonquilla</i>	P.D. Williams	7Y-Y	1927
'Trevithian'	'Pilgrim' × <i>jonquilla</i>	P.D. Williams	7Y-Y	1927
'White Wedgewood'	Unknown	de Graaff Brothers	7W-W	1927
'Solleret'	Unknown × <i>jonquilla</i>	G.H. Engleheart	7Y-Y	1929
'Penpol'	Unknown	P.D. Williams	7Y-Y	1935
'Snow Bunting'	Unknown	P.D. Williams	7W-Y	1935
'Lintie'	<i>assoanus</i> × <i>poeticus</i>	Barr and Sons	7Y-YYO	1937
'Little Prince'	<i>assoanus</i> × <i>poeticus</i>	Barr and Sons	7Y-O	1937
'Nancegollan'	Unknown	M.P. Williams	7W-W	1937
'Parcpat'	Unknown × <i>jonquilla</i>	M.P. Williams	7Y-O	1937
'Prisk'	Unknown × <i>jonquilla</i>	M.P. Williams	7Y-Y	1937
'Sweet Pepper'	'Hades' × <i>jonquilla</i>	R.V. Favell	7Y-O	1939
'Sweetness'	Unknown × <i>jonquilla</i>	R.V. Favell	7Y-Y	1939
'Flomay'	<i>watieri</i> × Unknown	A. Gray	7W- WWP	1946
'Sun Disc'	<i>rupicola</i> × <i>poeticus</i>	A. Gray	7Y-Y	1946
'Bobbysoxer'	<i>rupicola</i> × <i>poeticus</i>	A. Gray	7Y-YYO	1949
'Ripple'	'Beersheba' × 'Rugulosus'	Barr and Sons	7Y-Y	1949
'Shah'	'Dawson City' × <i>odorus</i> 'Rugulosus Maximus'	Barr and Sons	7Y-Y	1949
'Nirvana'	Unknown × <i>jonquilla</i>	Barr and Sons	7W-W	1951
'Hathor'	Unknown	Barr and Sons	7Y-Y	1952
'Porthchapel'	Unknown	R.V. Favell	7Y-O	1953
'Tittle Tattle'	'Gulliver' × <i>jonquilla</i>	C.R. Wootton	7Y-GYY	1953
'Waterperry'	Unknown	R.V. Favell	7W-YPP	1953
'Suzy'	'Hades' × <i>jonquilla</i>	R.V. Favell	7Y-O	1954
'Sundial'	<i>rupicola</i> × <i>poeticus</i>	A. Gray	7Y-Y	1955
'Skiffle'	<i>asturiensis</i> × <i>calcicola</i>	A. Gray	7Y-Y	1957
'Baby Moon'	<i>jonquilla</i> var. <i>minor</i> × <i>jonquilla</i>	J. Gerritsen and Son	7Y-Y	1958
'Alpine'	'St Mary' × <i>jonquilla</i>	G.E. Mitsch	7W-W	1959
'Kinglet'	'Narvik' × <i>jonquilla</i>	G.E. Mitsch	7Y-O	1959
'Dove'	'Mitylene' × <i>jonquilla</i>	C.F. Coleman	7W-Y	1962
'Dickcissel'	'Binkie' × <i>jonquilla</i>	G.E. Mitsch	7Y-W	1963
'Pipit'	'Binkie' × <i>jonquilla</i>	G.E. Mitsch	7YYW-W	1963
'Bunting'	'Narvik' × <i>jonquilla</i>	G.E. Mitsch	7Y-O	1965
'Quick Step'	'Wild Rose' × <i>jonquilla</i>	G.E. Mitsch	7W-P	1965
'Verdin'	'Binkie' × <i>jonquilla</i>	G.E. Mitsch	7Y-W	1965
'Dainty Miss'	('Rubra' × 'Coverack Perfection') × <i>watieri</i>	G.E. Mitsch	7W- GWW	1966
'Eland'	'Aircastle' × <i>jonquilla</i>	G.E. Mitsch	7W-W	1968
'Stratosphere'	'Narvik' × <i>jonquilla</i>	G.E. Mitsch	7Y-O	1968
'Oryx'	'Aircastle' × <i>jonquilla</i>	G.E. Mitsch	7Y-W	1969
'Intrigue'	'Nazareth' × <i>jonquilla</i>	W.G. Pannill	7Y-W	1970

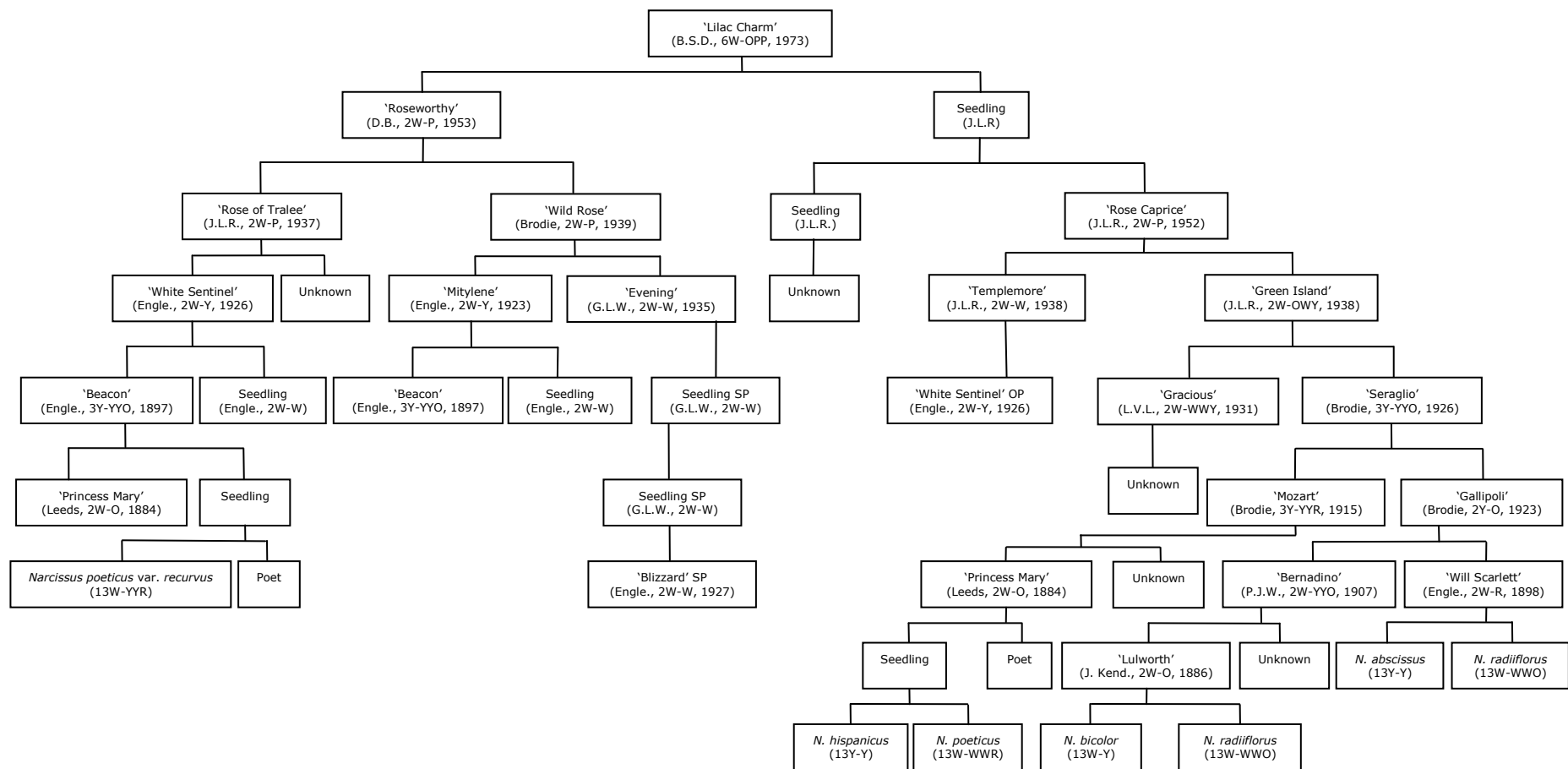
'Step Forward'	'Quick Step' × 'Daydream'	G.E. Mitsch	7Y-W	1970
'Bell Song'	('Wild Rose' × 'Interim') × <i>jonquilla</i>	G.E. Mitsch	7W-P	1971
'Canary'	'Daydream' × <i>jonquilla</i>	G.E. Mitsch	7YYW-W	1977
'Hillstar'	'Daydream' × <i>jonquilla</i>	G.E. Mitsch	7YYW- YWW	1979
'Lemon Tarts'	'Quick Step' × 'Daydream'	G.E. Mitsch	7YYW-W	1979
'Life'	'Top Notch' × <i>jonquilla</i>	G.E. Mitsch	7YYW-Y	1979
'Triller'	'Vulcan' × <i>jonquilla</i>	G.E. Mitsch	7Y-O	1979
'Wishing Well'	'Quick Step' × 'Daydream'	G.E. Mitsch	7Y-W	1979
'Pink Angel'	('Wild Rose' × 'Interim') × <i>jonquilla</i>	G.E. Mitsch	7W-GWP	1980
'Punchline'	'Quick Step' × 'Silken Sails'	G.E. Mitsch	7Y-YYP	1982
'Avocet'	('Green Island' × 'Chinese White') × <i>jonquilla</i>	G.E. Mitsch	7W-YYW	1982
'Ice Rim'	('Green Island' × 'Chinese White') × <i>jonquilla</i>	G.E. Mitsch	7W-YYW	1986
'Saint Piran'	'Aircastle' × <i>jonquilla</i>	R.A. Scamp	7W-Y	1993
'Ladies Choice'	'Quick Step' OP	B.S. Duncan	7W-W	1995

**Table 18.3.** Chronological list of some better known Division 7 cultivars. (Column 1, Name. The daffodil name is usually the registered cultivar name; Column 2, Parentage. The parentage is given, if known; Column 3, Breeder. The name of the breeder, occasionally the registrant; Column 4, Colour code. The colour code classification (1998 version); Column 5, Year. Usually the date is that of registration but with older daffodils the date is of the earliest known occurrence. OP = open pollinated.)

Name	Parentage	Breeder	Colour Code	Year
'Soleil d'Or'	Unknown		8Y-O	Before 1534
'Paper White'	Selected form of <i>N. papyraceus</i>		8W-W	
'Grand Monarque'			8W-Y	Before 1798
'Scilly White'	Unknown		8W-W	Before 1865
'Grand Emperor'	Form of <i>tazetta</i> subsp. <i>lacticolor</i>		8W-O	Before 1865
'Gloriosus'	Unknown		8W-O	Before 1883
'Elvira'	<i>poeticus</i> × <i>tazetta</i>	R.A. van der Schoot	8W-YYO	1904
'Laurens Koster'	'Ornatus' × <i>tazetta</i>	A. Vis	8W-YYO	1906
'Ideal'	Unknown	R. van der Schoot and Son	8W-O	1907
'Jaune à Merveille'	<i>poeticus</i> × <i>tazetta</i>	R. van der Schoot and Son	8Y-YYO	1907
'Scarlet Gem'	Unknown	P.D. Williams	8Y-O	1910
'Aspasia'	<i>poeticus</i> × <i>tazetta</i>	R. van der Schoot and Son	8W-Y	1910
'Admiration'	Unknown	A. Vis	8Y-O	1913
'Helios'	Unknown	Dutch origin	8Y-Y	
'Silver Chimes'	'Grand Monarque' × <i>triandrus</i> var. <i>loiseleurii</i>	E. Martin	8W-W	1916
'Chinita'	'Chaucer' × 'Jaune à Merveille'	F.H. Chapman	8Y-YYR	1922
'Cyclataz'	'Soleil d'Or' × <i>cyclamineus</i>	A.W. Tait	8Y-O	1923
'Glorious'	<i>poeticus</i> × <i>tazetta</i>	J.C. Williams	8W-O	1923
'Red Guard'	Unknown	Mrs R.O. Backhouse	8Y-O	1923
'Saint Agnes'	'Chaucer' × <i>tazetta</i> ('White Pearl'?)	P.D. Williams	8W-O	1926
'Halvose'	Unknown	P.D. Williams	8Y-O	1927
'Cragford'	<i>poeticus</i> × <i>tazetta</i>	P.D. Williams	8W-O	1930
'Early Perfection'	Selected form of <i>N. italicus</i>	R.A. van der Schoot	8W-Y	1930
'Geranium'	<i>poeticus</i> × <i>tazetta</i>	J.B. van der Schoot	8W-O	1930
'Orange Wonder'	Unknown	R.A. van der Schoot	8W-O	1931
'Early Splendour'	Unknown	A.C. van der Schoot	8W-O	1938
'Hiawassee'	'Cassandra' × 'Paper White'	E.C. Powell	8W-W	1943
'Martha Washington'	Unknown	A. Frylink	8W-O	1948
'Halingy'	? × 'Scilly White'	A. Gray	8W-Y	1949
'Avalanche'	Selected form of 'Grand Monarque'		8W-Y	1955
'Golden Dawn'	'Admiration' OP	Oregon	8Y-O	1958

'Matador'	'Admiration' OP	Oregon	8Y-O	1958
'Highfield Beauty'	Unknown	H.R. Mott	8Y-YYO	1964
'Motmot'	'Matador' × <i>jonquilla</i>	G.E. Mitsch	8Y-R	1979
'Shrew'	<i>tazetta</i> var. <i>lacticolor</i> × <i>minor</i>	A. Gray	8W-Y	1980
'Radiant Gem'	'Matador' × <i>jonquilla</i>	G.E. Mitsch	8Y-R	1984

**Table 18.4.** Chronological list of some better known Division 8 cultivars. (Column 1, Name. The daffodil name is usually the registered cultivar name; Column 2, Parentage. The parentage is given, if known; Column 3, Breeder. The name of the breeder, occasionally the registrant. Where no breeder is shown the cultivar is a selecte form of the species rather than a 'man made' hybrid; Column 4, Colour code. The colour code classification (1998 version); Column 5, Year. Usually the date is that of registration but with older daffodils the date is of the earliest known occurrence. OP = open pollinated.)



**Figure 18.1.** The pedigree of 'Lilac Charm'. (Abbreviations for breeders: Brodie = Brodie of Brodie, B.S.D. = Brian S. Duncan, D.B. = D. Blanchard, Engle. = G.H. Engleheart, G.L.W. = Guy L. Wilson, J. Kend. = J. Kendall, J.L.R. = J.L. Richardson, Leeds = E. Leeds, L.V.L. = L. van Leeuwen and Son, P.J.W. = P.J. Worsley. SP = self pollinated, OP = open pollinated.) [Note: this figure is best viewed at either  $\times 150$  or  $\times 200$ .]

## CHAPTER 19

### DIVISIONS 10 (*BULBOCODIUM* CVS) AND 12 (MISCELLANEOUS DAFFODILS)

Until the re-classification of daffodils in 1969<sup>(1)</sup>, the miscellaneous daffodils were in Division 11. When this division was re-allocated to the split coronas, Division 12 was created to cater for any daffodils not eligible for inclusion in Divisions 1 to 11. Because of the increased interest in developing *bulbocodium* cultivars they were given Division 10 in the 1998 re-classification<sup>(2)</sup> and daffodils distinguished solely by botanical name (species and wild hybrids) were moved to a new Division 13. All miscellaneous daffodils that do not fit into any of the other divisions will remain in the division created for them in 1969.

The purpose of Division 12 prior to 1998 was to contain all those garden hybrids not covered by Divisions 5 to 9 (the garden hybrids of *N. triandrus*, *N. cyclamineus*, *N. jonquilla*, *N. tazetta* and *N. poeticus*). The main species not contained in this list are *N. bulbocodium* and *N. cantabricus* and it is, therefore, not unexpected that one or other, or both, appeared as parents in most Division 12 cultivars pre-1998. Examples of such parentage are shown in Table 19.1.

The leading Division 10 show cultivar in 2003 was ‘Golden Bells’, a sport of *N. bulbocodium* which, as the name suggests, is all yellow. It was discovered by the Tesselaar group in Australia sometime before the mid-1990s. Other show winners have been the bicolor ‘Kenellis’ (Table 19.1) and ‘Solveig’s Song’, an all yellow daffodil raised by R.B. Wallis in Lower Beeding, Sussex and registered in 1992. Because this division is still at an early stage of development, many shows do not have any entrants in this class or the entries may be few in number, consisting of daffodils still under Seedling Number rather than being registered cultivars.

Cultivar	Parentage	Classification (1998)
‘Jessamy’ (D. Blanchard, 1952)	<i>N. romieuxii</i> × <i>N. cantabricus</i> var. <i>foliosus</i>	10W-W
‘Kenellis’ (Gray, 1948)	<i>N. bulbocodium</i> var. <i>citrinus</i> × ‘Snowflake’	10W-Y
‘Muslin’ (D. Blanchard, 1952)	<i>N. cantabricus</i> var. <i>foliosus</i> × <i>N. romieuxii</i>	10W-W
‘Poplin’ (D. and J.W. Blanchard, 1960)	A hybrid of the <i>bulbocodium</i> group	10Y-Y
‘Taffeta’ (D. Blanchard, 1952)	<i>N. cantabricus</i> var. <i>foliosus</i> × <i>N. romieuxii</i>	10W-W
‘Tarlatan’ (D. Blanchard, 1952)	<i>N. cantabricus</i> var. <i>foliosus</i> × <i>N. romieuxii</i>	10W-W

**Table 19.1.** Some *bulbocodium* and *cantabricus* cultivars found in Division 12 before 1998 but now within the newly created Division 10.

Due to the influence of *N. bulbocodium* and *N. cantabricus*, the colour range found in Division 10 is limited, with the majority being either all yellow or all white. A wider colour range is only likely to emerge through crossing *N. bulbocodium* and *N. cantabricus* with hybrids from other divisions. The main problem with this approach is that many of the offspring so produced may resemble more the parent used to give colour and therefore not qualify for Division 10. Obviously great patience will be required in pursuing this line of breeding if the colour range now common in many other divisions is to be achieved among Division 10 daffodils.

In common with Division 10 daffodils, those allocated to Division 12 are in short supply. During the early years of the 21st century, ‘Upalong’ (12W-YR, Scamp, 2003) and ‘Oz’ (12Y-Y, W.G. Pannill, 1980) occupied pride of place on the show bench in this sparsely populated division.



Other members, perhaps better known, include 'Bittern' (12Y-O, 1979) raised by G.E. Mitsch in the USA and A. Gray's trio raised in the 1950s from 'Cyclataz' × 'Cyclataz', namely 'Tête-à-Tête' (12Y-Y, 1949), 'Jumblie' (12Y-O, 1952) and 'Quince' (12Y-Y, 1953). These were formerly classified as *cyclamineus* cultivars but clearly could not remain in Division 6 because of their appearance.

A characteristic of Division 10 daffodils, and many in Division 12, is that they are small in both stature and flower – a reflection of the parents predominantly used. There has been a considerable upsurge of interest in miniature daffodils in recent years. This represents a reversal of the main hybridisation trends dominant in the earlier years of breeding, when the chief objectives were plant vigour and large flower size.

While all Division 10 cultivars are small in stature, not all daffodils classed as miniatures are in Division 10. In fact, the majority of miniatures belong to other divisions, with several in Division 12 as the Approved Lists of Miniatures<sup>(3)</sup> over the years would tend to show. For example, the American Daffodil Society's List of Miniatures for 1965<sup>(4)</sup> consisted of the names of some 75 cultivars of which the majority belonged to Divisions 1, 5, 6 and 7; but miniatures were also listed in smaller numbers from Divisions 2, 3, 4 and 8. Since 1965, the number of miniatures has increased, although not significantly: only 115 cultivars were approved by the American Daffodil Society in 1984. A considerable number of species, subspecies and varieties have been used in raising miniature daffodils, including *N. asturiensis*, *N. calcicola*, *N. cyclamineus*, *N. dubius*, *N. jonquilla*, *N. assoanus*, *N. minor*, *N. poeticus*, *N. rupicola* and *N. rupicola* subsp. *watieri*, *N. moschatus*, *N. obvallaris*, *N. tazetta* subsp. *lacticolor* and varieties of *N. triandrus*. As with Division 10 daffodils, the colour range in the miniatures is somewhat limited and, of the 115 listed in 1984 by the American Daffodil Society, 57 were all yellow, 22 all white and 18 white and yellow bicolors. A few are yellow and orange, while occasionally a few rimmed or reversed bicolor flowers are to be found – examples are 'Flomay' (7W-WWP, Gray, 1946), 'Marionette' (2Y-YYO, Gray, 1946), 'Bobbysoxer' (7Y-YYO, Gray, 1949) and 'Gipsy Queen' (1YYW-WWY, Gray, 1969).

By far the most successful breeder of miniatures has been Alec Gray, who commenced raising daffodils in the Isles of Scilly in 1927, and continued subsequently at Cambourne in Cornwall. He was responsible for 58 of the cultivars that appeared in the approved list referred to above. Breeding of miniatures has also taken place in the Netherlands, where Gerritsen has featured prominently. There has been increasing interest in the USA, where Mitsch and Mrs R.C. Watrous have led the way.

One of the most unfortunate features of the miniature daffodils is the relative scarcity of many of the listed cultivars. Only a few could be described as easily obtainable by the general gardening public, although this situation is improving. Those which are most accessible are: 'W.P. Milner' (1W-W, W. Backhouse, pre-1869), 'Cyclataz' (8Y-O, A.W. Tait, 1922), 'Hawera' (5Y-Y, W.M. Thomson, 1928), 'April Tears' (5Y-Y, Gray, 1939), 'Xit' (3W-W, Gray, 1948), 'Bobbysoxer' (7Y-YYO, Gray, 1949), 'Tête-à-Tête' (12Y-Y, Gray, 1949), 'Jumblie' (12Y-O, Gray, 1952), 'Little Beauty' (1W-Y, J. Gerritsen, 1953) and 'Baby Moon' (7Y-Y, J. Gerritsen and Son, 1958). The most readily accessible of these are 'Tête-à-Tête', a delightful daffodil that is 15 cm tall with one, two or three flowers of golden yellow on each stem, and 'W.P. Milner'. It is well worth going to a little trouble, however, to seek out 'Hawera', a charming daffodil that is a lovely shade of pale lunar-yellow.

The creation of a division for the perceived increase in *bulbocodium* hybrids is a considerable incentive to hybridists to work towards an increasing range of colours and colour combinations. This will follow the pattern already seen in the development of most other divisions over the years and will be encouraged by the beautiful and unique flower character of this type of daffodil.

Of equal excitement will be the development of miniatures as several previously unused species have been added recently to the hybridists palette, such as the short stemmed *N. cavinillesii*, *N. elegans*, *N. miniatus*, *N. minor*, *N. serotinus* and *N. viridiflorus* together with dwarf cultivars such as 'Cedric Morris.' These, and similar daffodils, seem to open up a whole new phase in daffodil breeding and already interesting results are starting to show particularly in the USA and New Zealand. Use of these daffodils not only promises to extend the range of miniatures but also to introduce new colours and an extended flowering season.

## References

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2. Kington, S. (1998). *The International Daffodil Register and Classified List 1998*. Royal Horticultural Society, London, p. 18.
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4. Anon (1966). American list of miniatures. *American Horticultural Magazine* **45**, 215.

## CHAPTER 20

### DIVISION 11 – SPLIT CORONA DAFFODILS

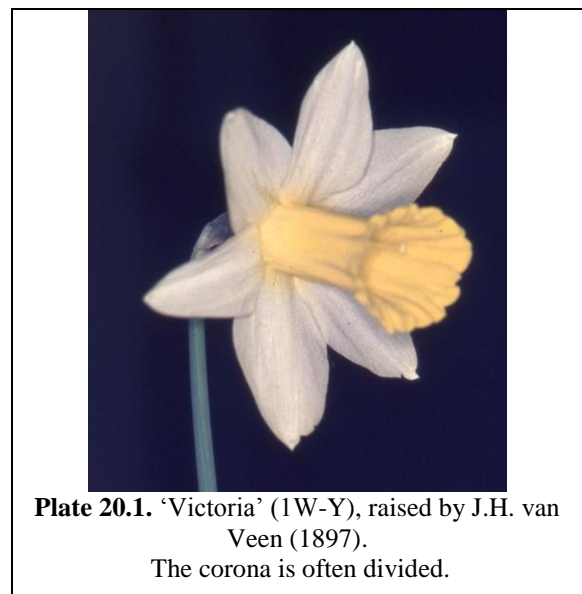
Division 11 was created in 1969 to cater for the ever-increasing numbers of split corona daffodils. As the name suggests, the corona is split, usually for more than half its length. In 1998, there was a further re-classification that resulted in the advent of two sub-divisions, for the Collar Daffodils and the Papillons. In the former, the corona segments, which are usually in two whorls of three, lie opposite the perianth segments. In the latter, the corona segments are in a single whorl of six and lie alternate to the perianth segments.

The prominent corona (trumpet or cup) which most of us recognise as the main distinguishing characteristic of daffodils is, in evolutionary terms, a relatively modern development. In the most primitive species, it exists as no more than a low rim of six small scales. In many of the more developed species, the corona consists of six clearly defined lobes, leading to the conclusion that at an earlier stage of evolution it may have been completely fused to form the characteristic, entire corona that we know today. The recent development of split corona cultivars is, therefore, something of a reversal of the evolutionary trend that has occurred within the species. This is not to say that further back in gardening history some cultivated daffodils have at least exhibited a tendency towards a split corona. One such daffodil was *N. minor* var. *pumilus* f. *fimbriatus*, the Fringed Narcissus, illustrated in Hill's *Eden, or a Compleat Body of Gardening* in 1757<sup>(1)</sup> (Figure 20.1). This daffodil's Latinized name at that time was *Narcissus spatha uniflora nectari limbo campanulato profundo secto*, the last three words in this cumbersome name indicating the profound or deep division of the bell or corona.



**Figure 20.1.** *Narcissus pumilus* var. *fimbriatus* (from J. Hill's *Eden, or a compleat body of gardening*, 1757).

Somewhat later, the cultivar 'Victoria' (Plate 20.1), a fine white and yellow daffodil raised by J.H. van Veen and registered in 1897, played its part. 'Victoria', nowadays rather rare in gardens, was described in Christopher Bourne's catalogue in 1913 as having a "large trumpet, rich yellow, flanged and frilled"<sup>(2)</sup>, making it in flower shape at least not too dissimilar to *fimbriatus*. It was frequently noticed that 'Victoria' threw reversion, or 'freaks', in which the corona was either deeply divided or split completely to the base to give six partially or totally separated lobes. One such reversion was named 'Buttonhole' in 1923 by Professor de Mol in the Netherlands. He co-operated with A. Nieuwenhuis in raising a series of hybrids from 'Buttonhole' that were known as the Gigantic Orchid-Flowered Daffodils. This strain, however, deteriorated and was destroyed.



**Plate 20.1.** 'Victoria' (1W-Y), raised by J.H. van Veen (1897).  
The corona is often divided.

J. Gerritsen of Voorschoten, the Netherlands, began his work on split corona daffodils in 1928, using a 'Buttonhole' seedling as the seed parent. Initially, results were disappointing but Gerritsen persisted, crossing the offspring from this early work, and eventually he made progress. His earliest and one of his most successful introductions, 'Orangery' (Plate 20.2), was registered in 1957. By the late 20th century, Gerritsen had raised about 100 split corona cultivars and was by far the largest and most successful hybridist working in this division. During his early work with split corona daffodils, Gerritsen coined the name Collar Daffodils: it was his intention to raise flowers that were ruffled with the corona divided to the base, and he thought that the name was descriptive of this aim. This term fell into disuse, being revived in 1998 for the Division 11a sub-division.



**Plate 20.2.** 'Orangery' (11aW-OOY), raised by J. Gerritsen (1957).

During his work, Gerritsen has raised a wide range of forms, shapes and colour combinations, at least one cultivar having a three-segmented corona resembling an *Iris* flower. Colour combinations include daffodils that are all yellow, all white, white and orange, white and pink, together with several rimmed forms in which the corona segments contain two or three colours.

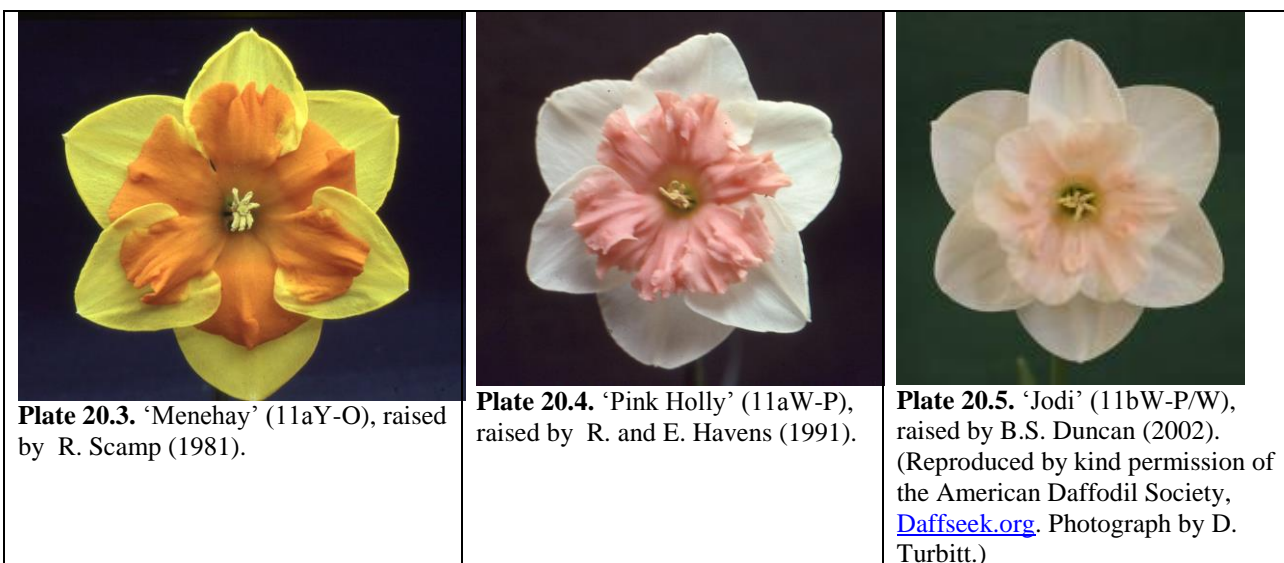
J.W.A. Lefeber of Lisse, the Netherlands, like Professor de Mol before him, also worked with a reverted form of 'Victoria' as seed parent and various large-cupped cultivars as pollen parents. The series of resultant seedlings had shorter corona lobes that do not fully overlap the corresponding perianth segments, and some had the segments of the two whorls positioned alternately. Lefeber gave the name Papillon Daffodils to this series, its best known member probably being 'Papillon Blanc', an all white daffodil registered in 1960, which received an Award of Merit (Haarlem) – signifying its suitability as a commercial cut flower – two years later. Other hybridists have been involved with split corona daffodils, including several in the Netherlands in addition to Gerritsen, while Mitsch and Kanouse led the way in the USA. The first split corona daffodil attributed to a breeder in the British Isles was J.L. Richardson's 'Teneriffe' (11aW-O) in 1965. In more recent years, they have appeared with increasing frequency, particularly through the work of B.S. Duncan in Northern Ireland and R.A. Scamp in Cornwall.

The most unsatisfactory aspect of the development of split corona daffodils is the scarcity of data on exactly which cultivars were used in their breeding. Scarcely any of the hybridists involved disclose this information. It is known, of course, that all the modern cultivars of this type had their origins in one or more of the much segmented reversions of the old bicolor trumpet 'Victoria', and that one of these was named 'Buttonhole' by de Mol in 1923. There was then a gap of about 30 years during which time the breeding of split corona daffodils must have been progressing quietly, but little appears to have been recorded or published. Consequently, little is known of the parent material of the offspring that ensued. Suddenly, in the late 1950s, cultivars began to be registered and have continued to appear in ever-increasing numbers up to the present day. Most of these latter day cultivars are either of unknown or at least unpublished parentage but, where the parentage is recorded, one parent is invariably a split corona daffodil of fairly recent origin. Unlike the majority of cultivars from other divisions, the complete ancestry of most split corona daffodils may never be known. All that can be stated with any certainty is that it all began with 'Buttonhole' and various other split corona seedlings which came from 'Victoria', and that subsequent daffodils of this type appear to have had the ability to pass on to their offspring the characteristics which make this division so different from the rest.

Several split corona cultivars are nowadays available to the general gardening public through the trade at a reasonable price, their flowers being widely used and greatly valued by floral decorators. Those most easily obtainable and all raised by J. Gerritsen and Son are ‘Canasta’ (11aW-Y, 1957), ‘Orangery’ (11aW-OOY, 1957), ‘Parisienne’ (11aW-O, 1961), ‘Cassata’ (11aW-W, 1963), ‘Frileuse’ (11aW-Y, 1964) and ‘Valdrome’ (11aW-Y, 1965). One worth taking a little extra trouble to obtain – for an unusual display in the garden – is ‘Tricollet’ (11aW-O, 1969) also raised by Gerritsen.

The top show cultivar in 2003 was ‘Tripartite’, an 11aY-Y (Brook, 1980) raised from ‘April Tears’ × ‘Baccarat’ itself an 11aY-Y introduced by Gerritsen in 1950. Other more recent cultivars that have had exhibition success and have added to the colour range include ‘Boslowick’ (11aY-O) and ‘Menehay’ (11aY-O) (Plate 20.3), both raised by Scamp and registered in 1991. B.S. Duncan has given us ‘Diversity’ (11aW-GPP), ‘Electrus’ (11aW-GPP) and ‘Lady Eve’ (11aW-GPP), the final two being introduced as recently as 2001 and 2000 respectively. By 2003, ‘Diversity’ and ‘Lady Eve’ were close on the heels of ‘Tripartite’ as leading exhibition split corona daffodils. Another outstanding flower in this group is ‘Trigonometry’, which was raised by Mitsch in the USA, flowered first in 1979 but was only registered in 1995 by R. and E. Havens. It is an 11aW-P. R. and E. Havens have raised several other cultivars having this colour combination an example of which is ‘Pink Holly’ (Plate 20.4), its split and frilled inner segments being clear rosy pink.

During the last few years (2005-2010), ‘Tripartite’ and ‘Boslowick’ have vied for the top spot in shows, with ‘Trigonometry’ and ‘Diversity’ ‘fighting’ for third place. A host of new cultivars are set to burst on to the scene, with yellow/pink and lateral coloured perianths adding to their already diverse and somewhat decadent appearance. ‘Jodi’ (11bW-P/W, Duncan, 2002) (Plate 20.5) and ‘Jodi’s Sister’ (11bW-P/W Duncan, 2004) are two of these, with ‘Tickled Pink’ (11aY-YPP, Duncan, 2007) another eye-catcher.



A notable development in this division has been the appearance in seedling beds (and occasionally among exhibits at the major shows) of double-flowered split corona daffodils. The doubling of those that have been seen on the show bench under seedling numbers takes the form of an additional second layer of corona parts, which gives the centre of the daffodil a ruffled appearance. Another recent interesting difference is the appearance of two or more colours in either the corona or the perianth in some divisions, but not in the usual concentric arrangement. Among the Division 11 daffodils an example of this is found in ‘Jodi’, in which the inner ring of segments have both pink and white, denoted by P/W rather than PW for a concentric arrangement. In ‘Jodi’, the pink colour predominates with the white secondary, the predominant colour being given first in the coded description.

To set the split corona cultivars in perspective, they comprise only about 0.1% of the total number of cultivars currently registered. It must also be noted that they are not the most popular type of daffodil with the show fraternity. No doubt as with the reverse bicolors before them, the passage of time will boost their popularity and bestow on them the place they so rightfully deserve among the more conventional types.

## References

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## CHAPTER 21 HYBRIDISATION

### A Brief Introduction to the History of Plant Breeding

A hybrid is a living organism of mixed ancestry. Through the process of hybridisation the plant breeder combines the history of ancestry of each parent to produce a new and, hopefully, improved offspring. Man has only deliberately hybridised plants for a relatively short space of time, although it is during this brief period that all the dramatic strides in plant improvement have occurred. There are hints from the horticultural literature of the early 17th century that man may have been dabbling in hybridisation then, but this may be a misinterpretation for, as late as 1694, Rudolph Jacob Camerarius of Tübingen<sup>(1)</sup> advanced what he clearly felt was a fresh interpretation: that plants are sexually differentiated and could be mated together like animals.

The first undisputed record of a man-made hybrid dates from 1718 when an Englishman, Thomas Fairchild, crossed *Dianthus barbatus* with *Dianthus caryophyllus*. The earliest hybridisations in the genus *Narcissus*, if one discounts Parkinson's reference in 1629<sup>(2)</sup> to one "of mine own raising", probably took place during the last few years of the 17th century and continued apace throughout the 18th century, especially in the Netherlands. The type of daffodil mainly worked on at that time was *N. tazetta*, between 200-300 cultivars being recognised by the late 1700s, although whether these were true man-made hybrids or selections from naturally occurring hybrids is uncertain. Probably the earliest result of hybridisation during the 'modern revival' of the daffodil in the early 19th century was 'Horsfieldii', raised around 1845 by John Horsfield (1792-1854). This was a white and yellow trumpet daffodil, its likely parents being *N. bicolor* × *N. pseudonarcissus*.

For several millennia before man took a direct hand in hybridisation, however, Nature had been carrying out the process for him but, compared with that of the past 200 years, progress was painfully slow. Man's intervention brought about two significant changes. The first involved plant discovery and introduction, whereby species from many geographical locations were brought together, often in the countries of Western Europe. The second involved the development of techniques enabling these species to be crossed together, for example, through pollen storage that made possible the pollination of late flowering species by those that flowered much earlier. Originally, the method used involved the collection of the pollen of early daffodils, which was then stored (at cool temperatures and in silver foil) until later daffodils were in a condition to be pollinated. Nowadays, refrigerated storage of pollen affords retention of viability over much longer periods. It is quite feasible to cross spring-flowering with autumn-flowering types; or to use pollen gathered in spring in the Northern Hemisphere on mother plants flowering in spring in Australasia – using refrigerated or frozen pollen that remains viable when removed from storage, even after several years.

The main essentials for success in plant breeding are:

1. A sufficient degree of genetic similarity between the selected parent material.
2. The ability of the chosen pollen parent to produce viable pollen; inability to produce viable pollen does not mean that a particular cultivar is unsuitable for use in breeding as it may behave perfectly if used as the seed parent.
3. The ability of the chosen seed parent to produce viable egg cells.
4. Suitable environmental conditions to encourage germination of the pollen on a receptive stigma and the subsequent growth of the pollen tube down the stigma to the ovary.

### Chromosome Number and the Ability to Hybridise

The vast majority of cells forming a plant contain two sets of paired and matching chromosomes, one set originating from the male gamete in the pollen of the pollen parent and the

other from the egg cell of the seed parent. The sex cells or gametes therefore, contain half the normal complement of chromosomes and are said to be haploid and the body cells that contain double this number are termed diploid. Plants in which the cells contain more than the diploid number of chromosomes are, however, common – especially among ‘improved’ garden forms – and these are collectively termed polyploids. The most common forms of polyploid encountered in daffodil cultivars are triploids with three times (3x) the haploid number and tetraploids with four times (4x) this number. Among the daffodil species the widest chromosome range is found in *N. bulbocodium* with 14 to 56 (2x to 8x) and the highest number (up to 75 chromosomes) in *N. dubius*. There is generally a level of ploidy for each genus at which optimum levels of desirable characteristics (e.g. vigour) are encountered; with daffodils this is found among the tetraploids.

Polyploids are of two types: autopolyploids and allopolyploids. In the former, the two sets of chromosomes in each cell are identical or nearly so, owing to the possession of identical or very similar genes on each set. The allopolyploids consist of sets of chromosomes that are not identical and may in fact be quite different, as is the case with the poetaz daffodils derived from crosses between *N. tazetta* and *N. poeticus*. The poetaz daffodils have a somatic chromosome number of 24 made up of one haploid set of 10 from *tazetta* and two haploid sets of 7 from *poeticus*. Due to this mismatch, they are very infertile, the pollen fertility of the poetaz cultivar ‘Geranium’ being assessed at just 3%. Owing to the greater, often almost identical, similarity of the chromosomes in autopolyploids problems of infertility on this account occur much less frequently. The best example of allopolyploids in *Narcissus* is found in hybrids produced from crosses between plants with 7 as the basic chromosome number and those in which the number is something other than 7. It is most frequently encountered in crosses between diploid ( $2n = 14$ ) daffodils and *N. tazetta* or its forms ( $2n = 20$ ). The hybrids that have resulted from crosses of this type contain 24 chromosomes: these are derived from unreduced sex cells containing 14 chromosomes combined with haploid sex cells from *N. tazetta* with 10 chromosomes.

In Nature, the diploid species *N. poeticus* often grows in close proximity to *N. tazetta*, especially in southern France. In such situations, these two species readily hybridise to produce *N. × medioluteus*. Several cultivars have been derived in this way from the same two species: these are known as Poetaz daffodils and some of the best known Division 8 daffodils are of this type. One of the earliest and subsequently most important of the Poetaz cultivars with a complement of 24 chromosomes was ‘Elvira’ (8W-Y), raised in the Netherlands by R.A. Van de Schoot and registered as long ago as 1904. Others are ‘Laurens Koster’ (1906), ‘Scarlet Gem’ (1910), ‘Saint Agnes’ (1926), ‘Cragford’ and ‘Geranium’ (both 1930). All of this group of Poetaz cultivars contain 17 chromosomes derived from *N. poeticus* (7 from 14) × *N. tazetta* (10 from 20). They all show a high degree of sterility resulting from the chromosomes of each parent differing in both number and make-up, which leads to difficulties in the production of gametes as the two chromosome sets are incompatible and cannot pair successfully at meiosis.

Another Division 8 daffodil with 24 chromosomes is ‘Golden Dawn’ (8Y-O), raised from an open pollinated ‘Admiration’ (8Y-O) by Oregon Bulb Farms in the USA. Few Division 8 daffodils have had their pollen fertility assessed, but, as would be expected, those that have, have been shown to be sterile or nearly so. Several *tazetta* cultivars have chromosome numbers other than 17 or 24 and some of these may be classified as Poetaz types. One such cultivar is ‘Hiawassee’, which was raised from the *poeticus* hybrid ‘Cassandra’ (9W-GYR) crossed with the *tazetta* ‘Paper White’ (8W-W). ‘Hiawassee’ has 18 chromosomes with 7 from ‘Cassandra’ and 11 from ‘Paper White’. It too is sterile. A straight *tazetta* hybrid within Division 8 is ‘Highfield Beauty’ (8Y-YYO) and this possesses 31 chromosomes. It arose from two *tazetta* parents with 20 and 22 chromosomes respectively: the 31 in the hybrid is the result of a non-reduced gamete from the former combining with a haploid gamete from the latter. As with the Poetaz cultivars, ‘Highfield Beauty’ is also sterile. Here, then, are good examples of how chromosome numbers – and the origins of the chromosomes themselves – can adversely affect the capacity to hybridise through an inability to form paired sets of chromosomes.

