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JULY 1954

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FURMAN LLOYD MULFORD

Mr. Furman L. Mulford, one of the founders of The American Horticultural Society, who retired from the United States Department of Agriculture in 1939, died at Saint Petersburg, Florida, on November 12, 1953, at the age of eighty-four. He was second President of the Society, serving from 1926 to 1928, during its early and formative years.

Mr. Mulford was a well-known horticulturist who propagated hardy perennials, early flowering chrysanthemums, and other ornamentals. He wrote numerous bulletins on rock gardens, flowering perennials, landscaping and roadside planting. Born in New Jersey, he was graduated from Cornell University, and began work in Washington, D. C., in 1911.

As early as 1925, Mr. Mulford's paper on *Roses for the Home* was published in the second of the Society's earlier Bulletin series. Later contributions to *The National Horticultural Magazine* included a tribute to Doctor Walter Van Fleet, which appeared in the April 1929 issue. He wrote the rose book, Farmers' Bulletin 750, in 1916. It was superseded in 1953 by the highly popular Home and Garden Bulletin No. 25, *Roses for the Home*. One of his chrysanthemums, the 'Algonquin,' is still a favorite in the District of Columbia.

The American Horticultural Society owes a special debt to Mr. Mulford for his efforts in the organization of the Society and his work in the early planning of the Society's programs and aims.



# Herbs From The Mediterranean Littoral

HELEN M. FOX

Last spring, when I visited Epidaurus in Greece, where Asclepius had his sanitarium, or a few weeks earlier, had walked along the shores of Lake Kinnereth, as the Sea of Galilee is called today, events that occurred two to five thousand years ago did not seem at all far away. Closeness to bygone ages was particularly real when I saw plants I raise in my own New York garden, such as parsley, rue, sweet marjoram, the thymes, and mints, growing wild or in gardens and noted how they were being dried and used for the same flavors, perfumes and foods and processed to provide medicine for the same illnesses as they have been since before the beginning of history.

Most herbalists, and I among them, have begun their studies with the herbals of the sixteenth century. In the Near East, however, one is very much aware that written records began a thousand or so years earlier. For source material, there is the *Bible*, but of more value to the botanist are the writings of Dioscorides and Theophrastus. According to Agnes Arber in her book, *Herbals*, these two summed up all known materia medica of their time and dominated the field until the sixteenth century. Dioscorides came from Cilicia in Asia Minor, lived in the first century A.D., traveled widely, and is alleged to have been the physician to Anthony and Cleopatra. I turned to him because he knew Greek medicine as it was practiced by Asclepius and his descendants from about six hundred B.C. for twelve hundred years. I used R. T. Gunther's Dioscorides published at Oxford in 1934. A valuable book on

Asclepius was compiled by Emma J. and Ludwig Edelstein, entitled *Asclepius, A Collection And Interpretation of the Testimonies*, and published by the Johns Hopkins Press in 1945. They took this material from the testimonies, written by cured patients, found in the ruins during the excavations at Epidaurus, which were begun in 1881 by the Greek Government and are still in progress. To these findings, they added gleanings from contemporary Greek and Latin writers. The testimonies were described in the second century by Pausanias, who visited Epidaurus and said there were six in existence and that they were written in the Doric dialect. The Edelsteins present forty-three. These testimonials tell the patient's name, describe his disease and how he was cured.

Other sources on Near Eastern medicinal plants are the writings of the great Spanish-Arabic doctor, Ibn Bai-thar, who lived in the tenth century. When I was in Israel, Dr. Michael Zohary gave me a list he and Naomi Feinbrunn had compiled from botanies in 1930, in order to advance their search for plants valuable today. Dr. Zohary also gave me a delightful and valuable book written by a native Palestinian, Louise Baldensperger, with Grace M. Crowfoot, entitled *From Cedar to Hyssop* and published by The Sheldon Press, London, 1932. I also used G. Post, *Flora of Syria, Palestine and Sinai*, 1896, and, of course, Rehder, Bailey, — the Dictionary and Cyclope-dia.

The land in Israel (I call it that, when referring to the new country, but Palestine, when speaking of the whole area as well as the land before 1948) is

GOTTSCHO-SCHLEISNER

← *Vitex agnus-castus*

fertile in the north and along the coast where there are quantities of lush plants growing wild. As in California, the desert portions require only water to produce fine crops. Almost immediately after trees have been planted in desert regions, adventitious plants appear in their shade and birds come to nest. Undoubtedly in a short time the whole countryside will be as colorful with wild flowers as the more moist hills and valleys are now. The height of bloom is in March and April. Hybrid tea roses begin to bloom in October and keep on into June. Summer is very dry.

In Greece there is very little rain and most of the land is stoney and mountainous.

In early days, for I cannot call the people who came at the beginning of history "ancient" or "olden," Hellas and her colonies spread out into Asia Minor and along North Africa. The story of medicine, there, centers about Asclepius and his descendants, their shrines and temples. The sanitarium at Epidaurus, where Asclepius is said to have been buried, is on the Peloponesus not far from Mycenae, the home of Agamemnon, or from Argos, whence Jason set out to find the Golden Fleece, reputedly accompanied by the great doctor.