Another group of daffodils in which improvement through hybridisation has been slow is Division 7, the jonquil hybrids. *N. jonquilla* is diploid ( $2n = 14$ ). A small number of jonquil hybrids are also diploid and these have been raised exclusively from *N. jonquilla* crossed with its forms or with the diploid *N. poeticus*. The majority of Division 7 cultivars, however, have been raised by crossing tetraploid cultivars (mainly belonging to Divisions 1, 2 or 3) with *N. jonquilla*, and they are consequently triploids. These triploids have 14 chromosomes from the tetraploid parent and 7 from *N. jonquilla*. The two chromosome complements vary in number and make-up, and so find it impossible to produce sets of matching pairs at meiosis. Consequently, the majority of these triploids are sterile, e.g. 'Golden Incense' (7Y-Y) and 'Sweetness' (7Y-Y), or almost so, as in the case of 'Penpol' (7Y-Y), for example. Others have low pollen fertility, such as that found in 'Tittle Tattle' (7Y-GYY). The problem with these is that their pollen and egg cells contain no *jonquilla* chromosomes as these, being unable to pair, are left at the first meiotic division and are thus not available for incorporation into the gametes. Even if seeds were produced, they would not give rise to improved Division 7 daffodils.

All is not lost with these triploids, however, for occasionally they will produce non-reduced (triploid) pollen grains and egg cells. Such gametes when combined with haploid gametes from *N. jonquilla* will give rise to fertile tetraploids. In order to exploit this phenomenon, the direction of the cross is important, for the number of unreduced egg cells produced will be less than 1%, which will produce insufficient developing seeds to allow the ovary to mature, causing it to wither and die. This rare occurrence of non-reduction may, however, give rise to 1% of viable pollen grains that can amount to an appreciable number in view of the total number of pollen grains that are produced by a single flower. The triploid 'jonquil' cultivar should, therefore, always be used as the male parent. Another way forward is to exploit those 'jonquil' cultivars that are already tetraploid and fertile. Examples of such cultivars are found in 'Porthchapel' with 80% and 'Roberta Watrous' with about 60% pollen fertility. These may be crossed with each other, other tetraploids, diploid 'jonquil' cultivars or *N. jonquilla* itself, to produce new and hopefully improved triploids. Tetraploids from other divisions, particularly Divisions 1, 2 and 3, may also be crossed with 'jonquil' diploids (either species or cultivars) and these too will give rise to new triploids.

Problems are also encountered in Division 4, the double-flowered cultivars, which generally do not possess fertile pollen, no matter whether they are diploid, triploid or tetraploid. This is because of the conversion of the sexual parts of the flower into petal-like structures during the production of the double flower. A few, however, do possess sexual parts and are thus able to produce fertile pollen and egg cells; it is through cultivars of this type, particularly 'Falaise' and 'Gay Time', that all the modern advances have come. Chromosomally, both are interesting. 'Falaise' is known to have had the triploid 'Mary Copeland' as its seed parent – the development of the seed pod from which 'Falaise' came is well documented. The pollen parent was unknown but an inspired guess can be made as to what it was. Its raiser, J.L. Richardson, was convinced that it was a *poeticus* because of the whiteness, scent and lateness of 'Falaise'. Early tetraploid *poeticus* cultivars are uncommon but one – 'Dulcimer' – was growing at Prospect House at the appropriate time. 'Falaise' itself contains 26 chromosomes and is thought to have obtained 12 (from 21) from 'Mary Copeland' plus 14 (from 28) from the pollen parent. 'Falaise' is, therefore, basically a tetraploid that has lost two chromosomes and is termed an aneuploid. The loss of two chromosomes can result in a major loss of vegetative vigour and this corresponds closely with Jefferson-Brown's description of 'Falaise' as "pleasant though it is, cannot be said to be outstandingly robust"<sup>(3)</sup>.

'Gay Time', a full tetraploid with 28 chromosomes, was raised from a cross between 'Falaise' and 'Limerick'. Jefferson-Brown described this cultivar as "much more vigorous than the rather weedy little 'Falaise'"<sup>(4)</sup>, reflecting the difference that two chromosomes can make. The chromosomal status of 'Limerick' has not been determined but it is likely to be tetraploid, its seed parent being the tetraploid 'Folly'. Its pollen parent was 'Hades' – that great advance in white and red daffodils during the 1920s from which most subsequent advances in this type came. The majority of improved cultivars from this era were tetraploids, the improvement being an outward manifestation of this most desirable degree of polyploidy. Additionally, there is strong evidence from the chromosome status of some hybrids raised from 'Hades' that indicates that it was indeed a tetraploid. The likely formula

involved in the production of 'Gay Time' is, therefore, 'Falaise' 14 (from 26) plus 'Limerick' 14 (from 28) = 'Gay Time' 28.

Although both 'Falaise' and 'Gay Time' were used with great success as seed parents, it is known that the latter has a high degree of pollen fertility at 94%. That of 'Falaise' has not been assessed. Richardson's use of these two cultivars solely as seed parents may simply have resulted from the fact that pollen production in doubles is sparse, and readily seen to be so with the naked eye. He would have had no conception that the relatively few pollen grains produced, at least in 'Gay Time', were highly fertile. Neither is he likely to have known, at least initially, the degree of fertility in the egg cells, for this knowledge would only come following his early attempts to hybridise with 'Falaise' as the seed parent. It is a fact, however, that female fertility is often higher than male fertility in hybrids of distantly related parents and, after all, the relationship between the parents of 'Falaise' was indeed distant, being a double and a *poeticus*. It is a pity that the fertility of the triploid 'Mary Copeland' has never been determined: but clearly, the development of a seed pod was an event rare enough to have caused Richardson considerable surprise. The whole course of development in Division 4 daffodils was changed out of all recognition through this chance fertilisation. Only two triploid double cultivars, 'Camellia' and 'Great Leap' have been tested for fertility and were found to be sterile. 'Falaise' was probably just one of those 'chances in a million' through which progress sometimes occurs.

Thankfully, hybridisation in daffodils is generally much easier than it is in the difficult divisions discussed above. Daffodils that contain even numbers of chromosomes, such as diploids and tetraploids, normally produce compatible paired sets of chromosomes and, therefore, good pollen and egg cells. Diploids readily hybridise with other diploids and tetraploids do likewise. Diploids hybridise with tetraploids and this has been a common pathway to the production of triploids. It should be remembered, however, that not all daffodils with even numbers of chromosomes are diploid or tetraploid as, for example, those in Division 8 containing 24 chromosomes; the reason for their sterility has already been explained. Diploids and tetraploids may also hybridise with non-reduced triploid gametes to produce tetraploids and pentaploids respectively. In *Narcissus*, the latter group tend to be weak and sickly and, owing to this, they are normally discarded during the selection process that takes place in the seedling beds.

Chromosome number is strongly linked to fertility. Pollen fertility has been assessed in some 170 cultivars<sup>(5)</sup>, the results indicating that, at 82%, diploids are the most fertile, followed by tetraploids at 68%. As would be expected, pollen fertility in the triploids is low at only 14%. While the mixing of genetic material is the norm with the vast majority of plants when male gametes (derived from the pollen) from one fertilises the egg cell of another, there are a few genera in which the egg cell is capable of developing directly into an embryo without the intervention of a pollen parent. The best known horticultural genus in which this occurs is *Sorbus* which, when propagated from seed, gives rise to offspring that are 'carbon copies' of the seed-producing parent. Any pollen that may have landed on the stigma from another *Sorbus* (either the same individual, individual of the same species or other *Sorbus* species) has no genetic input into the progeny. This process is known as apomixis and is a natural, if somewhat unusual, vegetative method of clonal reproduction without sexual intervention. In addition to *Sorbus*, apomixis has been reported in a number of other genera, including *Rubus*, *Rosa*, *Citrus*, *Taraxacum* and *Limonium*. What is interesting is that it has not been found in any bulbous plants until recently (2007), when the split corona *Narcissus* 'Tripartite', crossed with other *Narcissus* cultivars, produced only offspring that were identical to the seed parent<sup>(6)</sup>.

Normal fertile pollen grains are spherical in shape and can easily be distinguished under a microscope from non-fertile grains, following staining with a suitable stain such as tetrazolium blue. In most diploid and tetraploid daffodils with a high degree of fertility, the fertile grains are generally distinctly rounded and of a similar size, but occasionally much larger grains are obvious. These are likely to contain higher chromosome numbers, for example when some diploid or non-reduced grains occur among the more normal mass of those that are haploid. The other pollen grains seen under the

microscope are smaller and ‘sausage-shaped’. They do not take up the stain like the almost spherical living grains, which indicates that they are aborted dead grains. The proportion of spherical to ‘sausage-shaped’ (= non-viable) grains varies considerably from cultivar-to-cultivar and is reflected in pollen fertility levels. Assessments of pollen fertility levels can readily be conducted under a microscope by counting both types of grain. The results of such an assessment can quickly indicate the futility of using a particular cultivar as a pollen parent, though the same cultivar may prove viable as a seed parent. One such cultivar is ‘Irish Splendour’, which was often unsuccessful as a pollen parent; ultimately, a determination of pollen fertility revealed the reason why. However, it was used quite satisfactorily as a seed parent.

Pollen size is related to the type of daffodil from which it comes. That from the majority of species, which are mainly diploid, is smaller than the pollen from cultivars including those that are also diploid. Pollen from tetraploid cultivars is larger than that from diploid cultivars while that of tetraploid cultivars derived from more vigorous species is larger than the pollen of tetraploid cultivars with an ancestry of less substantial species.

Table 21.1 shows the differences in mean pollen grain size for different types of daffodil. There is a gradation in size from the species, which are mostly diploid, to the smaller and older diploid cultivars of Division 9 (*poeticus* hybrids), and to the more modern, tetraploid daffodils of Divisions 1 and 2 (trumpet and large-cupped hybrids). It is probable that any cultivar with a mean pollen diameter of 50  $\mu$  or above will be a polyploid and, most likely, a desirable tetraploid – because tetraploidy is the optimum chromosome level for *Narcissus* expressed in terms of plant vigour, flower quality, etc. These differences in pollen diameter may have had a pronounced effect on the way daffodil cultivars altered chromosomally<sup>(8)</sup> as the rate of hybridisation gathered pace between the mid-19th century and the present day. This led from a largely diploid population to one that is overwhelmingly tetraploid.

Daffodil type	Chromosome number	Pollen mean diameter ( $\mu$ )
Species (n=9)	Diploid, 14 chromosomes	38.7 (n=1838)
Cultivars (Division 9) (n=11)	Diploid, 14 chromosomes	42.6 (n=2190)
Cultivars (Division 9) (n=4)	Tetraploid, 28 chromosomes	52.9 (n=751)
Cultivars (Divisions 1 and 2) (n=7)	Tetraploid, 28 chromosomes	54.0 (n=1391)

**Table 21.1.** Relationship between daffodil type, ploidy status and pollen grain size. Data derived from the work of Tulloch<sup>(7)</sup>. (n = sample size.)

By and large, daffodil hybridisation has always been a very controlled process, the flower to be used as the seed parent having the pollen-producing stamens removed well before they mature. The flower is then covered to exclude unwanted pollen until such time as the hybridist makes his or her intended cross, after which the flower is re-covered once more until fertilisation has taken place. However, every so often, but fairly rarely it must be said, something will go wrong at the meiotic division during which the pollen is produced. While the vast majority will be normal grains with the haploid number of chromosomes some, in which the division process has proceeded abnormally, may be diploid with an additional chromosome complement. These grains will be larger: but is this likely to be of any consequence to the outcome? The hybridist in applying the chosen pollen to the stigma will deposit hundreds of normal grains and perhaps only a single modified grain. It may be conjectured that this single larger grain is more vigorous than the normal grains on account of its size; it may be capable of producing, therefore, a stronger pollen tube which will reach the egg cell and effect fertilisation before its weaker companions can do so. Recent research<sup>(9)</sup> has suggested a more positive role for the stigma in that it may ‘select’ the largest grains for fertilisation. If this is the case,

it would go some way to explain why tetraploids have become the dominant type over such a short time span as hybridisation has progressed.

Pollen storage was developed as a means by which late flowering cultivars could be crossed with those that flowered early. During the early years of the 20th century, it was pollen from early flowering cultivars that was stored for application to the stigmas of those that flowered much later. At that time, the pollen was shaken off the anthers on to thin silver foil sheets, which were then folded to form a sealed packet. These were then stored in as cool a place as possible until required for use. As true refrigeration techniques developed, it was discovered that pollen collected from late-flowering daffodils could be stored successfully for use on early-flowerers in the following season. The technique has now been used successfully with a considerable number of cultivars and involves the storage of pollen in tightly 'screwed-up' pieces of tissue paper in a dessicator kept at 1°C. Stored pollen has been applied to seed parents of known high fertility during the following spring. In terms of the number of satisfactory crosses and seeds produced, the results compare favourably with those obtained using fresh pollen on the same seed parents. Should pollen need to be stored for longer, the freeze method can be used.

### **Plant Manipulation as an Aid to Hybridisation**

It is possible to manipulate plants artificially in order to allow them to act either as pollen sources or seed parents. It involves holding back early-flowering cultivars in cold store at approximately 1°C and forwarding late-flowering ones under heated glass at 12°C in order to get both types to flower simultaneously. As the late cultivars approach flowering time, the early ones are moved from the cold store into the heated glasshouse where they rapidly come into flower. It should be noted that it is difficult to retard the growth of some of the earliest flowering cultivars, such as 'Rijnveld's Early Sensation', which tend to develop naturally outdoors during the low temperature of early spring. Plants grown in cold store with the sole intention of using them as parent material do not require light in order to develop satisfactorily for this purpose. They have been kept for up to ten weeks under such conditions, by which time all normally green parts of the plant are almost white. When removed from the cold store and placed in a warm glasshouse, flowering and maturation of both pollen and stigma occur extremely rapidly and, therefore, must be watched carefully at this stage if they are to be emasculated prior to use as seed parents. Such flowers have been treated with a variety of pollens and have produced very good levels of seed set.

One of the fundamental problems in daffodil breeding is that each stage in the improvement process is likely to take up to six years, which is the average time from sowing to first flowering. This period has been reduced to only two to three years by keeping the plants in continuous growth: but, so far, this technique has only been carried out in the production of new *tazetta* hybrids. Keeping the plants in continuous growth is not difficult in those areas of the world which do not have winter and summer seasons, the only essential being an adequate supply of water during dry summer weather. When attempting this technique under the more testing conditions of a climate with well defined seasons, there is likely to be a need for water in summer, and heating and possibly supplementary light, during winter.

### **Mutations**

Sometimes a plant, like the daffodil, which is propagated vegetatively will produce a new segment of growth which is different from that by which the plant is normally recognised. Such change occurring in vegetative tissue is known as a mutation or sporting, new and altered offspring later showing obvious changes, for example, different flower colour. Plants changed in this way are known as mutants or sports. When this happens, it rather defeats the purpose of vegetative propagation, the aim of which is to maintain cultivars in unchanging form. Nevertheless, when it does occur, a new and improved form may result, as happened in the case of the 'Cheerfulness' group of daffodils.

Mutations tend to occur most frequently in plants with a short life-cycle or in which repeated vegetative propagation is a feature, examples being chrysanthemums, carnations and dahlias. It is also common in some woody plants such as roses and *Potentilla fruticosa*, where it occurs with reasonable frequency<sup>(10)</sup> and is not unknown in bulbous plants like *Narcissus*. Mutations in fact are encountered from time-to-time in most plant species and often involve the production of a single mutated shoot or bulb that originates from a single, altered cell. The most obvious signs that a mutation has occurred are usually found in the shape, form and especially in the colour of the flowers. Single flowers, for example, may become doubled in the mutant shoot, or orange flowers may become red. The secret is in being able to spot a mutant once it has occurred; this frequently takes place in fields of bulbs being grown for cut flowers rather than in the confines of a hybridist's seedling beds. If a mutation is considered to be sufficiently distinct from the cultivar from which it originated then it needs to be established through the process of vegetative propagation.

Mutants have been found in the genus *Narcissus*. Indeed, some, which have been of considerable importance to the cut flower industry, have arisen in this way. Some authors have attributed the origin of that most important of daffodils, 'King Alfred', to mutation – but this is probably not so, as explained in Chapter 6. The most commercially important example of mutation among *Narcissus* occurred in the *tazetta* hybrids of Division 8, the starting point being the white and yellow, single flowered 'Elvira' (8W-Y) that was registered in 1904. It was raised in the Netherlands by R.A. Van de Schoot and in the hands of its owner gave rise to the mutant 'Cheerfulness' (4W-Y) in 1923. Although being the same colours as 'Elvira', its flowers were doubled. Subsequently, 'Cheerfulness' gave rise to 'Yellow Cheerfulness' (4Y-Y) in 1938 which, while still being a double, had flowers of all yellow. In turn, this produced the paler-coloured double 'Primrose Cheerfulness' (4Y-Y) in 1954. Other important mutations include 'Camellia' and 'Holland's Glory' from 'Emperor', and 'Golden Ducat' from 'King Alfred'. In the 'Elvira' to 'Primrose Cheerfulness' sequence, all the cultivars concerned have 24 chromosomes. Thus, the changes that occurred were at gene level, resulting in relatively minor alterations in flower and colour. More major mutations sometimes happen and it was an event of this magnitude that has been postulated as the origin of 'King Alfred'. The mechanism for such major change begins with the formation of a tetraploid cell during the mitotic division of a normal diploid cell, the two diploid sets of chromosomes failing to move to opposite ends of the dividing cell. The single tetraploid cell thus formed continues to multiply, producing initially a knot of tetraploid cells and, ultimately, a tetraploid bulbil. Such a major chromosomal change leads to a marked increase in plant vigour.

As stated earlier, the problem with mutation as a method of plant improvement in *Narcissus* is that it is likely to be difficult to spot the change owing to the huge numbers of normal plants among which the mutant occurs. Bulbs growing where they will be most easy to observe, as in the seed beds of hybridists, do not have the necessary time to develop mutant daughter bulbs to flowering age while in this situation. Later, selected seedlings will be planted out into field conditions to bulk up, the remainder being discarded. While still under the watchful eye of the hybridist, a mutant flower is likely to be detected, but once bulbs become part of a commercial crop such change may well pass unnoticed. For while the hybridist has an eye for improvement and change, a flower picker working among thousands of blooms in a large field is much less likely to notice an improved mutant and may not realise its potential importance, even if seen. This is especially so if the change induced by the mutation is more concerned with vigour rather than flower colour, but even the latter could be put down to the presence of a rogue variety by the casual observer.

### **Induced mutations**

While natural mutations occur frequently in some genera, they are no more than spasmodic events in many others. Even in types where mutations are common, the changes brought about may be minimal. Induced mutations, however, not only occur more often but also tend to show a greater range of variation than do natural mutations. The most effective method of inducing mutations is through the use of ionising radiation, especially X-rays and Gamma rays. Other methods have included the use of ultra-violet light, certain chemicals and various physical treatments, such as temperature shock and

wounding. Another method that has proved to be useful in several genera, including the bulbous *Allium*, is to allow the seed to age prior to sowing. Increases in the mutation rate of about five-fold have been obtained compared to those that resulted from the sowing of fresh seed<sup>(11)</sup>. The reason for such a dramatic increase in mutations is thought to be associated with the production of mutation-inducing chemicals during the ageing process. Chemicals that have often been applied to plants to induce mutation are colchicine, obtained from the Autumn Crocus (*Colchicum autumnale*) and ethyl methane sulphonate. The use of radiation treatment is by far the most effective method of inducing mutations. It is one of only two induction methods used on daffodils, and not very often at that. It was used by Harrison when he had seed of 'Alight' (3Y-O) treated with Gamma radiation at Harwell Atomic Energy Research Establishment. A seedling from this treated seed when crossed with 'Foxhunter' (2Y-O) gave rise to the intensely coloured 'Rio Rouge' (2O-R).

## Practical Aspects of Hybridisation

Examination of the old record books of hybridists will frequently show the term 'selfed' or SP (self pollinated), which indicates that the breeder thought that the seed parent had been self pollinated, i.e. pollinated with its own pollen. The vast majority of plants, however, possess mechanisms that render this and the consequent self-fertilisation difficult if not impossible. The devices used to curtail this (thus ensuring that plants behave as out-breeders subject to cross-pollination), and the benefits which accrue, are several in number. They include the positioning of anthers at a level in the flower below that of the stigma and the maturing of anthers and stigma in the same flower at different times. In addition, pollen may fail to germinate on the stigma of the flower in which it was produced; growth of the pollen tube may be arrested part way down the style or at a later stage when it reaches the ovary. Until fairly recent times, the term 'selfed' has generally been used by hybridists when, in fact, they did not know the name of the pollen parent owing to the cross being the work of a bee or other insect. In more recent times, the more correct term open pollination, or OP, has been used.

Once it is accepted that cross-pollination is the usual method by which hybrids are produced, it is important to ensure that chance and unwanted cross-pollinations do not take place. This can largely be achieved by emasculation of all flowers to be used as seed parents in order to remove as much pollen as possible from the breeding environment. As an added precaution, flowers may be bagged after emasculation and kept in this condition until the stigma is mature and the desired pollen has been applied. Emasculation should be carried out using a pair of tweezers as soon as the anthers can be reached easily once the flower begins to unfold. Bagging can be delayed until shortly before the stigma matures but, in practice, it is probably easier and more foolproof if carried out at the time of emasculation.

Potential pollen parents are best grown in pots and kept a good distance from the seed parents until shortly before crossing takes place. At that time, they should be transferred to the glasshouse where the bagged seed parents are also growing in pots. The protection thus afforded ensures good pollen production, which may not occur outdoors early in the year if temperatures are low. If the pollen matures too quickly under glass, it may be stored in a cool place or in a domestic refrigerator, as already described. Pollen transfer is achieved by removing the whole, dehiscing anther from the flower, holding this by the stamen with tweezers. Alternatively, the pollen is removed from the anther and transferred on to the stigma using a small, soft camel-hair paint brush. For the pollination to be successful, the stigma must be in a mature and receptive condition, this stage being indicated when its surface becomes sticky owing to a sugary exudate. Once on the stigma, viable and compatible pollen will germinate under good conditions with amazing rapidity, often within a matter of minutes. Because of this, re-bagging of flowers after pollination is normally unnecessary. It is essential at this stage, however, to ensure that the stems of the seed parents are well supported to minimise the chances of accidental breakage. Each stem should be tagged with details of the cross and this information must also be recorded in a suitable hybridisation record book.

Seed collection must take place as soon as the seeds turn black. At this stage, the seeds can be heard to rattle in the pod, which will be just starting to turn brown. If delayed, the pods are prone to



split open suddenly, spilling the valuable contents on to the soil. It is, therefore, safest to cut off the pod-bearing stems with their identifying label attached once this stage is reached. As the seed is removed from the pod it should be allowed to stand in an airy, sunny position in order to remove surface moisture prior to packaging. The packets are only used for short-term storage as sowing is best carried out as soon as possible after harvesting; in areas with very hot summers it is best to store the packaged seed until the heat of summer is past, sowing the seed in autumn. Keeping the packaged seed for too long in unsuitable conditions can induce dormancy, which will delay germination for one season. The details of the cross should be transferred carefully at each stage – from stem label on harvesting to seed packet, and from seed packet to box label on sowing.

Sowing is best carried out in 15 cm deep boxes as soon as possible after harvesting is completed. Being relatively large, the seeds may be conveniently space-sown at 2.5 cm apart. The boxes are usually filled with 10 cm of compost, the seeds being space-sown onto this surface. They are then covered with 1.25 cm of compost, topping with a thin layer of sharp grit that helps to deter slugs. Another method is to put 5 cm of compost into the box, sow the seed, and cover. A thin layer of grit is placed on as before but, this time, it is topped-off with 5 cm of a suitable mulch. This helps to keep the compost uniformly moist and relatively cool, which is beneficial in areas where high summer and autumn temperatures occur. Whatever method is used, the containers should be stood outdoors once sowing is completed, in a situation that does not get too much direct sunlight. As soon as the containers are placed outside they should be dressed with slug pellets in order to reduce the slug population in the area and, also, to control woodlice (*Armadillidium*, *Oniscus*, *Porcellio* and *Trichoniscus* spp.), together with black millipedes (*Cylindroiulus londinensis*) that tend to congregate under containers. In order to control these effectively, the pellets must be applied in anticipation of leaf emergence. Seed containers are also very subject to the attention of birds, especially blackbirds, which revel in scratching about in compost. Protection in the form of netting must be provided if damage is to be avoided.

Seedlings begin to emerge about six months after sowing, usually in December and January, although some may appear in autumn. If the compost has been mulch-covered, it will be necessary to remove this as soon as the first seedlings emerge; it is also important to ensure the permanent presence of active slug pellets. This is vital as the seedlings possess but a single leaf in their first season of growth, and if this is damaged development of the bulbil is held back. Use of an approved fungicide in spring and early summer will protect the foliage from attacks by the fungus *Stagonospora curtisii*, which causes the disease Leaf Scorch.

At the end of the first cycle of growth, the leaves die back at the normal time in July. It is usual at this stage to scrape away the surface compost above the level of the bulbils, replacing this with fresh material. If the seeds were initially sown on a 5 cm layer of compost, it will be possible to put on a much greater depth of fresh compost; this will ensure that the bulbils are closer to their optimum depth for their second season of growth in the container. Because of this, the bulbils will develop a much more satisfactory rounded shape and will not need to waste energy growing additional contractile roots in order to pull themselves down to optimum depth.

After two years in containers, the bulbils are lifted and cleaned prior to planting in open ground. The usual spacing at this stage is 15 cm × 15 cm, across slightly raised beds of such a width that the plants in the bed centre can be easily reached from the paths. Bulbs remain in these beds for about four years before the first flowers appear, which is naturally a time of considerable excitement and keen anticipation. During the whole of the bulbs' life in the beds, careful attention must be given to the control of pests, diseases and weeds by means of carefully-timed sprays of approved chemicals.

### **Selection of seedlings**

The impression often given at the initial flowering may not be very favourable but patience must be exercised as flower quality often improves over several years. There is, in fact, a 'settling-down' period in which each consecutive flowering season gives rise to flowers of better quality. In

this connection, it is as well to remember the story of Guy Wilson's 'Ave', which first flowered in 1942. Although of excellent colour from the outset, it was initially considered to be too flimsy and lacking in vigour to warrant registration. Wilson recorded that: "I nearly discarded it in 1946 but ... I replanted it with some other things that I did not value highly on a piece of rather poor land."<sup>(12)</sup> Here, it was almost forgotten about until it flowered magnificently in 1948. 'Ave' was later described as "one of the most perfect flowers in cultivation"<sup>(13)</sup>.

As soon as this settling-down period is completed, however, it is time to take some hard decisions as to what is to be retained and what is to be thrown away. When working on a small scale, retention may well be based on personal preference, but the professional breeder must work to a much stricter set of guidelines if he or she is not to be inundated with seedlings showing little improvement over cultivars already in existence. The guidelines for retention may be:

1. Improved characteristics as a show flower.
2. Improved characteristics as a commercial cut flower.
3. Possible usefulness in future breeding. This may be on account of such factors as: unusual colouration; fertility, especially in groups where this is uncommon; or good field resistance to troublesome diseases such as Basal Rot.

In the past, cultivars used in the production of commercial cut flower crops were selected initially because of their promising potential as show daffodils. It was often much later that a characteristic like exceptional vase life would point to their suitability for cut flower production. Only recently, and on a somewhat limited scale, have daffodils been bred specifically for use as cut flower cultivars and occasionally been subject to plant patent legislation<sup>(14)</sup>. Such selection has usually taken account of good resistance to diseases such as Basal Rot and, indeed, positive attempts to breed resistance into these cultivars have become a feature of this work.

### ***What are the chances of success?***

It is impossible to provide precise figures on the likely future success of hybridisation; all that can be done is to indicate past levels of success based on the comprehensive records kept by several breeders. The records of Lionel Richardson probably contain the most comprehensive details on which to base an estimate. Not only was every cross made at Waterford between 1928 and 1969 meticulously recorded, but the actual numbers of seeds sown and seedlings raised were also noted. During this period 235,211 seeds were sown, resulting in approximately 147,000 seedlings. It is known that Richardson registered about 600 cultivars, or 1 per 392 seeds sown or 1 per 245 seedlings raised. The records show, however, that the degree of success varied considerably from one cross to another. One of Richardson's most successful crosses was that made between 'Kilworth' and 'Arbar', which was carried out on six occasions at Waterford between 1948 and 1956. These crosses gave rise to 2,569 seeds from which 28 cultivars were registered, a high success rate of one cultivar from every 92 seeds. Of these 28 cultivars, eight received either an Award of Merit or a First Class Certificate.

One sobering thought is that approximately 27,000 cultivars have been registered during the past 130 years and, because of all this activity, it must become progressively more difficult to raise new daffodils showing marked changes or improvements as each generation passes. Nevertheless, there is no doubt that hybridists will continue to try.

### **Looking into the Future**

Future hybridisation of daffodils will be largely concerned, as it has been in the past, with the creation of 'new' colours, new combinations of colour, and the improvement of other characteristics associated with flowers, such as substance, texture and shape. To a lesser extent, it will also be concerned with the production of new cut flower cultivars and those showing resistance or immunity to disease. These activities are unlikely to be pursued with as much vigour as in the recent past, especially in England, owing to the curtailment of state finance available for so-called 'near market research'.

To the majority of the general public, the all-yellow trumpet daffodil and the white and red *N. poeticus*, ‘Pheasant’s Eye’, are familiar, much-loved flowers. Those of other colours may be actively disliked and regarded as being un-daffodil-like. Nevertheless, in spite of this, hybridists will continue their relentless quest for the novel. In relatively recent times, for example, pink petaloids have been introduced into double cultivars; large-cupped yellow and pink cultivars have joined their older white and pink relations; and mauve and lavender tones have been seen for the first time in the coronas of some daffodils.

The search for red trumpeted daffodils has occupied hybridists for over a century and the coming of the all-red daffodil is keenly anticipated. While hybridisation has succeeded in giving reddish tones to the trumpets of a handful of cultivars, those of a true red colour are probably still a considerable way off and the all-red daffodil clearly does not exist. Several cultivars are classified as having red coronas but few would approach the red shades contained in the *RHS Horticultural Colour Chart*<sup>(15)</sup>, and this does not apply only to Division 1 daffodils. Certainly, as the corona size decreases and the *poeticus* ancestry becomes more pronounced, the red takes on a truer hue; but it never quite matches the intense red in the corona rim of some *N. poeticus* varieties.

References in the literature to cultivars with so-called red parts often indicate the true nature of the colour. Jefferson-Brown, for example, discussing ‘red trumpets’, wrote: “‘Brer Fox’ is Mr. W.O. Backhouse’s triumph, a large flower of gold and strong orange.”<sup>(16)</sup> Indeed, ‘Brer Fox’ is colour-coded 1Y-O in the *International Register* of 1998 but in the *Checklist* of 1991 was classified as a 1Y-R<sup>(17, 18)</sup>. ‘Tidd Pratt’ and ‘Uncle Remus’, two other so-called red trumpets were, however, shown as 1Y-O in both publications<sup>(19, 20)</sup>. Therefore, in the past, not all cultivars said to be red, but which were really orange, were classified as such, but a real effort was made during the 1998 re-classification to rectify this problem. It is, however, a genuine problem for, even in those sorts showing the most intense colour, such as ‘Rio Rouge’, the colour is frequently less intense than it can be at its best, perhaps as a result of seasonal or soil conditions. The fact is that in the vast majority of modern cultivars the *poeticus* ancestry is only to be found a long way back; perhaps, the species or some of the more intensely-coloured Division 9 cultivars should be re-introduced into the current breeding programme in order to intensify the red. The tetraploid ‘Dulcimer’ may be a good starting point. The theory behind the suggestion to re-introduce *N. poeticus* ‘blood’ is based on the knowledge that the amount of beta carotene present in the red corona rim of *N. poeticus* var. *recurvus* is very high, while in the more orange coronas of cultivars far removed from any *N. poeticus* ancestry the beta carotene content can be as low as 2%. It is a fact that the coronas of *N. poeticus* represent one of the most concentrated sources of carotene in Nature – “In the fringes of the coronas of *N. poeticus recurvus* the average concentration was 16.5% of the total dry matter and in addition other carotenoids were present with the carotene.”<sup>(21)</sup>

There is no doubt that the colour with which the orange or red is paired can markedly affect its apparent intensity. Orange, even deep orange, seldom looks anything other than this colour in the presence of yellow but, if partnered by white, it tends to look much more intense. Reddish shades are at their most intense the closer a cultivar is to *N. poeticus* – for example, in the *poeticus* hybrids and the small-cupped daffodils with white perianths. Pink-centred daffodils tend to be either loved or hated; and the same is likely to be true for blue tones, as these too are not found in nature and could be regarded as being un-daffodil-like. Lilac and mauve shades have already appeared in several cultivars and it is probably only a matter of time before progeny from these take on a true blue colour.

Flower colour, like other characteristics in living things, is controlled by the genes situated on the chromosomes. Flower colour has a chemical basis and results from the presence of two groups of substances: the anthocyanins, which are responsible for scarlet, red and blue shades, and the closely-related anthoxanthins, which give rise to colours from pale ivory to deep yellow. Actual flower colour is determined by the nature and relative amounts of specific chemicals present from the two groups and these factors are gene-controlled. Both groups of chemicals occur as sap soluble glycosides, which are compound molecules consisting of the colouring matter combined with one or more sugar molecules. There are only minor differences in the chemical structure of the anthocyanins and the

anthoxanthins, and between the specific glycosides in each group, but the effect of these variations is substantial in terms of flower colour.

The power of anthocyanins as colour-producing factors within flowers is dependent upon the form in which they are present. There are three forms –pelargonidin, cyanidin and delphinidin – which vary only in the number of hydroxyl (-OH) groups attached to the molecule. The oxygen in the -OH groups is the factor that controls the colour: delphinidin with six groups being most blue; while red and magenta flowers contain more cyanidin (five groups); and scarlet flowers are pigmented with pelargonidin (four groups). Anthocyanins can also undergo other changes to their structure that modify colour, such as the attachment of sugar molecules and the replacement of hydrogen in the -OH groups with methyl (-CH<sub>3</sub>) radicals. These changes can increase the number of forms of anthocyanin from three to twelve and, in so doing, can give rise to subtle colouration. The capability of anthocyanins to bring about colour change is not based solely on the internal changes to the molecular structure, but is also influenced by external factors, such as the pH of the cell sap and the ability to co-pigment or form loose chemical bonds with anthoxanthins.

Anthoxanthins are responsible for the production of colours ranging from pale ivory to deep yellow. When present alone they are responsible for all the flower colour, but in the presence of anthocyanins can give rise to a range of intermediate colours; for example, a yellow anthoxanthin and a red anthocyanin giving orange flower colour while an ivory form of the former and a red form of the latter will produce pink. Both anthocyanins and anthoxanthins originate from the same basic material, for which there may be competition. This can result in the formation of one at the expense of the other; or the formation of both but in a different ratio from the norm. This, in turn, can give rise to delicate flushed apricot tints when the anthocyanin amount is small and is almost swamped by yellow anthoxanthin. The appearance of these subtle effects are well known to daffodil breeders.

In addition to the anthocyanins and anthoxanthins, the other factor that may influence flower colour is the plastid pigments. The colours normally involved are yellow from the pigment xanthophyll, and orange red from carotene. The plastid pigments are insoluble in cell sap and so interaction with the sap soluble anthocyanins and anthoxanthins does not occur. If the flower sap is free from anthocyanins, plastid pigments are either solely responsible for flower colour or will augment the effect of any anthoxanthins present. If anthocyanins are present, plastid pigments impart a background effect, changing, for example, pink to orange, crimson to scarlet and purple to brown. The interesting thing about most of the factors affecting flower colour is that they are controlled by single, highly-specific genes. Single genes, for instance, may control the presence of colour-producing chemicals, the forms in which these exist, sugar attachment, the ability to co-pigment and the pH of the cell sap. Combination of all the effects of such single-gene control results in a succession of flower colours from ivory to blue through a range of stages, including yellow, salmon, pink, rose, magenta and mauve.

It is clear from the cultivars produced that daffodil hybridisation over the past 150 years has put the genes controlling flower colour into the melting pot, out of which have emerged new colours and colour combinations. The knowledge of how flower colour is produced perhaps provides some rationale for the appearance of pink in daffodil flowers; while the indication that plastid pigments can impart background colour will readily bring to mind the names of some ‘unusual’ cultivars such as ‘Rouge’. The sorting of genes and their re-combination in new groupings, which hybridisation achieves, will undoubtedly go on producing novel shades and colours and new combinations of colours in the future, just as it has done in the past.

Several of the more minor cultivar divisions have been rather neglected in the past, most frequently due to difficulty in hybridising owing to problems encountered as a result of chromosome numbers. As already outlined, *tazetta* and *jonquilla* cultivars have failed to progress for this reason in the past but increasing knowledge has indicated how these difficulties may be surmounted. Division 9, the *poeticus* hybrids, has also been neglected, possibly owing to the preponderance of diploids among its cultivars. Two suggested routes for improvement would be through *N. poeticus* var.

*recurvus*, a triploid, through unreduced pollen, for example, or by using the one known tetraploid cultivar 'Dulcimer'.

Some species do not have their own cultivar division and while several have been involved in hybridisation, they have been used only sparingly. Many have not been utilised at all. Many of these species, and the hybrids which they give rise to, are small in stature and there has been an increasing interest in these small daffodils in recent years, both on the show bench and for planting in rock and trough gardens. The major aims of future hybridisation with this group are to increase the colour range and to utilise some of the previously untried species as parent material. Many of the existing hybrids of this type have *N. cantabricus* ancestry and are, therefore, predominantly white; some are bicolors from *N. bulbocodium* × *N. cantabricus*; and a few possess orange, mainly through the use of *tazetta* cultivars containing this colour. One of the main drawbacks of this approach to improvement is that the offspring may resemble the parent used for colour and, therefore, may not be eligible for inclusion in Divisions 10 for example. This could be a difficult problem to solve owing to the limited colour range in the species, subspecies and varieties not associated with the hybrid Divisions 5 to 9.

In recent years, some previously untried species have been used by hybridists, particularly in the USA and New Zealand, in order to create new cultivars, either by crossing with other species or existing cultivars. These have included *N. viridiflorus*, *N. miniatus*, which may have been used in the past under the mistaken identity of *N. serotinus*, and even the small and supposed primitive species *N. cavanillesii*. These species have become involved for a variety of reasons, not least of which has been simple curiosity as to what might result. But there have been specific aims: for example, the incorporation of new colours, such as the green from *N. viridiflorus*; overcoming the fertility problems often encountered when using jonquils in breeding; and the extension of the flowering season through the use of autumn-flowering species. Prime movers in this enterprise have been Manuel Lima, Harold Koopowitz and Bob Spotts in the USA and John Hunter in New Zealand.

Disease resistance is of particular importance to the hybridist owing to the prevalence, in particular, of Basal Rot. The recent recognition of cultivars and species showing resistance or immunity to attacks from this troublesome fungus has proved to be a step forward. This has led to the use of 'Saint Keverne', a cultivar showing a high level of field resistance to Basal Rot, in recent breeding work aimed at producing new cut flower daffodils: it is capable of passing on this characteristic to its offspring. Several daffodils, especially varieties of *N. jonquilla* and some cultivars with this species in their parentage, such as 'Parcpat' and 'Sugar Bush', show immunity to the disease. Anyone who has grown the jonquil *N. jonquilla* var. *henriquesii* must have been struck by its absolute defiance to Basal Rot, while others succumb. The introduction of daffodils of this type into breeding programmes is clearly highly desirable.

Data gathered over many years from the Rosewarne EHS daffodil cultivar trials have shown that there are considerable differences in both flower- and bulb-yield from one cultivar to another. These factors are obviously worthy of serious consideration in any breeding programme aimed at the production of new commercial cut flower cultivars or where bulb production for sale is of relevance. Trials have indicated that much higher planting densities are possible than those currently recommended. The main drawback to this at the moment is that many cultivars have spreading or lax foliage, which tends to lie on the soil and is thus photosynthetically inefficient. Therefore, breeding for upright foliage, and for bulbs that possess upper membranous scales capable of giving added support to the foliage, is likely to feature in breeding plans in the future.

The above provides an outline of some of the aims on which hybridists place a high priority. Plant breeding is, however, a very individual matter that in the past has often provided progress through the most unlikely sources and no doubt this will continue to occur in the future. The hybridist will feel affection for all his or her seedlings, the good and the not-so-good alike. But, constantly, the aim will be towards the big breakthrough – a 'Falaise' or a 'Kanchenjunga' – for, as Brian Duncan has put it: "Those of us involved should enjoy our seedlings while we can – and if they are good enough perhaps they may be permitted to influence the future."<sup>(22)</sup>

## Hybridisation Records

All daffodil hybridisation carried out by man has taken place during the past 200 years with the vast bulk occurring during the last century. Because daffodil breeding is a fairly recent activity and as many of those involved in this work were extremely systematic recorders of what they were about, we have an almost complete picture of the origins of the cultivars existing today, together with how new cultivar divisions and new colours arose as illustrated in Figures 21.1 and 21.2. One of the most comprehensive sources of information for many years was the Daffodil Data Bank of the American Daffodil Society, which contained data on many thousands of daffodils. This information, stored on an IBM computer system, was located at the Iowa Methodist Medical Centre, 1200 Pleasant Street, Des Moines, Iowa 50308, but it has now been superseded by the ADS Daffseek website (<http://daffseek.org>). Most of the daffodils listed in both sources have details of their parentage, colour, flowering season, height and fertility, as well as both seed and pollen parent, together with chromosome number, if known.

Obviously, information on parentage is vital in building up a picture of what has taken place since the mid-19th century in regard to the evolution of the modern daffodil cultivar. Such detailed data are available for few other major genera of plants. Using this information, it is possible to build up the family trees of many modern cultivars, and often to trace their roots to the species themselves. Along these paths will be encountered the ‘quantum leaps’ of plant breeding, which occasionally lead to great improvement on what has gone before, and which make hybridisation such an exciting activity. Examples of three such ‘quantum leaps’, which changed the face of daffodil cultivars for all time, are shown in Figure 21.3.

In 1998, the *International Daffodil Register and Classified List* was updated and considerably improved, this process being repeated in 2008<sup>(23, 24)</sup>. It now contains a vast amount of information relating to cultivar description, parentage and chromosome number if known, and is an invaluable aid in tracing the history of daffodil development. Another important source of information on daffodil breeding is the record books of the hybridists themselves. These contain not only information on parentage but, frequently, descriptions of the first flowering of seedlings – of particular interest when the seedlings progressed to become famous cultivars. Breeders also used their record books to note down predictions for a seedling’s future – for example, as an exhibition or cut flower daffodil; their forecasts, though dating from an early stage in a seedling’s life, were often uncannily accurate. Unfortunately, complete record books do not exist for all the major hybridists. Some failed to keep accurate records in the first place; others destroyed their records before they died for reasons best known to themselves; while in other cases records have simply disappeared with the passage of time. Where records do exist they usually contain a considerable amount of material of compelling interest to the garden historian.

G.L. Wilson and J.L. Richardson, in particular, kept very accurate records over a long period. It is instructive to note the methods used by these two important 20th century hybridists to record their seedlings. Wilson used a system involving two groups of numbers, the first group denoting the year in which the cross was made, while the second number was that allocated to each particular seedling in that year. Thus ‘Spellbinder’, which first flowered in 1942, was numbered 31/84: the 31 indicated that the cross was made in Wilson’s 31st year as a hybridist, and ‘Spellbinder’ emerged from the 84th cross made in that year. The biggest snag with this system is that, unless one is aware that Wilson started hybridising in 1906, the figure 31 is rather meaningless. Richardson used a specially printed book to record details of his crosses: each occupied one of a series of entry spaces numbered from 1 to 1002. Each worthwhile seedling as it came along was allocated a number, as indeed were cultivars of his own raising, and also those raised by other hybridists. Thus, No. 150 was allocated to ‘Tiercel’ (a P.D. Williams cultivar) in 1928, to ‘Cicely’ (A.M. Williams) in 1938 and to Richardson’s own ‘Revelry’ ten years later. The problems which can arise from the re-allocation of numbers are fairly obvious, especially when examining records many years after the event, in that it is not always apparent, for example, which No. 150 is being referred to.

In order to provide a system that is easier for the garden historian to interpret, it is suggested that the actual year in which the cross was made should always be denoted and code numbers for the seedlings' parents (or names if registered) should also be clearly stated. Thus, a suitable code for a cross may appear as follows:

2005 / 820 / (628 × 702, or parents' names if known)

This clearly and indisputably imparts all the information required – year of cross, allocated seedling number, seed parent code or name, and pollen parent code or name.

Every cultivar being used in the breeding programme must be allocated a number, which should be recorded in a master record; once issued, this number should never be re-issued to another cultivar. Similarly, the selected seedlings resulting from each cross must be allocated a seedling number which is unique. No system is entirely without snags but whichever method is used it should leave no room for future dispute and be capable of easy interpretation by researchers of horticultural history.

## Recording Cultivars

There are three important facets of recording the characteristics of hybrids, particularly at the stage at which registration is being contemplated. These relate to division, colour and size. It is important to record accurately the division to which the new hybrid belongs; it is especially important for Divisions 5 to 9 to have a knowledge of its ancestry. A hybrid cannot, for example, belong to Division 6 if it has arisen from a Division 5 daffodil crossed with one from Division 9, particularly if neither parent has a link with Division 6. The description of colour should be accurate and not fanciful. Preferably, it should be determined using the *RHS Horticultural Colour Chart*<sup>(25)</sup>. It is useful to record flower size for, while somewhat variable, it can be a useful aid to identification, especially when used in conjunction with the other factors already mentioned. Both colour and size can be captured forever on film or digitally and it would provide a valuable archive to have such a comprehensive record of cultivars. In compiling such a record, every effort should be made to obtain accurate colour comparability and the photographs must be taken in such a way as to show comparative and actual size.

The foregoing thoughts on the need for a visual and comparative record of daffodils have been with me for many years and now the Daffseek website has gone a long way towards meeting this need. In addition, it provides the data on ancestry essential to the success of the work of breeders and researchers in the future.

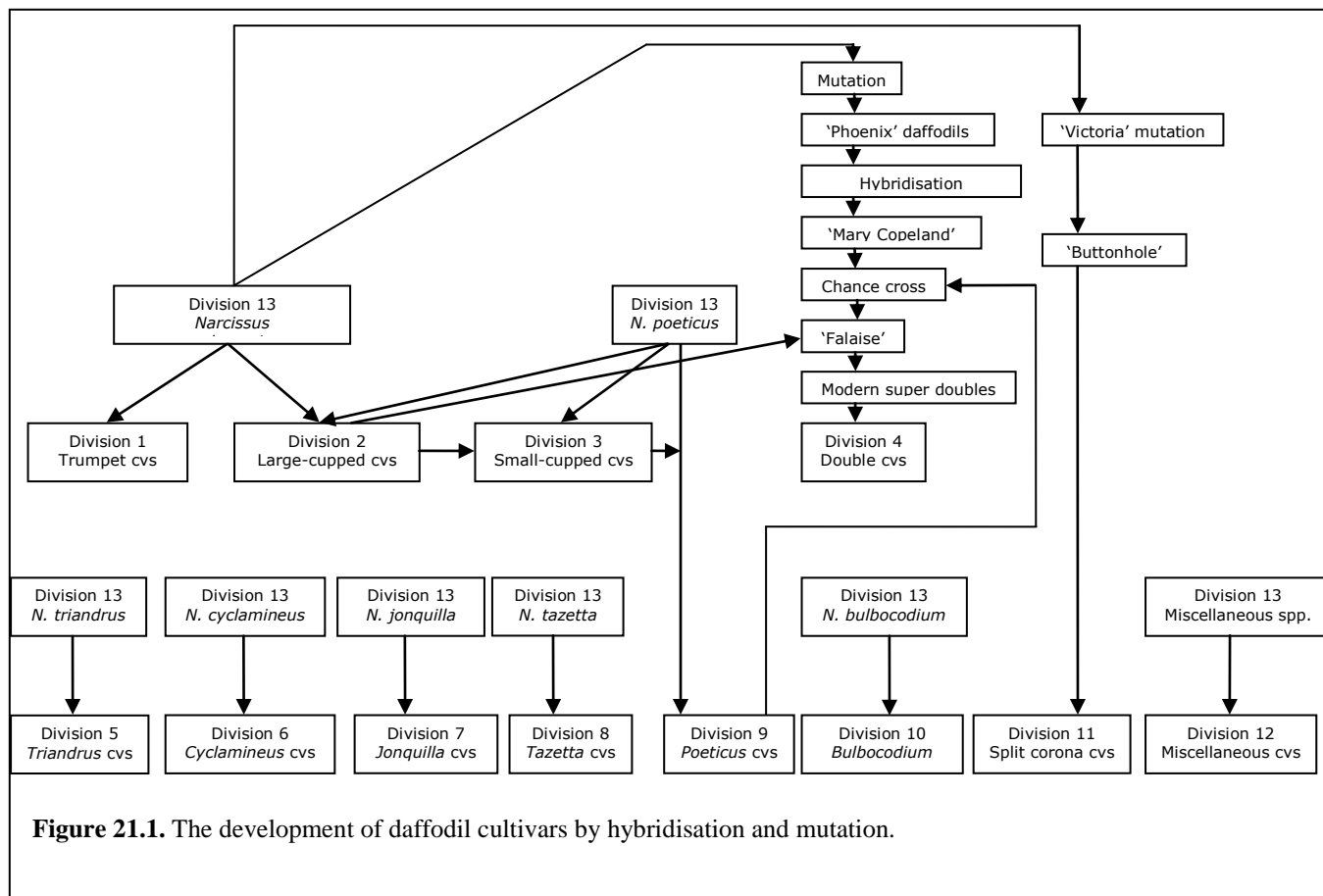
Daffodil hybridists are and will continue to be a rather special breed of people, blessed with total dedication, great patience and the ability to learn from experience. Jan de Graaff admirably described hybridisation and the work of the successful plant breeder as:

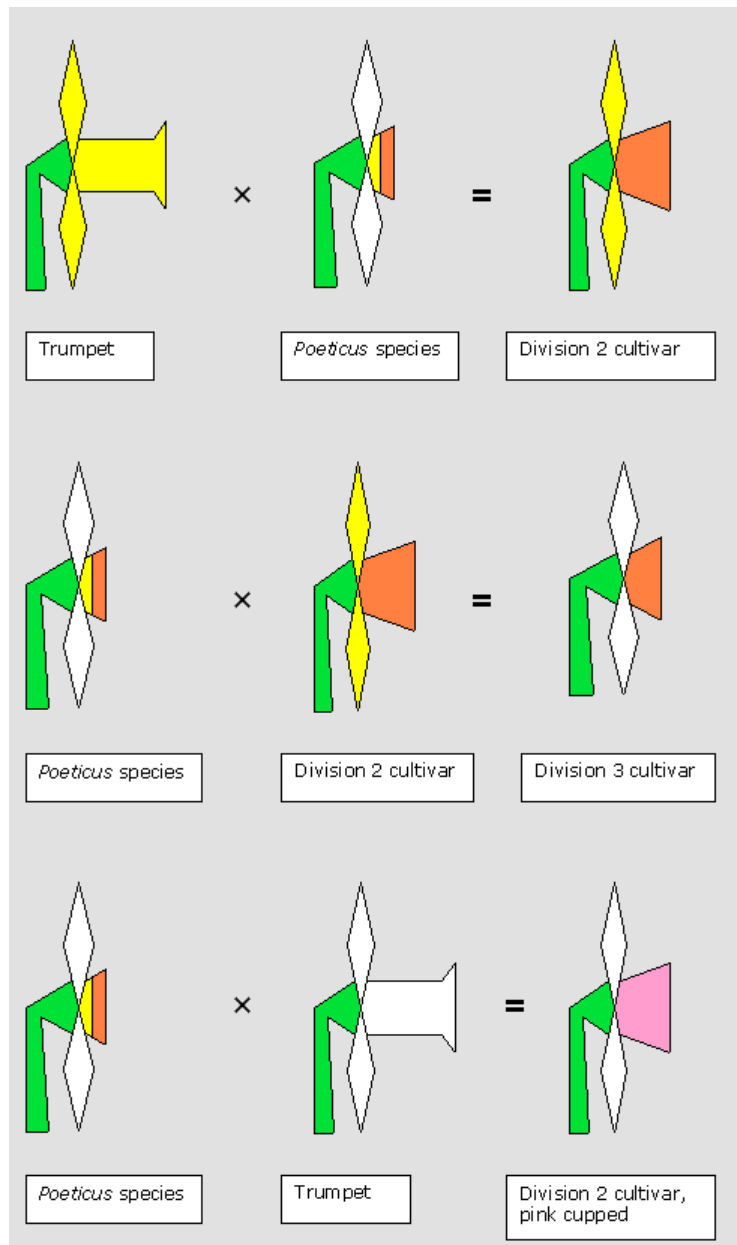
“An art as well as a science. The personality of the breeder will be reflected in the varieties he produces, just as the personality of an artist is reflected in his paintings. Like any artist the plant breeder must be a good technician. He must have a thorough knowledge of his material, in this case the genetic material and the horticultural factors affecting it. He must be methodical and persistent in following his breeding lines to their logical conclusion; but also highly imaginative and constantly inspired by intuitive glimpses into the future. And, above all, he must have that warm human quality which one might call concern for the daffodils he sends into the world.”<sup>(26)</sup>

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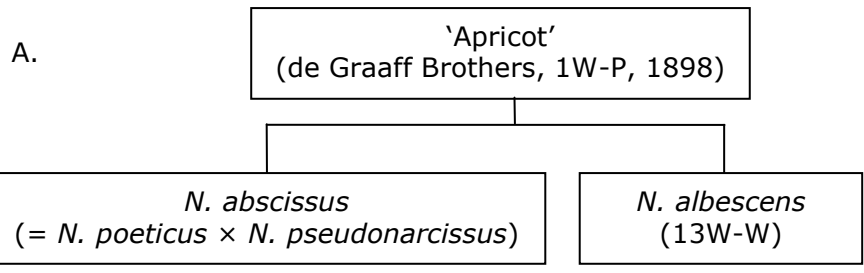
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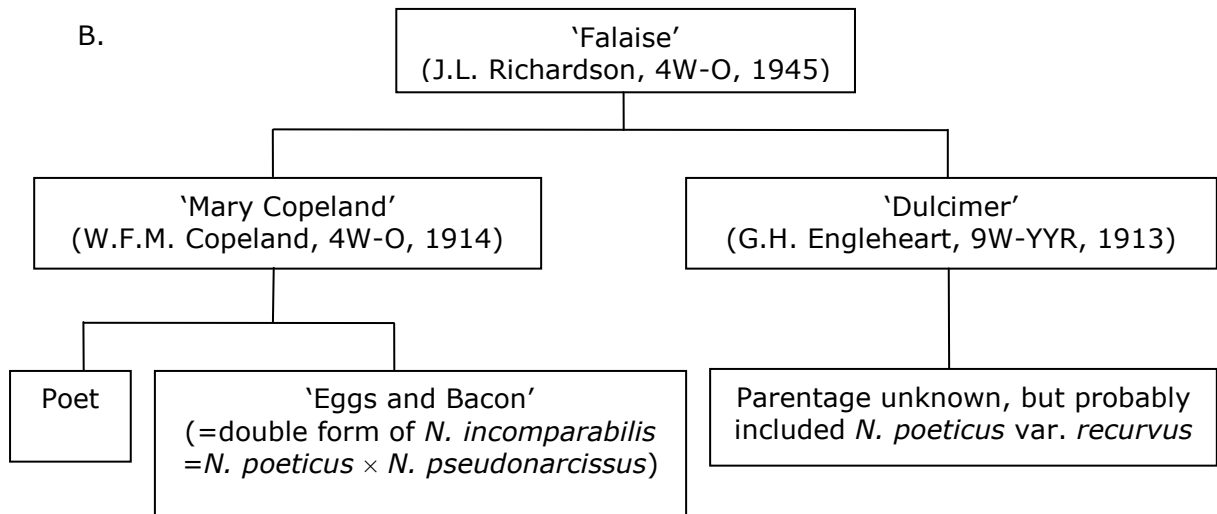




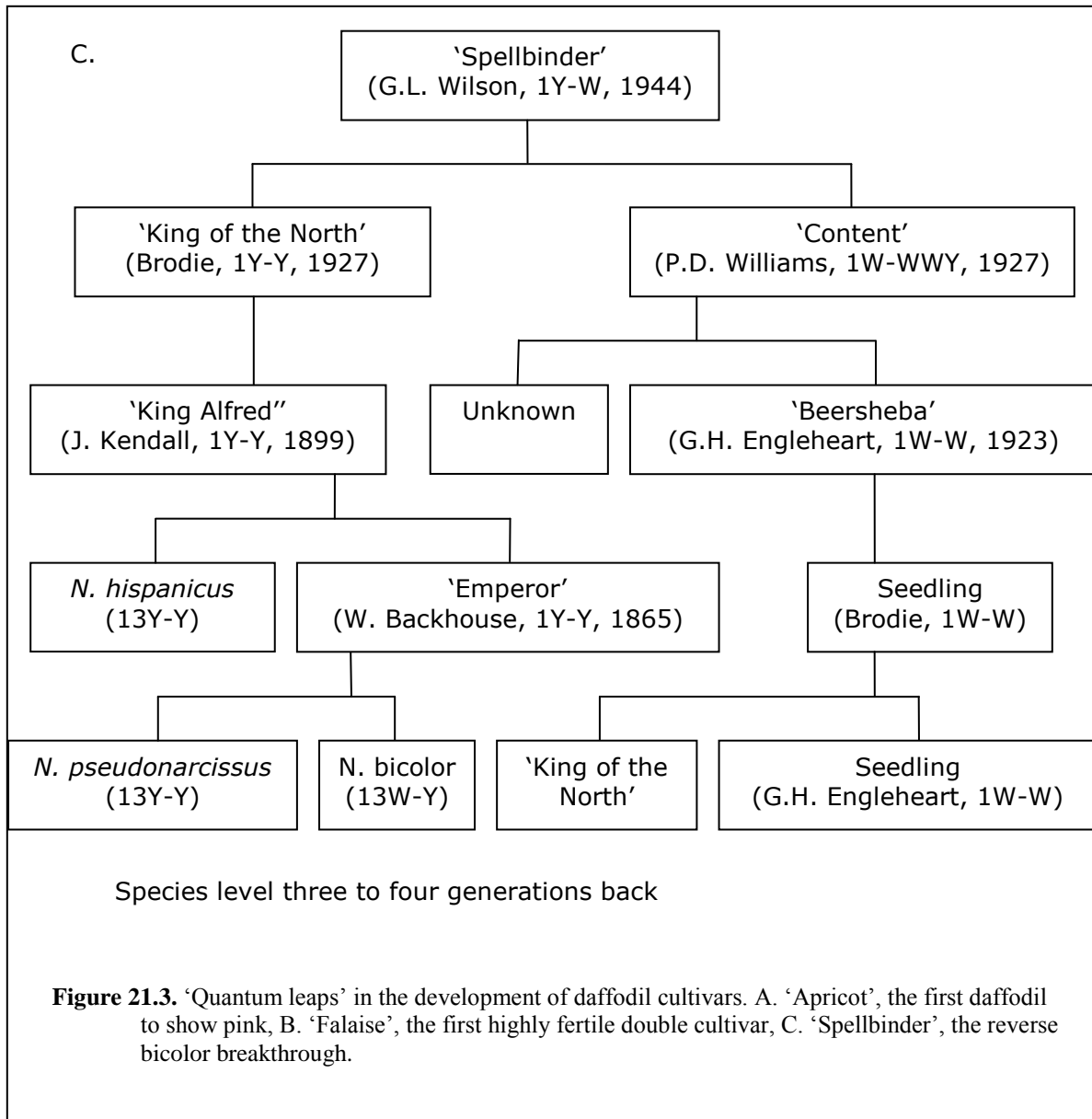
**Figure 21.2.** Some basic results of hybridisation. Top: By crossing trumpet species with *poeticus* species, hybridists created the first Division 2 cultivars. Middle: By crossing the newly created Division 2 cultivars with *poeticus* species hybridists created Division 3 cultivars. (In both the above examples the corona length of the Division 2 and 3 cultivars is midway between that of the parents.) Bottom: The red colour found in the corona of *poeticus* species when crossed with a white trumpet species was modified to produce pink, predominantly in Division 2 cultivars, with corona length intermediate to that of the parents.



Species level one generation back



Species level two generations back



## CHAPTER 22 PROPAGATION

Nowadays, several means of propagating daffodils are available. Until relatively recently, however, the only methods were Nature's own – either from seed, or from mother bulbs that give rise to daughter bulbils, these eventually breaking free to lead a separate existence. Both methods have disadvantages. As the majority of garden daffodils are hybrids, they will not come true to type from seed: they must be propagated vegetatively in order to maintain their clonal status. Natural vegetative reproduction in daffodils is, however, a very slow process, which means that new cultivars with highly desirable commercial characteristics cannot be introduced quickly. This situation is well illustrated by cultivars like 'King Alfred', registered in 1899, and 'Magnificence' (1914), which still remain leading cut flower and garden daffodils almost a century later. This does not mean that superior cultivars have failed to appear in the meantime, only that this natural method of propagation takes many years to produce bulbs in sufficient quantity for their cost to be attractive enough to encourage planting on a commercial scale.

Even with the species daffodils, propagation by seed rather than through natural bulb increase may not help in speeding up the process. This is owing to most species being inter-fertile. They are, therefore, capable of hybridising freely, unless they are grown in isolation from one another, or have a different flowering period from their neighbours. Methods such as cross-cutting and scooping are marginally better than natural vegetative propagation but the rate of increase is still slow. It was only the advent of methods such as twin-scaling, chipping and micro-propagation (tissue and meristem culture) that created the means for rapid reproduction and, in the case of the latter method, the creation of virus free stocks. Although it is impossible to give definitive rates of reproduction for the various methods available – because of varietal differences, for example – some estimates are possible. From a single bulb, it would take approximately 16 years to produce 1000 new bulbs/bulbils by natural means (offsets). Twin-scaling, on the other hand, would take six to seven years to achieve 1000 offspring whilst micro-propagation would achieve 1000 offspring in a little over a year.

### Propagation by Seed

This method is only relevant to the raising of species and, perhaps more importantly, to the production of new cultivars. The seed should be harvested as soon as ripe. At this stage, the seed capsule will have turned from green to yellowish-brown, the seeds will be detached inside, and can be heard to rattle around when the flower stem is shaken. Immediate sowing will give the most rapid germination; seeds stored even over short periods may subsequently remain dormant for a considerable length of time before germinating.

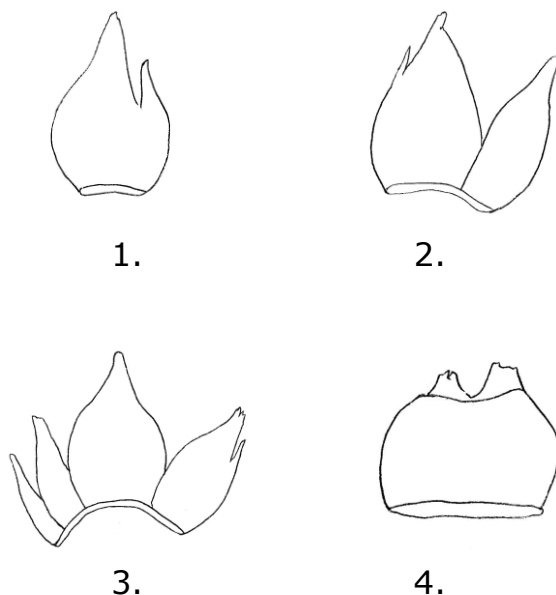
The seed is best space-sown at about 2.5 cm apart in a suitable seed compost covering them with at least 1.25 cm of this material. The trays should be reasonably deep as the plants will remain in these for two years before planting out. A suitable depth is 15 cm as this will allow the contractile roots of the developing bulbils to pull them further down into the compost. This in turn influences bulb shape, which is round in an adequate depth of compost, but unsatisfactorily long and thin in shallow trays. Seed sown immediately it is ripe will give a partial germination in autumn, with the remainder germinating during the following spring. The young bulbs require cold frame protection during the two winters spent in trays, and should be covered with an insulating layer of mulching material prior to the onset of heavy frosts. Regular treatments with slug pellets are essential during winter and throughout the early stages of foliage emergence in spring.

At the end of the second season, the bulbs should be planted out into the beds in which they will flower in due course. Each bed should consist of several rows spaced 30 cm apart, the spacing between the bulbs in the rows being 10-15 cm. Each bed needs to be separated from its neighbour by a path sufficiently wide to allow easy access and the beds themselves should be sufficiently narrow to allow inspection of all the plants from adjacent paths. The depth of planting should not be less than

7.5 cm. Bulbs grown from seed will take approximately five to six years to produce their first flower and so give an initial inkling of their likely worth, although some take a little longer to reach this stage.

### Natural Vegetative Reproduction

In mature bulbs, a lateral bud is capable of developing on the base plate between the outermost fleshy leaf bases. This bud produces leaves, the bases of which become fleshy and, thus, the new offset bulb begins to form. Initially, the parent and the offset bulb are held together by the encircling outer fleshy leaf bases; but, if left long enough, the increasing size of the new bulb pushes it away from the mother bulb, and it eventually breaks free (Figure 22.1, 1-3). This can be achieved somewhat earlier by the physical separation of bulbs at lifting time. They may be separated at the base using a sharp, sterilised knife; or they can be carefully pulled apart, while ensuring that part of the shared base plate goes with each bulb. If this operation is not done carefully, all-too-often the base plate detaches itself from the offset bulb, which is ruined. Newly detached small offset bulbs take about three years to reach flowering size. Sometimes a young bulb develops that is virtually incapable of detaching itself naturally (Figure 22.1, 4). In such cases, the encircling fleshy leaf bases are more substantial than normal and the base plate is more evenly shared between both bulbs. This type of development is more pronounced in certain daffodils, the hybrids of *N. tazetta*, for example.



**Figure 22.1.** Natural vegetative reproduction in *Narcissus*. 1 to 3. Development of offsets which split easily from the mother bulb; 4. Bulb in which the offset tends to remain attached.

### Cross-cutting and Scooping

Both of these techniques are considerably older than those formulated more recently for twin-scaling and chipping; they have been used for many years as a standard method of propagation for hyacinths. Hyacinths rarely produce offsets naturally, and cross-cutting and scooping does induce bulbil formation. Both techniques are occasionally used with daffodils. Cross-cutting involves making several V-shaped cuts across the base plate, while scooping consists of the complete removal of much of the base plate with the aid of a curved scalpel blade. Bulbils form along the V-shaped cross-cuts and on the scooped-out area, especially between leaf bases.

## Twin-scaling

This method of propagation usually commences in August when the bulbs are dormant; or, if grown in the southern hemisphere, during the comparable period of dormancy. The bulbs are prepared for twin-scaling by removing all unwanted material, such as membranous scales, from their outer surface. Any adhering soil and all remnants of dead and dying roots should also be removed. The base plate should be lightly trimmed, using a sharp knife or scalpel to remove any dead or diseased tissue. A former treatment for the superficially cleaned bulbs was to immerse in 0.2% formalin for 20 minutes but approval for use of formalin as a horticultural pesticide in the UK was withdrawn in 2008. Now, dipping in 1% sodium hypochlorite for 15 minutes may be used.

The twin scales are produced by slicing down through the bulb with a scalpel. In order to assist this operation, the nose of the bulb is cut off, giving a more stable surface to cut on to, the bulb being turned upside down for the slicing operation. It must be added, however, that slippery sap will exude from the cut surface; if this is placed directly on a wooden bench, the bulb will slide, so some arrangement is preferable that will prevent this from happening. The scalpel used to make the twin scales should be sterilised frequently by dipping it in 70% alcohol.

Turned upside down onto the flat surface produced by the removal of the nose, the bulb is then cut into a number of segments, resembling the slices of a cake or segments of an orange. The normal number of segments per bulb is about eight, but this obviously varies according to the size of the bulbs being dissected, and with large bulbs may number ten or even twelve. Each segment consists of several scales, which tend to fall open at the top but which are held together at the lower end by the base plate. This strip of base plate must be strong enough to hold the scales together and it is this that determines how many segments may be safely cut out of each bulb. Each segment, for example, may consist of six scales and can be dissected into three twin scales, each pair being held together by a small piece of the base plate.

The next operation is to put the twin scales into a fungicidal dip. In the early days of twin-scaling, a 0.2% dip of benomyl was used. It was soon discovered, however, that species of the *Penicillium* fungus, especially *Penicillium corymbiferum*, were prevalent on benomyl-treated scales and, indeed, appeared to thrive in the absence of other fungal species. *Penicillium*, though commonly present, causes little damage to healthy bulbs, but it is a wound parasite and will cause injury to damaged, unprotected surfaces. Obviously, twin scales are vulnerable as a result of the amount of slicing they undergo. Other fungi frequently present on bulbs are *Trichoderma* and *Rhizopus* spp. and *Fusarium oxysporum* f. *narcissi*. The latter, like *Penicillium*, can be especially troublesome through attacking the scales, and strains of these problem fungi have become benomyl-resistant. These fungi rarely attack the newly-developing bulbils but, in attacking the scales, they reduce the supply of food reserves on which the bulbil's early development is dependent. Consequently, a second fungicide called captofol was added to the benomyl dip, producing a mixture that proved very effective. Another effective fungicide against *Penicillium* and *Fusarium* was captan. The benefit derived from an effective fungicidal dip may be to increase both bulbil numbers and bulbil weight, the former captofol treatment being noted for producing larger bulbils than when captan was added; it also appeared to promote growth.

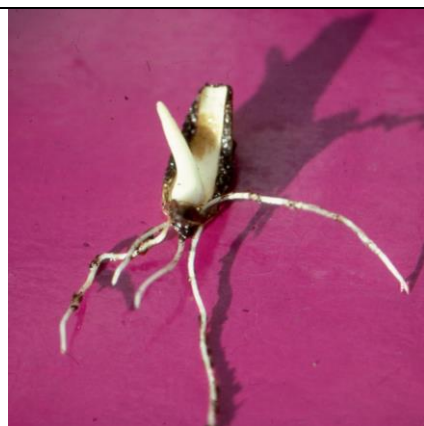
As these chemicals are no longer available or are not approved for use on daffodils, a currently available and approved fungicide should be substituted. On removing the twin scales from the fungicide, they are placed in a sieve to drip-dry. Once reasonably dry, they are transferred in to thin polythene bags containing sterilised vermiculite, which has been slightly moistened with one-twelfth of its volume of sterilised water. Approximately equal volumes of vermiculite and twin scales are mixed together by gently shaking the contents of the bag. Then the bag is tightly sealed by twisting the neck, doubling it over and securing with a twist tie. The bags are placed in a growth cabinet at a constant temperature of 20°C, which may be reached by using warm white fluorescent tubes, but this is not essential. After a few weeks, bulbils start to develop between the scales where they arise from the base plate tissue. Some twin scales develop only a single bulbil, others two, three

or even as many as five. The bulbils are taken out of the growth cabinet in early November (Plate 22.1), the remaining pieces of the scales being removed by dissecting away with a sharp scalpel. Where more than one bulbil occurs on a piece of base plate, these are also carefully separated using the scalpel. Although use of a controlled temperature growth chamber is the ideal, it is by no means impossible to propagate from twin scales in much less sophisticated environments, provided all the recommended hygiene precautions are taken. As soon as all dissecting and superficial cleaning-up of the bulbils is completed, they receive a further approved fungicidal dip treatment in order to give a fungicidal covering to all freshly cut surfaces.



**Plate 22.1.** Twin scales with developing bulbils in early November.

At this stage, it is safest to place the bulbils in trays containing a suitable compost, especially if new and expensive cultivars are being propagated, as unacceptable levels of loss may be experienced by placing small bulbils into cold, damp soil during winter time. If the trays are given cold glasshouse protection, good root growth will have been made by late January (Plate 22.2), with a large percentage of bulbils producing leaves by March (Plate 22.3). The trays should be stood outside in April and protected with netting against birds. Growth will continue until July when the foliage is allowed to die back, this being aided by letting the compost dry out slightly by withholding water. In the first half of August (Plate 22.4), the bulbs are removed from the trays and may then be lined out in open ground in September.



**Plate 22.2.** Bulbil with well developed roots in late January.



**Plate 22.3.** Leaf starting to emerge from a bulbil in late February, early March.



**Plate 22.4.** Bulbils in August, one year after twin-scaling.



The results of twin scale trials carried out at the (New) University of Ulster in the early 1980s, using new cultivars and unnamed seedlings raised by Brian Duncan and Tom Bloomer, are shown in Table 22.1 and clearly illustrate the effectiveness of this method of propagation.

## Colchicine and the Inducement of Polyploid Forms

The use of colchicine on daffodils is only capable of producing polyploids when used on twin scales and, therefore, details of the technique are included in this chapter on propagation, although it could also have come within the section on breeding, in which mutations have long played a part. Colchicine is a poisonous alkaloid obtained from the Autumn Crocus (*Colchicum autumnale*) and its activity in the creation of polyploids was initially demonstrated in the USA in 1937. It achieves this by being absorbed into the cells of meristematic tissue, where it has the ability to prevent the formation of the spindle and the new dividing cell wall during the process of mitotic cell division. Therefore, although the chromosomes divide normally during mitosis, the absence of the spindle means that they fail to move to opposite ends of the cell. The subsequent failure of the original cell to divide into two means that the single cell now contains double the normal number of chromosomes – it has changed from being a diploid cell into one that is tetraploid. When masses of meristematic cells are changed in this way, new tetraploid shoots or plants can develop. The procedure used is to place a drop of 0.1% colchicine, measuring only 0.01 ml, on to the base plate between the pairs of scales, and then rinsing in distilled water after eight hours. This used to be followed by a dip in 0.5% benomyl, after which the twin scales were allowed to surface dry before being treated as for normal twin scales. By no means all treated twin scales produce tetraploid bulbils; the success rate is only around 4%. As benomyl is no longer available, a currently available fungicide may be substituted. How can tetraploidy be confirmed in new bulbils? The simplest way is by observation of the growth of the resultant plant. If it is larger and more vigorous than the cultivar from which it originated, it is likely that it has become tetraploid. More sophisticated methods include the microscopic examination of root squashes that have been pre-treated with paradichlorobenzene, fixed and stained with aceto-orcein in order to directly count the chromosome complement. Not all the roots, however, which are produced from the base plate of the successfully treated twin scale during the first year, will be tetraploid, as diploid roots can still grow from unaffected parts of the base plate. The root squash technique is, therefore, not a foolproof method of determining ploidy levels, especially in the first year of growth after treatment. There is a much better method once the new plant produces leaves. This utilises the very good correlation between stomata size and the level of ploidy, whereby it is possible to distinguish diploids, triploids, tetraploids and higher level polyploids from one another. The technique involves painting a thin layer of clear nail varnish on to the leaves to be examined. Once dry this is stripped off and examined under a microscope. Finally, once plants reach the flowering stage, pollen grains may be compared to those from normal flowers of the same type, tetraploid pollen grains being much larger than those of diploids.

## Chipping

This process is a modification of twin-scaling and was developed as a simplified form of the latter and had the advantage of low labour-input and the possibility of mechanising the dissection process. It was originally developed during the late 1960s at the Glasshouse Crops Research Institute, Littlehampton, Sussex for the rapid propagation of virus-free bulbs of *Narcissus* 'Grand Soleil d'Or'. Subsequently, the practicalities of chipping were worked out at Kirton Experimental Horticulture Station in Lincolnshire. Chipping is now a successfully tried and tested method for rapidly bulking up *Narcissus* stocks, the process itself being capable of mechanisation, although, for the small grower, hand dissection is perfectly satisfactory. The process is carried out on dormant bulbs during July and August. Bulbs for chipping are cleaned as thoroughly as possible prior to cutting-up and are treated in the same manner as bulbs for twin-scaling by immersion in sodium hypochlorite. Following this dip, if the bulb is to be dissected by hand, the nose of the bulb is removed. Each bulb is cut into 8-16 radial segments, consisting of all scales from the outside to the centre held together by a strip of base plate.

For mechanical chipping, a Dutch-manufactured machine is available and is capable of making up to one tonne of chips in a normal working day. For these machines, regular quality

sampling of the chips needs to be carried out, looking especially for evenly sized chips that are well cut and have their scales firmly attached to a good section of base plate. If 80% of the chips conform to the above, the machine can be deemed to be working satisfactorily. The machine works best when cutting relatively large chips, the maximum number being ten from a bulb of 10-12 cm circumference. When using a machine it is important to disinfect it at regular intervals with an approved chemical to prevent the build-up of pathogenic fungi.

After preparation, the chips at one time were given the 30 minute fungicidal dip, as recommended for twin-scaling, using the mixture of benomyl and captofol, with captan sometimes being substituted for the latter. Nowadays, a suitable approved fungicide must be substituted. After treatment, the fungicide should be drained off and the chips mixed with moist vermiculite (11 volumes to 1 volume of sterilised water) in thin polythene bags, which are tied loosely at the mouth and placed in a growth cabinet at 20°C for 12 weeks. These conditions encourage the development of bulbils on the chips. Alternatively, the chips may be planted directly into the soil, provided this takes place before mid-August. The theory behind this method is that the soil temperature is sufficiently high at that time of year to incubate the chips *in situ*. A third method that may be used on a large scale is to place the chips in potato chitting trays filled with moist vermiculite. The trays are stored at 20°C and 90% relative humidity for 12 weeks. Trays may be wrapped in thin polythene film in order to prevent them drying out too rapidly, although good gaseous exchange between the atmosphere directly around the tray and the mass of air outside must not be restricted. Owing to the moisture in the vermiculite and the heat produced by the mass of chips within it, damaging over-heating can occur. Regular checks should be carried out, therefore, and, if excessive heating is taking place, the air temperature must be reduced accordingly in order to compensate.

Planting out the chips first incubated in vermiculite should be carried out when the soil is in good condition during October and November. The incubation period may be shortened by up to two weeks, or increased by up to four weeks, in order to coincide with optimum conditions. Good weed control is essential, especially in the first year of growth, as the foliage is sparse and delicate and will not be capable of withstanding competition from weeds. An approved residual herbicide that is confined to the top 2.5 cm of soil is suitable.

The advantages of propagating *Narcissi* by the chipping method are several. It is a method of rapid multiplication that produces large quantities of good quality bulbs within a relatively short period. For example, using 10-12 cm bulbs each cut into eight segments and planted at the rate of 2 tonnes/ha produced an increase in weight of nine fold over two years of which 90% consisted of 10 cm plus (i.e. flowering size) grade bulbs. A similar rate of increase was observed when the original bulbs were cut into 16 segments, this time the rate of increase was also 90% but with 50% consisting of 10 cm plus grade bulbs. Increasing planting rate reduced the weight of 10 cm plus grade bulbs but there was still a substantial increase in weight over the original planting rate. Other data suggest that over a 12-year period, close to a quarter of a million new bulbs/bulbils can be produced from a single initial bulb (Table 22.2).

	<b>Year</b>	<b>No. of bulbs</b>
Cycle 1	0-3	22
Cycle 2	3-6	484
Cycle 3	6-9	10648
Cycle 4	9-12	234256

**Table 22.2.** The projected multiplication rate of daffodil bulbs using the chipping technique.<sup>(1)</sup>

Such a means of rapid bulking up is of special value with virus-tested stocks and new cultivars. It gives rise to bulbs of high quality that are much rounder and of more regular shape than bulbs that are produced naturally. Apart from the value of this feature in grading, it has been noted by breeders over the years that daffodils that naturally tend to produce well-rounded bulbs appear to be less susceptible to Basal Rot, but whether this applies to bulbs from chips is not known. Daffodils

raised from chips have a higher ratio of flowers to bulb weight than when raised naturally. They normally reach flowering size in three to four years.

## Micro-propagation

Micro-propagation as a laboratory technique has been around for a considerable time. The idea that whole plants could be produced from cultured vegetative cells was first postulated by the German botanist Gottlieb Haberlandt in 1902. Two years later, another German botanist, E. Hannig, successfully cultured conifer embryos. However, it is in more recent times that the application of micro-propagation techniques to the multiplication of horticultural plants and crops has taken place. It was during the 1960s that methods developed to produce virus-free dahlias and potato plants were applied to orchids by G. Morel and C. Martin. They discovered that they not only had a method for freeing plants from virus but also a method of rapid multiplication. In 1967, the method was extended to carnations by W.P. Hackett and J.M. Anderson. Despite these early successes, the need remained to define more precisely the ingredients of culture media, and to work out their proportions in a range of media that would prove suitable for the culture of a wide range of genera. Folke Skoog worked on the interaction between the bud inhibitory auxin and the bud promoting cytokinin, discovered by him and his colleagues at the University of Wisconsin. Skoog, together with Toshio Murashige, went on to formulate culture media suitable for the micro-propagation of a wide range of horticultural crop plants. These media differed from their predecessors in that they contained a higher level of salts. Other constituents such as auxins, cytokinins and vitamins were present in varying proportions throughout the series. These media are immediately recognisable as the 'M and S' or 'MS' formulations nowadays widely used in the micro-propagation industry.

Micro-propagation has some distinct advantages over other methods used in the multiplication of horticultural crop plants. It provides a very rapid means of increase and, while not critical with many types of plant, it is of obvious benefit for the rapid bulking up of new cultivars and those that have a slow rate of natural increase. Daffodils multiplying naturally give an approximate six-fold increase in four years. Twin-scaling can increase this up to ninety-fold, but the increase that may be expected from micro-propagation during the same period is one thousand-fold or more. Another advantage of this system, or more correctly a form of it known as meristem culture, is that diseased plants may be cleaned of virus infections. In normal micro-propagation, relatively large pieces of tissue obtained from any part of the plant capable of budding are used, but in meristem culture it is only very small pieces of tissue, obtained exclusively from the meristematic tissue, which are utilised. This type of tissue is only found at the growing tips and consists of small groups of actively dividing cells. The reason for using meristematic tissue is that the cells composing it grow faster than viruses are capable of moving from the older parts of the plant to introduce infection. Of course micro-propagation is not uniformly advantageous and one of the limitations which has been observed is that a degree of genetic instability may be encountered, leading to the production of 'off types'.

The process of micro-propagation in daffodils is divided into several clearly defined stages. These are: the setting-up of the cultures; inducing shoot formation; making these shoots proliferate; the formation of bulbils; and, finally, weaning the new plants, or propagules, away from the artificial laboratory conditions in which all their early development takes place to a more natural environment. The process is a laboratory one. Growing small pieces of vegetative material in the confines of a test tube or jar has to be carried out in sterile conditions in order to avoid the sorts of fungal infections sometimes encountered in other rapid propagation methods, such as twin-scaling. The difference is that, while twin scales and their developing bulbils seem to cope reasonably well with a degree of fungal infection, micro-propagation cultures would be overwhelmed.

Micro-propagation consists of the growing on of small pieces of plant tissue or even a few apical cells in the process of meristem tip culture. To promote the development of these small pieces of tissue, they are placed on nutrient rich media containing all the essential major and trace elements needed for growth, plus sugar, vitamins and other organic chemicals. There are two essential stages in

the micro-propagation process: the growth and proliferation of shoots, followed by the production of roots on these pieces of shoot to form whole plants. These quite different phases are regulated by cytokinins, which assist cell division and shoot initiation, and auxins, which encourage cell enlargement and root initiation. Cytokinins and auxins are frequently used in combination during the multiplication phase, with the auxins being used alone during rooting. Auxins, as indole acetic acid (IAA), were first identified in 1935 with indole butyric acid (IBA) and naphthalene acetic acid (NAA) being produced synthetically later. These latter two materials were found to be more effective than IAA in encouraging cell enlargement and root initiation, and are the active ingredients found in proprietary rooting powders used to root cuttings.