Patients came to the sanitarium in early days, on an eight-mile road across the hills from the coastal city of Epidaurus, which no longer exists. Today it is reached by a bumpy road that leads through olive orchards and farms from the picture-book town of Nauplia situated on a bay off the Ægean Sea. In spring, the sides of the road are pink and white with blossoming cherries, in a brilliant contrast to the black costumes of peasant women. The land is scantily covered with low colorful plants, some of them long since introduced to European and American gar-

dens, such as *Ornithagalums*, grape hyacinths, and vividly colored anemones. In Attica in spring, the fields were gay with many plants, such as *Aubrietia*, *alyssums*, brooms, rosemary, and quantities of low vetches with bright flowers.

The site of the "Heiron," as the sanitarium was called, is a ruin except for the theatre considered to be the finest and best preserved in Greece. The temple was dedicated to Asclepius and is said to date from 400 B. C. The visitor is shown ruins of an inn for relatives of patients, of baths, the stadium and gymnasium, all indicative of how Greeks cured illness mainly by making the body strong and well. The most famous buildings were the circular Tholos, considered to be one of the most beautiful structures in Greece, and the Abaton, a two-storied portico situated against the side of a hill where the patients slept the night they saw the God in their dreams and awakened, cured, the next morning.

It seems strange the patient should be cured in one night. But, before he or she went into the Abaton, they had to be purified. According to one authority, this purification consisted in thinking holy thoughts; others mention purifying baths, cleansing of the body by diets, and engaging in violent exercise. In some cases it took a very short time to be purified and in others several weeks or months.

In a speech in honor of Asclepius quoted by the Edelsteins, Aristides spoke as follows: "Now ourselves he has likewise distinguished in this way, stopping catarrh and colds by baths in river and in the sea, healing us through

MARGARET DE M. BROWN

*Lavendula vera* (*Santolina chamaecyparissus* in foreground)

*Papaver somniferum*

*Marrubium vulgare*

*Ocimum basilicum*







long walks when we were helplessly bedridden, administering terrible cleansings on top of continuous abstinence from food, prescribing that I should speak and write when I could hardly breathe so that if there is any cause for boasting for those who have been healed in such a way, we certainly have our share in this boast."

According to Plato, in the Republic, Asclepius is reputed not to have charged the poor any fee and to have advised those who were intemperate not to avail themselves of his medicine. If he did not think they could be healed, he would not treat them though they might be richer than Midas.

Because of his marvelous cures and discoveries, Asclepius was deified after his death. He is credited with originating the art of surgery, the invention of the bandage and the probe. According to one tale, he was the first to prepare drugs and discover the potency of herbs; according to another, he learned how to use herbs from Chiron, the centaur and son of Saturn. He is said to have restored the dead to life, notably Hippolytus. His third son is reputed to have been the first to use purges and extract teeth. Shortly before his time, to explain the presence of so many medicinal herbs, it is told how Medea, while fleeing through the Thessalian plain, spilled her drugs, thus causing the land to abound in healing herbs, which proved of benefit to Greeks as well as Barbarians.

There are several stories about the birth and education of Asclepius. All agree his mother was the mortal Caronis and his father Apollo. He was called the gentle God and, sometimes, the Paeonian God (which means God of healing and is the source for the name of peony). His wife was Epione, which signifies the alleviation of troubles through soothing simples. One son, Machaon, was a surgeon and was

killed in the Trojan war. The other, Podalirius, worked on diet and was called herb gatherer because he studied flowers diligently. Both these sons used healing salves on warriors wounded in that famous war. The other children were Oaso, Panacea, and Hygeia. Asclepius' descendants were doctors, Hippocrates, being seventeenth in descent from him. At first the word "Asclepiad" meant a member of the family but later it meant a physician.

Dressed in white, with flowing hair, Asclepius led processions to the temple of Apollo, followed by marchers bearing garlands of laurel and tender olive shoots. He carried a gnarled staff to signify the difficulty of his art. The snakes associated with him are sometimes explained as indicating how the patient sloughs off his sick self when he becomes well.

The sweet bay, *Laurus nobilis*, of which crowns were made, is the green bay tree of the Bible. It is a beautiful tree, native to these regions, with brittle, pointed and crisp-feeling leaves that have a distinctive pleasant flavor. Oil from the berries is more pungent than from the leaves and is made into salves used today principally for veterinary purposes. The leaves were used as incense and have long flavored many dishes. The leaves of *Olea europaea*, wild olive, are reputed to be of value in reducing fevers. Sometimes they are mixed with elecampane and rue in a steam bath for rheumatism. On many occasions, oak leaves were substituted for laurel leaves and olive shoots. There is an order, "Let the priest sacrifice frankincense on the altar of Asclepius and let him use the olive branch and oleander in the temple for crowns."

Tall, evergreen bushes of oleanders, *Nerium oleander*, grow wild in the whole Mediterranean area. Sometimes they are disposed along the shores of lakes and I have seen them in valleys

in Spain. They are thought to have been meant when "willow" is mentioned in the *Bible*. They are easily rooted by cutting off a shoot and placing it in water. Today in Israel and also in Greece, oleanders, because they grow so quickly and have lovely flowers which last in bloom for considerable time, have been planted to line roadsides in the country and avenues in towns. The leaves are considered a remedy for heart disease and are said to be poisonous to cattle and to have destroyed rats.