Several parts of the daffodil plant have been used to provide material suitable for micro-propagation, including small sections from the leaf bases, scape (flower stalk), small twin scales and even subdivided ovaries. If using bulbs as a source of tissue, these should be mature and healthy. The bulbs are trimmed, removing all surplus and extraneous material, together with the protective, surface scales. The bulbs are then surface-sterilised in 1% sodium hypochlorite for 15 minutes. The pieces of plant tissue (explants) are then dissected out, using a scalpel that is regularly flame-sterilised during use. This work must be carried out within a laminar air flow or still air cabinet, for infection of cultures occurs too readily on an open bench. The explants are composed of small pieces of tissue, often taken from the scale leaf base, and measuring no more than 2 mm × 10 mm. Scape segments of 3 mm × 3 mm or small twin scales measuring 10 mm × 15 mm are also used. Once placed on the medium, the explants are kept at 25°C and given a 4000-6000 lux, 16-hour day. After about 6-8 weeks, clusters of multiple shoots appear. These are periodically cut up or sub-cultured, being placed on similar shoot multiplication medium in order to repeat the process. Once an adequate number of shoots has been obtained, the sub-cultured pieces are placed on the root-promoting medium, rooting usually being achieved at 18°C in light. If the shoots are allowed to grow up in the culture vessel during and after rooting, they will eventually die back to produce dormant bulbils.

Although the mass of research and experimentation has been on the laboratory techniques of micro-propagation, the weaning of micro-propagated plants has received considerably less attention. Fortunately, however, as the end product of the *in vitro* culture is dormant bulbils, the problems encountered with daffodil weaning are considerably less than with plants in which the material coming out of the culture vessels is soft, leafy and with non-functioning stomata.

Once the leaf growth has died back in the culture vessels, the bulbils are removed, given a cold treatment, and then placed in a suitable compost for further hardening off and subsequent growth. Bulbils have also been planted in pots or directly into open ground without cold treatment or into the latter situation once at least two roots have developed. An 80-90% survival rate can be expected.

*Narcissus* micro-propagation has developed into a successful commercial system used to exploit the rapid multiplication of virus-tested stock and new cultivars. Another advantage is that bulbs produced by micro-propagation tend to flower when smaller and, therefore, younger than bulbs raised normally. They also give rise to more flowers per bulb. Already the signs are good with several important cut flower cultivars having been successfully micro-propagated. These include 'Carlton', 'Early Splendour', 'Finland', 'Fortune', 'Golden Dawn', 'Ice Follies', 'Pink Smiles', 'Scarlet O'Hara', 'Sealing Wax', 'Verger', 'Victorious' and 'White Lion'.

## **A Cautionary Note on the Use of Chemicals**

It was during the latter part of the 20th century that several of the propagation techniques outlined in this chapter were developed. If these techniques involved the use of chemicals, it is those chemicals used at the time that have been identified here. This has been done to provide readers with a true historical perspective of how things were conducted at the time. While many of the propagation procedures are still in common use, it must be made clear that many of the chemicals formerly recommended are no longer approved for that particular use; indeed many have been withdrawn from use entirely. It is essential for anyone contemplating using these methods of propagation to identify

the chemicals that are available and approved. Government approval of all pesticide usage is nowadays reviewed on an annual basis in most countries.

Daffodil propagation has come a long way since the 1960s. As a result, old but commercially important cultivars that were undergoing a process of deterioration due to virus build-up have been revitalised and their yield tripled. The rapid propagation methods have led to new cultivars being introduced as commercial crop plants more quickly. This is readily seen during a garden centre visit in autumn; it is no longer the case that the home gardener only has access to old established cultivars as on the same shelves are to be found cultivars that not too many years ago were expensive exhibition ones. Nor are the processes involved the exclusive domain of the professional horticulturalist for any interested and careful amateur is capable of twin-scaling with little more than could be found in the average kitchen – a sharp knife, bleach, water and a polythene bag. All that need be bought is the vermiculite, while a garden propagator at 20°C is ideal for the bagged scales. It is then time to sit back and watch in amazement as the tiny, pearly-white bulbils develop. A scapel may also be required for, if very successful, three or four bulbils may develop along each scale and, by November, these will need to be separated using a sharp blade. Propagation is the real heart of horticulture and everyone can be involved!

## Reference

1. Flint, G. (1983). *Narcissus* propagation using the chipping technique. *Daffodils* **1983-84**, 46-53.

Cultivar or Seedling	No. bulbs treated	No. bulbils, November	No. leaves, March	No. bulbils, August	Average no. bulbils per bulb
'Ballet'	1	56	31	46	46
'Doctor Hugh'	5	184	55	125	25
'Fragrant Rose'	2	45	38	48	24
'Golden Joy'	1	59	24	43	43
'High Society'	2	70	57	65	32.5
'Lilac Charm'	2	59	39	47	23.5
'Midas Touch'	1	41	16	22	22
'Pink Pageant'	1	36	31	34	34
'Pismo Beach'	3	93	27	89	29.6
'Snowcrest'	1	79	48	57	57
'Verdant'	1	32	24	28	28
'White Star'	3	68	35	57	19
Seedling B287	1	94	78	73	73
Seedling B289	1	35	2	20	20
Seedling B291	2	22	17	26	13
Seedling B306	1	60	49	58	58
Seedling B384	2	63	37	41	20.5
Seedling D306	1	13	6	4	4
Seedling D383	2	62	19	45	22.5
Seedling D588	1	18	5	9	9
Seedling D603	1	24	6	9	9
Totals/average	35	1213	644	946	27

**Table 22.1.** Bulbil production from twin-scaling daffodil bulbs supplied by Brian S. Duncan and Tom Bloomer at the (New) University of Ulster, early 1980s.

## CHAPTER 23

### GROWING DAFFODILS

#### Naturalised Daffodils

Naturalised daffodils mean different things to different people, for they may involve species or cultivars and are met with in several distinct situations. Among the former group, without doubt the grandest, are the great drifts of *Narcissus pseudonarcissus* that occur in England: in the moist meadows and in the dappled edges of woodland in the Lake District and elsewhere in Cumbria, in Farndale in North Yorkshire and in the south-west Midlands. There may be debate about the true status of *N. pseudonarcissus* as a true native or a long introduced species, but this is of little consequence for here the term naturalised is probably used in its most correct sense. The daffodils concerned are growing in areas that are difficult to distinguish from the surrounding countryside, and where their presence is long-established; the daffodils are so 'at home' that they reproduce by seed as well as vegetatively.

Such extensive natural settings as those described above are not the only places in which the Lent Lily (*N. pseudonarcissus*) is found as a naturalised plant, for it was widely planted on many of the great 18th century estates. While such plantings were more contrived, they were frequently considerable in area, blending in well with the surrounding countryside. Many of the sites chosen for these plantings proved to so agreeable to this species that they seeded and happily spread into surrounding areas; they became truly naturalised. Today, the Lent Lily can be found planted in other situations, chosen because it looks comfortable in its surroundings. There is one such planting on a large bank side leading out of a village not far from Farndale. When its thousands of bulbs flower both they and their observers seem at ease for they are obviously so right for that place. No other daffodil is as well suited as the Lent Lily to an environment of undisturbed ancient pasture and woodland. It is a small, squat and sturdy plant without in any sense being dwarf and in danger of being overcome by the grass and herbs with which it grows. As it makes its growth early, it is always in advance of the pasture until after flowering is finished. If growing in deciduous woodland, flowering is over before the tree cover closes canopy and gives the cool summer temperatures in which the bulbs thrive (Plate 23.1). Wherever it grows, the squat, sturdy nature of the plant ensures that it can resist the cold winds of spring. The Lent Lily was the daffodil to which Shakespeare referred when he wrote: "Daffodils that come before the swallow dares, and takes the winds of March with beauty"<sup>(1)</sup>. It is predominantly of a uniform yellow colour but considerable variation does occur, both in the intensity of the yellow, which can pale almost to cream, and in the degree of uniformity throughout the perianth and corona.

With other species there can be no argument that they are truly naturalised for they are natives of other lands. Examples are the white trumpet species which, over several centuries, found the Irish climate so much to their liking and *N. bulbocodium*, which can be such an effective feature in the lawns and meadows of large gardens.

The second type of naturalised daffodils is that which is found in the green spaces of our towns and cities. Most urban parks have been created since the mid-19th century, their creation coinciding with the beginning of daffodil hybridisation. William Robinson's advocacy of daffodils and the wild or natural garden at the end of the 19th century made naturalised plantings of daffodils in such situations almost obligatory<sup>(2)</sup>. In more recent times, massed planting in grass has spread from parks to features of the modern urban environment such as motorway embankments. Most frequently it is cultivars that are encountered in these situations and, as cultivars vary considerably in colour, height and time of flowering, basic rules have to be observed in planting if a fine effect is to be achieved. While the Lent Lily looks perfectly well dotted about pasture in small, scattered groups, cultivars in urban grassland, if similarly planted, would not have a pleasing effect. Furthermore, such



a distribution of plants would make the maintenance of the grass in which they were growing an impossible task. In the ancient pastures, where the Lent Lily is so often found, sheep and rabbits maintain the grass by eating it, while carefully avoiding the unpalatable, calcium oxalate-laden leaves of the daffodils; apart from occasional trampling, the plants suffer no harm.

In order to achieve the twin objectives of making an outstanding floral feature while not interfering with the maintenance of the surrounding areas of grass, daffodils in naturalised urban plantings should be in bold drifts, the individual bulbs being closely placed. Such a scheme will create the effect of islands of colour. Several cultivars may be used within a single drift but each should be confined to distinct groups of sufficient area to produce an immediate visual impact, which is considerably diminished if several cultivars are mixed together within a group. The separation of cultivars ensures uniformity of flowering times in each group, and gives scope for the proper gradation of groups within the drift according to plant height, so that none is obscured from view. Such plantings are particularly effective on banks or locations where they can be viewed from higher ground. The edges of drifts should always be made to look as natural as possible by avoiding straight lines and exploiting curves. After flowering is fully over the foliage will start to die back. The rate at which this happens depends on weather conditions and is much delayed in wet summers. Once the dying-back process is seen to be well underway, the daffodil foliage may safely be mown off without impairing the following year's flowering potential, provided the recommendations given below are followed. This will then allow the grass underneath to recover.

As winters become less cold owing to the effects of global warming, the flowering dates of many early cultivars, which have only a short cold period requirement before producing flowers, becomes earlier and earlier. In these circumstances, the 'no mowing until six weeks after flowering' rule does not apply as the plants are still fully photosynthetically active at this time: if defoliated too early, bulb size will reduce year-on-year and flowering will lessen until it does not occur at all. Therefore, the six-week defoliation rule only applies to daffodils flowering in late April and should be carried out in mid-June, which must be regarded as the earliest date for cutting back any foliage irrespective of time of flowering.

The final situation in which daffodils may be naturalised is in the lawns of small private gardens, where they may be planted under trees or in the open. This type of planting will sometimes utilise bulbs that have been forced to produce a flower crop. These can often be obtained cheaply from local nurseries at the end of the forcing season, although it must be remembered that they will take a year or two to recover fully from the forcing process. Alternatively, bulbs may be purchased specifically for naturalising. The use of the Lent Lily itself is ideal. If cultivars are to be used, a natural and pleasing effect will result, particularly from yellow trumpets: several of the charming *cyclamineus* hybrids like 'February Gold' and 'Peeping Tom' are ideal. Miniatures are especially suited to small areas of land; 'Tête-à-Tête', because of its early flowering habit, is ideal for planting in clumps among crocuses. Generally, double-flowered cultivars do not look right when naturalised, but the short-growing, yellow 'Van Sion' can be used to good effect and is already so extensively naturalised in many parts of the country that it is readily accepted.

The best method of getting bulbs into the lawn is to use a special planting tool. When only limited numbers of bulbs are involved a small bulb-planter is ideal, but for larger numbers a taller implement, which will allow the work to be done from a standing position, is essential. Both types of planter remove a core of soil and turf large enough to accommodate a bulb at the correct planting depth. After placing the bulb in the hole, the core is placed back in the hole and is tramped down, leaving the lawn surface as it was. Because the bulb and the soil core occupy a volume previously occupied only by the core, it is important that bulbs are fully dormant when planted, as emerging foliage is easily damaged.

If the lawn in which daffodils are present is treated with weed killer, it is essential that the foliage has died back below soil level and that the holes left by the decaying foliage are filled in by brushing in a top dressing before applying the weed killer.

## Daffodils in Borders and Rock Gardens

While daffodils are sometimes included in formal borders of spring bedding, they are more effective when planted in informal herbaceous and mixed borders. As for planting in grass, groups should be bold, the number of bulbs in each being sufficient to create a significant splash of colour. Again, impact is maximised if each group consists of a single cultivar. Unlike bulbs under grass that are left undisturbed once planted, bulbs in borders will require lifting and dividing every three to four years to prevent overcrowding. Indeed, in areas where summer soil temperatures are high it may be necessary to lift and chemically-dip bulbs annually in order to keep Basal Rot in check. Bulbs of daffodils are only dormant for a short period, usually in July in the northern hemisphere, and this is when they should be lifted and divided and then replanted immediately, apart from where chemical treatment is required. When replanting the same number of bulbs as were originally planted should be used, selecting flowering-sized bulbs of uniform dimension.

Dead and dying daffodil foliage can look unsightly in borders and need not be left to die completely before removal. Leaves can be removed without damaging the flowering prospects for the following year – if done some six weeks after completion of flowering for cultivars which bloom in late April, although this work should not be carried out any sooner than this date (mid-June) for earlier flowering cultivars. Flower initiation occurs quickly in daffodils and will proceed to completion after the dying foliage has been removed, or even after the bulbs have been lifted. If spot treatment of weeds within the border is carried out after the daffodil foliage has died back, it is essential, first, to fill in any holes leading to the bulbs left by the dying leaves. This can be done with a light hoeing, which will also deter Narcissus Flies from descending down these holes to lay eggs on the bulbs, or nearby. In general, daffodils do not require support, but tall or heavy-headed types growing in exposed positions will benefit from growing up through birch twigs which are pushed into the soil as the leaves begin to appear.

There are many exquisite daffodil species and dwarf cultivars, which look well alongside alpine plants in the rock garden. Included among the former are *N. asturiensis*, *N. bulbocodium*, *N. cyclamineus*, *N. rupicola* and *N. triandrus*, while cultivars such as ‘Little Gem’, ‘Minnow’ and ‘Tête-à-Tête’ are also highly desirable in this situation.

## Bulbs in Pots

Both dwarf species and cultivars, and many of the taller cultivars can be successfully grown in pots to provide an early splash of colour at the start of the growing season. The types of species recommended above for the rock garden are ideal subjects for growing cold in pans in the alpine house. To these may be added other dwarf species, for example *N. minor* at only 7.5-10 cm tall, and the equally small *N. rupicola* subsp. *watieri*. *N. bulbocodium* always looks well in pans where the leaves will be protected from slug damage.

Also ideal indoors are the somewhat taller Jonquil and Tazetta species and, if some very early flowers are required, many of the Moroccan species can be grown successfully in pots, although the bulbs are usually relatively expensive to buy. None is better than *N. broussonetii* that will produce its sparkling white flowers in November: these will persist for fully three weeks under cold glass. The spring-flowering Jonquils and Tazettas grown in cold glass will also provide the added dimension of perfume to their other obvious qualities, which will concentrate into a heady scent in this confined environment. All these taller species are best grown in 13 cm pots rather than in the shallower pans recommended for the dwarfer species. Among the smaller cultivars, few can provide a more attractive sight than a closely planted pot or pan of ‘Hawera’. Many of the taller cultivars are capable of performing well in pots, and are often grown commercially for sale as pot plants. It is usual to plant four, five or six bulbs in a 13 cm or 14.5 cm pot, placing the bulbs at two levels in order to fit them in. If left to their own devices, such cultivars will grow away too rapidly once housed for flowering, their foliage and flower stems becoming soft and lax. When grown commercially for sale as pot plants, vegetative rankness has been controlled using Ethrel C (2-chloroethylphosphonic acid) although currently there is no approved product for use on *Narcissus*.

All bulbs grown in pots should be given a cool period after planting in order to encourage the formation of an adequate root system. This can be achieved by placing the pots in a shady position and covering them with an insulating layer of clean straw, which is free from persistent herbicides. This covering is removed as soon as the foliage begins to emerge, the pots being housed as soon as hard frosts occur as these can cause bulb damage. With tall cultivars being grown as pot plants, they should be taken indoors when the leaves are 10-15 cm in height, and placed in a temperature of 15-18°C. Formerly at this stage, they would have been given Ethrel C at 10 ml in 13.65 litres of water, applied as a soil drench in place of watering. This amount of diluted Ethrel solution was sufficient to treat approximately 170 pots of 14.5 cm diameter. Following treatment, the air temperature was kept at 15-18°C for a few days, after which it was lowered to 10°C. Any watering that was required after treatment was given sparingly. Not all daffodils require these temperatures or chemical control of growth in order to give sturdy plants that flower earlier than normal. The daffodil 'Paper White', for example, can be grown cold throughout to flower in early January and the application of only slight warmth in December should bring it into bloom for Christmas. Grown in this way, it is sturdy enough not to need any Ethrel C or approved alternative treatment.

## Conservation and the Historic Collections

During recent years, it has become obvious that many of the older cultivars are in danger of being lost as they are superseded by 'superior' modern types. Some of the older cultivars may have characteristics, however, that make their continued survival desirable. An example would be an inherent resistance to disease, a property that may be used in the breeding of modern cultivars. Other older and historically important cultivars may be quite different, being susceptible to disease and in need of special care. Thankfully, much has been done in recent years through the activities of plant conservation organisations to stem the further loss of garden plants through the setting up of, for example, National Collections (Plate 23.2). The National Council for the Conservation of Plants and Gardens (NCCPG) led the way in this work in the British Isles.

Such collections serve several purposes. They preserve part of our national heritage and they ensure the continued availability of older garden varieties to those organisations and individuals who may wish to grow them – as, for example, in the case of an historically important building around which it may be thought desirable to recreate the garden as originally planted. Collections can also have an important educational role, especially with a well documented genus like *Narcissus*, in which it is possible to illustrate in a living museum the development of the most modern hybrid from the original species. Collections form gene banks of tremendous importance to present-day hybridists seeking factors such as disease resistance. Finally, but by no means least important, is the ability to use collections, if correctly sited, as tourist attractions. Such a collection would seem to be particularly appropriate in the English Lake District: it would show the development of cultivars from the Lent Lily (one of the major parent species being used extensively in breeding during the latter part of William Wordsworth's lifetime) through to the most modern cultivars.

But even the owner of the smallest plot could plant up an area that would not only provide an interesting talking point for visitors during Spring but also something of considerable beauty. Consider, for example, the double and the pink daffodils. With both, it would be quite possible, and at only moderate expense, to show development since Elizabethan times in the case of the former, and from the species daffodils growing in the Pyrenees with the latter.

Dealing with the doubles first, 'Van Sion' would be the starting point. The double *tazetta*, known as the Double Roman, could also be included, being one of the earliest double daffodils known to cultivation from before 1600. The inclusion of the double form of *N. poeticus* would not only illustrate another early form but, being particularly late, would also extend the flowering period. Coming to the 19th century, 'Rip van Winkle' would be readily obtainable; on the other hand, the important Phoenix group would require a little more effort, although 'Eggs and Bacon' should not be impossible to find. This is the important member of the group, for it was a parent of 'Mary Copeland'

and provided the link between the 19th and 20th centuries, and thus with the modern double cultivars. William Copeland was the pioneer of double daffodil breeding in the early years of the 20th century and another of his cultivars that is still easy to obtain is 'Irene Copeland'. It was, however, 'Mary Copeland' that proved to be most important when it crossed spontaneously with a *poeticus*, probably 'Dulcimer', to give rise to 'Falaise', the most significant cultivar in the development of the doubles. Planting all three in a group shows the parents and offspring of one of the most important crosses in the history of the daffodil. Once 'Falaise' had arrived and was used in breeding, a flood of good doubles ensued in a range of colours and quality of bloom not previously seen. Many of these 'super doubles' are readily available at not too great a cost, enabling even the most modest collection to be brought up to date.

With the pinks, it is possible to begin with the species involved in the creation of the first pink cultivar. These are *N. poeticus* and *N. alpestris* or *N. moschatus*, all of which are fairly readily available. The cultivar concerned was 'Apricot', registered in 1898. The next important step forward was 'Mrs R.O. Backhouse', registered in 1923; both it and 'Apricot' frequently appear in catalogues. Then came 'Rose of Tralee', followed by a host of improved pinks through to the present time. 'Passionale', 'Romance' and 'Rainbow' are examples of these fine modern cultivars that could be used. Pink coloration has also been transferred to other groups of daffodils such as the *cyclamineus* hybrids and the doubles, and 'Foundling' from the former group may come within the scope of the keen gardener's pocket. Most of the pink doubles are more expensive at present, although the widespread use of rapid propagation techniques such as micropropagation is tending to make modern cultivars more quickly available and at reasonable cost.

## Field Production of Cut Flowers

In the British Isles, the field production of commercial cut flower crops is concentrated in the south-west of England, where some 600 ha were grown in the 1970s<sup>(3)</sup>. By 1980, a small decrease to 550 ha was reported but expansion then took place, the hectares down to daffodils in south-west England being estimated in 2002 to be about 1200 ha. A significant level of production is found in the Netherlands, the largest European mainland producer, while the Pacific north-west is the area of greatest concentration on the American continent. In western Washington State, there are 400 ha of daffodils representing 90% of field production in the USA<sup>(4)</sup>. The south-west of England and the Pacific north-west are favoured growing areas on account of their mild winter climate, with prolonged spells of frost being unusual. The Netherlands is colder and more subject to a continental type of climate, and is thus unsuitable for the growing of early sorts without the aid of some protection. In Britain, the most climatically favoured area of the south-west is the Isles of Scilly, with an annual production of 45 million bunches<sup>(5)</sup>. The early flowering cultivars of *N. tazetta*, such as 'Soleil d'Or', are the main types grown, flowering from before Christmas. The flowering time for an early cultivar on Scilly is about two weeks sooner than for the same type on the Cornish mainland which, in turn, is several weeks in advance of the colder eastern side of England, which leads to a considerably extended flowering season. The later flowering cultivars, however, bloom at approximately the same time in all areas.

Although the south-west is milder, there are some less favourable aspects to its climate, particularly in winter and early spring. The chief of these is salt-laden gales, which can cause severe damage in exposed places where it is necessary to provide crop protection in the form of wind-breaks. In the Isles of Scilly, these usually take the form of 240 cm high hedges spaced at 21 m apart. These may not be sufficient in themselves in very exposed situations, where they need to be supplemented with 120 cm lath screens or wattle hurdles erected before flowering commences. For natural barriers, a range of trees and shrubs which are evergreen and tolerant of salt-laden gales are used, the commonest being *Cupressus macrocarpa*, *Escallonia macrantha*, *Euonymus japonicus* and *Griselinia littoralis* with *Pittosporum crassifolium* and *Olearia traversii*, all of which are used in the mildest areas of the far south-west.

What are the characteristics of a good commercial cut-flower cultivar? Most importantly, it must be productive, both in terms of flowers and bulbs. The stem length should be such as to keep the flowers clear of chafing contact with the foliage. The minimum stem length is considered to be 40 cm, although stems of some early flowering sorts are frequently less than this. The plants should be resistant to cold spring winds and the flowers, once picked, should have a long vase life. Most market cultivars are yellow or partly yellow, but buyers are showing interest in new colours that are different from the predominant sorts. Whatever the colour, it must always be clear and bright.

Daffodils are grown either in beds (Plate 23.2) or ridges. The latter system has become increasingly popular over the past several decades and is now widely used, allowing for a good deal of mechanisation in the production of the crop. The land under the ridge system is, however, less productively used, high density planting in beds giving bulb yields of almost 30% more per unit area<sup>(6)</sup>. Flower yield is also much less, being directly related to planting density and mean bulb weight. As ridge planting may only require 75% of the bulbs used in an equivalent area of bed, the effect on flower numbers will be readily appreciated. Beds consist of six rows of bulbs at 25 cm spacing, with an unplanted row forming the path between adjacent beds. Bulbs are planted from 10 cm apart in the rows to almost touching (densities of 54-216 bulbs per m<sup>2</sup>), the highest flower yield being obtained from the highest planting density; this also produces flower stems that are up to 20% longer than those at the widest spacing. Planting depth is normally 12.5 cm from the soil surface to the base of bulb. Beds are left down for from 2-4 years, the former being most suitable for double-nosed bulbs and the latter for small bulbs. In the ridge system, the drills for planting are taken out at 75 cm centres, the base of the furrow being flattened to take two rows of bulbs at 10-15 cm apart. Spacing within the rows and depth of planting is as for the bed system. It is worth noting that soil temperature is a critical factor in the growth of *Fusarium*, the fungal organism responsible for Basal Rot. This disease has become much more common in recent years due to warmer summers and the temperature effects can be influenced by the growing system used. Under ridges, the bulbs will be in a warmer environment than if grown in beds due to the variation in soil surface area to soil volume ratio. Even the orientation of the ridges can have an effect, east-west ridges being warmer than those running north to south. For both ridge and bed systems it has been shown that bulbs growing on south facing sites are more susceptible to infection than if facing north. Weed free soil is warmer than soil with a weed or mulch cover, therefore herbicide treated crops can be more prone to *Fusarium* infection.

During the pre-planting soil preparations, a dressing of compound fertiliser rich in potassium should be worked into the soil. There is little doubt from the experimental evidence that potassium is the most important nutrient for daffodils: bulb size is increased by potassium sulphate at 250 kg per ha, with flower yield being proportional to bulb weight<sup>(7)</sup>. The evidence for the value of nitrogen as a fertiliser is less clear, significant effects on yield being obvious only in some seasons. However, the results hardly justify more than a moderate nitrogen application in the base dressing. Potassium and nitrogen appear to interact, adequate potassium being essential for maximum nitrogen response. Nitrogen shortage always results in paler foliage, and shoot emergence may also be delayed. Top-dressing with nitrogen during the growing season appears to have little effect on growth or yield. The phosphorus requirement of daffodils is low and little or no benefit is derived from fertiliser phosphate where soil phosphate levels are adequate. Calcium requirement also appears to be low, successful crops having been grown in quite acid conditions. Consequently, it is not usual to add lime to soil specifically for a daffodil crop, although it may be necessary to apply for other crops used in the rotation. The best soils for daffodils are those kept in good heart through the use of rotational cropping and adequate dressings of farmyard manure applied to these crops: the application of potash-rich compound fertiliser is all that is required for the daffodil crop itself. Weed control is carried out almost exclusively by the use of herbicides. Flowering of field-grown crops can be advanced by up to six weeks by using a cool treatment (9°C) similar to that used in pre-treating bulbs for forcing. Bulbs treated in this way should be planted during late August to early September. In addition to the advancement of flowering seen in the season of treatment, a lesser carry-over effect is also observed the following year.

Suitable cultivars for cut-flower production have been extensively tested at Rosewarne Experimental Horticulture Station. These are divided into those that are already well established in commerce for this purpose, and those that have shown their suitability during trials but which earlier had been little used or, indeed, not used at all. Examples are shown in Table 23.1.

Division	Established Cultivars/Species	Recommended Cultivars
1	'King Alfred'	'Effective'
2	'Aranjuez'	'Ballymarlow'
3	'Barrett Browning'	'Blarney'
4	'Cheerfulness'	'Irene Copeland'
7		'Golden Perfection'
8	'Geranium'	'Ideal'
9	'Actaea'	'Caedmon'
11		'Baccarat'
13	<i>Narcissus poeticus</i> var. <i>recurvus</i>	

**Table 23.1.** Species and cultivars recommended for cut flower production following trials at Rosewarne Experimental Horticulture Station.

## Harvesting the Flowers

Daffodils are always harvested in bud with the exception of double and multi-headed cultivars. There are three distinct stages in bud development. The first is known as 'green fat pencil' in which the bud is still in the vertical position. Next, the bud will begin to assume a more horizontal pose that is known as 'green goose neck'. Finally, the buds will come to rest at 90° to the stem, will have undergone considerable enlargement, and will be starting to show some colour. This stage is known as 'fat goose neck' and is the ideal stage at which to pick high-quality flowers. Picking has, however, tended to become earlier, and harvesting in pencil stage is now the norm as flower packing is easier (Plate 23.4). Some harvesting is still done at 'green goose neck' especially for local outlets. Double-flowered cultivars must have their flowers ¾ open when harvested or they will subsequently fail to absorb water and will never open fully as a result. Multi-flowered cultivars, such as the tazettas, should have the first flower on the stem fully opened before starting to harvest. Once received at the point of sale the flowers should be placed in water, rapid opening being induced by temperatures in the range 10-16°C. In the past, better quality flowers were obtained by using the plant growth regulator 2-chlorethylphosphonic acid as the product Ethrel C. This had the effect of giving flowers with shorter, sturdier stems, if applied as a drench when stem length was 15 cm.

## Lifting and Storage of Bulbs

There is less experimental data available on the ideal storage conditions for bulbs between lifting and replanting again in the field than there is on many other aspects of growing. However, both storage conditions and the lifting prior to storage have taken on added importance in recent years due to the effect they have on minimising the spread of Basal Rot disease.

It has been common commercial practice to lift daffodil bulbs between late June and early July and storing until mid-August when they would be hot water treated with the probable addition of a fungicide at that stage. The advantage of this system was that it resulted in minimal damage to the embryo flowers already present in the bulbs. Due to increases in Basal Rot, a judgement has to be made nowadays between the quality of the flower crop and the likely increased occurrence of Basal Rot. Late lifting, as described above, extends the period for field infection while storage into August allows fungal penetration into the bulbs to go beyond the reach of the fungicide given with the hot water treatment. It has been found that lifting earlier and giving the hot water plus fungicide treatment in mid-July rather than mid-August resulted in a significant reduction in the disease<sup>(8)</sup>. Early lifting, in combination with an immediate post-lifting thiabendazole dip, is recommended because at this stage the bulbs still have some physiological activity that aids translocation of the fungicide so that it behaves in a more systemic manner.

Storage is as important as lifting in controlling *Fusarium*. It is crucial to put only clean bulbs into store as these will not develop disease even if storage temperatures and humidity are not at optimum levels. Also the link between field conditions, such as high soil temperature and humidity and infection should be remembered. Removal of all damaged bulbs and dipping in an approved fungicide within one or two days after lifting is essential prior to storage.

The normal practice is to keep bulbs in well-ventilated, open-sided stores – with sufficient air movement to dry the bulbs rapidly after lifting and to prevent root formation before replanting. The bulbs are often stored in mesh-bottomed boxes, with the stores themselves being sited in a shady place to avoid overheating, dehydration and rapid development of Basal Rot. It has been shown that temperature in store is important in controlling the development of Basal Rot, there being twice as much infection after one month at 25°C than is the case if stored at 17°C<sup>(9)</sup>.

## Flower Forcing

Daffodil flowers can be produced earlier than normal – from November to March rather than February to May – by the use of certain temperature treatments given to the bulbs between lifting and planting. This advancement of the flowering date is termed forcing. The type of treatment to which the bulbs are subjected differs according to the time when flowering is required. For earliest flowering, in the period up to Christmas, the bulbs are subjected to two distinct temperature regimes. The first is a warm treatment on lifting, followed by a period of low temperature. Daffodils have a low temperature requirement and in field crops this is satisfied by low winter temperatures; in bulbs to be forced this low temperature must be administered during summer, being achieved by controlled cool storage. For bulbs flowering between Christmas and the end of January, it is only necessary to administer the low temperature treatment. For the latest-flowering forced bulbs, no specific temperature treatment is required as the bulbs are flowering reasonably close to their natural flowering time.

The earliest systematic study of the temperature requirements of bulbs for forcing was carried out by Professor E. van Slogteren at the Flower Bulb Research Laboratory, Lisse and Professor A.H. Blaauw at the Plant Physiology Laboratory, Wageningen, the Netherlands. The possibility of forcing treatments was, however, first mooted some years before Slogteren published his results. This pioneering work was carried out by Nicolaas Dames, a Dutch bulb grower, using hyacinths. Dames' work<sup>(10)</sup> indicated that if hyacinth bulbs were lifted earlier than normal, even before the current season's foliage had begun to die back, a post-harvest period of high temperature would promote the initiation and development of the following year's flower bud several weeks before this would take place naturally. It was he who identified the most suitable temperature and length of treatment necessary to predispose bulbs to early flowering. His work with hyacinths created a market for treated or 'prepared' bulbs, as they became known. The Dutch also did work on daffodils that clearly indicated the danger of storing bulbs at high temperatures after lifting, this delaying flowering<sup>(11)</sup>. The higher the temperature and the longer the period of storage, the more retarded the flowering date became. Another dangerous practice discovered was to follow early lifting with immediate cool storage. When such bulbs are planted they fail to produce an adequate response to the forcing treatment.

Under normal outdoor conditions, the development of the daffodil flower for the following year begins in early May and within about six weeks all parts of the flower will have developed, apart from the corona. As bulbs are not normally lifted until another four weeks have elapsed, the embryo flower is well developed at that time. The Dutch research concluded that, if bulbs were lifted at the normal time when the flower bud was fully developed, they could be stored at 8-9°C: but if lifted early they should be stored at 16.5°C until flower development was completed<sup>(12)</sup>. Damage could occur if the period of cool treatment was too long, the most satisfactory length of cool storage being two months – lifting the bulbs in late July and storing until boxed in late September. After boxing, the bulbs must still be kept cool at 9°C until forcing begins in late November. This cool period allows

adequate rooting and is achieved by keeping in a cool store or placing in a shady border, covering the boxes with 10-12.5 cm of straw. Forcing at 16°C will induce flowering within three weeks.

Accounts of the Dutch work appeared in the *Daffodil Year Book* in 1933<sup>(13)</sup> and 1935<sup>(14)</sup>. British growers, who often worked under very different growing conditions from those found in the Netherlands, had to rely on the Dutch recommendations for the next 30 years. From the early 1960s, however, an increasing body of information specific to British growers started to become available, following a research programme carried out by the Agricultural Development and Advisory Service<sup>(15)</sup>. Among its main findings was the importance of recognising the stage at which the differentiation of the parts of the bud, which gives rise to the following year's flower, is completed. This stage is reached when the tissue known as the paracorolla appears at the base of the bud and is termed the Pc stage. It is determined by dissecting samples of each cultivar to be pre-treated on a twice-weekly basis, starting in mid-May and ending in late July. This range of testing is necessary as the Pc stage is reached at different times from year-to-year, even in the same cultivar, and from one cultivar to another growing in the same locality. These differences can be quite considerable as can be seen from some maximum figures given below which certainly justifies twice-weekly sampling:

1. Same cultivar, same location, different years: difference 15 days
2. Same cultivar, different locations, same year: difference 21 days
3. Different cultivar, same location, same year: difference 13 days

It is important that cool treatment is not given before the Pc stage is reached and, if it is not reached naturally before lifting, warm storage must be given immediately after lifting to help complete bud development. Low temperature storage prior to the Pc stage can lead to splitting of the corona and distorted flowers of poor quality. The use of post-lifting, high temperature storage is beneficial in that treated bulbs flower earlier, and a period of five days at 35°C, given immediately after lifting and grading, is essential if bulbs are to flower before Christmas. This short period of high temperature allows next season's flowers, already initiated at lifting time, to move towards differentiation. The initial five-day period is followed by storage at 17°C, this being maintained until the Pc stage is reached. Another benefit of warm temperature storage is that it helps to prevent damage from hot water treatment that often manifests itself in the splitting of the corona.

While the above is the recommended regime for warm storage treatment, the temperature and the period over which it is applied does not appear to be critical, 30°C for seven days being as effective as a higher temperature over a shorter period in advancing differentiation. The warm storage treatment cannot be carried out immediately after lifting as the bulbs have to be cleaned and graded. It should commence as soon as possible, however, but no retarding effect has been detected provided treatment is begun before 12 July, this being followed by the 17°C period until the Pc stage is reached. If cool storage is started too soon before the Pc stage is reached, inhibition of root development may be encountered after planting. Cool storage is necessary once the Pc stage is reached, six weeks at 9°C being recommended for all bulbs to be flowered from early to mid-season (mid-November to late January). Cool storage ensures earliness of flowering and a short period of only 4-5 weeks in the glasshouse. As with the warm storage treatment, the temperature used does not appear to be critical, those in the range 7-11°C giving acceptable results. Temperatures below 7°C accelerate earliness but at the expense of flower quality and plant height. Above 11°C, flowering is retarded. As well as controlling temperature in store, adequate air circulation should also be provided to maintain the relative humidity at between 70-75%<sup>(16, 17)</sup>.

After the bulbs are planted, they must still be kept cool, by returning the boxes to the cool store or placing them in a cool standing ground. A modern alternative to the latter is to stack up the boxes to about eight high on pallets, first giving them a thorough watering. Several pallets may be placed together, these being surrounded by an insulating layer of straw bales or heavy-gauge, black polythene. The storage of planted bulbs in a cool store, termed wet or double cooling, provides a very precise period of cool storage, consisting of 6-9 weeks at 9°C after boxing. During storage, the compost must be kept moist to maintain rapid root and shoot development.



The stacking system appears to work satisfactorily. The temperature within the stack is generally found to be 1-2°C lower than in adjacent standing grounds. No shoot damage results from stacking the boxes on top of one another and rooting is satisfactory, provided the compost is kept moist throughout the stacking period. This may be achieved by turning on a spray-line running across the top of the stack for approximately one hour per week. The standing ground system is the oldest method of maintaining cool temperatures prior to housing and, in order to achieve this, the area should be naturally shady. The boxes must also be provided with an insulating layer of a material such as straw. The earlier the boxing is carried out, the more difficult it will be to maintain suitably low temperatures in the standing ground, as the ambient temperatures are likely to be excessive in September. In order to keep the compost temperature within bounds it is necessary to use a 30 cm thick layer of straw and irrigate at least twice per week. With later boxing, both the depth of the insulating layer and the frequency of irrigation may be decreased. In addition to the coolness of the standing period, it is also essential that the soil onto which the bulbs are to be placed is free from Stem and Bulb Eelworm, which can attack through roots emerging from the boxes. It is necessary to ensure that the straw used as an insulator is not contaminated with any herbicide that may enter and damage the plants through the emerging foliage.

Bulbs that are double-cooled are ready to house 6-9 weeks after boxing. With bulbs in stacks or in a standing ground it is essential that the flower bud has moved up into the neck of the bulb before moving the boxes into the glasshouse; in order to ensure successful forcing of bulbs housed during November and December, the bud must have moved well up the neck of the bulb by this time. Bulbs housed before this stage will exhibit uneven growth and flowering, and the latter may be considerably delayed. When bulbs are first housed the recommended temperature is 13°C, rising gradually to 16°C, which will give rapid flower development combined with high quality. The amount and quality of daylight in the forcing house is unlikely to be a limiting factor in the production of quality blooms. Bulb Scale Mite can be a serious pest on forced crops of daffodils and thorough control measures must be carried out at the first signs of its presence.

A summary of the temperature treatments for forced crops is given in Table 23.2.

Treatment	Early Season	Mid-Season	Late Season
Lifting	Mid-June to early July	Early to mid-July	Mid- to late July
Cleaning/grading	Soon after lifting	Soon after lifting	Soon after lifting
Warm storage	35°C for 5 days	-	-
Intermediate storage	17°C to Pc stage	17°C to Pc stage	17°C to Pc stage
Cool storage	9°C for 6 weeks	9°C for 6 weeks	-
Boxing	Mid-September	Late September	October to November
Housing after double cooling	After 6-9 weeks	After 6-9 weeks	-
Housing after stacking or standing ground	Buds well up neck of bulb	Buds well up neck of bulb	Buds well up neck of bulb
Forcing temperature	13-16°C	13-16°C	13-16°C
Forcing period	4-5 weeks	4-5 weeks	4-5 weeks

**Table 23.2.** Summary of temperature treatments for forced crops. (Pc = paracorolla.)

A selection of cultivars suitable for forcing would include the following:

1. Early season flowering mid-November to late December  
‘Magnificence’ 1Y-Y
2. Early to mid-season flowering mid-November to late January  
‘Barrett Browning’ 3W-WRR  
‘Carlton’ 2Y-Y  
‘Edward Buxton’ 3Y-OOR  
‘Fortune’ 2Y-O
3. Mid-season flowering late December to late January

- 'Dutch Master' 1Y-Y
- 'Quirinus' 2Y-YRR
- 'Rembrandt' 1Y-Y
- 'Unsurpassable' 1Y-Y
- 4. Late season flowering February and March
  - 'Actaea' 9W-GYR
  - 'Cheerfulness' 4W-Y
  - 'Verger' 3W-R
  - 'White Lion' 4W-Y
  - 'Yellow Cheerfulness' 4Y-Y

## Daffodil Bulb Production

It may come as something of a shock to be told that Britain has the largest area of daffodil production in the world, for most people would expect this position to belong to the Netherlands. The daffodil-producing areas of Britain occur in two main regions. These are the south-west of England, particularly Cornwall and the Isles of Scilly, which specialise in early outdoor crops of cut flowers. Bulb production is concentrated in the east, principally in Lincolnshire and Norfolk with 2750 ha<sup>(18)</sup>. There is also a smaller, but nevertheless, important area devoted to dry bulb production in eastern Scotland (530 ha)<sup>(19)</sup> and in recent times, bulbs are also being grown for galanthamine production in the uplands of south Wales (50 ha). The production of dry bulbs in eastern England provides for almost the whole of the home requirement and, in addition, has given rise to a considerable export trade. Successful bulb crops depend upon several factors, including suitable soil and good husbandry, leading to the production of clean, healthy and high yielding crops.

Daffodils cannot be considered to be a fussy crop with regard to soil conditions, growing satisfactorily on a wide range of soil types. The best soils are, however, deep and fertile and, while being capable of retaining moisture, must not be subject to water-logging. It should not be stony and it should be free from perennial weeds; above all, it must be free from pests and diseases capable of causing damage to the crop or hindrance to the provision of the phyto-sanitary clearance necessary for export. Can more precise definitions be put on these factors and can action be taken to improve soil for daffodil bulb production?

An ideal soil type would be either a sandy loam or a brickearth, both of which have fairly precise limits to the various textural fractions of which they are composed. A typical sandy loam, for example, may contain 75% of the various sand fractions, ranging from very fine sand at 0.05-0.125 mm diameter to very coarse sand at 1-2 mm diameter, 18% clay at less than 0.002 mm and 7% silt at 0.002-0.05 mm diameter. Thus, the soil type is defined in terms of the amounts of each fraction present, the particle size of each fraction being within defined limits. Not only must the texture of the soil be suitable, but the textural particles must be well-structured, with many of the fine clay particles being aggregated so that physically they behave as larger particles while retaining their unique water- and nutrient-holding properties. Structure in soils is encouraged by the presence of adequate fresh (non-humified) organic matter, a reasonable supply of calcium and a good population of active earthworms. Apart from its role in structure formation, organic matter is also concerned with moisture and nutrient retention and should be present in the ideal sandy loam at a level of not less than 3%. As organic matter applied to sandy soils does not persist, regular applications will be required in order to maintain soil structure and ensure good moisture and nutrient retention. In order to achieve this, dressings of organic matter at 75 tonnes per ha are applied to other crops in the rotation, but not immediately prior to the planting of daffodils. Daffodil bulbs must not sit in water over winter, this requirement being satisfied by the amount and type of sand in the sandy loam or brickearth. In order to grow satisfactorily and produce a high bulb yield, the crop must not be short of moisture during the critical period from April to June and this is where the importance of the organic matter lies: for the soil must be capable of retaining 40 mm of moisture for each 300 mm of its depth.