A patient records how, when frankincense was scarce, he stuffed partridges with barley and laurel leaves. Myrrh and frankincense are mentioned frequently in the *Bible*. Frankincense was called *olibanum* and used in the form of a gum, which comes from *Boswellia carteri* and *B. frereana*, both native to Somaliland and Arabia. Myrrh comes from the same region. It is also an aromatic resin and is taken from *Commiphora abyssinica*. This was sometimes mixed with oil of labdanum, which is derived from a cistus and is used today not as an incense but in dentifrices, perfumes, and as a tonic. Another spice which must have been brought from Ceylon is cinnamon, the dried inner bark of cinnamon, *Cinnamomum zeylandicum* or *C. loureirii*. This spice was one of the ingredients that composed the anointing oil used by the first priests in the Tabernacle. Additional spices that figured in early Greek and *Bible* days are nutmeg from the dried seeds of *Myristica fragrans* from the East Indies, and cloves, the dried flowers of *Eugenia aromatica* which came from the distant Mollucas and acted as a flavoring agent and a preservative as well. At first, it was hard to believe these primitive people could have obtained spices from so far away, but they must have come by way of Phoenician, Greek and, later, Roman

vessels, as well as part of the journey by camel caravans.

I have not been able to identify some of the herbs mentioned in the testimonies. For example, Asclepius used an herb called "panacea," the name of one of his daughters. This herb had been found by Chiron in the glen of Pelio below a snow-capped ridge and had the virtue of stopping inflammation which resulted from blows, wounds and so on. Again, Cretan herbs are mentioned which might be any of several.

Evidently, the Greeks invoked certain herbs to heal them as in the quotation from Antonius Musa, *De Herbe Bettonica* "Herb betony first discovered by Asclepius or by Chiron, the centaur heed these prayers."

And from Appendix ad Ps Apullii, "Herb parseley pray you in the name of your discoverer Asclepius to come to me again." The seed of this and of celery were medicinal. Or "Holy plant crisocantus I pray you by Asclepius discoverer of herbs to come hither" and "Herb erision (which might be eryngium) may you attend to my request, may your power be present."

Elsewhere it is written, Asclepius prescribed southernwood, *Artemisia abrotanum*, which was destructive to harmful organisms and removed tapeworms.

Artemisias native to the region include *A. judaica*, *A. judea*, *A. arborescens* (from Carmel) and *A. absinthium* found in Palestine. One of these is the wormwood of the *Bible*. Mugwort, *A. vulgaris*, formerly provided medicine.

A patient of Asclepius was told to cure himself of spitting blood by eating the seed of pine cones mixed with honey for three days.

To apply to a pain in the shoulder, a prescription is given for a plaster made of barley meal mixed with old wine, pine cones ground down and

mixed with olive oil and other ingredients, such as fig and goat's fat, milk with pepper, wax, pitch and olive oil—and more ingredients—all mixed into a paste.

The pine of the *Bible*, called "green fir tree," is thought to be stone pine, *Pinus pinea*, because of the edible fruits. Today in Palestine and Trans-Jordan, the seeds of Aleppo pine, *P. halepensis*, are considered valuable for nursing mothers, while pine bark of any species is used for a lotion, particularly for scalds caused by boiling oil.

One of the testimonies tells how a malignant sore on the little finger was cured by having the patient, herself, mix the shell of an oyster, burnt and ground, with rose ointment combined with mallow and olive oil, and then having her anoint the finger with this.

The mallow may have been either marsh mallow, *Althaea officinalis*, *A. rufescens* or *Malva sylvestris*. This last was cultivated by early Romans from Beersheba to Gaza and Jerusalem, during the time Palestine was their colony. Dioscorides mentions hollyhock, which would be *A. ficifolia*, as medicinal, and the translator calls it *Malva alcea*. *Althaea rufescens* is used today in Mesopotamia for throat and eye diseases. All mallows abound in mucilage and have provided demulcents. The leaves of young plants of the common mallow, *Malva rotundifolia*, called "Khubbezi" by Arabs, are cooked by them in layers with rice between.

The oil of roses is extracted from the petals and is astringent, more from some species and varieties than from others. There are several roses native to Palestine. Among them are dog rose, *Rosa canina*, damask rose, *R. damascena*, Austrian briar, *R. foetida*, *R. phoenicia*, *R. dumetorum* and *R. arabica*. Some of them were blooming in February when I was there. The oil figures in medicine and cosmetics. In

Turkey, jam is made from the petals, principally from *R. gallica* and the damask rose.

In *Oribasius Synopsis ad Eustathium* 111-162, Aristides mentions an unguent used by Asclepius, composed as follows: "Common salts, rock salts, Cappadocian salts roasted, pumice stone, white coarse soda, laurel berries, at the rate of one pound; white hellebore, soapwort, wild raisins, Alexandrian mustard, unburnt brimstone, feverfew, salt of tartar, mastic tree blossoms, marsh plant, at the rate of 6 oz., marjoram, powdered astringent earth, gall nut, gum frankincense, bastard sponge, parched barley, raw cucumber root, chameleon thistle, iris, dry horehound, at the rate of 3 oz.; chipping and sifting these use."