There is a variance of view as to the degree of acidity that will give the optimum growth in daffodil crops. It has been stated that they will grow successfully at a pH as low as 4.9 but, considering that the daffodil crop is an integral part of a crop rotation, the requirements of these other crops must be taken into account. Most of these crops will not tolerate such a degree of acidity and, indeed, the liming programme carried out for structure maintenance will tend to keep the pH at around 6.5.

Studies on the nutritional needs of daffodils have been carried out over the years but the resultant recommendations have never reached the degree of precision often associated with other crops, where there is a direct relationship between nutrient input and yield output. The early studies, e.g. Caldwell and Heydecker<sup>(20)</sup> indicated the need for nitrogen, usually applied at the time in an organic form, a shortage resulting in late leaf emergence, pale leaves and a consequent reduction in bulb yield. More recently, soil analysis has been used to relate fertiliser applications to the level of nutrients already in the soil. More emphasis was laid on the importance of potassium and to a lesser degree on the essential role of phosphorus and magnesium in daffodil nutrition. Generally, the recommendations range from 125 kg/ha for nitrogen and phosphorus ( $P_2O_5$ ), 250 kg/ha for potassium ( $K_2O$ ), and from 60-90 kg/ha for magnesium ( $MgO$ ), the higher rate being more essential on sandy soils. The rates may need to be reduced to 50 kg/ha of phosphorus and 100 kg/ha of potassium on moderately rich soils. These nutrients should be applied during the cultivations carried out in preparation for planting. Fertiliser top dressings are not normally recommended for daffodils, with the possible exception of a crop showing poor growth during its first year being given a nitrogen application of 50 kg/ha during the late autumn of its second season.

The preparation of land for planting daffodils should fit into a carefully planned rotation, which preferably allows the application of organic matter in the year prior to planting the bulbs. In planning the crops within the rotation, account must be taken of serious pests and diseases, which they may host and which can also attack daffodils. Onions, for example, should not be included in the rotation as they can be a host for Stem and Bulb Eelworm, permitting its multiplication without showing significant symptoms of the presence of the pest. If tulips are included in the rotation, they should always follow daffodils and never be planted immediately before: for, while daffodils are susceptible to the tulip and *Narcissus* strains of the Stem and Bulb Eelworm, the tulip is not attacked by the *Narcissus* strain. Another crop to be aware of, especially if the bulbs are being grown for export, is potatoes. This is because daffodils, being grown to export, must not come into contact with soil containing Potato Cyst Eelworm. While this pest does not attack daffodils, it may be carried on the surface of bulbs grown in infested soil or in soil particles adhering to the bulbs. Finally, to the place of the daffodil itself in the rotation. It is recommended that crops of this plant be separated from one another by at least four years. Any stock of daffodils to be used in the production of a crop of bulbs must be healthy, free from viruses, pests such as eelworms and Bulb Scale Mite, and major diseases like Basal Rot. To ensure cleanliness a vigorous policy of roguing must be pursued, together with the application of a hot water treatment at every lifting.

Formerly, crops for bulb production were grown on the bed system, beds consisting of six rows of bulbs spaced 25 cm apart, spacing in the row being 1.5-2 bulb-widths. More recently, the popularity of the bed system has waned in favour of a ridge and furrow system. In this, the furrows are drawn out 75 cm apart and 12.5 cm deep with a flattened base. The bulbs are planted in this at 10 cm apart in two rows. The popularity of the ridge and furrow system has to do with speed of planting and lifting through mechanisation, rather than with the maximum production of bulbs per unit area. Most of the experimental evidence points to the fact that bulb yield, the numbers of forcing-sized bulbs, and the numbers of flowers all increase as the density of planting is increased. The proportion of large-sized bulbs, however, decreases with density. If the market is for this type of bulb, ridge and furrow is the best growing system. At the most dense rates of planting, the flower number per bulb was found to decrease but flower stem length increased in excess of 20%. There is no machinery available that is capable of coping with the bed system.

The planting rate for daffodils destined to produce a crop of bulbs ranges from 12.5 to 22.5 tonnes per ha. The ideal size of bulb is 10-12 cm in circumference, although those which are only 8 cm will make up to satisfactory bulbs provided growing conditions are good in a two-year down crop. Starting with bulbs of the above sizes will give a crop conforming to European EC standards<sup>(21)</sup>, which are as follows:

<b>Division</b>	<b>Double nosed 1</b>	<b>Double nosed 2</b>	<b>Double nosed 3</b>
Division 1 (Trumpet cvs) and Division 2 (Large-cup cvs)	> 17 cm	15-17 cm	13-15 cm
Division 3 (Small-cup cvs), Division 4 (Doubles) and Division 8 (Poetaz)	> 14 cm	12-14 cm	10-12 cm

In commerce, some cultivars are now being propagated by means of techniques such as twin-scaling or chipping. Using these methods, bulbs of about 12 cm circumference are produced in about four years, each being capable of producing a single flower. A characteristic of crops raised by these methods is the great uniformity of flower size and height.

Effective weed control is essential in crops being grown for bulbs and nowadays this is achieved through the use of chemical herbicides. In addition to controlling weeds, herbicides are also useful in the control of 'ground keepers' (bulbs left in the ground accidentally after removal of earlier crops of daffodils). The good control of weeds and ground keepers is essential in reducing competition with the crop for water, nutrients and light. It also lessens the incidence of certain pests and diseases, either attracted by weed cover or for which the weeds or ground keepers act as host. The control of perennial weeds and ground keepers is best achieved prior to the daffodil crop being planted: but annual weeds can be controlled by residual herbicides applied to weed-free, moist soil of fine tilth after the bulbs are planted (pre-crop and pre-weed emergence). A few herbicides may be safely applied during the early stages of crop emergence. They are mostly residual in nature being held for some time in the topmost (2.5 cm) layer of soil and are effective provided that the soil is still weed-free at the time of application, or has only seedling weeds present that must not have developed beyond the seed leaf (cotyledon) stage. Residual herbicides control germinating annual weeds that mostly germinate in the uppermost soil layer by entering through their roots, while the crop with a deeper root system remains unaffected. At a slightly later stage of crop emergence, the contact herbicide bentazone can be applied to control more developed weed seedlings, which would be immune to the effects of residual herbicides at that stage. Finally, at the end of the first growing season of a two-year down crop, any large weeds that have escaped the earlier treatments must be killed with an approved herbicide or by other means.

Adequate supplies of moisture are essential to a growing bulb crop, particularly during the period of maximum bulb expansion from late April to late May. Growth of bulbs occurs predominantly at night when the stomata are closed or almost so, and hardly occurs at all during the day while the stomata are open. Little work has been done in Britain on the effect of irrigation on growth during dry periods through the maintenance of turgidity, but a general recommendation has been made to return soils to field capacity when a soil moisture deficit of 25 mm is reached. There is some evidence to show that growth is stimulated following a dry spell when rainfall reaches the roots, and it is reasonable to assume that irrigation will give a similar result under these conditions. One essential task during spring growth is to inspect regularly the growing crop from the time the leaves are 7.5-10 cm tall until two or three weeks after flowering. All plants that show any signs of pest or disease damage or that are not true to type should be dug up and burnt.

Bulb yield can be increased by up to 5% as a result of the removal of buds to prevent flowering, but this is seldom carried out as the increase in weight does not merit the use of the labour required to achieve it. Picking of flowers from daffodil crops being grown to produce dry bulbs tends to reduce bulb weight owing to the removal of photosynthetically-active, flower-stem tissue at the

start of the period of maximum bulb growth. Picking flowers may also cause damage through which the Smoulder fungus (*Sclerotinia narcissicola*) may enter, which later causes decay in infected stored bulbs<sup>(22)</sup>.

Ideally, at least 95% of the leaves and stems should have died back before the bulbs are lifted. Lifting before this stage of senescence is reached can markedly reduce bulb yield to a maximum of 40% if the lifting is carried out as early as May while the leaves are still green compared to when the majority have senesced about a month later. The difference in bulb yield – between the green-leaf stage in May and full leaf and stem death in July – can be as large as 70%. Leaving the bulbs in the ground to achieve maximum weight, however, must be balanced with the time required to prepare them for export, with the deadline for export orders being mid-August. The requirement for a cool period prior to forcing also influences lifting time, as bulb preparation together with hot water treatment must be completed before early August. Another problem with late lifting is the increased danger of Basal Rot infection, the causal organism becoming more active as soil temperatures rise in summer. Later lifting may also expose bulbs to greater danger from aphid-borne virus infection and attack by Large Narcissus Fly larvae. The date of lifting not only affects bulb weight but can also influence the vigour and quality of the flowers, the earliest forced flowers from the earliest lifted bulbs often being of poor quality. The flowers are often smaller, they are carried on shorter stems and the crop may mature unevenly. While seasons vary considerably, generalised rules can be formulated for earliest safe lifting, bearing in mind all the factors affected by the date. For example, lifting before mid-June in the south-west of England would be detrimental and the operation is best carried out between mid- and late June. Lifting in eastern England and the Netherlands is not recommended before early July.

Once the ideal lifting time has been established for a particular area and cultivar, and taking account of the season, it may be desirable to kill the weeds present with a herbicide: but if any greenness remains in the daffodil tops, it is much safer to mow off, using a flail set to cut within 5 cm of the soil surface. The bulb lifting operation is carried out using specialised equipment that digs the bulbs and then separates them from soil lifted at the same time.

As soon as possible after lifting, thorough cleaning and grading is carried out using a vibrating riddle or revolving barrel cleaner, followed by passage along an inspection belt where diseased and damaged bulbs, together with their debris and any remaining soil, are removed. The grading process separates the bulbs into forcing and saleable sizes in the 10-17 cm range and those for replanting, which consist of large mother bulbs and small offsets of 7-9 cm diameter. Between grading and replanting, all bulbs to be used for this purpose should be given the hot water plus approved fungicide treatment. It is essential that bulbs are dried rapidly whenever they become moist, such as immediately after lifting, cold dipping or hot water treatment. This is achieved by: storing in conditions in which there is free movement of air at ambient temperature through bulbs stored in slatted trays in a shady, open-sided building; or by moving air at 30-35°C through bulbs stored in bulk boxes. Ventilation is essential to stop bulbs sweating in store, where a combination of heat and high humidity can lead to the appearance of storage rots or the premature emergence of roots through the base plate. Proper ventilation will not only help to prevent such problems but also gives the bulbs a better skin finish. Excessive temperatures in store must be avoided, the ideal storage temperature being 18°C, apart from during periods of pre-treatment prior to hot water treatment or forcing.

The weight increases that may be expected in a bulb crop vary considerably from one cultivar to another and are also affected by the time the crop is left down prior to lifting. In Britain, the majority of daffodils grown to produce a crop of bulbs are left in the ground for two growing seasons; a considerable amount of data has been amassed during the Rosewarne EHS variety trials on the increase in weight lifted over weight planted. The lowest rate of increase was 94% and the highest 387% over a two-year period. In the first series of Rosewarne EHS trials (1955-1963)<sup>(23)</sup>, the crop was left down for three years, the lowest and highest percentage increases during this period being 88% and 1340% respectively. For a two year crop, less than 149% bulb weight increase was considered low, 150-200% average and over 201% high. The ability to rapidly increase bulb weight has acted as

a selection pressure in the past: older-established cultivars such as 'Flower Record', 'Fortune', 'King Alfred' and 'Magnificence' all regularly provide bulb weight increases in excess of 201%.

## Bulb Retardation

The growth and development of Narcissi is largely temperature-controlled. This fact has been utilised for many years in the advancement of flowering date by artificial exposure of the bulbs to a period of cool temperature storage at 9°C. The actual length of the cool period required varies according to where daffodils are found in nature. The lowland English Lent Lily (*N. pseudonarcissus*) has a requirement of up to 15 weeks, while *N. poeticus* var. *recurvus*, found growing at higher altitudes in mountainous regions of southern Europe, has a cool period requirement in excess of 15 weeks. For *N. tazetta*, a native of lowland areas of southern Europe, the Mediterranean islands and countries bordering its eastern end, there is no cold requirement, for winters as we know them seldom occur in these regions. Those species growing in northern Europe or at high altitudes farther south have a short resting period each summer. This can be of extremely short duration, often lasting no more than three or four weeks and generally occurring during July. Lowland southerly species have their summer dormancy initiated by increasingly dry soils, with growth recommencing immediately after autumn rain.

If a period of cool treatment of bulbs is successful in advancing flowering what, if anything, can be done to retard this process? Obviously delayed flowering is directly linked to the extension of summer dormancy and, in practice, this can be achieved by a period of artificial warm storage. This effect of warm temperature storage on flower retardation in *Narcissus* was first noticed by Professor E. van Slogteren during the 1930s<sup>(24, 25)</sup>. For the large-flowered cultivars derived from *N. pseudonarcissus*, or crosses between it and *N. poeticus*, the optimum temperature for warm storage is 26°C with a relative humidity of 75%. The warm treatment must commence by 1 August before any movement of the bud or root initials has taken place for, once begun, these processes are difficult to control. The period of warm storage is ended by a transitional period of four weeks at 17°C, aimed at bridging the gap between high temperature storage and low temperature growth.

Bulbs treated in this manner have been planted between early March and early July, initial growth taking place at 9°C in order to encourage good rooting. While this temperature can be readily achieved in a cool plunge bed with a straw covering for the spring plantings, it is much more difficult with those planted during summer. With these, an artificial cool period is preferred, using a cool store with the temperature thermostatically controlled at 9°C for six to nine weeks. The time from planting to flowering is of the order of 75-85 days, but it can be as low as 65 days for crops planted in May. Retardation of *N. tazetta* cultivars requires a somewhat higher temperature and treatment must also begin slightly earlier, in July. The optimum temperature for bulbs of this type is 30°C, with a final four weeks at 25°C, good growth taking place at ambient temperatures after planting. Planting has been carried out from March to July, as for the larger flowered cultivars, with the time to flowering ranging from 55-95 days for the earliest plantings, depending upon the cultivar concerned. With later plantings the time to flowering ranges between 45-100 days, May planting producing the fastest flowers in from 35-80 days.

## The Influence of Hemisphere Shift on Flowering

Since the late 19th century, bulbs have been exported from the northern to the southern hemisphere, while more limited movement has gone on in the other direction since the 1930s. Because the seasons are six months out of phase, this has led to difficulties concerning the handling of bulbs on arrival – particularly if sent shortly after lifting or in storage in the country of origin, and especially if despatch was delayed until shortly before the normal planting season at their destination. Recommendations for suitable storage temperatures were developed in the Netherlands during the 1930s<sup>(26)</sup>, a constant 28°C being preferred at that time. Over 20 years later, this recommendation was changed to 28°C from lifting to mid-October, followed by -0.5°C until the end of December. Thereafter, until planting, the storage temperature recommended was 26°C.

While the above storage regime was devised with exports of large commercial stocks of bulbs in mind, it did little to assist the hybridist involved in the transfer of relatively few bulbs, usually sent shortly after lifting. Bulbs lifted in the southern hemisphere autumn (March) would arrive in northern Europe during April or May. Was it best to plant such bulbs immediately on arrival or to store them until normal planting time in September? The method most often chosen appears to have been to store the bulbs at room temperature until September. However, bulbs planted on arrival also survived reasonably satisfactorily, provided they were treated to resist the ravages of *Fusarium*, at its most serious during the summer when soil temperatures are at their highest. Bulbs planted on arrival would flower in September as if still in the southern hemisphere, adopting a more normal flowering pattern in the second season. Observations on the effects of hemisphere shift<sup>(27, 28, 29)</sup>, along with the research carried out by Professor Slogteren during the 1930s in the Netherlands<sup>(30)</sup>, led to the appearance of retarded bulbs in British amateur gardening catalogues in 2005. These bulbs are planted in spring and flower in summer. Along with the breeding of earlier and later cultivars, this has greatly extended the flowering season.

## Flower Storage Techniques

There are various means by which the life of flowers, once cut, may be prolonged. While these methods, with the exception of cool storage, are little used by commercial growers, they may be of considerable advantage to the exhibitor in helping him or her to stage flowers in the best possible condition. The ability to control the longevity of flowers is assisted in various ways through correct cutting, the use of water of high quality, the addition of chemicals to the water (having a preservative effect), and by the use of cool storage.

Ideally the stem bases should be cut across diagonally with a sharp knife. This method ensures that the stem bases do not rest flat on the bottom of the container, in which state water movement into the stems would be restricted. This type of cut also increases the absorbent area.

The storage water should be of high quality, with the total dissolved solids not exceeding 100 ppm and the fluoride content not more than 3-4 ppm. In order to achieve these standards, it may be preferable to use deionised water or rain water. Water uptake is essential if flowers are to have a long life and, in addition to using the correct cutting method, a warm water dip (about 43°C) immediately after cutting can be helpful. Warm water has a lower viscosity than cold water and is thus able to move into the stems more readily, where it is capable of removing blockages in the conducting vessels caused by air bubbles. Vessel blockage can considerably reduce the vase life of cut flowers.

Chemical additives are available either as proprietary products, which only require to be dissolved, or the equivalent may be made up by mixing individual chemicals together. They may: supply the flowers or the developing flower buds with a supply of energy; reduce blockages in the conducting tissues; enhance water uptake through the control of microbial build-up; and, finally, give protection to flower tissue from the damaging effects of ethylene gas that can build up in cool stores, especially if fruit is also being stored.

The usual energy source is the sugar sucrose that is dissolved in the storage water to give a 1-5% solution. It is especially helpful to flowers cut in bud, ensuring that they will open properly. Immersion in a 5% sucrose solution for 20 hours allows the sugar to accumulate in the petal cells, enhancing their ability to absorb water and remain turgid, even when they are subsequently placed under stress conditions. Such treatment is advantageous to growers who have to transport their flowers over long distances or where transportation is slow.

Several micro-biocides are used to prolong the life of cut flowers, the most common being 8-hydroxyquinoline citrate at 200-600 ppm and sodium benzoate at 100 ppm. Citric acid at 75-200 ppm may also be used but it behaves as a bactericide by reducing the pH rather than having the wider micro-biocidal properties of the other chemicals. It works by checking the activity of micro-organisms which, if unhindered, can block the conducting vessels either at the cut base of the flower stem or

within it. Proprietary products consist of a mixture of an energy source and a micro-biocide, usually sucrose and 8-hydroxyquinoline.

Another useful chemical additive is silver nitrate at 25-50 ppm. This helps to prevent damage caused to flower tissue by ethylene gas, which can reach levels capable of harming delicate petals. Such toxic amounts are normally only encountered in cool stores that are also used to store fruit. Benzyl adenine is occasionally added to storage water, it functioning as a senescence inhibitor. Little experimental evidence is available that would warrant the widespread use of these chemicals in conjunction with commercial crops, although this is unlikely to deter exhibitors aiming to preserve their prize blooms in peak condition.

The average vase life of daffodils is seven to eight days at 16°C and 65% humidity with the lower and upper limits at five and 12 days respectively. The physical appearance of the flowers of a particular cultivar gives little guide to their longevity, some flimsy ones outlasting those with considerably more substance.

Cool storage of flowers may be used by both commercial producers and growers of exhibition flowers, although the techniques used differ. With all cool storage the first essential is to remove the 'field heat' from the flowers as rapidly as possible, this heat arising from factors such as exposure to sunshine and metabolic changes going on within the growing plant. The removal of field heat is achieved by placing in a cool store at a controlled temperature of 1-2°C as quickly as possible after picking. In addition to the low temperature, a high relative humidity of about 90% is required for satisfactory cool storage.

Commercial cut-flower crops are normally cool-stored for only short periods of up to five or seven days. If storage is expected to last this long, the flowers must be stored in an upright position to prevent curvature of the stems. With short-term storage, the plants should be kept in a vertical position overnight to remove the field heat, then packed horizontally and returned to the cool store to await despatch. The vase life of flowers stored in this manner is unaffected, but the ends of flower stems will begin to show the influence of geotropism if stored horizontally for periods in excess of 24 hours. Short-term storage does not usually involve the use of water prior to despatch as daffodil blooms readily recover when placed in water later.

Longer-term storage may be undertaken using the temperature range and relative humidity shown above (i.e. 1-2°C and 90%). Flowers may be stored for up to 14 days in an upright position, immersed in a shallow mixture of water and biocide that may need to be renewed during the storage period. Storage of up to 14 days will not affect the flowers, other than reducing the vase life by up to 25%; storage for longer than this will also reduce flower size.

Many of the cultural techniques involved in the growing of outdoor or forced flower crops, and with the production of bulbs, were the subject of research from the 1930s to the 1970s. These subsequently became standard practice remaining largely unchanged up to the present day. There have been events, however, that have demanded a review of the way things are done, none more so than the upsurge in the occurrence of Basal Rot disease. While the major factor in this is undoubtedly global warming, cultural practices can accentuate or mitigate the effects of this extra warmth. For example, growing in ridges and under bare, weed free soil, possible with the use of herbicides, are known to increase soil warmth and this leads to a judgement having to be made as to the best practice to attain a particular objective. The scourge of Basal Rot and the control of ever present pests like the Narcissus Flies have coincided with the withdrawal, mostly on environmental grounds, of several pesticides that formerly were important products in the daffodil growers' armoury. Most notable among these were aldrin in 1989 and formaldehyde in 2008. Withdrawn chemicals may be replaced by equally efficacious but safer alternatives, but this is not always so, or by a product with an 'off label' recommendation, i.e. a stop gap, temporary measure. As a result it is sometimes necessary to review and adapt cultural practices to try to lessen any adverse impact resulting from uncontrollable changes.



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**Plate 23.1.** Species daffodils naturalised in parkland.



**Plate 23.2.** Daffodil conservation. The Guy Wilson Daffodil Garden at the University of Ulster, Coleraine, Northern Ireland.



**Plate 23.3.** Daffodils growing in beds at Prospect House, Waterford, Ireland.



**Plate 23.4.** Daffodil flower packs ready for market.

## CHAPTER 24 SHOWING DAFFODILS

The showing of daffodils not only provides a fine excuse for a social get-together of all those interested in these delightful flowers, but also an opportunity for the latest developments within the genus to be displayed and to receive awards for their excellence. Nonetheless, daffodil shows have always been much more than this. They have been the driving force behind the largely amateur hybridisation programmes over much of the period that led to the development and improvement of the genus described elsewhere in this book. Furthermore, this concentration of amateur interest in raising new exhibition daffodils has also given rise to the very cultivars that today are the bedrock on which the commercial trade in cut flowers and dry bulbs is based.

### Growing for Shows

As with all plants destined for shows, timing is of critical importance. The key objective is to have the flowers at the peak of their perfection at show time. The Rosewarne Daffodil Trials between 1955 and 1971 demonstrated the constancy of flowering times for particular cultivars from one year to another in a particular location. Occasionally, exceptional winter weather could lead to variations – mild weather forwarding the flowering date, and harsh winters causing significant delay.

If they are to be successful, growers of exhibition daffodils must be able to modify the effects of weather. They have proved more than equal to this task during the many ‘early’ seasons experienced during the late 1990s and the early years of this century, when the tendency has been for premature flowering, while show dates remained as they had always been. It is necessary, therefore, to be able to manipulate the time of flowering. This is achieved through: the use of low temperature storage of bulbs at 5°C, both before and after potting, which delays flowering; and the use of warm soil temperature at 10°C and supplementary lighting, which advances the process.

Growing for shows is carried out either in pots or in protected outdoor sites. The soil may not always be ideal in the latter and, if this is the case, it will be worthwhile attempting to improve this through the addition of organic matter, lime and fertilisers – in line with the general recommendations given in Chapter 23. The aim of such additions should be to create conditions in which the bulbs do not stand in water, have a free root run, have access to adequate moisture throughout the growing season, and have an ample supply of nutrients to meet the requirements of growth at all stages.

Daffodils for exhibition are usually grown in beds from 1.2-1.5 m wide. These beds take four or five rows spaced 30 cm apart, the bulbs being planted 15 cm apart in each row. Planting should be relatively deep at around 15 cm, as this tends to discourage the production of offsets, and therefore prevents overcrowding. As a result, beds may be left down for four years, good-quality exhibition flowers being produced from year two to year four.

The daffodil beds must be protected along the ends and sides – a wise precaution even on sheltered sites, where strong winds in March can wreak havoc. Protection is provided by hessian, or by one of the modern woven, synthetic materials, which must be firmly fixed to posts spaced no more than 1.5 m apart (Plate 24.1). This will prevent the cover from flapping on to the outside rows of the bed, which are only 15 cm distant. In order to make absolutely sure that the material does not move, bamboo canes should be placed on the inside and outside of the protective sheeting between each post. Some of the greatest exhibitors of daffodils have gone to extraordinary



Plate 24.1. Protection afforded to potential show blooms.

lengths to protect their blooms. J.L. Richardson surrounded the whole of the area used to produce exhibition flowers with a 1.8 m high artificial shelter, although a peripheral living shelter or wind break would have been just as suitable. Within this area, each bed was protected along the sides and ends in the manner described above, while canes across the top of the bed allowed a cloth cover to be pulled over during periods when maximum protection was required. Protective cones are also available.

These may be placed over individual flowers and, if not readily available, home-made adaptations are not difficult to devise. Exhibition flowers are a long time in the making: it is futile to rear them almost to the pitch of perfection, only to have them ruined by a sudden burst of inclement weather. Exhibitors should learn from Guy Wilson's experience with 'Zero', firstly by providing protection, and secondly by ensuring that this will not move even in the most severe storm.

Pots have the advantage over beds in that, being moveable, they can be housed in advance of approaching bad weather, or when the buds need advancing to meet a show date. They have the disadvantage that the root run is more limited than for bulbs in beds. It is also essential to ensure that during autumn the pots are placed where the bulbs will remain cool, in order to produce good root development that is capable of supporting the plant. As pots are moved about, it is worthwhile to provide some support in the form of split canes. As with all flowers with show potential, it is important to make certain that good slug control is carried out at all stages of growth.

## Selecting Show Blooms

In selecting show blooms, exhibitors will be seeking the most perfect flowers of each cultivar. Generally speaking, these will be selected from a fairly limited range of well known and successful exhibition cultivars, some of many years' standing and others of more recent introduction. Exhibitors may also try their hand at hybridisation; when the results of this process are sufficiently advanced, they will wish to test the quality of their work in the seedling classes at the shows. Occasionally a seedling may appear that has novel characteristics. Changes from accepted norms do not always meet with immediate acceptance by show judges. This is what happened when reverse bicolor daffodils were first shown during the 1940s; more recently, the split corona daffodils have encountered similar difficulties. In such situations, patience and perseverance are indispensable virtues.

What are the qualities to be looked for in the perfect exhibition daffodil? They are many in number, and include such facets as: flower colour – shape, size and make-up of the flower; the angle at which it is held; the number of florets present in multi-headed cultivars; and the strength of the stem. These characteristics are dealt with under the following headings – condition, form, size, texture (and substance), poise and stems. Some apply equally to all divisions; others apply in varying degree to specific divisions, an example being the downward poise associated with *cyclamineus* and *triandrus* hybrids. During the judging process, each of these characteristics is capable of earning a maximum number of points. Although there is more than one system of pointing, the differences are slight. A brief explanation of these terms is required if someone new to exhibiting daffodils is to understand what does make up the perfect flower.

### **Condition**

This relates to two specific points: the age of the flower exhibited, and any blemishes that it may possess. The perfect flower is mature, but not over- or under-mature. Age is indicated by the overall condition of the flower but, when competition is close, condition may focus on such apparent minutia as the condition of the anthers, stigma and ovary. In an under-mature flower, the anthers are greenish in colour and not fully developed; in a mature flower they are well-filled and creamy-yellow. If the flower is over-mature, the pollen will be scattered and the anthers brown. Ideally, the stigma should be moist and glistening and, when over-mature, will be dry and withered. At this stage, the ovary will be over-enlarged.

## **Form**

Form is concerned with the symmetry and balance of the flower. With the majority of divisions the outline shape of the flower should fit into a circle. On either side of a vertical median line, one half of the flower should be a mirror image of the other. In order to achieve this, the uppermost perianth segment should be vertical and bisected by the median line. The inner whorl of perianth segments should overlap the outer whorl in an even and regular fashion. By and large, the segments should be flat: but, clearly, *cyclamineus* and *triandrus* hybrids would fall short of ideal form if the perianth was anything other than typically reflexed. The corona should also possess an outline that is circular; however, corona rims are of various forms, such as straight, frilled and lobed. Provided the rim is neat and does not detract from the essential mirror image of the two halves of the flower, corona rims of all types are perfectly acceptable. In total, the flower should possess a balanced appearance, the corona being in balance with the perianth.

## **Colour**

Flower colour should be pure in tone and possess a richness, even when the colour is a pale one. Any lack of purity, which is frequently referred to as ‘muddiness’, is detrimental. Streakiness of colour is also frowned upon, particularly if this is asymmetrical. It should be recognised, however, that colour streaking may be characteristic of the cultivar, the commonest form being yellow lines radiating through a white perianth. In such cases this character will be constant in all flowers of a particular cultivar, the venation being regular in appearance.

## **Texture and substance**

The tissue of flowers is characterised by its degree of smoothness and thickness, these being respectively referred to as the texture and substance. Ideally, the smoother the texture, the better – crêpiness and ribbing of the perianth being unacceptable in top exhibition blooms. The tissue of show flowers should be of a substance that is firm and sturdy. In many cultivars, especially whites, good substance will manifest itself by imparting to the flowers a sheen and translucent, almost crystalline, quality. As flowers pass beyond the peak of perfection, the peripheral tissue loses its translucency, eventually turning brown. Flower substance has often been equated with longevity after cutting, but trials have indicated that cultivars possessing good substance are frequently outlived by flowers of lighter and more flimsy build.

## **Poise**

The term poise refers to the angle at which the flower is held relative to the stem. In the major divisions, flowers should be forward-facing and held at – or as near as possible to – a right angle (90°) to the stem. In the case of the *cyclamineus* and *triandrus* hybrids, the flowers must be downward-facing, a characteristic of the species from which these hybrids originated. Upward-pointing flowers in any division are, at the present time, usually unacceptable: but, as hybrids derived from species such as *N. bulbocodium* become more commonplace, this position will be required as cultivars from this species must have the characteristics of Section *Bulbocodium* clearly evident.

## **Stem**

The quality of the stem is judged by its ability to support the flower. It must also be in proportion to the flower in terms of both its thickness and its length; it must be green throughout its length.

## **Summary**

In selecting flowers for exhibiting, all the characteristics outlined above should be as close as possible to the ideal. As very few ever reach this standard in all respects, it is important to select those flowers that come closest to the ideal in those characteristics that attract most points in the chosen system of judging. It is worth remembering that the pointing system does vary slightly between

daffodil societies. It should also be recognised that daffodil flowers may be artificially improved in some respects, but not in others.

Cutting of the best blooms can begin several days before showing and should continue on a regular basis until shortly before the event. After each cutting, the flowers should be carefully examined under good natural light, any loose, extraneous matter being removed using a small camel-hair brush. Soil splashes on the petals must first be moistened if they are to be removed satisfactorily, but it is best to avoid these by means of a light mulch of bark. It is especially important to remove any splashes from the back of the perianth segments for, if viewed from the front, these make the colour appear to be blotchy rather than ideally pure and even in tone.

Once superficial cleaning is completed, the flowers are stood in water, or in water plus additives, making sure that the stems are vertical. If not, they tend to curve into an upright position during storage. Care must be taken to see that flower heads are not resting on one another, as this can give rise to distortion, particularly of the perianth segments. Flowers are kept in a cool place after cutting; for those cut up to 14 days before the show date, a cold room at 2°C minimum is satisfactory in delaying the too rapid development of the flower. The storage temperature must not be allowed to exceed 4.5°C. Stored flowers require light for at least 12 hours in every 24-hour cycle: if natural light is unavailable, good artificial photosynthetic light can be provided by means of warm white-fluorescent tubes. Daffodil flowers must not be left in cold storage for too long, as most require both warmth and light to develop their flower colours properly. The types of daffodil most affected by lack of warmth and light are the pinks, the deep orangey-reds and the reverse bicolors. Under such conditions, true pink colour fails to develop, at best being an apricot shade, whilst the orangey-reds lack intensity and the coronas of reverse bicolors fail to whiten.

The selection of flowers of cultivars and seedlings for classes with several flowers in each entry requires thought in order to achieve the balance within the group that provide the optimum impact. There are no hard and fast rules as to what constitutes an ideal show group, but the experience of exhibitors indicates that a favoured combination for a group of twelve may consist of the following:

Trumpet daffodils – two yellow, one white

Large-cups – three yellow and orange/red, one yellow, two white and orange/red, one white and pink, one rimmed (may be small-cupped)

Small-cups – one white and orange/red

## **Packing Flowers for Show**

Exhibition flowers are best transported in light wooden or stout cardboard boxes. The boxes should be long enough for blooms to be packed at either end and may hold up to 36. The heads are supported on rolls of tissue paper, the stems being held in place with cotton tapes pinned to the base of the box. In addition to the flowers, ample foliage should also be packed, which should preferably be daffodil leaves, although conifer foliage is a possible alternative where permitted.

## **Staging the Exhibit**

On arrival at the show, the flowers should be unpacked and stood in water in a vertical position. This is the stage at which some attempt may be made to manipulate the flowers into a state of perfection. This is achieved by the smoothing out of any ribbing of the perianth by brushing with a broad, soft brush, and by gently rotating the flower head until it assumes a vertical position. The former operation must be done with extreme care; otherwise, the excess tissue present in the ribbing will be forced out sideways, resulting in splitting at the edge of the segments. Care must also be exercised with the rotation process as flower heads are easily snapped off. The usual numbers of flowers in a daffodil exhibit are one, three or twelve, the latter consisting of twelve daffodils staged as single blooms, each in a separate vase.

The procedure for setting up an exhibit is to fill the vases with water, and then select the best leaves, placing them towards the rear of the vase, with the leaf tips about 2.5 cm below the height at which the flower heads will be placed. The position of the leaves is secured by means of a ball of moist moss placed in the neck of the vase. The number of daffodil leaves used in each vase is three for single blooms, and not less than five for an exhibit of three flowers. The bases of the flower stems are cut diagonally so that they may be inserted more easily through the ball of moss. Single-stem exhibits should be inserted vertically, and exhibits of three flowers mounted in such a way as to form in outline a triangle. The best flower of the three should be placed centrally, inserting it in an upright position and slightly higher than the two lateral flowers, which should be positioned leaning outwards and facing fully forward.

Where a collection of cultivars or seedlings are being exhibited, the rules which should be observed are to keep flowers of similar colour and shape separate, and to place those with the boldest colouring in the back row. The flowers within each row should be at the same level; the leaves used in each row should be similarly adjusted for height. Once the arrangement is perfectly positioned, each vase should be filled to the rim with moss and topped up with water to ensure that the flowers do not move position. Finally, the vases should be wiped and the identifying card bearing the name of the cultivar or the seedling number positioned in front.

## Judging

At all the major shows, the judges will themselves be growers and exhibitors of considerable experience. They will have served what is virtually an apprenticeship in judging, beginning at the smaller local shows prior to graduating to the top events – at which they work in teams consisting of very experienced senior members. In the USA, judges are only accredited by the American Daffodil Society on satisfactory completion of a series of short courses. They must also provide proof of growing not less than 100 daffodil cultivars, of having good experience as an exhibitor, and of having worked as a student judge alongside accredited judges. Similar courses for prospective judges are also held in Britain.

In examining an exhibit, judges will seek the finer points of condition, form, colour, texture and substance, poise and stem, as outlined earlier, together with the way the exhibit has been arranged. Each major daffodil society has its own variation of a points system relating to the above factors. Examples of these are shown in Table 24.1.

<b>1. Royal Horticultural Society</b>	
Single Bloom Classes	Points
Colour	5
Form	5
Condition	4
Size (consistent with cultivar)	3
Texture	3
Poise	3
Stem	2
<b>Total</b>	<b>25</b>
Three Bloom Classes	Points
Condition	4
Form	4
Colour	4
Size	3
Texture	3
Poise	3



Stems	2
Uniformity	2
Total	25
<b>2. The Daffodil Society</b>	
Single Bloom Classes	
Form and Poise	3
Condition and Texture	2
Colour	2
Size	2
Stem	1
Total	10
Three Bloom Classes	
For these add to the above ...	
Uniformity	2
Total	12
<b>3. The American Daffodil Society</b>	
Points	
Condition	20
Form	20
Texture and Substance	15
Colour	15
Poise	10
Stem	10
Size	10
Total	100

**Table 24.1.** Variation in the points system used for judging daffodils.

In reaching their conclusions and awarding points to each exhibit, the judges will consider a series of meritorious and defective characteristics. In the major Divisions 1 to 4 together with Division 9, the flower should be held at right-angles to the stem with the floral parts arranged symmetrically. In Division 4 flowers, which possess many more floral parts than are found in other divisions, the petaloids should be arranged evenly, giving a uniform distribution of colour throughout the flowers when these are two-toned. The amount of brightly coloured petaloids should be ample, and a flower so structured would always be considered to be superior to one in which the petaloid colour was sparse. Another important point with doubles is that they should have a reasonable depth of profile. Lack of depth would be considered to be a defect, especially in a cultivar with a large flower diameter, the ideal being where depth of profile and diameter are in proportion to one another.

In Divisions 5 and 6, the characteristics of poise are different from those in other divisions. Here, a forward-pointing flower would be considered defective: they must point downwards. In most divisions, a flat perianth is meritorious but in Divisions 5 and 6 it is a defect, as the perianth should exhibit the characteristic reflexing of the species from which these cultivars are derived, and which contributes greatly to their essential gracefulness.

While Division 6 daffodils usually only have one flower per stem, those from Divisions 5, 7 and 8 (and their double forms) most often have several flowers per stem, the numbers varying from cultivar to cultivar. The most constant number of flower heads per stem has been ascertained for many cultivars within these divisions. Examples for some of the more common cultivars are given in Table 24.2.

Division 4			
‘Cheerfulness’	4	‘Primrose Beauty’	3
‘Sir Winston Churchill’	5	‘Yellow Cheerfulness’	4
Division 5			
‘April Tears’	5	‘Niveth’	2
‘Horn of Plenty’	3	‘Thalia’	3
		‘Tresamble’	3
Division 7			
‘Hesla’	1	‘Sweetness’	1
‘Orange Queen’	3	‘Tittle Tattle’	3
‘Parcpat’	2	‘Trevithian’	4
‘Porthchapel’	3	‘Waterperry’	2
Division 8			
This Division is divided into two groups, the first with 2-11 flowers and the second with 12 or more			
Group 1			
‘Early Splendour’	9	‘Saint Agnes’	3
‘Geranium’	6	‘Scarlet Gem’	5
‘Helios’	5	‘Silver Chimes’	11
‘Highfield Beauty’	3	‘Sparkling Eye’	5
Group 2			
‘Avalanche’	16	‘Soleil d’Or’	12
‘Grand Monarque’	12	‘Scilly White’	12

**Table 24.2.** The number of flower heads per stem of a representative sample of some of the more common cultivars.

In judging these multi-headed cultivars, the composition of the complete flower head should be as symmetrical as possible. Should the number of individual flowers exceed the most constant number, this is regarded as being meritorious, but a lower number would be a defect.

## Miniature Daffodils

The miniature daffodils may be included as a separate group within show schedules; where this is the case, the ‘approved list of miniatures’ of the particular daffodil society is the official reference for those species and cultivars that are eligible for entry. Approved lists vary slightly from society to society but generally their similarities are greater than their differences. Miniature daffodils have various distinguishing features: the chief of these is an undeniable daintiness, which, in the case of the cultivars, reflects the small stature of the species from which they sprang. Their flowers are usually less than 5 cm in diameter and are held at a height of less than 25 cm.

## Top Show Cultivars During the 1980s

Table 24.3, located at the end of this chapter, shows the three most successful exhibition cultivars for the years 1981, 1984 and 1987 in each class. In some classes less than three names are given, this being where no single cultivar achieved the consistent success required for first, second or third place – in which order the cultivars for each year are listed. The table clearly indicates the importance of the breeding work carried out in Ireland, especially by Richardson and Wilson. Over half the cultivars listed were raised there.

The important exhibition cultivars during the period 1980-2010 are summarised at the end of each chapter dealing with the various cultivar groups. While several of those listed above still reign

supreme, others now only make occasional winning appearances, having been superseded by an array of ever-improving newcomers.

### Price Limit Classes

The Daffodil Society prepares (and amends on a regular basis) lists of price limit cultivars. This is to cater for the shows run by increasing numbers of affiliated societies, whose members are more likely to enter lower-priced cultivars rather than high-priced recent introductions. These lists provide both exhibitors and judges with a ready reference point to determine the eligibility of cultivars, as well as ensuring fair competition. These lists are too extensive to reproduce in full but an example of their content is given in Table 24.4.

<i>The Daffodil Society Show Handbook – 2nd ed.</i> <sup>(1)</sup>			
‘Abadan’	0.50p (lower limit)	‘Agena’	£1.00
‘Altruist’	£1.50	‘Amber Light’	£2.00
Supplement No. 1, 1986			
‘Achduart’	£1.50 (addition)	‘Agena’	0.50p (alteration)
‘Altruist’	£1.00 (alteration)	‘Andalusia’	£2.00 (addition)
Supplement No. 2, 1987			
‘Advocat’	£2.00 (addition)	‘Albany’	0.50p (addition)
‘Amber Castle’	£1.50 (alteration)	‘Avalon’	£1.50 (alteration)
Supplement No. 3, 1988			
‘Ann Cameron’	£1.00 (alteration)	‘Apotheose’	0.50p (alteration)
‘Ardress’	£1.50 (alteration)	‘Arkle’	£1.50 (alteration)

**Table 24.4.** Price limited classes in daffodil shows. The above contains examples from the *The Daffodil Society Show Handbook* of how price is used to determine the eligibility of cultivars.

The former price list classes were replaced in 2001 by the list of approved cultivars for restricted classes as outlined in the Daffodil Society publication *Cultural Guide and Show Handbook*, 4<sup>th</sup> edition (2005). All selected cultivars remain on this list for a minimum of 3 years before being considered for removal.

## Reference

1. Anon (1985). *The Daffodil Society Show Handbook*, 2nd ed. The Daffodil Society.

<b>Division</b>	<b>1981</b>	<b>1984</b>	<b>1987</b>
1Y-Y	'Viking'	'Viking'	'Viking'
	'Golden Rapture'	'Ballyrobert'	'Kingscourt'
	'Kingscourt'	'Kingscourt'	'Ballyrobert'
1W-Y	'Newcastle'	'Newcastle'	'Newcastle'
	'Preamble'	'Downpatrick'	'Bravoure'
	'Downpatrick'	-	'Pennine Way'
1W-W	'Empress of Ireland'	'Empress of Ireland'	'April Love'
	'Panache'	'Panache'	'Empress of Ireland'
	'Ben Avon'	'Cantatrice'	'Cantatrice'
1Y-W	'Honeybird'	'Honeybird'	'Honeybird'
	'Chiloquin'	'Gin and Lime'	'Gin and Lime'
	'Nampa'	-	'Spellbinder'
2Y-Y	'Strines'	'Golden Aura'	'Saint Keverne'
	'Golden Aura'	'Strines'	'Golden Aura'
	'Saint Keverne'	'Bryanston'	'Strines'
2W-Y	'Tudor Minstrel'	'Tudor Minstrel'	'Tudor Minstrel'
	'Pontresina'	'Tudor Love'	'Irish Minstrel'
	'Dunmurry'	'My Love'	-
2W-W	'Broomhill'	'Ben Hee'	'Ben Hee'
	'Canisp'	'Broomhill'	'Broomhill'
	'Dane's Balk'	'Canisp'	'Canisp'
2Y-W	'Daydream' (Plate 24.2)	'Daydream'	'Daydream'
	'Grand Prospect'	'Grand Prospect'	'Grand Prospect'
	'Rushlight'	-	-
2Y-O/R	'Torridon'	'Shining Light'	'Shining Light'
	'Irish Light'	'Torridon'	'Loch Hope'
	'Loch Lundie'	'Loch Lundie'	'Torridon'
2Y-YYO/R	'Ringmaster'	'Balalaika'	'Ringmaster'
	'Balalaika'	'Ringmaster'	'Balalaika'
	'Front Royal'	-	'Front Royal'
2W-O/R	'Hotspur'	'Rameses'	'Rameses'
	'Northern Light'	'Don Carlos'	'Borrobol'
	'Rubh Mor'	'Avenger'	'Hotspur'
2W-YYO/R	'Ringleader'	'Ringleader'	'Ringleader'
	'Lysander'	-	-
2W-P	'Rose Royale'	'Dailmanach' (Plate 24.3)	'Dailmanach'
	'Passionale'	'Passionale'	'Passionale'
	'Glen Rothes'	'Rose Royale'	'Rose Royale'
2W-YYP	'Drumboe'	'Rainbow'	'Rainbow'
	'Rainbow'	'Drumboe'	'Drumboe'
	-	-	'Pismo Beach'
3Y-Y	'Lemonade'	'Lemonade'	'Lemonade'
	-	'Citronita'	-
3W-Y	'Aircastle'	'Park Springs'	'Park Springs'
	'Park Springs'	'Aircastle'	'Aircastle'
	'Silver Leopard'	'Syracuse'	'Syracuse'
3W-W	'Verona'	'Cool Crystal'	'Cool Crystal'
	'Cool Crystal'	'Verona'	'Verona'

	'Delos'	'Angel'	'Angel'
3Y-O/R	'Achduart' (Plate 24.4)	'Achduart'	'Achduart'
	'Doubtful'	-	'Doubtful'
3Y-YYO/R	'Perimeter'	'Perimeter'	'Montego'
	-	'Sunapee'	'Perimeter'
3O-O/R	'Altruist' (Plate 24.5)	'Altruist'	-
3W-O/R	'Rockall'	'Rockall'	'Rockall'
	'Dalhuaine'	'Dr Hugh'	'Dr Hugh'
	'Cul Beag'	'Cairn Toul'	'Privateer'
3W-YYO/R	'Merlin' (Plate 24.6)	'Merlin'	'Merlin'
	'Kimmeridge'	'Kimmeridge'	'Kimmeridge'
	'Purbeck'	'Purbeck'	'Colley Gate'
4Y-Y and 4Y-O/R	'Tahiti'	'Fiji'	'Tahiti'
	'Manly'	'Manly'	'Fiji'
	'Fiji'	'Tahiti'	'Apotheose'
4W-Y and 4W-O/R	'Unique'	'Unique'	'Unique'
	'Gay Challenger'	'Gay Kybo'	'Acropolis'
5	'Arish Mell'	'Hawera'	'Rippling Waters'
	'Rippling Waters'	'Arish Mell'	'Liberty Bells'
	'Liberty Bells'	'Rippling Waters'	'Tuesday's Child'
6	'Dove Wings'	'Foundling'	'Charity May'
	'Foundling'	'Dove Wings'	'Jet Fire'
	'Andalusia'	-	-
			'Foundling'
			'Lilac Charm'
			'Dove Wings'
7	'Sweetness'	'Sweetness'	'Suzy'
	'Suzy'	'Stratosphere'	'Sweetness'
	'Pipit'	'Bell Song'	'Trevithian'
8	'Geranium'	'Highfield Beauty'	'Highfield Beauty'
	-	'Geranium'	'Avalanche'
	-	-	'Silver Chimes'
9	'Cantabile'	'Cantabile'	'Cantabile'
	-	-	'Sea Green'
	-	-	'Actaea'
Miniatures	-	-	'Hawera'
	-	-	'Clare'
	-	-	'Sundial'

**Table 24.3.** Top show daffodil cultivars during the 1980s. For each year and for each class, the cultivars are arranged in order, from that cultivar in first place to that in third. In some classes less than three names are given, this being where no single cultivar achieved the consistent success required for first, second or third place.



**Plate 24.2.** 'Daydream' (2Y-W), raised by G.E. Mitsch (1960).



**Plate 24.3.** 'Dailmanach' (2W-P), a leading show pink raised by J.S.B. Lea (1972).



**Plate 24.4.** 'Achduart' (3Y-O), raised by J.S.B. Lea (1960).



**Plate 24.5.** 'Altruist' (3O-R), a deep coloured daffodil raised by F.E. Board (1965).



**Plate 24.6.** 'Merlin' (3W-YYR), a good rimmed show cultivar raised by J.L. Richardson (1956).



## CHAPTER 25

### PESTS AND DISEASES OF NARCISSI

Compared with other crops and garden plants of equivalent importance in horticulture, the *Narcissus* is subject to attack by remarkably few serious pests and diseases. It is, however, vital that these are adequately controlled because of the economic importance of the export trade in dry bulbs, especially in the British Isles and the Netherlands. In addition, a considerable proportion of cut flowers are produced as a forced crop under conditions that favour the rapid and destructive build-up of some pests and diseases. While vigilance is important in commercially grown crops, as a garden plant there are few problems that will prove troublesome or adversely affect the floral display each spring, with the possible exception of Basal Rot, the incidence of which has increased in recent years as average temperatures have risen. Many of the pests and diseases concerned appear to have originated in areas such as southern Europe where *Narcissus* species are endemic; it is probable that many were transported in imported bulbs, introduced over a prolonged period, perhaps four centuries or more.

As interest in daffodils increased from about the mid-1800s, culminating in the rapid expansion in the area cultivated during the 20th century, there was concomitant growth in the occurrence of pests and diseases. So favourable did some of them find prevailing conditions that, on perhaps more than one occasion, the existence of the crop was threatened. In 1910, for example, the Revd Joseph Jacob writing on Basal Rot stated: "I know no cure. The only thing is to give up growing those varieties which are the worst sufferers."<sup>(1)</sup> More or less simultaneously, the depredations of the Stem and Bulb Eelworm (*Ditylenchus dipsaci*) were beginning to wreak havoc. The well known hybridist, E.M. Crosfield, had to abandon his work completely in 1915, having lost all his stock, while the stock of that major breeder, A.M. Wilson, fell in value from £12,000 to £200 in just two years. The pest assumed such importance that the Royal Horticultural Society appointed J.K. Ramsbottom to investigate the problem, and it was only following his development of the Hot Water Treatment of bulbs in 1916-1917 that the future of the modern daffodil was assured. The whole of P.D. Williams' collection of 2000 cultivars was given hot water treatment under Ramsbottom's supervision and was thereby saved to provide not only many commercially important sorts, but also breeding stock for others to work with to produce the wonderful range of modern daffodils.

While the biology and control of Basal Rot disease and Stem and Bulb Eelworm are now widely understood and appreciated, they still remain the most important disease and pest of *Narcissus*, against which continuing vigilance has to be maintained. Both can be a drain on the assets of the daffodil industry and both impose limits on levels of exports of dry bulbs.

#### **The Pests of *Narcissus***

The main pests of *Narcissus* belong to three distinct invertebrate groups – the insects, mites and eelworms – each group containing at least one pest of considerable economic importance.

#### ***The Narcissus Flies***

These are pests of worldwide distribution in all areas where daffodils grow, three species attacking daffodils in the British Isles. These are sub-divided into two groups, the Large Narcissus Fly (*Merodon equestris* F.) and the Small Narcissus Flies (*Eumerus tuberculatus* Rond. and *E. strigatus* Fall.), the last two being treated as the same for all practical purposes. All three are important pests but the Large Narcissus Fly is of major economic importance in the south-west of England and also causes substantial damage throughout mainland Europe and western America. Freedom from all these pests is an essential requirement of most countries involved in the import and export of dry bulbs.

## The Large Narcissus Fly

The first reported occurrence of Large Narcissus Fly (*Merodon equestris*) in Britain was made in 1865, which fits very well with the simultaneous development of crop and pest mentioned in the introduction: for this was the year in which William Backhouse's famous 'Emperor' and 'Empress' appeared. Since that time, the daffodil has developed in importance as a commercial crop, while the Fly has become a widespread and frequently serious pest. The Large Narcissus Fly belongs to a group of insects containing the Drone and Hover Flies and is characterised by its stout, heavy body (which resembles that of a Bumble Bee), and by its whining hum when on the wing. The adult fly is about 12 mm long and in colour varies from tawny-brown to boldly-banded, the banding being either overall or restricted to the abdomen. Although the banding often leads to confusion with Bumble and Honey bees, the Large Narcissus Fly has, in common with all true flies, but a single pair of wings unlike the two pairs always possessed by bees. The adults may emerge as early as February in forced crops, but normal emergence out of doors takes place between late April and late June. Once emerged, their lifespan is remarkably short for such sturdy insects, being no more than eleven days for the males and about one week for the females.

Activity and therefore severity of attack is much influenced by temperature. They tend to be active over *Narcissus* crops only in warm weather, particularly in the afternoon, when the sound of whining, bumble bee-like insects will almost certainly indicate the presence of Large Narcissus Flies. When at rest during such weather conditions, they can frequently be found sunning themselves on tree trunks, warm banks and in similar situations. Egg-laying obviously coincides with the period of adult activity and, therefore, only occurs on bright, warm and windless days when the temperature is at least 18°C. The eggs, which are about 1.6 mm long and pearly white, are laid singly, close to bulbs, often on foliage near the neck, or on the bulb itself. The latter feat is achieved by the female descending into the hole created as the foliage rots away at the end of the season. Each female lays about 40 eggs, which hatch within 10-15 days, but they are extremely delicate and often fail to hatch under cold damp or hot dry conditions. Those eggs that do hatch produce very active maggots which, although legless, rapidly wriggle towards the base plate where they burrow in, leaving a small, rust coloured hole. The maggots initially burrow slowly within the base plate but, once in the softer tissue of the leaf scales, they progress quickly, eating out a large cavity within the space of a few weeks, and growing rapidly in the process. Sometimes, having eaten out the centre of one bulb, the maggots will migrate to a second, where feeding and development is completed – by which time they measure approximately 18 mm. The maggots are always found singly in the cavities within the bulbs in which they over-winter. In spring, the maggot develops into a pupa contained within a leathery, tough puparium that is found in the soil close to bulbs or within the neck of the bulb. The adult fly emerges from the puparium after five or six weeks.

## Symptoms

Initial burrowing by the maggot is slow and, being confined to the base plate, gives rise to few observable symptoms. Indeed, the softer tissue may not be entered until July and, consequently, attacked bulbs may not feel particularly soft when lifted. Careful examination of bulb samples should, however, always be carried out and, if attacked, will reveal the tell-tale symptom of the entry hole in the base plate. Hot water treatment at this stage will kill the maggot. The effect of maggot feeding will normally kill small bulbs, but large ones are often only damaged, this taking the form of the destruction of the growing-point and embryo flower. There follows a rapid development of lateral bulbs around the outside of the damaged bulb, these giving rise to a circle of small leaves termed 'grass'. If the growing-point is not destroyed, weak and distorted growth may be produced, which often resembles damage caused by Stem and Bulb Eelworm or Bulb Scale Mite.

## The Small Narcissus Flies

There are two Small Narcissus Flies (*Eumerus tuberculatus* and *E. strigatus*) and although both flies attack *Narcissus*, it is *E. tuberculatus* that is most common on this crop; it is also capable of damaging parsnips and potatoes. *E. strigatus* is more common on other bulbous crops such as

hyacinths and irises. Neither can be considered to be primary pests of *Narcissus*: they normally only attack bulbs already damaged by slugs, eelworms, diseases or various mechanical operations, such as grading.

Adult flies are only about half the length of the Large Narcissus Fly. Their overall colour is black with a greenish or bronze metallic sheen – with three pairs of white crescent-shaped marks on the abdomen and a white line on each side of the thorax. In appearance, they resemble some of the smaller solitary bees. The flies first emerge in April and two or three generations are produced each year, adults from the last being found into October. Egg-laying commences within a few days of adult emergence. The eggs are 0.8 mm long, round, white and shiny, being laid in groups of ten or more in close proximity to bulbs. They hatch within three days, giving rise to maggots that have a transparent skin and are easily distinguishable by the bright-chestnut breathing pore at the rear end, flanked by two smaller but prominent projections. When fully grown, the maggots reach 8 mm in length. Entry to bulbs is either through the neck or through sites of earlier damage and, once achieved, the bulbs are rapidly reduced to a rotting mass. The maggots are most active in the neck area of the bulb and by July most pupate to produce a second generation. Some, however, remain as maggots feeding throughout the summer. These over-winter in or close to bulbs before pupating in a tough, leathery, pear-shaped puparium the following spring.

### **Controlling Narcissus Flies**

In any of the daffodil growing areas of the world, on account of its very destructive capacity, control of the Large Narcissus Fly is necessary wherever this pest is prevalent. Because of climatic differences, however, prevalence can vary considerably even over relatively short distances. For example, the pest can be very destructive in the bulb-growing areas of south-west England where the climate tends to be warm and moist, and where control measures are essential. Little more than 300 km away in the bulb-growing districts of eastern England, the spring weather is usually drier and cooler, and control measures are rarely required there.

Hot water treatment, administered on every occasion bulbs are lifted, will provide comprehensive control. Before treatment, any soft bulbs must be removed during the grading process, and then destroyed. The remaining bulbs are then immersed in hot water at 44.4°C for one hour; formalin used to be added to the dip in the proportion of one part formalin to 200 parts water but plant protection using this chemical ceased in 2008. Until 1989, aldrin provided a protective treatment, either in the form of a bulb dip or as a spray application into the furrows at planting time. Aldrin, however, is a very persistent chlorinated hydrocarbon and has been withdrawn from use on environmental grounds. Another chemical-dip treatment, which to some extent could be substituted for the hot water soak, consisted of a cold water soak in 0.05% gamma HCH (miscible formulation), to which extra wetting agent was added. Bulbs were immersed for one hour, and this provided some control of maggots within the bulbs. However, the only approved insecticide currently available for the control of Narcissus Flies is chlorpyrifos ('off label'), a contact and ingested organo-phosphorus chemical.

### **Bulb Scale Mite**

Bulb Scale Mite (*Steneotarsonemus laticeps* Halb.) can be damaging in forced-bulb crops and is probably present in many stocks of bulbs growing outdoors, where it seldom causes significant damage. The adult mites are very small with the female, at 0.2 mm, being larger than the male. Young mites are colourless, becoming a pale, translucent-brown as they mature. Owing to their small size and pale colour, they are only visible with the aid of a hand lens. Adult mites feed in groups in the neck of the bulb, where they reproduce throughout the year, giving rise to several overlapping generations.

A warm and humid environment enables mites to develop rapidly and this makes them an important pest of forced daffodils that are grown at 16°C. Under these conditions, the life-cycle is completed in approximately two weeks. With such a rate of increase, mites are often subjected to

feeding pressure that forces some to vacate the bulbs. They move on to the foliage and flower stalks, where they lay eggs. Mites can become so numerous that they are visible to the naked eye in spite of their small size and translucent-white colour. Although such profuse egg production may give the impression of a population explosion, in reality few of the larvae hatching from them manage to complete their life cycle. The chief means of spread of this pest is through the planting of infested stock, or because of the migration of adult mites that wander freely in the soil once the foliage has died back.

Symptoms of the presence of mites within daffodil stocks may be seen in dormant bulbs in which they continue to feed and multiply, in forced bulb crops and, occasionally, in field crops. In dormant bulbs, feeding results in brown scarring of one or more leaf scales. When an infested bulb is cut horizontally through the neck region, the browned feeding areas will be seen in the angles of the scale leaves, although bulbs may be infested with mites without any scarred feeding sites being present. Bulbs that have a loose, open structure tend to be more prone to attack than those which are firm and solid throughout. The large air spaces between the leaf scales in the former tend to facilitate attack and such bulbs can become heavily infested with mites. Bulb structure is probably a cultivar characteristic and solid bulb structure is regarded as desirable by many hybridists who select for this feature.

In forced crops, damage can be serious, both in terms of flower numbers and quality, owing to the rapid build-up in mite numbers. Most of the damage occurs before or during the emergence of foliage and flowers. Attacked leaves show an abnormal bright greenness, becoming distorted and frequently sickle-shaped. Yellow streaking is seen on parts of leaves where the mites are abundant. Leaf edges in particular are attacked and scarred, giving them a rough, saw-edged feel, this symptom sometimes also being found on the flower stalks. At best, damage to the flower will result in deformity; at worst, the bud will be killed soon after emergence from the bulb and in bad infestations can lead to serious loss in flower yield.

Field crops seldom show symptoms of damage by Bulb Scale Mite, even in crops that have remained undisturbed for more than one season. Mild attacks can give rise to a general loss in vigour, but no definitive symptoms will appear. Occasionally, in the south-west of England, following exceptionally mild winter weather, leaf growth may be almost inhibited, with only a few small, malformed flowers being produced.

#### Control

As Bulb Scale Mite causes its most serious damage in forced crops of daffodils, every effort must be made to ensure that bulbs are clean before being used for this purpose. The standard hot water treatment at 44.4°C for a period of three hours offers the best control and all bulbs for forcing should be treated in this manner. If for any reason this cannot be done, it is wise to cut through a few bulbs before boxing to check for damage. Provided this was present in minimal amounts, a useful yield of flowers was at one time possible using a spray of endosulfan plus wetting agent applied within a few days of housing the bulbs. The spray was applied using a watering can or sprayer at low pressure, directing it into the plant centres, thus ensuring total wetting of the foliage. However, endosulfan has been withdrawn and has not been replaced so that control is now achieved during the routine hot water treatment given for eelworm.

### **The Stem and Bulb Eelworm**

The Stem and Bulb Eelworm (*Ditylenchus dipsaci* (Kuhn) Filipjev) is the most significant pest of daffodils in the British Isles and the Netherlands. Infestations had developed to such an extent by around 1910 that the daffodil industries in both countries were heading for extinction, and were only saved by the timely discovery of the hot water treatment by J.K. Ramsbottom. Perhaps it would be more correct to say that Ramsbottom rediscovered and refined the hot water treatment for daffodil bulbs as Charles Shaw of Spalding stated that an ancestor of his had used a similar treatment almost a century earlier. Shaw's father told him that his grandfather had used a hot water immersion treatment

while working as head gardener on the estate of Lord Lamington in Lanarkshire. The treatment was used to control Tarsonemid Mites (*Steneotarsonemus* spp. and *Hemitarsonemus latus*) on *Eucharis amazonica* and other bulbs by immersion in water at about 43°C<sup>(2)</sup>.

The Stem and Bulb Eelworm is approximately 1.2 mm long, thread-like and transparent, which makes it invisible without the aid of some form of magnification. Both sexes live within the tissue of daffodil plants where considerable populations frequently build up. The females lay large numbers of eggs that give rise to small, immature eelworms. These go through four moults before becoming adults, but the immature stages resemble the adults in all but size. They play an important role in eelworm survival, for they are capable of massing together to form 'eelworm wool', in which they enter a dormant phase and are difficult to kill. Breeding is rapid and continuous both in growing crops and in stored bulbs, provided temperatures in the range 10-15°C are maintained and the host plant remains alive. Their high level of activity and feeding will eventually rot and kill host bulbs, at which point many of the eelworms perish. Some, however, manage to migrate through the soil to establish themselves in new host plants.

Eelworm attack will also destroy stored bulbs, with thousands of pre-adult eelworms oozing from their bases. These masses gradually dry, turning into the buff-coloured eelworm wool mentioned earlier. The eelworms in this wool can remain viable for in excess of ten years, having their dormancy broken when they are moistened in the presence of a suitable host plant. Eelworm wool has similarities with the mycelium of the Basal Rot fungus, which is also found at the base of rotten bulbs, but the mycelium is white and fluffier. Apart from eelworm wool and migrating eelworms, infestation can also be spread on contaminated particles of bulb tissue, and during the flailing-off of foliage at the end of the season, when this material is spread around the field. Eelworm wool may be of less importance in the spread of infestation than its resistance to destruction in the dried state would indicate: for, provided it is kept moist, the eelworms in it can survive for little more than a year in the absence of a suitable host crop.

One of the great difficulties in controlling Stem and Bulb Eelworm in the field is its considerable host range: it is capable of infesting several types of crop plants and weed species. The eelworm exists in several races, some of which are capable of breeding on a wide range of hosts, while others are much more limited in this respect. The different races are morphologically indistinguishable and can only be differentiated by means of the host range on which they are capable of multiplying. Even within a host range, some plants seem to be more desirable to eelworms than others, although they are able to survive and even multiply slowly on the latter. At least three races are known to infest bulb crops in the British Isles: the *Narcissus*, Tulip and Hyacinth races. In addition to the first, the Tulip race is also capable of attacking daffodils, although it is the former race that is extremely important economically in the bulb fields of eastern England. It can persist on a range of other crop plants, including broad, French and runner beans, onions and strawberries, but characteristic eelworm symptoms do not necessarily appear on these crops. In fields where daffodils have been attacked, the eelworm will also be found on most of the common weed species, including Chickweed (*Stellaria media*), Groundsel (*Senecio vulgaris*), Knotgrass (*Polygonum aviculare*) and Speedwells (*Veronica* spp.), all of which are capable of maintaining reservoirs of the pest between *Narcissus* crops.

There are two fundamental problems with Stem and Bulb Eelworm – infested bulbs and infested soil. The former can be satisfactorily controlled; but the latter is more difficult, and it is of little use planting clean stock into infested soil as these bulbs will be rapidly attacked. The migrating eelworms enter the bulbs in the neck region where they attack young tissue, being carried upwards as the leaves and stems grow. There they establish breeding colonies, the sites of which are marked by pale yellow swellings known as spikels. With light infestations, visible symptoms are not always present, but the feeding areas become roughened and may be detected between the finger and thumb. Necrotic tissue develops in the centres of the feeding areas of severe infestations, the spikels coalescing and causing leaf deformity. Flower stems are attacked in a similar manner and become twisted and stunted. Growth is generally retarded and infested plants often appear as late flowering

patches within a crop. Owing to the high temperatures used in forcing daffodils, symptoms appear more quickly and with greater severity, bulbs often being completely destroyed within a matter of weeks. Although eelworms tend to develop on the lower parts of the foliage during the growing season, they descend back into the bulbs as senescence approaches. Their feeding gives rise to orange-brown or grey patches on the scale leaves, which can be seen when the bulbs are sliced through horizontally. These patches eventually run together to form the characteristic rings of discoloured tissue so indicative of eelworm infestation.

## **Control**

Control measures can conveniently be grouped into cultural measures, chemical treatments and the all-important hot water treatment.

### **1. Cultural Control**

The two most critical aspects of cultural control are to plant only healthy stock, and to check the growing crop, roguing out all eelworm-infested and other doubtful plants. The planting of healthy stock can only be assured if it has been treated with hot water. Inspection of the growing crop is most efficiently carried out on dull days after flowering, when all the characteristic symptoms of infestation should be obvious: namely the pale coloured spikels, gaps within the crop, distortion of leaves and stems, stunting and patches of late flowering.

Infestation has been found to spread in the direction of cultivations and so these should be kept to a minimum through the use of herbicides. This has the additional beneficial effect of killing many of the weed-host plants. Apart from the importance of weed hosts, infestation may be carried over from one crop to the next in ground-keepers left in the soil from the previous crop. These must be rogued out and destroyed or killed *in situ* with a spot treatment of an approved herbicide. If rigorous control of host weeds and ground-keepers is practised, crop rotation can play an important part in the reduction of soil infestations.

Hygiene is important. Ensure that grading equipment is regularly cleaned, removing bulb dust and other particles that may contain eelworms and so be capable of contaminating healthy bulbs. The use of an end-of-season, contact herbicide spray is a much more hygienic practice than flailing-off the debris that spreads infested crop and weed foliage. The timing of this operation can be critical, however. Some herbicides can damage daffodil bulbs as a result of downward movement through green leaves which have not abscised from the bulbs; or, if left too late, the herbicide can run down on to the bulbs through holes in the soil left as the foliage decomposes. Apart from causing chlorosis of the leaves the following season, too early destruction of the daffodil foliage can result in a dramatic reduction in bulb yield, so correct timing is essential. For many years the standard approved material for chemical pre-harvest desiccation of foliage was sulphuric acid (77% w/w) but this was recently withdrawn due to EC regulations. There is currently no approved replacement. The use of flat fields is preferable to those that slope, as surface water tends to spread eelworm in the direction of the flow.

### **2. Chemical Control**

Thionazin, a systemic organo-phosphorus compound, introduced in 1959, was used until recently but has now been withdrawn. Approved soil sterilants were also used for control of Stem and Bulb Eelworm and gave significant reductions in field populations of this pest but again there is no currently approved product. They were applied to friable soil when the temperature and moisture content was correct, spring or autumn being most suitable, the soil being rolled after application in order to trap the nematicidal gases. In addition to controlling Stem and Bulb Eelworm, the Potato Cyst Eelworm was also killed, this being important in dry bulb crops destined for export. The formerly approved chemical 1, 3- dichloropropene was withdrawn from use in 2009.

It is instructive to acknowledge the importance of this pest over several decades and to read of the precautions that Guy L. Wilson, the hybridist, took as long ago as 1925. His diary notes for that year<sup>(3)</sup> contain details of a chemical treatment involving what he referred to as nitro-hydroxy perchlor, which was probably the wood fungicide 2, 6-dichloro-4-nitrophenol. Wilson recommended its use at

one part to 3000 parts of water, to which solution was added some ammonium nitrate. The solution was used either as a drench on infested daffodil beds or as a cold soak for bulbs known to have been grown on infested soil. The addition of the ammonium nitrate was thought to aid penetration of the solution into the bulbs. When applied to the growing crop, it was recommended that any chemical that contacted the foliage should be washed off as soon as possible after spraying. It is interesting to note that Ramsbottom<sup>(4,5)</sup> had considered cold chemical soaks to be ineffective in controlling eelworm as early as 1917. Yet almost ten years later, Wilson seems to have been using a highly-effective control, reporting that it would kill eelworm within the plant, beneficial effects showing after only four days and reaching a maximum within ten days. It should perhaps be mentioned that cold chemical soaks in non-nematicides, such as conventional fungicidal dips, can actually disseminate eelworms within a stock of bulbs.

### 3. The Hot Water Treatment

The possibility of treating bulbs with hot water in order to control eelworm was first investigated in England by Barr and Ramsbottom in the early years of the 20th century<sup>(6)</sup>. Since that time, the method has been modified and refined to give the most effective means of controlling not only eelworm but also Narcissus Fly and Bulb Scale Mite.

The treatment is based on subjecting bulbs to a precise and constant temperature applied for a set time. Only a small margin of error exists, for conditions in excess of those recommended will lead not only to the death of pests but also to the death of the bulbs. The standard recommended treatment is for immersion in water at 44.4°C for three hours. Hot water treatment of bulbs intended for forcing is not recommended, unless there is no alternative, as serious damage can result. If it is necessary to treat such bulbs, damage may be limited by a pre-conditioning treatment consisting of storage at 30°C for seven days immediately prior to the immersion in hot water. Unfortunately, the pre-conditioning of the bulbs against damage, pre-conditions the eelworm to stand the normal temperature of 44.4°C, and therefore it is necessary to raise this to 46.7°C.

Various additives used to be included in the hot water treatment, these being formalin, as 40% formaldehyde, added at one part to 200 parts of water, plus non-ionic wetting and anti-foaming agents. The purpose of these materials was: to control any free swimming eelworms that may not be adequately controlled by heat; to ensure that all bulb surfaces were thoroughly wetted; and to break down any foam in the tank which tended to insulate bulbs and bulb debris from the full effects of the hot water. The inclusion of formalin also helped to control the spread of Basal Rot fungus.

The timing of the hot water treatment varies according to the amount of infestation present in the bulbs. Known infested stocks should be lifted early, and treated as soon as cleaning and grading is completed. It is preferable for these bulbs to be replanted while still damp from the hot water treatment. Bulbs from apparently clean stock should be lifted at the normal time and allowed to progress to the Pc (paracorolla) stage, which may be reached as early as mid-July in the south-west of England, and will be completed before the end of August in all other regions. The Pc stage marks the completion of the differentiation of the flower parts within the bulb. At this stage, dissection of the bulb will clearly show the presence of stamens, perianth and paracorolla, the latter being the tissue which eventually forms the flower trumpet. The hot water treatment is given once the Pc stage is reached for, if given sooner, flower damage may result in the following year. If bulbs have to be stored after hot water treatment, they must be placed in a cool, well-ventilated environment so that they lose their 'held' heat and dry out as quickly as possible. Stacking in trays with slatted sides and mesh bottoms is ideal. Nevertheless, storage after hot water treatment should be avoided wherever possible and immediate planting is recommended.

Daffodil types show a wide variation in their natural resistance to the damaging effects of hot water treatment. That most susceptible to damage is 'Ornatus' and related cultivars such as 'Double White'. These most sensitive types are best treated as soon as the Pc stage is reached. The subsequent order of damage to daffodils are the small-cups (Division 3), which have a strong *N. poeticus* ancestry; then the large-cupped cultivars; and finally the trumpet daffodils. Treatment in this order

will help reduce both plant and flower damage, although with some trumpet cultivars, which are more prone to Basal Rot, earlier treatment in order to control this disease may be preferable.

### **Other pests of *Narcissus***

The three pests dealt with so far are without doubt the most economically important of all those which attack daffodils. There are others, however, that usually cause only slight problems but which, under certain conditions, can give rise to serious economic damage.

#### **Root Lesion Eelworm (*Pratylenchus penetrans* (Cobb) Chitwood & Oteifa)**

This eelworm attacks the roots of *Narcissus* plants, often in association with the fungus *Nectria radicola*, and can lead to considerable losses. The eelworm is the primary pathogen, the fungus entering the roots through the initial damage that it causes, to such an extent that the subsequent adverse effects on growth are mostly because of the fungus. Attacks by this eelworm and the root rot that it causes have been recognised for a long time in the Isles of Scilly. It is also found in other bulb growing areas in the south-west of England, as well as in Lincolnshire and in the Netherlands. Symptoms in the field show as patches of retarded plants that, apart from their backward growth, appear to be quite normal. The reason for this retardation can be clearly seen when attacked plants are lifted, the roots being brown and rotted, and breaking off just below the base plate. The only satisfactory method of control in the past was through the use of an approved soil fumigant which also controlled *Nectria*.

#### **Narcissus Bulb and Leaf Eelworm (*Aphelenchoides subtenuis* (Cobb) Steiner & Buhner)**

This eelworm was first discovered on daffodils in the Isles of Scilly in 1934. Its behaviour is odd in that sometimes many years will pass without any record of it being found on daffodils. Such a lull may be followed by a sudden attack, leading to serious damage. The symptoms are in many ways similar to those produced by Stem and Bulb Eelworm. The bulbs show similar internal discolouration, while large populations feeding on the leaves cause yellowing and premature die-back. Other distinctive symptoms are the crinkling and blistering of the outer scale leaves. Fortunately, its spread within daffodil stocks is rather slow. Good control is obtained by the use of the standard hot water treatment and crop rotation.

#### **Eelworm vectors of viruses**

In addition to direct damage to daffodils by eelworms, some are indirectly harmful as they are capable of transmitting viral diseases. Of the 16 or so viruses which attack daffodils, seven are known to be transmitted by eelworms. These include Arabis Mosaic, Strawberry Latent Ringspot, Tomato Black Ring, Raspberry, Tobacco and Tomato Ringspot, and Tobacco Rattle. Several species from four genera of eelworms are capable of transmitting daffodil viruses, Tobacco Rattle virus being carried by species of *Trichodorus* and *Paratrachodorus*, and the others by species of *Longidorus* and *Xiphenema diversicaudatum*. Populations of these eelworms can be dramatically reduced by the use of a soil fumigant.

#### **Potato Cyst Eelworms (*Globodera pallida* (Stone) Behrens & *G. rostochiensis* (Woll.) Behrens)**

While these eelworms do not attack daffodils, they are of considerable importance in the economics of crops grown for dry bulb sales, especially for export. Most countries have regulations banning the import of plant material grown on land known to be infested with these eelworms. Both may be found on bulbs and in soil adhering to bulbs, and therefore it is essential to ensure that dry bulb crops are grown on clean land, which means that former potato land should be avoided if possible; as a minimum precaution, wide rotations of crops must be used. The only satisfactory chemical control is with a soil fumigant.

### **Aphids**

Although aphids or greenfly are seldom seen on daffodils, they can cause severe damage through their ability to transmit viruses. Many species of aphids are involved, among them several of the most common, such as the Potato Aphid (*Macrosiphum euphorbiae*), the Peach-Potato Aphid



(*Myzus persicae*), the Black Bean Aphid (*Aphis fabae*) and the Pea Aphid (*Acyrtosiphon pisum*). The viruses transmitted are the important Yellow Stripe, White Streak, Latent and Degeneration diseases that are specific to daffodils, Cucumber Mosaic which has an extensive host range, Broad Bean Wilt and possibly Onion Yellow Dwarf.

### **Control**

The most likely means of combating these diseases might appear to be through the control of their aphid vectors. Unfortunately, this is not the case – for several reasons. Firstly, the aphids which transmit the viruses are migratory, and winged forms may not be present at the time spraying is carried out. Secondly, they are capable of both picking up virus from infected plants and transmitting it to non-infected ones in a matter of minutes, and certainly within a period before even the most toxic insecticide can prove lethal. Finally, the presence of insecticide on the foliage has been shown, in small-scale experiments, to increase the rate of virus spread<sup>(7)</sup>. The reasons for this are not fully understood but may be associated with agitation of the alighting aphids; the presence of insecticide could cause them to feed more rapidly than they would under normal circumstances, and also to move about more within the crop in an attempt to find suitable feeding sites. Aphid transmission of viruses gives rise to conspicuous foliar symptoms. The best method of controlling spread is to rogue regularly, thus reducing the reservoir of infection that is available to aphids within a crop.

### **Slugs**

Two species commonly cause damage – the Garden Slug (*Arion hortensis* Fer.) and the Field Slug (*Derocerus reticulatum* Mull.). Damage is found on both field and forced crops, occurring chiefly under mild, damp conditions. Damage is caused to both aerial and subterranean parts of the plant, with leaves and flowers being eaten and holes rasped out of the bulbs. The latter type of damage is especially important as it allows entry to secondary pests and rotting fungi. The danger of flower damage is especially serious to the flower exhibitor. Control is achieved by means of regular applications of a molluscicide bait.

### **Bulb Mites (*Rhizoglyphus* spp.)**

These common, soil-dwelling mites have been linked with damage to several bulbous crops throughout Europe, their chief role being that of secondary pests, which they are on daffodils. There is no confusing these mites with the Bulb Scale Mite, for they are over four times as long at 0.9 mm, with the males being slightly smaller than the females. They are translucent-white in colour with two obvious dark spots showing through the body wall.

Bulb Mites will go on developing and laying eggs as long as conditions are suitable, high temperatures and adequate moisture being essential factors. Each female lays in excess of 100 pearly-white eggs up to 0.2 mm in diameter, these being deposited over a period of several days. They hatch into immature mites that feed in moist, decaying bulb tissue. They progress through three moults before becoming adult, the rate at which these changes occur being largely temperature-controlled. The life cycle takes 27 days at 21°C. Below 12°C, the mites become inactive. The activity of the mites within damaged bulbs changes moist, rotting tissues into a dry, mealy mass throughout which the mites are scattered. The only two satisfactory control methods available are through the limitation of bulb damage by primary pests, and by the hot water treatment; of course, the latter is the most likely way of achieving the former.

### **Garden Swift Moth (*Hepialus lupulinus* L.)**

The adult moths are seen on the wing between mid-May and late June, most commonly over pasture or weed-infested land, where the eggs are laid. The larvae hatch in about two weeks and are translucent-white in colour with a reddish brown head. On hatching the larvae first burrow into the soil and then eat their way into the bulbs, where they will continue feeding through the winter. The damage caused is very similar to that perpetrated by the Large Narcissus Fly, the only difference being in the location of the entry point, the Swift Moth larva entering through a large, round hole in the side of the bulb. This feeding gives rise to irregular growth and gaps in the rows, where seriously

damaged bulbs fail to emerge. Attacks are not common in Britain but have been recorded on the eastern side of the country, especially in Lincolnshire.

### **Control**

Effective weed control, as normally practised in *Narcissus* crops, will deter egg-laying, which is invariably carried out over a close vegetational cover. As numbers of Swift Moth larvae are likely to be highest in old pasture, growing daffodils as the first crop after ploughing should be avoided. If this cannot be avoided, frequent cultivations between ploughing and planting will reduce the population of larvae to insignificant amounts. Growing bulbs as a one-year-down crop, and the subsequent hot water treatment which such crops usually undergo, will eliminate Swift Moth larvae.

### **The Diseases of *Narcissus***

The majority of disease organisms which attack daffodils normally result in only insignificant amounts of damage other than on a localised scale. There are, however, two exceptions: the ubiquitous fungus that causes Basal Rot, and the virus responsible for Yellow Stripe. Both diseases cause serious economic damage.

### **Fungal diseases**

#### **Basal Rot**

Two organisms are responsible for very destructive bulb rots in daffodils – *Fusarium oxysporum* Schl. f. *narcissi* Snyder & Hansen, and the eelworm *Ditylenchus dipsaci*. Indeed, only in the last 80 years have the organisms, and their symptoms, been clearly defined and separated. Daffodil literature at the start of the 20th century showed a good deal of confusion between the two, and it was far from clear which organism was causing which symptom. At one stage, Basal Rot was the term used to describe the condition that follows a severe eelworm attack, when the base plate separates from the lower scale leaves.

Basal Rot first began to attract attention towards the end of the 19th century when frequent references were made to it in the horticultural press. The Revd C. Wolley-Dod was one of the horticultural characters of that period, a daffodil buff and a prolific correspondent. It was he who first highlighted the problem when he wrote to *The Gardeners' Chronicle* in 1889<sup>(8)</sup>, and again in 1894<sup>(9)</sup>. Wolley-Dod recorded that affected plants were stunted with leaf tips browned and flowers imperfectly developed. On lifting, he noted that the bulb base was soft and rotten with few, if any, roots present. He suggested that the condition was caused by unfavourable climate and soil. Others who joined the discussion cited unfavourable soil conditions after planting, poor bulb storage, and even a fungal organism. There was more than a grain of truth in each of these suggestions. Little was heard or written about Basal Rot for over a decade. Had the problem vanished as quickly as it had appeared? The summer of 1911, however, was particularly hot and the problem that had almost been forgotten suddenly re-appeared with a vengeance. Massive quantities of bulbs in England and the Netherlands rotted in storage. The rot was progressive, starting in the base plate and moving upwards into the leaf scales, which became pinky-red or greyish brown. Another churchman and daffodil enthusiast, the Revd Joseph Jacob, attributed the rot to the combined action of heat and the fungal organism *Fusarium bulbigerum*<sup>(10)</sup>. Following the very hot summer but only a year earlier, he thought it may result from over manuring “especially if it is rich in nitrogen”<sup>(11)</sup>. The fungus responsible for the disease had been described by Cooke in 1887 as an organism new to Britain<sup>(12)</sup>, listing it as *F. bulbigerum* Cooke & Mass., but its pathogenicity was not recognised at that time. In 1913, the mycologist, G. Masee<sup>(13)</sup>, carried out an investigation into the disease described by Jacob, and he also concluded that the causal organism was *F. bulbigerum*.

In 1915, the Royal Horticultural Society undertook an investigation of the problem under the supervision of Miss E.J. Welsford. She inoculated daffodil bulbs with *F. bulbigerum* but failed to produce any rotting of the bulbs. In another series of experiments eelworms obtained from rotting bulbs reproduced the rot in healthy ones, and it was concluded that *Anguillulina (Ditylenchus) dipsaci*

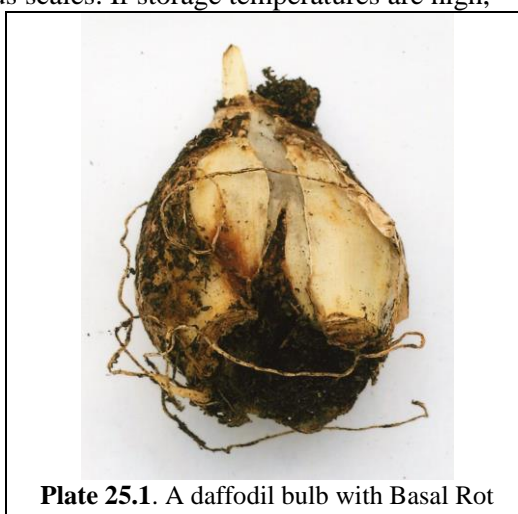
was the sole cause of the disease. Welsford's results were published in 1917<sup>(14)</sup> and appeared to be confirmed in the following year by J.K. Ramsbottom<sup>(15)</sup> who, in his investigations, rarely encountered *Fusarium* in rotting bulbs; when he did, it was always there in association with *Anguillulina* (*Ditylenchus*). During the period reviewed above, from the description of the problem by Jacob, work had proceeded in parallel in the Netherlands. In 1911, for example, J. Westerdijk<sup>(16)</sup> stated that the rot was caused by a *Fusarium* of the group *elegans*, which she had demonstrated was capable of causing a storage rot in bulbs kept at 26-30°C. As the temperature was lowered to 22°C, the rate of infection slowed down, with infection being halted when a storage temperature of 18°C was used.