The plants mentioned in the above prescription are laurel berries, which would be from Sweet bay. White hellebore is probably *Veratrum album* and is in Dioscorides; so is soapwort, *Saponaria* spp. Alexandrian mustard is probably *Brassica arvensis* (presently called charlock) and called Egyptian mustard by Dioscorides. Black mustard, *B. nigra*, is the mustard mentioned by Jesus when He said to cast the tiny seed into the gardens and said it would become a plant strong enough to shelter birds. This mustard grows waist high in Palestine. Feverfew is *Chrysanthemum parthenium*. The dried flowers of it are mixed with those of Chamomile in France, these days. Wild chamomile, *Matricaria Chamomilla*, is not common in Palestine, but has medicinal qualities similar to those of *M. aurea*, which is infused in a tea to lessen abdominal

*Ruta graveolens*

*Coriandrum sativum*

Damask Rose

*Borago officinalis alba*

*Ruta* by: EDWARD VAN ALTENA

*Others* by: WALTER BEEBE WILDER



pains. Chameleon thistle is Pine thistle, *Atractylis gummifera*. The U. S. Dispensatory says an extract from this plant is similar in effect to strychnine. Iris is probably *Iris pseudacorus*, while horehound is *Marubium vulgare*, common along roadsides in Palestine and taken in infusion as a stomachic.

Marjoram might be *Origanum*. There is a charming drawing of it in Dioscorides accompanied by a description of a different plant. Oddly enough, the correct naming of varieties of this plant and of majorana has been the subject of discussion both in the Near East and here, where the exact place of oregano has long been in question. (I place it under *Origanum vulgare* as a dwarf form.) In the Near East, according to Miss Baldensperger, *O. maru* is called "Za'tar" in Arabic and is used from one end of Palestine to another as a condiment and medicine. She thinks the distinction between *O. dubium* and *O. maru* very slight and quotes Dioscorides as having considered them to be the same. Moreover, she is certain about the identity of "Hyssop" of the *Bible*, a plant which does not grow in Palestine and, according to general opinion, has been mistranslated. Miss Baldensperger thinks the plant meant was *Origanum*. To prove this, she went to the Passover festival conducted by the Samaritans, the most conservative of all groups in Palestine, who follow old customs to the letter, and she noticed they used *Origanum* in their service. In the Mishnah, a collection of traditional Jewish doctrines, she read that all Jews are advised to use the right kind of hyssop, which they are presumed to know, and that all other kinds, such as Roman, wild, or Greek, are incorrect.

There is no telling when grapes were first made into wine. We all know of

Noah's imbibing, and the Greeks deified Dionysus, whom they considered to have been the first to make it, having been taught by Chiron.

As to the mastic tree, it is undoubtedly *Pistacia lentiscus*, an evergreen shrub with small greenish flowers. The resinous exudation from stem and branches has furnished food and light for the Arabs. It is said to smell slightly of balsam, and is used to this day for medicine and as a varnish.

The following is a quotation from Pliny, *Naturalis Historiae*:

"But we are about to leave the garden plants, we append one famous preparation from them, an antidote against venomous animals, which is inscribed in verse upon a stone in the temple of Asclepius at Cos. 'Take two denarii of wild thyme and of appopanax and meum respectively; one denarius of trefoil seed; and of anise seed, fennel seed, Ammi, parseley, six denarii respectively with twelve denarii of meal of fitches. After these ingredients have been beaten together and passed through a sieve with the best wine that can be had, they are made into lozenges of one victoriatus each; these are given to the patient one at a time, steeped in three cyathi of wine.' King Antiochus the Great, it is said, employed this antidote against all kinds of venomous animals, the asp excepted." The lozenges sound as if they might be delicious.

The above prescription lists some of the flavoring herbs popular today and grown in most modern herb gardens. Anis would be *Pimpinella anisum*; fennel, *Foeniculum vulgare*; fitches mean vetch. However, in Isaiah, when the black seed of *Nigella sativa* is meant, it is translated as a vetch. Ammi may be *Visnaga*, an umbelliferous plant of the Mediterranean region. The fruits were used as medicine in Egypt. According to the Dispensatory, it has medicinal value.

Other flavoring herbs mentioned in the Bible are *Coriandrum sativum*, *Cuminum cyminum*, and dill, *Anethum graveolens*. Cumin, according to Post, is collected from the wild today. Coriander, too, might be collected because it is frequently a weed in Palestine, where its taste is far pleasanter than it is in my garden. *Thymus capitatus* covers the hills of Attica and is the plant whence comes the famous and entirely delicious honey of Mt. Hymettus. *Angelica sylvestris* grows in these regions and has similar properties to *Angelica archangelica*; both fruits and stems are medicinal and have a good flavor.

To return to the testimonials. This one comes from "In the Priesthood of Poplius Aelius Antiochus": "I, Marcus Julius Appelles, Idrian from Mylasa, was sent for by the God—when I arrived at the Temple and he told me to keep my head covered for two days and for these two days it rained; to eat cheese and bread, celery and lettuce, and to wash myself without help, to practice running, to take lemon peels, to soak them in water, near the bath—to take a walk in the upper portico, to take some passive exercise, to sprinkle myself with sand, to bathe in hot water—mix honey in the milk—was anointed all over with mustard and salt—and was cured; this caused pain, but after the bath I had no more—used olive oil to get rid of head ache, gargled in cold water, got well."

Bitter orange, *Citrus aurantium*, is in the Dispensatory and is used medicinally and for flavor today as is lemon, *C. limonia*, but not *C. medica*, in spite of its name. This last is grown in Jaffa where in September the Jews, following a very old custom, carry the best-shaped fruits along with palm branches during the feast of Tabernacles.

In a play by Aristophanes, one of the characters, in speaking of Asclepius,

says, "When he first mixed a plaster for Neochleides, throwing in three cloves of Tenian garlic and with these he mingled verjuice (the fresh juice crushed from green or unripe fruits), and squills, and brayed them up together. Then drenched the mass with Sphettian vinegar and put this on the eyelids of the man."