There can be little doubt that the disease that caused such massive damage in 1911 and for several years afterwards was that now known as the fungal Basal Rot, although at the time the connections between causal organism and symptoms were not always made, and references to Basal Rot, as a fungal disease, were patchy. The fact is that attention became firmly fixed on the pathogenic eelworm as the cause of Basal Rot, the role of *Fusarium* being regarded only as a second, subsidiary phase of eelworm attack.

From the mid-1920s, a very prevalent Basal Rot was evident in bulbs imported from the Netherlands and these were examined at the Plant Pathology Laboratory, Harpenden. The Laboratory consistently found that *Fusarium* was present in the rotted bulbs and, significantly, it was never accompanied by *Anguillulina* (*Ditylenchus*). Similar results were reported from the Netherlands, the USA and Canada and a general conviction rapidly emerged that it was *Fusarium* alone that caused the widespread losses in stored bulbs. During the 1920s and 1930s, the hot water treatment developed for the control of eelworm was re-examined in relation to *Fusarium* control, both on its own and with fungicidal additives. Work continued apace on treating the disease in England, the Netherlands and the USA and also on the specific nature of the *Fusarium* involved. This was finally confirmed as being *F. bulbigerum* by P.H. Gregory in 1932<sup>(17)</sup>, synonymous with the name under which it is known today. Thus, the trail that had begun in 1887 with a troublesome bulb rot and the identification of a new fungus, and which had been dogged for much of the time through failure to separate fungus from eelworm, reached a satisfactory conclusion some 45 years later. At last scientists and growers were in a position to take positive action against a disease that had been responsible for the disappearance of livelihoods, almost overnight.

The disease in the British Isles does not usually manifest itself until shortly after lifting, although infection occurs while the bulbs are in the ground and any lacking roots at lifting time are likely to be heavily infected. Infected bulbs (Plate 25.1) are soft to the touch and show a pinkish-red to greyish-brown discolouration just below the membranous scales. If storage temperatures are high, the rot will quickly engulf the whole bulb, at which point a white or pinkish crust of fungal spores appears where the rotted base plate was once attached to the scale leaves. A characteristic of *Fusarium* attack (often noticed by gardeners) is that, when cleaning the roots off lifted bulbs, the base plate readily detaches from the scale leaves above. Subsequently, the rotting bulbs shrink, turn dry and light in weight, and become brittle and mummified.

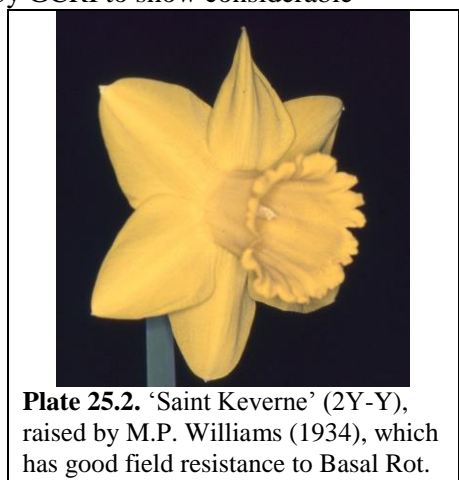
The problem in controlling Basal Rot is its widespread distribution in soil, for, although this form of *Fusarium* has only been found on *Narcissus* plants, it does occur in soil where these have never previously been grown. Therefore, every plant and planting site must be suspect. *Fusarium oxysporum* occurs in two forms, one of which is pathogenic and the other non-pathogenic, which may account for Miss Welsford's failed attempts to induce Basal Rot. Still more strangely, both forms have been found on apparently healthy bulbs.



**Plate 25.1.** A daffodil bulb with Basal Rot

Temperatures in the soil and in storage have time and again been shown to be critically important in the development of the disease. Root infection and subsequent bulb rotting appear to be closely linked to soil temperature, soil moisture and the condition of the roots at the time. Soil temperatures above 13°C are thought to trigger infection: this increases in severity as temperatures rise until, at about 29°C, infection overwhelms bulbs in a very short time. Roots growing in soil below 13°C do not become infected. Soil moisture is at its most damaging when present in sufficient quantity to keep the root surfaces moist over a period of time; the roots themselves are most vulnerable when beginning to die back into the base plate. The period during which root senescence occurs is much longer than is generally appreciated, starting in late May and extending into September, some weeks, that is, after the new roots for the following season have begun to emerge. Much of this period of root senescence coincides with the range of temperatures required for active infection. The fungus rarely grows actively within the soil but it can move over considerable distances, both along and within roots, to infect other bulbs. The nutritional status of the soil is also thought to have some bearing on infection, more Basal Rot being found in bulbs that have received nitrogen fertiliser than in those that have had only potassium. Bulbs are perhaps at their most susceptible in August for, not only is the temperature likely to be high, but there are two sites through which infection can take place – in the roots which are dying back, and in the wounds made in the base plate by the newly emerging adventitious roots. This may well account for symptoms of attack often being present in growing crops, showing as stunted growth or yellow leaves which die back early. Infection at the start of the season would certainly provide adequate time for the development of the degrees of infection frequently found when lifting the bulbs at the end of the season.

Is there any apparent resistance or immunity among daffodil species or cultivars to this destructive organism? Over many years, observations by individual growers have led to a rough and ready grouping – into those which are markedly susceptible, and those that show considerable resistance. A more objective approach was adopted at Rosewarne Experimental Horticulture Station: there, an association between white perianths and susceptibility had been noted in cultivars such as ‘Madame de Graaff’, ‘Mitylene’, ‘Evening’ and ‘Niphetos’. Supplementary studies indicated cultivars that showed a marked field resistance to *Fusarium*. These were used in an extensive breeding programme, the aim of which was the introduction of new commercial cut-flower cultivars. A similar examination of susceptibility and resistance was undertaken at the Glasshouse Crops Research Institute (GCRI), Littlehampton, Sussex, where trials mostly concentrated on the species. The results from both programmes tended to confirm the earlier observations of growers: for example, that *N. jonquilla* var. *henriquessii* will happily grow on through ‘thick and thin’, while cultivars around it succumb, the GCRI classing it as resistant. Other species found by GCRI to show considerable resistance were *N. jonquilla* and *N. poeticus* var. *recurvus*. These discoveries opened up new breeding opportunities and may revitalise efforts within the *Jonquilla* and *Poeticus* hybrid divisions. Even more interesting with regard to the latter is the Rosewarne EHS finding that the Division 9 cultivar ‘Dulcimer’ is also resistant. This is an old cultivar, registered in 1913, one of its probable parents being the resistant *N. poeticus* var. *recurvus*. It is the only known tetraploid among the *poeticus* hybrids and this, combined with its resistance to *Fusarium*, should prove a most interesting combination for hybridists. The best known cultivar to come through the Rosewarne EHS trials showing a high degree of field resistance is ‘Saint Keverne’ (Plate 25.2), which has been used extensively in the breeding programme there.

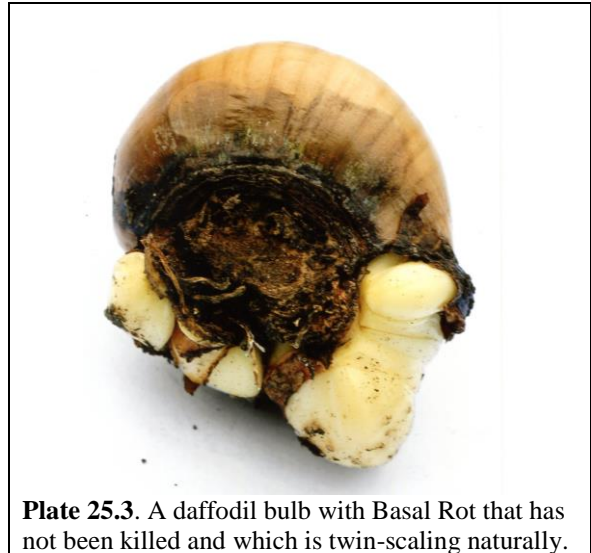


**Plate 25.2.** ‘Saint Keverne’ (2Y-Y), raised by M.P. Williams (1934), which has good field resistance to Basal Rot.

### Control

There is no cure for Basal Rot once *Fusarium* has invaded the bulbs and, in nearly all cases, such an attack leads to death. Very occasionally, however, small sections of basal tissue survive and, although no foliage may emerge during the following season, the bulb will eventually re-grow.

When such bulbs are lifted they will be seen to consist mainly of rotted tissue but in some cases a small pearly-white bulbil will be found growing from the small amount of healthy basal tissue; it is this that produces foliage during the second year. Such bulbs may be said to have naturally twin-scaled themselves (Plate 25.3). As interesting as this attempt at self-preservation may be, it should in no way lessen the resolve to control the disease; while this may not achieve 100% success, a combination of careful husbandry and the use of chemicals will considerably reduce damage. There is no way at present of totally avoiding attack, for the organism persists in soil in the absence of a host, and is even found in areas in which *Narcissus* has never previously grown.



**Plate 25.3.** A daffodil bulb with Basal Rot that has not been killed and which is twin-scaling naturally.

The most potent weapon in control by husbandry is temperature. The rules are quite simple. If reasonable control of temperature is available, efforts should be made to ensure that it never rises above 18°C. If accurate control of temperature is unavailable and it is apt to rise above 18°C, it is better to plant than to continue to store – provided, of course, that the soil temperature is lower than that of the store. With controlled-temperature storage, planting should be delayed until as late as possible when soil temperatures will have started to fall. Other husbandry factors thought to lessen danger of infection are connected with lifting and drying. The bulbs should be lifted as soon as possible after leaf senescence, and dried off thoroughly and quickly before putting into storage at below 18°C.

Chemical control has followed two lines, one being the use of cold dips in solutions or suspensions of appropriate fungicides. The other method has involved the addition of fungicidal chemicals to the hot water treatment used for eelworm control. The use of formalin, as 40% formaldehyde, added to the hot water dip at the rate of one part to 200 parts of water, was a highly effective treatment pioneered by P.H. Gregory and L.E. Hawker. In the bulb-growing districts of the south-west of England, this treatment was modified and consisted of a cold soak in 1:200 formalin, followed by a hot water treatment plus formalin. Whatever method was used, it went without saying that all infected and doubtful bulbs were removed and destroyed during pre-treatment grading. The effect of applying one of the above treatments each year, for three successive years, had a dramatic impact on the health of a stock, Basal Rot being all but eliminated. The current off label recommendation for a post-lifting or pre-planting cold dip using thiabendazole for *Fusarium* control will also give some control of Smoulder (see below). In recent years, there has also been an off label recommendation for carbendazim – approval for all products containing this active ingredient expired in December 2009. For 2010, there is an off label approval for chlorothalnil for the control of Basal Rot.

In the past, mercurial fungicides have been used in cold dips and there is little doubt that mercury is extremely effective against *Fusarium*. Use of this chemical is, however, no longer allowed on environmental grounds. Chemicals that were used successfully in cold dips during the late 20th century were benomyl, carbendazim and thiabendazole, which are systemics with protective and eradicant properties.

### **Root Rot**

This root rot, *Nectria radicola* Gerlach. & Willson, is quite distinct from that caused by *Fusarium oxysporum*, which almost certainly results from interaction between the Root Lesion Eelworm and the *Nectria* fungus. Over the years, *Nectria radicola* has been referred to in the literature by a variety of names, including *Cylindrocarpon destructans* Zinssm. & Scholten and,

earlier, *Cylindrocarpon radicum* Wollenw. This root rot was first identified in Britain in the Isles of Scilly in 1929, and later in other parts of the south-west and Lincolnshire. *Nectria* has almost always been found in damaged roots but all attempts to prove its pathogenicity failed. Prior to its discovery in Britain, the disease had been troublesome in the Netherlands for almost 20 years. There, J. Westerdijk had isolated a fungus from infected roots, naming it *Ramularia macrospora*<sup>(18)</sup>. By inoculation into healthy roots, she had succeeded in inducing rotting of both roots and base plate. Possible control methods were examined, steam sterilisation and formalin both being found to be effective. Subsequent work in the Netherlands during the 1930s confirmed that *Cylindrocarpon radicum* was an ever-present fungus in diseased roots. Later, a similar root rot was reported from Canada and South Africa. No connection, however, was made at this time with the role of the Root Lesion Eelworm in this disease.

The first symptom of an impending attack is the appearance of small brown or black lesions on the roots, which result from the activity of the Root Lesion Eelworm. The *Nectria* gains entry to the roots through these lesions, causing rotting that may extend into the base plate. Attacks, however, do not extend into the scale leaves. The damage results in plants that are stunted and may not flower; if they do, the flowers are short-stalked, being well down among the leaves. This is almost certainly the same disease as that sometimes called Root Plate Rot, in which *Nectria radicum* is always the main fungus present in diseased tissue. The only effective control in the past employed soil fumigants which also killed the Root Lesion Eelworm, thereby denying entry to any *Nectria*. Unfortunately no approved soil fumigants are currently available.

### Leaf Scorch

The symptoms of this disease consist of a scorched, burnt appearance to the emerging leaf tips, but as the season progresses flowers also suffer damage. The organism involved is *Stagonospora curtisii* (Berk.) Sacc. and it is found throughout the daffodil-growing regions of Europe, North American and Australasia, and is widely distributed within the British Isles. The disease is seldom of economic importance here, apart from in the south-west where climatic conditions are most favourable to its development. It was first observed on daffodils in the USA in 1878; in the early years of the 20th century it was recorded on several occasions in England and in various parts of mainland Europe. Since the late 1920s, it has caused significant damage in the south-west of England in certain seasons.

The first signs of trouble appear on the emerging leaf tips. This spreads downwards in wet weather with the result that the foliage tends to yellow and die prematurely. Fungal fruiting bodies develop in large numbers on leaf lesions and are visible as dark brown swellings just below the leaf surface. These contain many spores, which are released when the leaves are wet, and which are splashed on to neighbouring foliage by raindrops. Moisture is, therefore, a crucial factor in the development of the disease and is one of the reasons for its prevalence in the south-west. Another is the susceptibility of 'Soleil d'Or', one of the main cultivars grown there. Aerial attacks are not confined to the leaves: the flower stalks, spathes and the flowers themselves all develop brown spotting. Flower symptoms often develop after packing for market, particularly if transported in closed boxes in which a moist atmosphere tends to build up. The fungus is also present in the bulbs. These are the source of the infection from which come the early attacks evident on the leaf tips; these become diseased as they push outwards and upwards through the bulb. There is a suspicion that the fungus, which is present between the leaf scales forming the bulb, can cause rotting of the tissue, although some doubt exists as to its ability to cause direct damage.

### Control

Hot water treatment with added formalin gave satisfactory control of the fungus within bulbs; after such treatment had been carried out, the disease seldom appeared in crops during the first year. In subsequent seasons, up to the next lifting, sprays with chemicals like the systemic eradicant benomyl or the protectant zineb were used (two pre- and one post-flowering sprays). Currently there are no approved chemical sprays. Control was also achieved using the cold fungicidal dips as recommended for Basal Rot.

## White Mould

White Mould (*Ramularia vallisumbrosae* Cav.) disease is found throughout most of the daffodil-growing areas of the world, including Western Europe, the north Mediterranean region, the west coast of the USA and Canada. The disease was first described in 1899 by Cavara<sup>(19, 20)</sup> in Italy, where it had caused severe damage on daffodils growing near Vallombrosa during three successive seasons. In 1901 it was described by Boudier<sup>(21)</sup> in France, who named it *Cercospora narcissi*; in England it was recorded by Chittenden in 1906 as *Ramularia narcissi*. The disease is rarely serious in England apart from in the early flowering districts of the south-west, where the first symptoms may be seen as early as January. These develop as small sunken areas coloured grey-green, or as yellowish streaks or spots on the leaves, mostly close to the tips. Similar symptoms appear on the flower stalks, all attacked areas increasing in size and darkening in colour.

In moist weather the spread of the disease is rapid, white powdery masses of fungal growth appearing on the lesions. If the weather is warm as well as moist, the disease becomes an epidemic and, as these conditions are more prevalent in the south-west in spring than in most other areas of Britain, it is worth taking control measures there in most years. The disease is spread through the dispersal of spore masses by wind and rain splash, but these cannot survive long if they dry out. As a result of infection, leaves tend to yellow and die back prematurely, leading to a reduction in bulb size and a lowering of the following year's flowering potential. Black sclerotia are found in the withered leaves, persisting in leaf debris over winter to produce the source of the early attacks in the following year. White Mould is a disease that is confined to the aerial parts of the daffodil: the bulbs are not attacked, nor is the fungus carried on bulbs. The disease is especially damaging on certain cultivars, 'Actaea', 'Cheerfulness' and 'Double White' being noted for their susceptibility. It will also attack main crop cultivars in the south-west of England where 'Dutch Master', 'Fortune' and 'Magnificence' are prone to damage.

## Control

There are several cultural measures that may be taken to limit attacks. As much of the leaf debris as possible should be burnt at the end of each season in order to destroy the over-wintering sclerotia. A rotation system which allows at least one year between *Narcissus* crops should be practised, which will reduce soil infection. Cultivars known to be susceptible should not be planted next to one another: basically, this means the late-flowering cultivars that reach their peak of development when the temperatures are relatively high. Chemical control of the disease has been achieved using the chemicals recommended for Leaf Scorch, but with added glasshouse-grade petroleum emulsion at the rate of one part to 500 parts of spray. Four applications were needed for effective control, the first being given when the foliage was 7.5 cm high. Two more were often given before flowering, and the last after flowering was over. Spraying during the two weeks immediately prior to flowering was avoided in order to lessen the risk of unsightly chemical deposits on the petals. The current recommendation for the control of White Mould is chlorothalonil. This is an off label approval that restricts application to crops being grown for galanthamine production. Any potential *Botrytis* infection will be controlled simultaneously.

## Smoulder

This disease was first described in 1907 by Klebahn<sup>(22, 23)</sup> who named the causal organism *Botrytis narcissicola* (now *Sclerotinia narcissicola* Greg.), a name which is still in use today. It was first seen in England in 1924 on imported bulbs and is now of world-wide distribution wherever daffodils are grown. The earliest signs of infection are seen on the young leaves, which develop blackish-brown tips. Smoulder is a disease that flourishes in cold, wet seasons: infected tissue becomes covered with masses of grey spores, which are dispersed by wind and rain splash. As the disease develops, considerable discoloured spotting of leaves and flowers occurs. The leaves die back and, as they do so, black sclerotia form which persist in the leaf debris. The fungus on the leaves grows downwards into the neck of the bulb, sclerotia forming there as well, just beneath the papery outer-scale leaves. The black sclerotia, which are 1-2 mm in diameter, are seen in the bulbs at lifting

time; on a small scale, it is worthwhile peeling off the outer membranous scale leaves and in so doing the sclerotia will be removed. If untreated infected bulbs are stored, they will rot.

### **Control**

Warm, dry weather early in the season will provide a reasonable degree of natural control for, under such conditions, infection is usually limited to one or two leaves. Chemical control will give reasonable results; cold dipping in benomyl was the recommended treatment, but is no longer approved. The thiabendazole cold dip approved (off label) for *Fusarium* control may give some coincidental control of Smoulder.

### **White Root Rot**

This fungus was first reported in Germany in 1876<sup>(24)</sup> when Massink discovered a species of *Rosellinia* on the outer scales of daffodil bulbs. It was subsequently named *Rosellinia massinkii* (now *R. nectarix* Prill.). It was recorded attacking *Narcissus* bulbs in England in 1926<sup>(25)</sup>. The fungus has a wide distribution, especially in the warmer areas in which daffodils grow. In the British Isles, it occasionally causes problems in the Isles of Scilly, but elsewhere the optimum conditions of soil moisture and temperature seldom occur together frequently enough for the disease to reach troublesome proportions. When the optimum combination of conditions occurs in Scilly, severe outbreaks can follow. The most characteristic sign of attack is the appearance of bare patches within bulb fields, all the bulbs within these areas having rotted. In the early stages of an attack, diseased bulbs show a marked lack of roots and the outer bulb scales are blackened. Bulbs lifted from the periphery of areas in which serious infection has occurred show similar symptoms, but the rotting will be at a less advanced stage. White mycelial threads stand out distinctly against the dark background of the attacked outer scales. In moist conditions, the mycelium develops into a white woolly mass at the base of infected bulbs and, from these, threads of fungus can grow out through the soil to affect adjacent plants. These can be daffodils or any other plant of the wide host range on which this organism lives.

In the Isles of Scilly, the bulb fields are frequently long and narrow, and are often protected on all sides by *Pittosporum crassifolium*, a major host plant. Another important host plant is the African Wood Sorrel or Bermuda Buttercup, *Oxalis pes-caprae*, which is often found growing at the base of the windbreak hedging<sup>(26)</sup>. Owing to the layout of the fields designed to protect the crop from salt laden winds, it is inevitable that crop, windbreak and associated host weeds are always in close proximity.

### **Control**

All bulbs from diseased patches and adjacent areas should be carefully lifted and destroyed. As the spread of the mycelium through the soil progresses most rapidly in moist conditions, growers often believe that frequent cultivations that aerate and dry the soil will kill the fungus. While this may help to control fungal spread, care must be taken to thoroughly wash down the cultivation equipment afterwards so as not to spread the infection elsewhere. In addition, the control of weed host-plants can be helpful while, on a small scale, soil fumigation provided an effective chemical control.

### **Miscellaneous fungi**

In addition to the major fungal organisms discussed so far, there are a few others that have occasionally been found to cause damage. *Rhizopus* is capable of causing a soft, cheesy rot of bulbs that are stored damp at too high a temperature. It enters bulbs through wounds and is frequently present on the outer scales without causing any damage. The fungus is widespread in its distribution. The rust *Puccinia schroeteri* was found by the Revd C. Wolley-Dod in the 1890s on *N. poeticus* var. *majalis* and *N. jonquilla*<sup>(27, 28)</sup>, and has occurred occasionally since. *Coleosporium narcissi* has been recorded in Lincolnshire while, in continental Europe, *Aecidium narcissi* has been found in the Netherlands and France, and the smut *Urocystis colchici* f. *narcissi* in Spain.



### **The virus diseases of daffodils**

There are 16 viruses known to attack daffodils, together with an unconfirmed report of a 17th from the USA. Virus transmission is by means of invertebrate carriers termed vectors, which feed on infected plants and later transmit the virus to non-infected plants. Mechanical transmission also occurs, for example, during the flower-picking operation when infected sap on fingers may be transferred to healthy plants. Viruses may be classified according to their mode of transfer; a comprehensive list is given in Table 25.1.

<b>Spread by:</b>	<b>Invertebrate vectors</b>		<b>No known invertebrate vectors</b>
	Aphids	Eelworms	
Virus	Yellow Stripe	Arabid Mosaic	Narcissus Mosaic
	White Streak	Tomato Black Ring	Tip Necrosis
	Latent	Raspberry Ringspot	
	Degeneration	Tobacco Ringspot	
	Late Season Yellows	Tomato Ringspot	
	Cucumber Mosaic	Tobacco Rattle	
	Broad Bean Wilt	Strawberry Latent	
	(Onion Yellow Dwarf)	Ringspot	

**Table 25.1.** Vectors responsible for the transfer of viruses that attack daffodils.

#### **Narcissus Yellow Stripe**

This is the most important of all virus-induced diseases that affect daffodils. The condition has been recognised in Britain and the Netherlands since the late 19th century and is now thought to affect all daffodil growing areas, world-wide, owing to the international trade in bulbs. It was, almost inevitably, the redoubtable Revd C. Wolley-Dod who first drew attention to Yellow Stripe in 1885 showing infected plants of *Narcissus × incomparabilis* to the Royal Horticultural Society's Scientific Committee in 1896<sup>(29)</sup>. During the ensuing 30 or 40 years, the disease became much more prevalent and widespread, being variously attributed to unfavourable weather and faulty husbandry.

The first breakthrough in finding the real cause came in 1932 when it was shown that the symptoms were sap-transmissible. Seven years later, it was demonstrated that the natural agent for transfer was aphids. The symptoms that were first noticed in 1896 are all too common today, consisting of chlorotic streaking of the leaves, flower 'breaking', and a progressive and eventually serious loss of vigour and yield. The virus is transmitted by nine species of aphid, including the glasshouse-potato, black bean and potato aphids, which during migration briefly settle and feed on daffodils. The rapidity with which the disease spreads is governed by the numbers of migrating aphids and the percentage of infected bulbs within the daffodil stock on which they feed.

#### **Narcissus White Streak**

Named on account of its very characteristic leaf symptoms, this was first described in Britain in 1933 as Silver Leaf (also its name in the Netherlands), while in the USA it was called White Streak or White Stripe. Symptoms of the disease appear quite dramatically some three or four weeks after flowering, though curiously infected plants are entirely symptom-less before then. Initially, longitudinal purple streaks appear on the leaves and flower stalks, these soon turning the tell-tale white colour, which gives the disease its name; the streaks eventually run together. These symptoms are transitory, however, for within a few days the white areas become necrotic and sunken, and the leaves die back quickly. This condition of abnormally early senescence is referred to as 'early decline'. The development of symptoms appears to be triggered by temperatures in excess of 18°C, which rarely exist before mid-May in Britain. As the loss of foliage occurs just when light and temperature are most favourable to the photosynthetic process and the accumulation of dry matter,

this is so impeded as to cause significant reductions in bulb yield, amounting possibly to 30 or 40%. The vectors transmitting the disease are the potato, peach-potato, black bean and pea aphids.

#### **Narcissus Latent Virus**

As the name suggests, this is a disease that displays few readily observable symptoms on infected plants and is thought to have spread unnoticed over many years within daffodil stocks. It was initially discovered in some of the older cultivars such as 'Lucifer' (1890) and 'Magnificence' (1914) during investigations into Narcissus Yellow Stripe and Narcissus Mosaic. It is readily transmitted by the pea aphid and by mechanical inoculation and may give rise to a mild leaf chlorosis and flower-mottling in some cultivars.

#### **Narcissus Degeneration Virus**

The precise symptoms of this disease are difficult to ascribe as it frequently occurs in complexes with other viruses, but they are thought to consist of a conspicuous yellow striping and general chlorosis. This virus, in combination with others, particularly Narcissus Mosaic, caused considerable degeneration in the stocks of 'Soleil d'Or' in the Isles of Scilly during the mid- to late 20th century, resulting in loss of vigour and productivity. The problem has been largely overcome through the use of meristem tip culture in which virus-free cells from the growing points of infected plants are grown into virus-free plants on nutrient media under sterile laboratory conditions. The virus-free plants produced in this way have larger flowers, more florets per stem and increased bulb weight and growth. They are marketed as 'Super Sol'. Other cultivars that have been freed of the virus using this technique include 'Carlton', 'Fortune', 'Ice Follies' and 'White Lion'.

#### **Narcissus Late Season Yellows**

This is a disease which, like White Streak, appears after flowering, producing chlorotic leaves, premature senescence and general loss of vigour.

#### **Cucumber Mosaic Virus**

This is the only aphid-borne disease attacking *Narcissus* that also attacks many other crop and weed plants. It is transmissible through the transfer of sap by a wide range of aphid species, including *Myzus persicae* and *Aphis fabae*, the latter probably being the major vector out-of-doors. The symptoms develop particularly on young leaves but will show on leaves of all ages (with the exception of those that were mature at the time of infection) as a bold yellow mottling.

#### **Broad Bean Wilt Virus**

Although of world-wide distribution, this virus has only been found infecting daffodils (*N. tazetta*) in Japan. It too is capable of being transmitted by several species of aphids.

#### **Onion Yellow Dwarf Virus**

The only reported occurrence of this virus infecting daffodils is from the USA, where it was found in *N. jonquilla* and *N. tazetta*.

#### **Control of viruses spread by aphids**

The control of virus diseases in daffodil crops and the aphids which transmit them is discussed elsewhere in this chapter.

#### **Eelworm Transmitted Viruses**

All of these viruses have a wide host-range, consisting of both weed and crop plants. They are transmitted to and among daffodil crops by the same types of eelworm that are responsible for their spread among other crops, namely *Trichodorus* and *Paratrachodorus* in the case of Tobacco Rattle Virus, and *Longidorus* and *Xiphinema* in the case of the others. Whereas the aphid-borne viruses give conspicuous symptoms, those carried by nematodes seldom do, at most producing a light mottle.

Tobacco Rattle Virus was the first virus carried by eelworms to be recognised (initially in the Netherlands and later in the British Isles) as a pathogen, and it was found in many stocks. The widely grown 'Soleil d'Or', however, appears to be immune to Tobacco Rattle. Raspberry Ringspot Virus has been found infecting daffodils on the east side of Scotland, where daffodils are often grown in close proximity to raspberries. Arabis Mosaic is the most prevalent of this group of viruses in Britain – being widespread among trumpet cultivars and in 'Soleil d'Or' – but it gives rise to no conspicuous foliar symptoms. Other eelworm-transmitted viruses commonly found among daffodils in Britain are Strawberry Latent Ringspot and Tomato Black Ring. Peroxyacetic acid (5% w/w), an organic fungicide, was used as an approved dip for bulbs that would also kill any adhering free living nematodes; this approval was withdrawn in December 2010.

### **Other Viruses**

The viruses within this group are those for which no invertebrate vectors are known. Spread of these viruses chiefly takes place during such operations as flower harvesting, when infected sap is carried from plant-to-plant along the rows.

### **Narcissus Mosaic**

The first reported occurrence of a disease in daffodils caused by this virus was in the Netherlands in the late 1930s. Previously, the term Narcissus Mosaic had been used, especially in the USA, in error for Narcissus Yellow Stripe: the latter caused conspicuous yellow striping compared to the mild yellow mottling of the Narcissus Mosaic. Narcissus Mosaic Virus is very widespread in Division 1, 2 and 4 cultivars, trial work indicating that over 50% of all stock is infected. It is also prevalent in the *poeticus* cultivar 'Actaea', while many of the widely-grown older cultivars such as 'King Alfred' and 'Magnificence' appear to be wholly infected. The majority of cultivars in which Narcissus Mosaic is the only virus present show no foliar symptoms or, at most, an inconspicuous mosaic at the leaf base during or after flowering. A peculiar characteristic of this virus is that, although highly infectious and readily spread on the hands, it is never transmitted by aphids. Narcissus Tip Necrosis

This disease was initially reported from the Netherlands and was subsequently found to be widespread in England and Scotland. It does not induce foliar symptoms in all infected daffodils but, in some types, will give rise to necrosis at the leaf tips.

### **Control of viruses**

Since the 1950s, a considerable body of information has been garnered on the aphid-borne viruses of daffodils, and since the 1960s there has been intensive investigation of those carried by eelworms. Nevertheless, serious concern persists over the more severe diseases such as Yellow Stripe which, in addition to spreading from outside, also spread within stocks owing to natural vegetative propagation.

The only curative treatment for viral infection is meristem culture – a technique introduced relatively recently – but, until this can be widely and economically applied, limitation of spread must remain the chief method of control. The most obvious means of achieving this is by roguing, made easier in the case of most of the aphid-borne diseases that give rise to conspicuous foliar and other aerial symptoms. The roguing should be carried out before numbers of migratory aphids become significant and as soon as foliar symptoms are evident. This is usually in March and April for Narcissus Yellow Stripe, and May for White Streak. By removing all plants showing even the slightest foliar abnormality as early as possible, spread of eelworm-borne viruses may also be limited, as the vectors tend to be less active in the soil while temperatures remain low.

Chemical control of vectors is not particularly effective, especially in the case of aphids, as it is impossible to control migratory insects quickly enough to prevent them from spreading viruses. Indeed, some studies have indicated that infection levels can increase where insecticides are used as they lead to greater aphid activity in the field and additionally may kill off natural enemies<sup>(30)</sup>. With

eelworms, however, soil fumigation had given dramatic reductions in populations and, while not a cheap option, it was justified in small areas used for the building up of clean stocks of new cultivars. Some new cultivars have been found to contain significant amounts of virus and, although the propagation from seed used in their production can break the chain of infection inherent in natural vegetative methods, it should not be forgotten that some viruses are seed- and even pollen-transmissible. Whenever building up stocks of new cultivars, they should always be grown under conditions that will isolate them, as far as possible, from invertebrate vectors. This may be achieved by soil sterilisation, although no approved chemical methods are currently available; growing under protective fine mesh will excluded aphid vectors.

## **Non-Parasitic Disorders**

Several of the conditions normally dealt with under this heading may in fact have their origins in fungal infection or pest attack. The most important of these are Grassiness, Soft Storage Rot and Neck Rot. The first nearly always results from pest attacks, principally by the Large Narcissus Fly. Soft Storage Rot is probably of fungal origin, and perhaps involves *Rhizopus*. The condition known as Neck Rot, which can cause rotting and death of tissue in the neck region of bulbs, has been found during pre-export inspections carried out in England, and is a very worrying development. It is likely that the condition has a fungal origin, both *Fusarium oxysporum* and *Sclerotinia narcissicola* often being present in infected tissue.

There are probably four other conditions of daffodils to note: as far as is known, these are unconnected with any pest or disease organism. They are damage by hot water treatment (discussed elsewhere), Chocolate Spot, Flowering Failure and Leaf Damage.

### **Chocolate Spot**

This is a condition in which elongated patches of epidermal cells in the leaf tissue die and give rise to a chocolate-coloured spotting. Sometimes all the foliage on a plant can show these symptoms. The cause is unknown, though it may be associated with temperature.

### **Flowering Failure**

This condition is found only among double daffodils such as ‘Cheerfulness’, ‘Texas’ and *N. poeticus* ‘Flore Pleno’. The flower buds fail to open, remain enclosed within the spathe, and are described as ‘bull-headed’. The condition persists from year-to-year and may be genetic in origin. The only control measure is to rogue out all affected plants.

### **Leaf Damage**

Exposure of young leaves to excessive cold may give rise to chlorotic bands of tissue across the leaf blades later in the season. Alternating periods of growth and non-growth caused by temperature variations during the winter can produce similar symptoms. A more uniform yellowing of the leaves has been found to result from the incorrect timing of application of the herbicide paraquat during the previous season before the foliage was properly detached from the bulb. In these circumstances, the paraquat was rapidly drawn down into the bulb, along with food material being transported there at that time for over-winter storage.

## **Pesticide Availability in the Early 21st Century**

In this chapter an attempt has been made to provide an historical perspective of the pests and diseases which afflict Narcissi by mapping their development and progression over the years, and by outlining the measures taken for their control, particularly those that were in use during the second half of the 20th century. Since that time, the range of chemicals available for pest and disease control has decreased, especially in the case of minor crops, including products that are available to the amateur or hobby gardener. Protection of the user and the environment is now an overriding priority, and rightly so. Nowadays all pesticide products must have official approval for use on specified crops, and for particular purposes within those crops.

Looking back at the materials already mentioned, Guy Wilson's use of the one-time wood preservative 2, 6-dichloro-4-nitrophenol in 1925, for the control of stem and bulb eelworm, would definitely be forbidden, owing to the carcinogenic nature of the chemical. Other pesticides at one time approved for use on daffodils have also disappeared – endosulfan, gamma HCH (BHC) and zineb. Pesticides that were approved in 2004 for specified uses in the control of pests and diseases in daffodils were:

1, 3-dichloropropene, a halogenated hydrocarbon soil nematicide for the control of stem and bulb eelworm;

Metam (formerly metham) sodium, a methyl isothionate producing sterilant for the control of nematodes (eelworms);

Formaldehyde, for use in conjunction with the hot water treatment of bulbs, for the control of fungus diseases; and

Thiabendazole, a systemic, curative and protectant benzimidazole fungicide for use as a bulb dip to control *Fusarium* basal rot.

Recommendations and approvals are reviewed on an annual basis and can be found in *The UK Pesticide Guide*<sup>(31)</sup> for each current year.

By 2010, many of the pesticides mentioned above had been either withdrawn completely or approval for their use on daffodils had been revoked. For example, the important 1, 3-dichloropropene and formaldehyde, were withdrawn in 2008. Approval for all products containing carbendazim expired in December 2009, while the recommendation for the use of thiabendazole on daffodils went off label. In the meantime, a few new recommendations have emerged and, perhaps, reflect the increasing importance of daffodil bulb crops for the production of galanthamine. These include off label use of chlorothalonil and mancozeb for the control of White Mould (*Ramularia*). Peroxyacetic acid was approved for general control of a range of fungi on bulbs: it was given as a dip treatment of one-minute duration of a 50:1 dilution of the 5% w/w formulation. This treatment also helped to control free-living eelworms, which are responsible for the transmission of a range of viruses but this product is now withdrawn.

There is little in the armoury for the control of insect pests, although there is an off label recommendation for the use of chlorpyrifos against the important Narcissus Flies. Few other insects cause serious damage and, for those that do, nicotine is the only approved chemical. By and large, the off label recommendations provide pest and disease control where there are no, or very few, fully approved alternative measures available. There is a trend to standardise all pesticide usage throughout the EC, and the off label recommendations are essential in controlling problems which may be national or regional (rather than international) in nature. Chemicals which have off label clearance can be used legally, provided such usage accords with recommendations appearing in the current year's issue of *The UK Pesticide Guide*.

Post-2010, only two fungicides remain with approval for use on daffodils, these being thiabendazole and chlorothalonil (both off label) with the systemic tebuconazole being available for crops being grown for galanthamine. The contact and ingested organo-phosphorus insecticide chlorpyrifos is the only approved (off label) chemical available for the control of Narcissus Flies. The approval for the three fungicides all expire in 2011 and it will be interesting to see what remains in 2012, as the general trend is for products with user, consumer or environmental concerns to first go off label and then disappear entirely. Daffodil growers could well come to fully appreciate the work of Shaw, Welsford and Ramsbottom for their work on the enduring power of hot water.

The position with herbicides is little better; for general crops of daffodils two chemicals are available these being carfentrazone-ethyl (off label) and cycloxdim, while pendimethalin has off label approval for use in crops grown for galanthamine. The latter, which is a residual herbicide, is used to control both broad leaved and grass weeds; the contact herbicide carfentrazone-ethyl is available for use in general crops, pre-planting, to control annual dicotyledons. Grass weeds in such crops may be controlled with cycloxdim.

If it was not for the hot water treatment, the economics of commercial daffodil growing could be adversely affected due to the lack of alternative or supplementary chemical treatments for the major pests and disease, while the manipulation of weed cover to control soil temperature during the summer months is now almost impossible.

The choice of insecticides and fungicides which are effective against the major pests and disease of daffodils are not available to the amateur grower. In recent articles, the reality of the situation was succinctly put in the concluding paragraphs which stated: “There are not many insecticides on offer to help amateur daffodil growers manage pests.”<sup>(32)</sup> and “The choice of fungicides ... is extremely limited” and “there are now no suitable products for amateur use as bulb dips against basal rot”<sup>(33)</sup>.

In the end, the only recourse may be to try to mitigate the effect of high summer temperatures by growing under grass or using a shading summer mulch; perhaps even reverting to the hot water dip practised on Scottish estates in the 19th century for the control of tarsonemid mite.

Although this situation does present a problem it should in no way deter gardeners from growing these beautiful flowers, most cultivars being capable of given a spectacular welcoming display to the gardening year over a prolonged period without any problems occurring.

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## CHAPTER 26 WEED CONTROL

The methods of weed control available to amateur gardeners are very different from those used by professional growers, particularly in regard to chemical treatments, although the choice available to the latter has reduced considerably in recent years as established products have been withdrawn because of environmental, safety or efficiency concerns. At the same time, new and safer chemicals are being introduced.

The professional use of all pesticides, including weed-killers, is controlled by the Food and Environment Protection Act (FEPA) 1985 and the Control of Substances Hazardous to Health Regulations (COSHH) 1988. The Act introduced statutory powers to control pesticides with the aims of protecting humans and animals, safeguarding the environment and ensuring safe and efficient control of pests. Control of pesticide use is through the Control of Pesticide Regulations (CORP) 1986, which stipulates the approvals required before use can take place, and specifies the conditions under which such approval is given. Use is very specifically defined in that it is the product that receives approval for use on stated crops, rather than the active ingredient being given blanket approval for use on all crops for which it is suitable. All operatives applying pesticides, if born after 31 December 1964, are required to possess a Certificate of Competence.

The COSHH Regulations were made under the Health and Safety at Work Act 1974. They cover not only pesticides but all substances found in the workplace which may be hazardous to health if incorrectly used, classifying these into very toxic, toxic, harmful, irritant or corrosive. The Regulations require an assessment of risk to be made for the use of all relevant substances, and the pursuit of appropriate measures to control risk. In 1993, the EEC Directive 91/414 became effective, only chemicals agreed at Community level being allowed.

### **The Amateur Gardener and Weed Control in Bulbs**

In the past there were a few herbicides available in small packs to amateur gardeners, these mostly being products with low mammalian toxicity. It is unlikely that any product would be available to the amateur if it did not already have professional approval for the same use. Probably the only herbicide that has come into this category in recent times was propachlor, a chemical considered to have a high degree of crop safety on a wide range of crop plants, including ornamentals and perennials and, therefore, bulbs such as daffodils.

There are, of course, more traditional methods of weed control that the amateur may employ, the commonest method in many gardens being to naturalise the bulbs in grass. This has the added advantage of not only eliminating the weed problem but also keeping the bulbs in a cooler environment owing to the effect of evaporation and transpiration. Indirectly, this helps to control attacks by *Fusarium*, a high-temperature organism that is responsible for Basal Rot. Another useful method of weed suppression is through the use of mulches such as cocoa shell or bark which, if applied to weed-free soil from which all perennial weed roots have been removed, will effectively blanket out subsequent attempts by annuals to germinate and grow. These materials also help to insulate the soil from excessive heat and cold, protecting some of the less hardy types of daffodil from the worst effects of frost.

### **Weed Control for the Professional Grower**

Since the 1970s, there has been considerable change regarding the number of herbicides available to the professional grower. At that time it was stated that “nowadays commercial daffodil crops never see a hoe or cultivator for the whole of their two or three year duration”<sup>(1)</sup>. The manipulation of crop and weeds had considerable benefits in that control had been shown by the Scottish Horticultural Research Institute to increase bulb production by up to 30%, although research elsewhere did not match this figure. Once bulb growth had ceased weeds could be allowed to grow

during the hottest summer months, keeping soil temperature lower which in turn limited the spread of *Fusarium*<sup>(2)</sup>. In 1978, there were no fewer than 18 herbicides approved for use on daffodils<sup>(3)</sup>. By 2008, only five herbicides were approved, two of these being 'off label' recommendations restricted to crops being grown for galanthamine production<sup>(4)</sup>. With the withdrawal of paraquat in that year, only two herbicides were available for general use in daffodil crops, bentazone with post emergence contact action and chlorpropham, a residual. The above shows a very clear trend developing which is illustrated by the figures for product additions and deletions in 2008, with 274 in the former group and 310 in the latter. The situation has rapidly changed and will no doubt continue to do so as research costs for getting new chemicals to market increases and profits from niche markets decrease.