Its "fragrance" notwithstanding, garlic has always been popular with southern people and is considered to be an internal disinfectant. *Urginea maritima* is probably the scilla meant, for it grows all through the Mediterranean area.

While on the subject of bulbs, others used medicinally might be mentioned. The orange stigma of the fall-blooming *Crocus sativus*, that is so heavy it drops through the violet perianth, furnishes saffron. The crocus is said to have been grown in Solomon's garden. Saffron provided medicine, perfume, and flavor. The corms of *C. hyemalis* are roasted and eaten, in the neighborhood of Bethlehem, in March. The handsome *Colchicum autumnale*, which brightens the fading garden in September with its lavender to purple goblets, is native to the Holy Land and furnishes colchicine, and has been a remedy for gout. *C. luteum* from farther East is also medicinal. The leaves of *Lilium candidum* are mucilaginous and functioned in poultices on wounds. The snow-white and fragrant lily, which figures as the symbol of the Annunciation in Renaissance paintings, grows wild on hilly places in semi-shade in Palestine, but always sparsely. The roots of *Acorus calamus*, called sweet flag, have a lemon scent. This plant is native from India to North America and across this wide geographic area has functioned as a charm, perfume, and medicine, and the root is a pacifier given to babies to bring through their first teeth. It, too, was

one of the ingredients in the anointing oil mentioned in Exodus.

Aristides, judging from the many quotations about his illnesses, seems to have been something of a hypochondriac. He is credited with the following: "After having coughed for two years incessantly, I was cured by nibbling rocket on an empty stomach, Italian wine with pepper to drink, powder of holy ashes, starch with hot water, some holy water, an egg, pine resin—then again moist pitch, then iris with honey, then quince and wild purslane boiled together, the fluid to be drunk while the quince was to be eaten, then to eat a fig, with holy ash from the altar where they sacrifice to God."

The seed of purslane, *Portulaca oleracea*, was the medicinal agent. When the leaves of purslane are young, as with so many bland plants, they provide a pleasant salad and can be mixed with equal amounts of young leaves of sorrel, *Rumex acetosa* and dandelion, *Taraxacum officinale*, all native to these regions. This portulaca spreads like something evil over empty spaces in my garden. In Greece, I saw donkey carts filled to overflowing with sorrel leaves on their way to Athens to furnish a most delectable spring green when prepared by present day and very excellent cooks. Quince is *Cydonia vulgaris*.

The early people distinguished between wild and cultivated figs, ripe and unripe. Of course, figs were mentioned in the Bible. *Ficus carica* probably is the one meant. The fruits were eaten and the ashes of boughs of wild figs were also administered to patients.

It is not possible to mention all trees and shrubs of medicinal value to people in early days, but they seemed to know the physical effect on them of each fruit. What would happen to them when they ate the fruit of the medlar, *Mespilus*, the service tree, *Sorbus do-*

*mestica*, the damson, *Prunus domestica*, almond, *Amygdalus communis* pistache, *Pistacia vera*, walnut, *Juglans regia*, hazelnut, *Corylus avellana* or the mulberry, *Morus nigra*.

The fruit and seed of pomegranate, *Punica granatum*, were medicinal. In Palestine, the juice was given to sick babies when the orange flowers with five overlapping petals were strung into necklaces. It was thought no evil spirit could dwell in either *Celtis australis*, hackberry or pomegranate, so that it was safe to sleep under their branches.

Two last shrubs famous in herb lore that abound along the Mediterranean shores are lavender and rosemary, both with highly fragrant foliage and valuable in the past as well as the present for perfume and medicine, and the rosemary for flowers as well.

A shrub with fragrant leaves, divided like fingers on a hand, and spires of lavender flowers, called Chaste tree, is *Vitex agnus-castus*. This plant provided wood with which to make an image of Asclepius. This type is not too hardy, but the variety *incisa* is hardy as far north as Boston.

In the Near East, particularly in Turkey, I had noticed a plane tree, *Platanus orientalis*, in almost every mosque courtyard and had wondered why. In going over the material on Greek medicine, I found the plane tree was planted beside wells situated in the very center of sanctuaries. Moreover, Dioscorides says the leaves soaked in wine are good for inflammation of the eyes, and the bark soaked in vinegar is helpful for a toothache.

... Nor can all the herbs be mentioned. One would love to linger and describe the many handsome salvias grown and used, rue mentioned by Jesus, *Sesamum indicum* which provided the pass word for Ali Baba and valuable for its oil, *Datura metel* an important medic-

inal plant, and *Valeriana officinalis* its root yielding perfume. Then there is poison hemlock, *Conium maculatum*, which Socrates drank. Yellow bedstraw, *Galium verum*, with fragrant yellow flowers of value as a dye and medicine, and supposed to have furnished the hay under the manger. Of importance today is *Glycyrrhiza glabra* and its varieties, which yield licorice. The root and underground stems are used by tobacco industries. And, oddly enough, they furnish a fertilizer for mushrooms, while powder

from the root is valuable medicinally. Mandrake, *Mandragora officinarum*, has long figured in folklore, largely because the roots are shaped something like a man. The plant is narcotic, the most active principle being in the root. In Greece, it was called a plant of Circe's and it is recorded to have been administered by Hippocrates.

In closing, I would like to recur to my original idea that down through the millenia man has changed little in his use of plants that grow in the woods and fields near his home.

*Ornithogalum umbellatum*

WALTER BEEBE WILDER





# The Effect of Plant Material Upon the Microclimate of House and Garden

ROBERT B. DEERING AND FREDERICK A. BROOKS<sup>1</sup>

## *The Cooling Influence of a Plant Cover*

It is important to recognize that plants are living organisms. They offer a wide variation in heat and water exchange balances according to their natural ecological adaptations. They change the shaded area in winter and summer, and materially affect the temperature and moisture content of the soil and air.

Planners of homes, communities, and cities should consider more seriously the total cooling influence of plants on local environment and the results of their removal. Their influence increases substantially with a corresponding increase in number and size. Air flow can be channeled or deflected by the proper selection and placement of plant materials, yet objectionable hindrance to air movement may occur if the density problem is not considered.

As soon as a bare surface is covered with vegetation, the solar-energy absorbing surface previously held by the soil is transferred to the upper layers of plant foliage. (See illustration.) This produces not only desirable shading, but also a transfer of the sunshine-receiving area from a shallow surface to a living thermal-absorbing surface that draws on soil moisture from a considerable depth to provide surface evaporation cooling. This is especially important in dry climates.

The heat balance at foliage surfaces differs fundamentally from that of a bare-ground surface because of lack of connection with a substantial heat res-

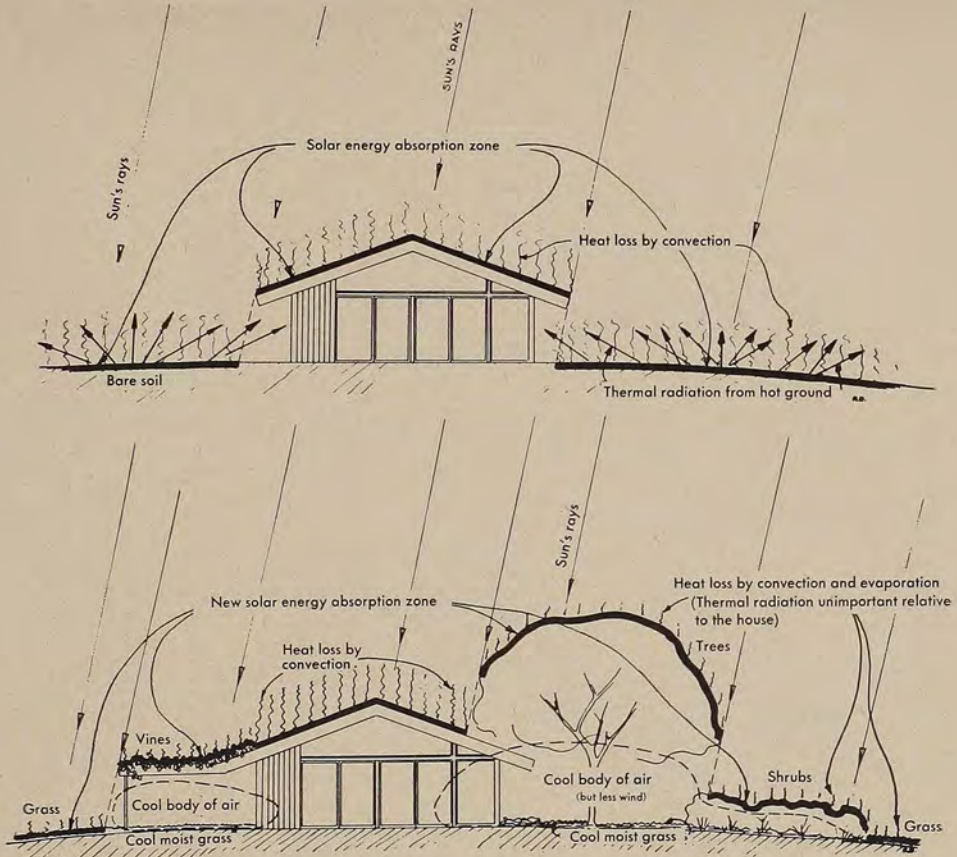
ervoir. In other words, there is no appreciable heat-capacity term for the leaf. That means that the outgoing heat rates from leaf surfaces are balanced by the incoming heat rates all the time, and heat does not accumulate in the foliage. In the daytime, the air is usually moving fast enough to cause forced convection, and most of the solar energy transformed to sensible heat by the foliage is carried away by the air, only a minor fraction being radiated. Air itself has very little heat capacity, and is readily cooled by evaporation; therefore the body of air lying beneath the foliage cover can be maintained cooler than air over bare ground.

## *The Influence of Vegetative Forms*

*Mowed Turf:* Establishment of a good turf sod results in the creation of a thick sunshine-absorption layer on top and a shaded soil surface beneath. This shading prevents large amounts of heat absorption by the soil, and thus keeps the ground surface from getting hot. Each blade of grass acts as a miniature evaporative cooler, and the resulting cool grass cover will act as both an absorber of heat radiated from the house and dust-proofing of the soil surface. It has been found that the evaporation from a sod surface may approach that from an equal area of water, but the sod will cool off more at night because it does not accumulate as much heat as water.