In the past, two basic types of herbicide have been used by growers for the control of annual weeds in field-grown crops of daffodils. The more common type consisted of various residual weed-killers, their mode of action being to control many species of broad-leaved and grassy annual weeds as a result of being taken up mainly by the rootlets of newly germinating seeds, thereby arresting further seedling development. These chemicals are applied to weed-free soil, as in general they only control germinating weeds: but some will control young seedling weeds present at the time of spraying. To be fully effective residual herbicides must be applied as an even, overall spray to soil of a fine tilth from which all clods have been removed by cultivation. The soil should also be moist at the time of spraying, and moderate rainfall following application will certainly boost effectiveness. Because of these requirements, most residual herbicides are applied soon after planting the crop, as the soil is then normally weed-free and in good tilth owing to pre-planting cultivation. As planting of daffodils occurs in autumn, there is a good chance that the soil will be moist when applying the herbicide, or that rain will fall within a few days.

The term residual herbicide implies that the effect of these chemicals will last over a period that may range from a few weeks to several months. With those that have a relatively short effectiveness, a second application may be permissible within the same year. Residuals are very safe to crop plants as they only enter plants through the root system or through the developing shoot while still underground. These chemicals are predominantly confined to the top 2.5 cm of soil, where they are retained on the clay particles and, therefore, do not contact the crop plants that are much deeper in the soil.

The other type of weed-killer used in commercial daffodil crops are contact chemicals, which kill by scorching plant foliage. As these materials are much less selective than the residuals, they must generally be applied before the crop emerges, although some crop plants may be resistant to their effects by having a waxy leaf covering, leaves which because of their shape will quickly shed the weed-killer or in which the plants' delicate growing points are protected. Contact chemicals have little or no residual action and therefore kill only the weeds present at the time of spraying. They do not prevent other weeds from germinating later although, in practice, if application is correctly timed there should be minimal, subsequent germination.

Several of the commercial herbicides which were used by professional growers were combinations of two or more chemicals that comprised both residual and contact materials. Sometimes, formulations contained more than one residual, this usually being done to broaden the spectrum of weed control, the second material often killing weeds with resistance to the first chemical. The inclusion of a contact chemical meant that the timing of the application was less critical, as the contact material would mop up any weeds that did not succumb to the residuals.

In 1992, there were eleven herbicidal products for use on daffodils. Five of these contained only one herbicide, the others two or more:

1. Chlorpropham, which is sometimes referred to as CIPC, is a residual carbamate chemical with a relatively short persistence in the soil. It has a strong inhibitory action on cell division in the meristems, resulting in the cessation of growth in buds and at shoot and root tips, which often appear distorted. The photosynthetic process can also be adversely affected.
2. Bentazone, which is a contact diazinone herbicide. Unlike other contact herbicides, Bentazone is recommended for the control of seedling weeds in daffodil crops at any time

after crop emergence, except during the period in which the flower buds are developing.

Formerly it was recommended as the second stage of a weed control programme, the first part of which consisted of an application of the two residual herbicides, chlorbufam + chloridazon.

3. Cyanazine, which is a triazine herbicide with both residual and contact action. Cyanazine was a useful treatment in that it could be applied pre- or post-crop emergence, the latter treatment being permissible to a maximum crop height of 10 cm.
4. Diphenamid, a residual amide herbicide that had a severe stunting effect on germinating weeds, which often failed to emerge.
5. Lenacil, a residual uracil herbicide. Entry to germinating weeds was chiefly through the roots, although some uptake occurred through the developing shoot. Toxicity was due to inhibition of the Hill reaction, in which water is split to yield oxygen during the photosynthetic process.

The remaining products then available each contained more than one herbicidal chemical, these being:

1. Chlorpropham + pentanochlor, the latter being a contact anilide herbicide. The mode of action of the former has already been noted. Pentanochlor was mainly absorbed through the foliage and translocated in weed plants to a limited degree. Its toxicity was through the inhibition of the Hill reaction.
2. Diquat + paraquat, extremely effective bipyridyl and bipyridilium contact herbicides. Both gave rise to rapid foliar scorching but had no soil activity, being strongly absorbed on to soil particles, especially the clay fraction. Within the plant, these chemicals were broken down to toxic hydrogen peroxide, strong light considerably enhancing this process.
3. Chlorbufam + chloridazon, respectively residual carbamate and pyridazinone herbicides. The former chemical behaved in a similar way to chlorpropham but chloridazon also entered via the foliage, allowing application to be made either pre- or post-weed emergence. Both chemicals inhibit the Hill reaction.
4. Chlorpropham + fenuron + cresylic acid, a mixture of residual and contact herbicides, was also approved.

5 and 6. There were two other similar proprietary products that contained the same three chemicals, namely the residual carbamate chlorpropham, the residual urea herbicide fenuron, and the contact cresylic acid. Both the urea and carbamate herbicides inhibit the Hill reaction, which is concerned with the release of oxygen as an essential early stage in the photosynthetic process. Some types of herbicide, particularly the substituted ureas, are capable of blocking this process.

By 2004, several of the herbicides which had been available a decade earlier had either been withdrawn entirely (diphenamid, chlorbufam and cresylic acid), while others no longer had approval for use on daffodils (chloridazon, fenuron and lenacil). Therefore, of the herbicides available in 1992 only chlorpropham, bentazone, cyanazine, chlorpropham + pentachlor and diquat + paraquat (and these two materials separately) retained approval for use on daffodils. To these were added cycloxdim, a translocated post-emergence oxime herbicide that was recommended for grass weed control when the crop plants are 5-10 cm high. Some daffodils were found to be sensitive to this treatment and spraying a small area first was recommended. Since 2004, more changes have been made, as outlined earlier, which in practical terms has meant that crop management has had to adapt to these circumstances. Many of these enforced changes have a sound basis in protecting the environment by the withdrawal of long term residual or highly toxic herbicides.

It is important to remember that approval for product use is given on an annual basis; all approved herbicides for use on daffodils can be found by reference to the current issue of *The UK Pesticide Guide*, published jointly by the Commonwealth Agricultural Bureaux and the British Crop Protection Council<sup>(5)</sup>. In using the *Guide*, the Crop Guide should be first consulted, where a section on Bulbs and Corms will be found under Flowers and Ornamentals. All herbicides (and other pesticides) for use on bulb and corm crops are listed there. These chemicals can then be found in the section

entitled Pesticide Profiles in which they are listed in alphabetical order. The actual proprietary products approved for use in daffodils will be found under the chemical names.

In common with pesticides in general, the number of approved herbicides available to the professional daffodil grower has also fallen sharply. In 2009, only three herbicides were approved for use on daffodils. Those recommended were as follows:

1. Bentazone – this is a post-emergence, contact herbicide used to control annual dicotyledonous weeds in daffodils. It is most effective if applied when the weeds are growing actively and are less than 5 cm high or across. Split dose applications are permitted and generally provide the best weed control. The weed foliage should be dry and rainfall within a few hours of spraying will result in poor weed control; in addition, the temperature must not exceed 21°C.
2. Chlorpropham – this is a residual herbicide for the control of annual dicotyledons and weed grasses, and is especially effective against Chickweed and Polygonums. Spraying should be carried out on freshly cultivated soil, in the case of daffodils as soon as possible after planting: maximum weed control will only result if adequate rainfall follows spraying.
3. Cycloxdim – this is a translocated herbicide for the control of grass weeds, normally before the crop has emerged. The best results are achieved when the weeds are small, but there must be sufficient foliage surface to ensure ample weed-killer intake. Weeds emerging post-spraying will not be controlled, so timing is all important. Application should be made only when the weed foliage is dry and when no rainfall can confidently be expected in the following two hours. Cycloxdim can be applied in daffodils, post-crop emergence when foliage is 5-10 cm tall but, as cultivar tolerance varies, this should be tested on a small-scale before spraying large areas.

In 2010, the situation changed again. Bentazone and cycloxdim remained but chlorpropham was no longer recommended for use in daffodils. Two new approved recommendations have been made for carfentrazone-ethyl, a contact herbicide for use on non-edible crops prior to planting, and pendimethalin, a residual herbicide with ‘off label’ approval for the control of Knotgrass (*Polygonum aviculare*) in daffodil crops grown for galanthamine production. ‘Off label’ approvals exist not only for weed-killers but also for fungicides, which relate specifically to crops being grown for galanthamine production and clearly indicate the increasing importance of this crop.

This chapter illustrates a rapidly changing picture with regard to both the number and type of herbicides available to the daffodil grower. For the amateur, there is really no alternative to the careful use of the hoe or a spot of hand weeding. The position of the amateur and herbicides is best illustrated by two recent articles in *The Daffodil, Snowdrop and Tulip Yearbook*. In 2009, there was an article entitled “Fungicides for amateur daffodil growers”<sup>(6)</sup>, followed in 2010 by a similar article on insecticides<sup>(7)</sup>. Needless-to-say, an article on herbicides for the amateur did not appear in 2011, so all that is left is the hoe or hand weeding.

Life is no easier for the professional who is left with a mere handful of chemicals, the majority having only contact action, the range of effective residuals of times past no longer being available. This in turn means precise timing for spray applications and the hope that rain does not fall soon afterwards.

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## CHAPTER 27 POSTSCRIPT

It is now 30 years since I was engaged on research at the (New) University of Ulster into the development of the daffodil in Ireland between 1879 and 1979. At that time, I sought the views of the leading hybridists in Ireland on the direction their breeding would take in the future.

Some of their aims were quite specific, relating to the types of daffodil in which their main interest lay (e.g. Harrison and green-centred flowers). Others were of a more general nature relating to a wide range of divisions and factors such as improved flower shape, purity and segregation of colours. In all cases, there was a universal priority to that unseen part of the plant, improvement of bulb quality. Looking back at what I wrote then it is clear to see that many of the objectives have not yet been achieved, although it must be pointed out that 30 years is only a few daffodil generations and no time scale was set when the forecasts of progress were made.

On the other hand some of the cultivars raised in the meantime have met those aspects of the quality required to become successful show flowers and have now begun to replace standard show cultivars that had enjoyed many years of uninterrupted success (e.g. Duncan's 'Goldfinger' and 'Dateline'). Furthermore, there are many more waiting in the wings to take on the mantle of regular winners at the major shows (e.g. Duncan's 'Queen's Guard'). Other cultivars have appeared for which there was no forecast 30 years ago, in divisions in which the hybridist had little or no apparent interest at the time (e.g. Duncan's Division 11 daffodils such as 'Drama Queen' and several others). Within a number of divisions, new colour combinations have appeared (e.g. Duncan's 'Dusky Maiden' 2P-P), while in others an improvement in colour combinations, which were relatively new in the late 1970s, has been achieved (e.g. with yellow and pink daffodils found in Duncan's 'Thistin').

Looking forward into the early part of the 21st century, the following are likely to feature prominently among the successful show cultivars:

1YYW-WWY	'Trumpet Warrior'	(Mitsch, 1980)
1Y-Y	'Ombersley'	(Postles, 1985)
1W-Y	'Queen's Guard'	(Duncan, 1997)
2W-GYP	'June Lake'	(Duncan, 1990)
2W-Y	'Honeybourne'	(Postles, 1994)
2W-YOO	'Neon Light'	(Postles, 1995)
2Y-O	'Millennium Sunset'	(Scamp, 1999)
3W-GWW	'Nice Day'	(Postles, 1987)
3Y-GOO	'Jake'	(Duncan, 1997)
7W-W	'Lady's Choice'	(Duncan, 1995)
11aW-P	'Trigonometry'	(Mitsch, 1979)

Also of importance has been the considerable activity in breeding new colour combinations and the improvement in quality of existing ones, many of these cultivars having appeared during the last 20 years. These may either be or become successful exhibition cultivars in the future or be potential parents for new forms and colours. A few examples are given below:

1W-P	'Pink Silk'	(Havens, 1980)
1YYW-P	'American Heritage'	(Havens, 1983)
1Y-YOO	'Corbiere'	(Lea, 1988)
1Y-YPP	'Filoli'	(Lea, 1991)
2O-ORR	'Loch Leven'	(Lea, 1983)
2O-R	'Limbo'	(Duncan, 1984)
2YYW-Y	'Hambledon'	(J.W. Blanchard, 1985)
2W-P	'New Dawn'	(Lea, 1985)
2P-P	'Dusky Maiden'	(Duncan, 2001)

3O-R	‘Bossa Nova’	(Duncan, 1983)
3W-P	‘Orchard Pink’	(Abel Smith, 1995)
4Y/W-W/Y	‘Doubleday’	(J.W. Blanchard, 1985)
4Y-PPY	‘Eype’	(J.W. Blanchard, 2001)
11aY-Y	‘Tripartite’	(Brook, 1980)
11aW-PPW	‘Diversity’	(Duncan, 1999)
11aW-YPP	‘Drama Queen’	(Duncan, 2000)

Another change that has been quite marked, during the past few years, is the increasing range of daffodil cultivars that are now available to the general public through garden centres. Some of these cultivars were expensive, leading show flowers little more than ten years ago yet today can be obtained almost anywhere at a very reasonable price. Two examples that readily spring to mind are ‘Foundling’ and ‘Tahiti’. Their availability may reflect the increasing use of rapid propagation techniques, but whatever the reason, it can only be good in further popularising the daffodil as one of our leading garden plants.

During the 1980s and 1990s, there has been an increasing appreciation of the value of plant conservation, perhaps to preserve a living record of our garden history or to maintain a gene pool of older varieties that could be of value in future breeding work. This interest in plant conservation resulted in the setting up of the national collections of plants of all kinds during the 1980s. It is pleasing to recall that the Guy L. Wilson Daffodil Garden at the (New) University of Ulster was one of the first to be established and was certainly one of the most comprehensive in those early days with 1700 cultivars. Other national collections of daffodils were established including the Martin Harwood collection at Country Gardens Centre, Windlesham, Surrey and the Alec Gray hybrids at Broadleigh Gardens, Bishops Hull, Somerset, while another has resulted from the consolidation and augmentation of an already existing collection of Brodie cultivars at Brodie Castle, Forres, Scotland.

During this period, there have been many conservation successes, not only in the British Isles but throughout the temperate world. There have been, however, some regrettable failures with at least one large and important daffodil collection being lost, which must be a reminder to be vigilant at all times. To conclude on a thoroughly optimistic note, the story of the rescue of the ‘lost’ *Narcissus* ‘Weardale Perfection’ is related below.

In the mid 1990s, members of the Weardale Society decided to gather together bulbs of the once famous ‘Weardale Perfection’ from various sites within Weardale and the neighbouring Teesdale with a view to carrying out some plantings to celebrate the Millennium. This daffodil had been raised by William Backhouse at Wolsingham in Weardale in the mid-19th century and caused a sensation among Victorian gardeners when it first flowered because of its unprecedented vigour. This was no doubt due to the likelihood that it was a polyploidy and recently its ploidy state has been confirmed as being tetraploid. This newly witnessed level of vigour seen in the 1870s made ‘Weardale Perfection’ an expensive and much sought after cultivar for both garden decoration and breeding purposes.

The search for this cultivar has concentrated on estates and gardens that had Backhouse connections and, by 1998, a large collection of old daffodils had been gathered together in a trial plot in Weardale. Now came the work of separating the ‘wheat from the chaff’, in other words finding the authentic ‘Weardale Perfection’. Many plants in the plot were weeded out without much difficulty, but ultimately there remained a good number of ‘Weardale Perfection’ look-alikes as they came to be known. Because this cultivar was such a sensational break from what had gone before, it had been very well described to such an extent that dimensions of actual flower parts were available. Based on this information an ‘identikit’ containing 21 points of similarity was devised and this eliminated all but one plant. Was this the last remaining plant in Weardale of the once widespread stock of ‘Weardale Perfection’, which a century earlier had thrived in gardens the length and breadth of the country?

Although some of the look-alikes were very similar to this ‘best-match’ plant it was decided that the best way forward was to produce clonal stock from this single plant. From the initial bulb, 60 bulbils were produced by twin-scaling in two propagations and, when large enough, some of these were used to bring the total to something in excess of 500. By 2007, many of these were large enough to plant out in time to celebrate properly the birth of the pioneering hybridist William Backhouse. The bulbs were planted mostly in the grounds of the parish church of St Mary and St Stephen in Wolsingham, Co. Durham but, in keeping with good conservation practice, some were planted in other recorded places within Weardale, others going to a national collection and a university botanic garden. In the spring of each year since the planting, the bulbs have grown and flowered well, not only raising much media interest but hopefully giving a lot of pleasure to local residents and visitors alike.

My career working with daffodils over several decades has always been a joy and much of the time I feel it has been a privilege – and all began by chance, although it often felt like destiny. To have been able to work with the hand written records of Guy Wilson and Lionel Richardson was fantastic and to have been able to talk to their right hand men in John Shaw and Jack Goldsmith was special. Working on the Burbidge papers found in Dublin in 1982 was also quite special as these had probably lain undiscovered for at least 100 years. The letters from Engleheart threw much light on the origins of pink colouration in cultivars through his Leedsii hybrids and this tied in with later scientific findings. Then, when officially retired, to have the opportunity to work on the ‘Weardale Perfection’ project was the icing on the cake – not only in its rediscovery and re-establishment but also in its determination as a tetraploid, the earliest recorded daffodil cultivar with 28 chromosomes. This made ‘Weardale Perfection’ the pioneer cultivar in the process that was to change the face of daffodils. What we must remember, however, is this increase in chromosome numbers has been going on in all plants since man first settled and began to grow plants, the process adding vigour that allowed the selection of superior types and thereby continual improvement long before the science behind these changes was understood. That the history of daffodil development since the 19th century and all the immaculate records kept by the hybridists concerned should help in throwing some light on this process is in itself interesting but if it does not interest you just enjoy the daffodils and the renewal of spring that they herald. Daffodil hybridists will continue to produce the novel and strive for a new perfection (Plate 27.1) just as they have done over the past 200 years.



**Plate 27.1.** Into the future – two modern seedlings.

## Coming Full Circle

In its distant history, daffodils were important medicinal plants in the herb gardens and monasteries of Europe.

In 1998, American scientists announced the results of trials with the drug galanthamine at a conference in the Netherlands. These trials had demonstrated the ability of galanthamine, which is obtained from daffodil bulbs, to halt deterioration in patients suffering the early symptoms of Alzheimer’s disease.

Daffodils, which for millennia have heralded renewal with the passing of winter and the coming of spring now offer a gleam of hope for sufferers of this affliction. Full circle, indeed.



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In writing this book, I have had access to many sources of information, both published and unpublished as well as correspondence. The following list includes all such sources not formally cited and referenced in the main text. For manuscript sources, I have indicated where they are currently located (this includes a small number of items, e.g. Wilson's Record books that are cited in the main text).

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## NARCISSUS SPECIES AND INTERSECTIONAL HYBRIDS

The species and intersectional hybrid names in the following list refer to those names found in the main body of the text.

*abscissus*

× *abscissus*

*albescens*

*alpestris*

*assoanus*

*asturiensis*

*atlanticus*

× *bernardii*

*bertolonii*

*bicolor*

*bulbocodium*

*bulbocodium* var. *citrinus*

*bulbocodium* var. *conspicuus*

*bulbocodium* subsp. *obesus*

*bulbocodium* var. *tenuifolius*

*calcicola*

*cantabricus*

*cantabricus* var. *foliosus*

*cantabricus* subsp. *monophyllus*

*cavanillesii*

*cuatrecasatii*

*cyclamineus*

*dubius*

*elegans*

*fernandesii*

*fernandesii* var. *cordubensis*

*hipanicus*

*hispanicus* var. *propinquus*

*hispanicus* var. *spurius*

*humilis*

× *incomparabilis*

× *intermedius*

× *johnstonii*

*jonquilla*

*jonquilla* var. *henriquesii*

*jonquilla* var. *minor*

*jonquilla* var. *stellaris*

*juncifolius*

× *medioluteus*

*miniatus*

*minor*  
*minor* var. *conspicuus*  
*minor* var. *pumilus* f. *fimbriatus*  
*moschatus*  
× *muticus*

*nanus*  
*nobilis*

*obvallaris*

*pallidiflorus*  
*panizzianus*  
*papyraceus*  
× *poculiformis*  
*poeticus*  
*poeticus* var. *hellenicus*  
*poeticus* var. *recurvus*  
*pseudonarcissus*  
*pseudonarcissus* var. *humilus*

*radiiflorus*  
*radiiflorus* var. *exertus*  
*radiiflorus* var. *poetarum*  
*radiiflorus* var. *stellaris*  
*requienii*  
*romieuxii*  
*rupicola*  
*rupicola* var. *watieri*

*scaberulus*  
*serotinus*

× *taitii*  
*tazetta*  
*tazetta* subsp. *aureus*  
*tazetta* subsp. *lacticolor*  
*tazetta* subsp. *ochroleucus*  
*tortuosus*  
*triandrus*  
*triandrus* var. *cernuus*  
*triandrus* var. *concolor*  
*triandrus* var. *loiseleurii*  
*triandrus* var. *pallidulus*  
*triandrus* var. *pulchellus*

*viridiflorus*

*willkommii*



## ***NARCISSUS CULTIVARS***

The cultivar names in the following list refer to those names found in the main body of the text.

Accent	Armada
Acclamation	Armidale
Acme	Armynel
Achduart	Arndilly
Acropolis	Arriba
Actaea	Artillery
Admiration	Ascot
Advocat	Ashmore
Afficionado	Askelon
African Sunset	Astrid's Memory
Aircastle	Audubon
Akala	Autumn Glow
Akepa	Avalanche
Alamein	Ave
Alight	Avenger
Almira	
Alray	Baby Moon
Alroi	Backhouse's Giant
Altruist	Badbury Rings
Altun Ha	Badenloch
Alys	Bahram
Amazing Grace	Balalaika
Ambergate	Ballygarvey
Amberglow	Ballyrobert
American Dream	Ballywalter
American Frontier	Balvenie
American Heritage	Banbridge
American Phoenician	Bandit
American Shores	Bandolier
Ancona	Banker
Andalusia	Barbados
Andrew Marvell	Barcarolle
Angel	Bar None
Anthea	Barnesgold
Apple Honey	Barnsdale Wood
Apricot	Barrii Conspicuus
April Love	Bastion
April Tears	Bayard
Aranjuez	Beacon
Arbar	Beauty of Radnor
Arctic Doric	Beauvallon
Arctic Gold	Beersheba
Ardbane	Ben Alder
Ardclinis	Benediction
Arish Mell	Bengal Tiger
Arkle	Ben Hee
Ark Royal	Ben Loyal
Arleston	Ben Rinnes
	Ben Vorlich

Beryl  
Best Friend  
Bethany  
Big Boy  
Binkie  
Bishop Mann  
Bizerta  
Black Prince  
Blackwell  
Blarney  
Blarney's Daughter  
Blisland  
Bobbysoxer  
Bold Lad  
Bonnington  
Border Chief  
Borrobol  
Boslowick  
Bossa Nova  
Bravoure  
Brer Fox  
Bridal Robe  
Brindisi  
Broadford  
Broadway Village  
Broomhill  
Broughshane  
Brunswick  
Bryher  
Bunclody  
Bunting  
Burning Bush  
Burntollet  
Butter and Eggs  
Buttercup  
Butterscotch  
Buttonhole

Caerhays  
Cairntoul  
Camelot  
Campion  
Canasta  
Candida  
Canisp  
Cantabile  
Cantatrice  
Cape Cornwall  
Cape Kennedy  
Cape Point  
Caprice  
Caracas  
Carbineer  
Careysville  
Carib

Caribbean Snow  
Carib Gipsy  
Carintha  
Carlton  
Carnival  
Carole Lombard  
Cassandra  
Cassata  
Casterbridge  
Castle of Mey  
Causeway Sunset  
Cavalryman  
Celestial Fire  
Celilo  
Ceylon  
Chanson  
Charity May  
Charter  
Chaucer  
Checkmate  
Cheerfulness  
Chief Inspector  
Chiloquin  
China Doll  
Chinese White  
Chinita  
Chobe River  
Chortle  
Chromis  
Chungking  
Churchman  
Citronita  
City Lights  
C.J. Backhouse  
Claverley  
Clockface  
Clubman  
Cock Robin  
Cocktail  
Codlins and Cream  
Cold Overton  
Colleen Bawn  
Colley Gate  
Columbine  
Comal  
Comus  
Content  
Coolattin  
Cool Autumn  
Cool Crystal  
Coolgreany  
Contravene  
Copper Rings  
Corbiere  
Corky's Song

Cornell  
Corlo  
Coronach  
Corsair  
Cotterton  
Cotton Puff  
Counsellor  
Courage  
Court Martial  
Cragford  
Craigyarren  
Crackington  
Crater  
Creag Dubh  
Crepello  
Crimpelene  
Crimson Braid  
Crimson Chalice  
Cristobal  
Crocus  
Croesus  
Cromarty  
Crossbow  
Crowndale  
Cryptic  
Cul Beag  
Cupid's Eye  
Cushendall  
Cyclades  
Cyclataz  
Cyros

Dactyl  
Dailmanach  
Dainty Miss  
Dalhuaine  
Dallas  
Damson  
Dante  
Dateline  
Daviot  
Dawnglow  
Dawson City  
Daydream  
Debutante  
Delnashaugh  
Delos  
Delta Wings  
Demand  
Dena  
Dervish  
Descanso  
Dickcissel  
Diolite  
Disquiet

Distingue  
Diversity  
Doctor Hugh  
Don Carlos  
Dorchester  
Doubleday  
Double Event  
Double Vision  
Dove of Peace  
Dover Cliffs  
Dove Wings  
Downpatrick  
Drama Queen  
Dreamlight  
Dress Circle  
Driven Snow  
Dromona  
Drumboe  
Dubloon  
Dulcimer  
Dunkeld  
Dunkery  
Dunlewey  
Dunley Hall  
Dunmurry  
Dunskey  
Dusky Maiden  
  
Earl Grey  
Early Mist  
Early Sensation  
Earthlight  
Easter Moon  
Eastern Promise  
Effective  
Eggs and Bacon  
Elizabeth Ann  
Elmwood  
Elphin  
Elvira  
Emerald Sea  
Emperor  
Empress  
Empress of Ireland  
English Caye  
Enniskillen  
Entente  
Entrancement  
Entrepreneur  
Epic  
Eribol  
Estremadura  
Ethos  
Evening  
Everest

Evesham  
Eyeglass  
Eyelet  
Eype  
Eyrie  
Eystettensis  
  
Fairlight Glen  
Fairmile  
Fair Prospect  
Fairy Nymph  
Fairy Tale  
Falaise  
Falstaff  
Fanflare  
Fanny Currey  
Fantasie  
Faraway  
Fayum  
February Gold  
February Silver  
Felindre  
Ferndown  
Festivity  
Feu de Joie  
Fiery Flame  
Figaro  
Fiji  
Filoli  
Finch  
Fiona McKillop  
Fionn  
Fire Blade  
Firecracker  
Firemaster  
Fireproof  
Fire Rocket  
Flight  
Flomay  
Flying Nun  
Folly  
Foresight  
Forfar  
Fortune  
Fortune's Crest  
Foundling  
Foxhunter  
Fragrant Rose  
Frigid  
Frileuse  
Frolic  
Front Royal  
Fury  
  
Gallipoli

Galway  
Garron  
Gaybrook  
Gay Buccaneer  
Gay Cavalier  
Gay Challenger  
Gay Kybo  
Gay Record  
Gay Song  
Gay Symphony  
Gay Time  
Gay Trip  
George Herbert  
George Leak  
Geranium  
Gettysburg  
Gilfach  
Gin and Lime  
Gipsy Queen  
Glen Alladale  
Glendalough  
Glendarroch  
Glendermott  
Glenfarclas  
Glen Lake  
Glen Rothes  
Glenshesk  
Gloria Mundi  
Gloriosus  
Glorious  
Glory of Leiden  
Glory of Lisse  
Goff's Caye  
Goldbeater  
Gold Convention  
Goldcourt  
Golden Amber  
Golden Aura  
Golden Bells  
Golden Clown  
Golden Dawn  
Golden Harvest  
Golden Horn  
Golden Incense  
Golden Ingot  
Golden Jewel  
Golden Joy  
Golden Pedestal  
Golden Pond  
Golden Prospect  
Golden Rapture  
Golden Spur  
Golden Torch  
Golden Vale  
Goldfinger

Goldhanger	Horsfieldii
Gold Ingot	Hospodar
Goodwill	Hotspur
Gracious Lady	Ice Wings
Grandis	Inca
Grand Monarque	Infatuation
Grand Primo Citronière	Interim
Grand Prospect	Intrigue
Great Expectations	Inverpolly
Greenheart	Irene Copeland
Green Island	Irani
Greeting	Irish Light
Grey Lady	Irish Luck
Guardian	Irish Minstrel
Gulliver	Irish Ranger
Gypsy	Irish Rose
	Irish Splendour
Hades	Ivy League
Halgarry	
Halingy	Jake
Halolight	Jamestown
Hambledon	Jaune à Merveille
Hamzali	Jenny
Hanbury	Jersey Roundabout
Happy Valley	Jessamy
Hartlebury	Jetfire
Harvest Moon	Johnnie Walker
Havelock	John Peace
Hawaii	Jovial
Hawera	Joybell
Hebron	J.T. Bennett-Poe
Helen Falconer	Juliet
Helen O'Hara	Jumble
Helford Down	June Lake
Helios	
Henry Irving	Kamau
Hero	Kanchenjunga
Herrick	Karamudli
Hesla	Karanja
Heslington	Kasia
Hexameter	Kelanne
Hiawassee	Kelpie
Highdown Bells	Kenellis
Highfield Beauty	Kenmare
Highland Wedding	Kentucky Cardinal
High Society	Kewpie Sprite
Holme Fen	Kibo
Home Fires	Kildrum
Homer	Killaloe
Honduras	Killearnan
Honeybird	Killigrew
Honeybourne	Kilmurry
Honeycomb	Kilworth
Honeyorange	Kimmeridge
Horace	Kinbrace

King Alfred  
King of May  
King of the North  
King's Grove  
King's Pipe  
King's Ransom  
King's Stag  
Kingscourt  
Kingsley  
Kiwi Sunset  
Knightwick  
Knowehead  
Korora Bay  
Krakatoa

Ladies Choice  
Ladybank  
Lady Eve  
Lakeland Fair  
Lalique  
Lanarth  
Lancaster  
Lapine  
Larkelly  
Last Out  
La Tosca  
Laura  
Laureate  
Laurens Koster  
Lavalier  
Lavender Lass  
Lawali  
Leaping Salmon  
Leda  
Lemonade  
Lemon Doric  
Lemon Drops  
Lemon Silk  
Lemon Tarts  
Lennymore  
Leonora  
Liberty Bells  
Lieberslied  
Lighthouse Reef  
Lilac Charm  
Limbo  
Limeade  
Limerick  
Lintie  
Lisbane  
Lisbreen  
Little Barry  
Little Beauty  
Little Goldfinch  
Little Prince

Little Rusky  
Little Soldier  
Liverpool Festival  
Loch Alsh  
Loch Assynt  
Loch Broom  
Loch Brora  
Loch Carron  
Loch Coire  
Loch Hope  
Loch Leven  
Loch Lundie  
Loch Maree  
Loch Naver  
Loch Owskeich  
Loch Stac  
Loch Turnaig  
Lochinvar  
Loch Kitchener  
Lord Roberts  
Lough Areema  
Loyalist  
Ludlow  
Lullaby  
Lunar Sea

Mabel Taylor  
Madame de Graaff  
Magna Carta  
Magnificence  
Mahmoud  
Maid of Ulster  
Majestic Star  
Manna  
Marietta  
Marionette  
Marjorie Treveal  
Market Merry  
Marksman  
Marquis of Headfort  
Marychild  
Mary Copeland  
Masai King  
Matapan  
Matlock  
Matthew Arnold  
Medio Luteo d'Harlem  
Medio Luteo van Dyk  
Menabilly  
Menehay  
Merlin  
Merry Widow  
Mervyn  
Mexico  
Mikado

Milan  
Milestone  
Milk and Honey  
Millennium Sunset  
Mill Grove  
Millie Price  
Minnie Hume  
Minnow  
Miss E.M. Bowling  
Misty Glen  
Misty Moon  
Mitylene  
Monaco  
Monarch  
Moneymore  
Monkstown  
Montego  
Monterrico  
Montevideo  
Moonbeam  
Moon Goddess  
Moongold  
Moonlight Sonata  
Moon Shadow  
Moonstruck  
Moriaty  
Mott's Mill  
Mount Angel  
Mount Hood  
Mozart  
Mr Cowan  
Mrs Ernst H. Krelage  
Mrs George Cammell  
Mrs Harrison Weir  
Mrs Langtry  
Mrs Oscar Ronalds  
Mrs R.O. Backhouse  
Mrs William Copeland  
Mullion  
Muslin  
Mystic  
  
Nacre  
Nampa  
Namsos  
Nantucket  
Narvik  
Naxos  
Nazareth  
Neon Light  
Nevis  
Newcastle  
New Dawn  
New Moon  
Nice Day

Nigeria  
Nightflight  
Niphetos  
Niveth  
Nonchalant  
Northern Sceptre  
Norval  
Nylon  
Nymphette  
  
Ocarino  
Olympic Gold  
Ombersley  
Omri  
Once-in-a-While  
Orange Phoenix  
Orange Ring  
Orangery  
Oratorio  
Orchard Pink  
Orchard Place  
Oregon Pioneer  
Orion  
Ormeau  
Oryx  
Osmington  
Outline  
Outward Bound  
Owston Wood  
Oz  
  
Pacific Rim  
Painted Desert  
Palestine  
Panache  
Paper White  
Papillon Blanc  
Papua  
Parisienne  
Parkmore  
Park Springs  
Parsifal  
Parthia  
Parua  
Passe Bazelman  
Passionale  
Patabundy  
Patagonia  
Patois  
Patsy  
Pearl of Kent  
Peeping Tom  
Peiping  
Pencrebar  
Pennant

Pennine Way  
Penpol  
Penquite  
Pequenita  
Perdita  
Perimeter  
Peter Barr  
Philip Hart  
Phoenician  
Piccolo  
Pink Champagne  
Pink Chiffon  
Pink Cloud  
Pink Gin  
Pink Mink  
Pink Monarch  
Pink Pageant  
Pink Panther  
Pink Paradise  
Pink Perry  
Pink Silk  
Pinkess  
Pinklette  
Pink o' Dawn  
Pink 'un  
Pin Money  
Pinza  
Pipe Major  
Pipit  
Pirate King  
Pismo Beach  
Plenipo  
Plumeleteer  
Poet's Way  
Poet's Wings  
Pol Crocan  
Polindra  
Pol Voulin  
Polonaise  
Pooka  
Poplin  
Poppy's Choice  
Pop's Legacy  
Porthchapel  
Porthilly  
Powerstock  
Premiere  
Prestige  
Primo Citronière  
Primo de Munk  
Primo Jaun  
Primo Madouce  
Primrose Cheerfulness  
Prince Charming  
Princess Mary

Principal  
Privateer  
Prologue  
Prometheus  
Punchline  
Purbeck  
Pure Joy  
Purity  
  
Queen of Ulster  
Queen's Guard  
Quetzal  
Quick Step  
Quiet Waters  
Quince  
  
Raeburn  
Rainbow  
Raindrop  
Rameses  
Random Light  
Rapture  
Rashee  
Rathowen Gold  
Rathkenny  
Red Goblet  
Red Hot  
Red Ranger  
Red Rum  
Red Squirrel  
Relko  
Replete  
Reprieve  
Revelry  
Reverend Charles Digby  
Rhine Maiden  
Rhyminster  
Riber  
Rijnveld's Early Sensation  
Rima  
Ring Fence  
Ringleader  
Ringmaster  
Rio Rouge  
Rippling Waters  
Rip van Winkle  
Ristin  
Roberta Watrous  
Rockall  
Rockery White  
Romance  
Rosario  
Roseate Tern  
Rose Caprice  
Rosedown



Rose of Tralee  
Rose Royale  
Rosewall  
Roseworthy  
Rossini  
Rouge  
Royal Charger  
Royalist  
Royal Mail  
Royal Marine  
Royal Princess  
Royal Ransom  
Royal Regiment  
Royal Ruby  
Royal Sovereign  
Rubh Mor  
Rubythroat  
Ruskin  
Rustom Pasha  
Rutland Water

Sabine Hay  
Sacramento  
Saint Agnes  
Saint Egwin  
Saint Keverne  
Saint Piran  
Salmon Trout  
Salome  
Samantha  
Samaria  
Samba  
Samite  
Samsara  
Santana  
Sarchedon  
Sargeant's Caye  
Sassy  
Savoir Faire  
Scarlet Elegance  
Scarlet Gem  
Scilly White  
Scoticus  
Sea Dream  
Sea Horse  
Sealing Wax  
Sedate  
Sennocke  
Seraglio  
Seraph  
Serendipity  
Sevenoaks  
Shandon  
Sharnden  
Sheelagh Rowan

Sheer Joy  
Shepherd's Hey  
Shining Light  
Shrew  
Shurdington  
Silent Beauty  
Silent Charm  
Silent Cheer  
Silent Glow  
Silent Grace  
Silent Morn  
Silent Valley  
Silent Wonder  
Silk Stocking  
Silken Sails  
Silver Bells  
Silver Chimes  
Silversmith  
Silverspring  
Sir Watkin  
Skiffle  
Slemish  
Slieveboy  
Slowcoach  
Smokey Bear  
Smyrna  
Snow Bunting  
Snowdrop  
Snow Magic  
Socrates  
Soft Focus  
Solar Tan  
Soleil d'Or  
Solid Gold  
Solstice Star  
Solveig's Song  
Sonata  
Sorley Boy  
Spellbinder  
Spitzbergen  
Splendour  
Spofforthiae  
Stafford  
Stainless  
Standfast  
Stanway  
Starfire  
Star Trek  
State Express  
Statue  
Stella Turk  
Step Forward  
Stephen Phillips  
Stocken  
Stormy Weather

Stourbridge  
Strathrowan  
Stratosphere  
Strines  
Stromboli  
Suave  
Sugar and Spice  
Sulphur Phoenix  
Sulphur Prince  
Summer Breeze  
Sunapee  
Sun Chariot  
Sun Disc  
Sundial  
Sun Dust  
Sunkist  
Sunproof Orange  
Sunrise  
Sunstar  
Suzy  
Swansdown  
Sweet Georgia  
Sweetness  
Sweet Pepper  
Sylvia O'Neill  
Symphony  
Syracuse

Taffeta  
Tahiti  
Tain  
Takoradi  
Tamara  
Tamsyn  
Tania  
Tao  
Tapin  
Tarlatan  
Tasgem  
Tehidy  
Tenedos  
Teneriffe  
Tête-à-Tête  
Thalia  
The Nun  
Thoresby  
Tibet  
Tidd-Pratt  
Tiffany Jade  
Tinker  
Titania  
Tittle-Tattle  
Tobernaveen  
Tonga  
Top Notch

Toreador  
Torridon  
Tradition  
Tregoose  
Trelay  
Trena  
Tresamble  
Trevisky  
Trevithian  
Trewirgie  
Tricollet  
Trigonometry  
Tripartite  
Triple Crown  
Trostan  
Trousseau  
Trumpet Warrior  
Truth  
Tudor Minstrel  
Tuesday's Child  
Tulyar  
Tutankhamun  
Twicer  
Twilight Zone

Ulster Bank  
Ulster Prince  
Uncle Duncan  
Uncle Remus  
Undertone  
Unique  
Unsurpassable  
Upalong  
Upper Broughton

Valdrome  
Valhalla  
Van Sion  
Verdin  
Verlene  
Verona  
Victoria  
Victory  
Viennese Rose  
Vigil  
Vigilante  
Viking  
Virgil  
Viscountess Falmouth  
Volcano  
Vulcan

Walt Whitman  
Warlock  
Waterperry

Weardale Perfection  
Weldon Pond  
Whang-Hi  
Whipcord  
Whiteadder  
White Convention  
White Dame  
White Empress  
White Knight  
White Nile  
White Prince  
White Sentinel  
White Star  
Wild Rose  
Willow Green  
Will Scarlett  
Winged Victory  
Winter Waltz  
Wishing Well  
Woodgreen  
Woodland Beauty  
Woodland Belle  
Woodland Charm  
Woodland Elf  
Woodland Gem  
Woodland Jewel  
Woodland Knight  
Woodland Splendour  
Woodland Star  
Workman  
Wychavon  
Wychbold

Xit

Yellow Cheerfulness  
Yellowthroat  
York Minster  
Young American  
Young Blood

Zero

## GENERAL INDEX

2, 6-dichloro-4-nitrophenol

Abel Smith, Mrs B.

Aberconway, Lord

*Acyrtosiphon pisum*

*Aecidium narcissi*

Akbar

Ain-i Akbari

Aldrin

Amaryllidaceae

American Daffodil Society

American Daffodil Society, classification

American Daffodil Society, data bank

Anderson, E.

Andrews, Clarrie

*Anguillina dipsaci*

Anthocyanins

Anthoxanthins

*Aphelenchoides subtenuis*

*Aphis fabae*

Arabis Mosaic

*Arion hortensis*

Aslabie, John

Awards (to daffodils)

Babur, Emperor

*Babur-nama*

Backhouse, Charles James

Backhouse, Henry

Backhouse, Mrs Robert Ormston

Backhouse, Robert Ormston

Backhouse, William

Backhouse, William Ormston

Bacon, Francis

Baker, J.G.

Barr, Peter

Basal Rot

Bastard daffodils

Bauhin, Johann

Bed system of planting

Beirne, Miss M.

Bell, David S.

Benomyl

Bentazone

Benzyl adenine

Blaauw, Professor A.H.

Black Bean Aphid

Blanchard, David

Blanchard, John

Bloomer, Tom

Board, Fred E.

Booth, Professor V.H.

Bourne, Christopher

Bourne, Revd Stephen E.

Bowles, E.A.

Brandham, Dr Peter

Broad Bean Wilt Virus

Brodie of Brodie

Brogden, G.W.E.

Buckingham, Duke of

Buckland, L.

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Chlorethylphosphonic acid

Chloridazon

Chlorpropham

Chlorpropham-fenuron-cresylic acid

Chlorpropham-pentanochlor

Chocolate Spot

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