It is known that a ground cover of vegetation exerts a great influence on the heat characteristics of the soil beneath. Conduction takes place horizontally through the ground as well as

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Typical situation before planting or site without trees. As soon as a bare surface is covered with vegetation, the heat absorbing surface which was previously held by the soil and roof is then transferred to the upper layers of foliage, in trees, shrubs, vines and turf, and a cool body of air is then produced by evaporation in the shade.

vertically, depending on the temperature differences. There is significant advantage, therefore, in having the ground surrounding the house as cool as possible because of this horizontal conduction of heat in the deep soil.

In addition, there is a cool moist layer of air lying above a turf cover, whereas a warm one, which is generally drier, lies above dry soil, asphalt, or concrete. Placement of trees, and especially the use of grass near the house, allows the heavier air to be carried inside when low openings are provided for cross circulation.

*Shrubs:* The main difference between a turf cover and shrubs is in the horizontal obstruction and the characteristics of the air space enclosed within. The air space enclosed by turf is very shallow and close to the soil, but covers a large area. That inside a group of shrubs is much deeper, but, as gen-

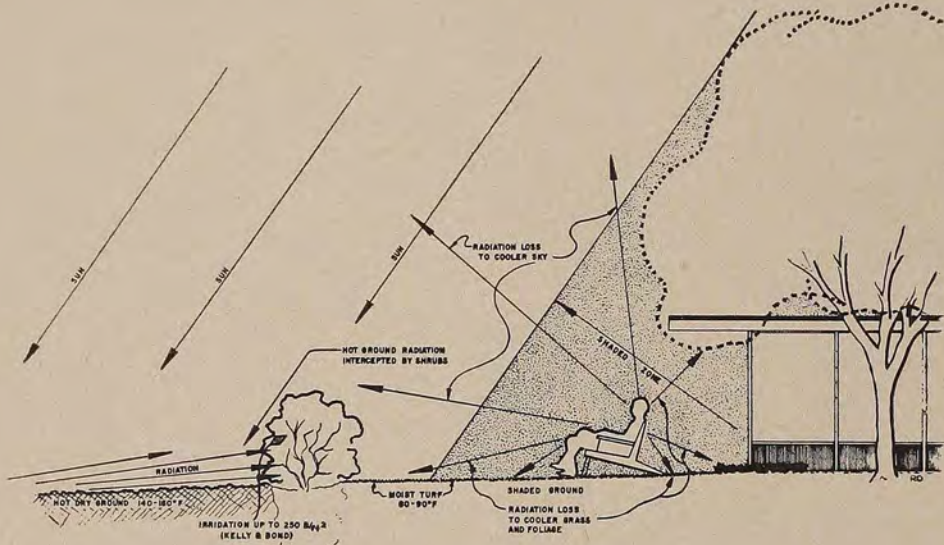
erally used, covers considerably less area.

High humidity and high temperatures may persist in sunlit areas adjacent to shrubs mainly because the density of the foliage may prevent breezes from penetrating them. Shrubs with an open structure, however, may assist in reducing the velocity of strong winds, but yet not create a stagnant area.

Because the walls of houses offer such a great barrier against the wind, low plants located adjacent to them generally interfere very little with the breezes. The main advantages of plants used in this situation, other than for aesthetic purposes, are that they shade the soil near the house and reduce radiation, glare and reflection. One distinct advantage in using shrub masses in dry climates is their ability to act as a horizontal thermal-radia-

tion absorption barrier against heat from adjoining dry-ground areas (See illustration). Thick foliage may be very desirable when used as wind-

Of great importance to the home owner is whether the overhead cover is deciduous or evergreen. During the winter and early spring direct solar



*In hot-dry climates, shrub masses act as thermal-radiation absorption barriers against heat from adjoining dry-ground areas. They also act as windbreaks, dust, and noise filters.*

breaks or dust and noise filters; therefore the selection of plantings needs to be considered in relation to lawn and trees from the several aspects mentioned above.

**Shade Trees:** Under the shaded protection of a canopy of trees there is a large body of air many feet deep having properties depending on the extent and species of the trees. After a group of trees develops, the main heat-transfer surface is high up in the foliage level, the outer foliage becoming the main surface where solar radiation is converted to sensible heat.

An important factor in the use of shade trees is that most varieties naturally turn as great an absorbing surface as possible toward the sun for photosynthesis. This produces the greatest amount of shade, yet does not have the disadvantage of an extensive solid surface.

energy is usually desired; therefore, vines and trees planted on the south side should be deciduous. Evergreen trees usually provide a cool atmosphere, which in winter is generally undesirable. They are pleasant to look at when other leaves are absent and can be used in locations where they will not interfere with the warmth of the winter sun. Their greatest value is their usefulness for shade, wind control, and dust and noise absorption.

In comparing an area without trees and an area with a grove of deciduous trees in early spring, there is little difference in the amount of light and radiation the ground receives. But a sudden change occurs as soon as the leaves appear. There is then produced a canopy drawn over the top that intercepts a large portion of the total radiation, shields the ground from wind, and moderates the daily temperature.

fluctuations. As the thermal-absorption area of plant foliage expands during the growing season, the radiation penetration becomes increasingly reduced. Experiments have shown that in dense groves as much as 80% of the incident radiation has been stopped by the tree foliage. This, of course, depends on the species of tree, planting distance, and density of foliage.

In summer, tree shade delays the warming of the ground and hastens nocturnal cooling. This is particularly important for rooms having east and west windows. In hot climates even east sun may be objectionable.

The air layer beneath the trees receives some chilled air from the foliage canopy overhead, but the main source of cool air would be from a moist turf, if present. In hot-dry climates shading and moisture-producing surfaces have a very great cooling effect on the air unless the wind is strong. In hot-humid climates air circulation is necessary to encourage evaporation, and large, tall trees with an open lawn are desirable. Where calm air is frequent, large fans may even be practical for outdoor use.

As the shadow from an overhead cover or foliage moves over an area, the speed of cooling is important because the newly shaded area is immediately useful. With bare-ground surface temperatures ranging from 136 to 152 degrees Fahrenheit in the California interior valleys, Kelly, Bond and Ittner,<sup>2</sup> on August 9, 1948, found that temperatures cooled an average of thirty-six degrees in five minutes after the arrival of the shadow line. This clearly points out the importance of shaded vs. sunlit areas.

They also state that trees, because of the depth or mass of foliage, have shadows larger than the vertical projected area, giving a larger low-temperature

ground area than would be practical with artificial shades. The vertical tree form in rows is also advantageous in permitting greater exposure to cool sky than is possible with a thin horizontal shade. When considering the total ground area covered by the shade from a large tree during the day, one can readily see the importance to the ground surface and the usable air layer of shading by large plant materials.

#### *Orientation and Planning Important*

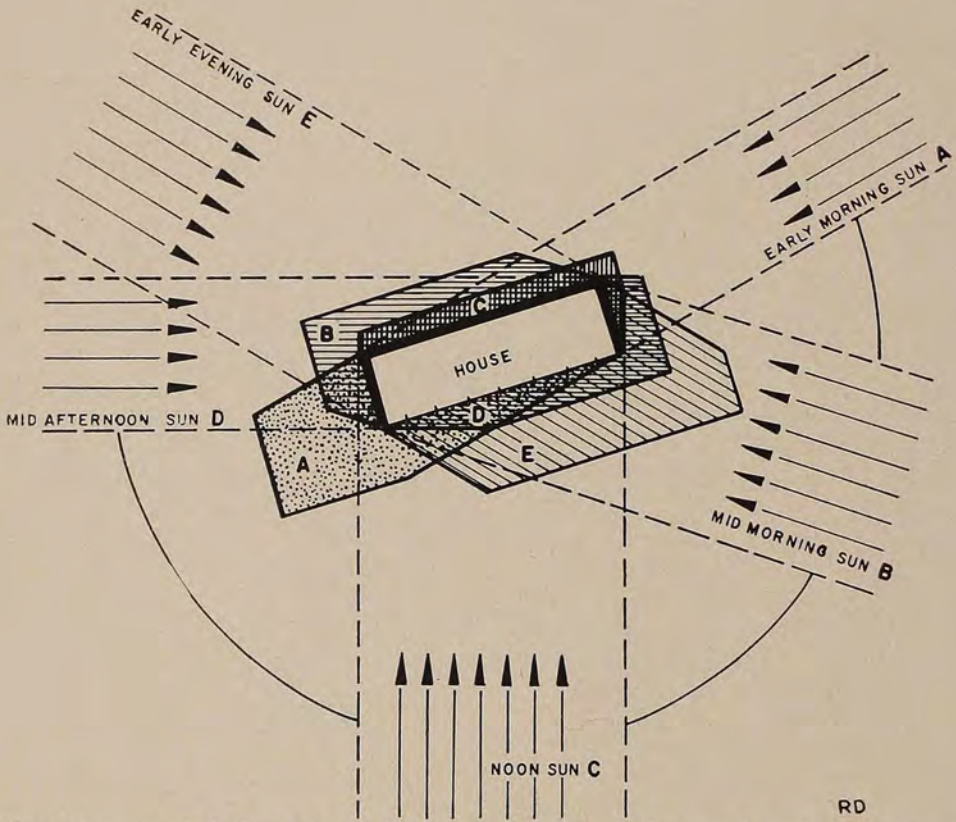
There are, of course, many methods for improving the outdoor comfort of a poorly oriented house. But the best time to consider summer comfort is simultaneous with the planning of the house. It is important to consider the cold winter winds and desirable winter sun even though the summer sun may present the greatest problem in many regions. The arrangements should, therefore, take advantage of any prevailing cool summer breezes without increasing winter discomfort.

Most home owners prefer to have their living and garden areas face south or southeast to benefit from the warm winter sun. This orientation is best for winter and spring months, but usually requires specified tree locations for the hot summer months.

During the day, a study of the ground shaded by the house itself shows that the shadows start on the west side of the house in the morning, move to the north during mid-morning to mid-afternoon, and to the east and southeast in the afternoon. An exposed south-facing area remains hot from mid-morning to mid-afternoon, when the air temperature is usually the warmest, until the sun moves to the northwest. This indicates that not just one living area is sufficient, but ideally there should be living areas on all sides of the house so as to have some cool outdoor area throughout a summer day as well as a warm one in winter (See

<sup>2</sup>Kelly, C. F., Bond, T. E., and Ittner, N. R., Thermal Design of Livestock Shades, Agri. Engineering; V. 31 (12);601-606, 1950.

NORTH



Successive ground shadow patterns during a day in June indicate need for living areas on each side of the house: A. Shadow pattern in the early morning when areas are little used; B. Northwest shade provides cool area in morning—needed mostly for children on hot days; C. North area most desirable during midday—this area is greatly extended in late summer because of lower angle of the sun; D. South and east become shaded in mid-afternoon at a time when most needed, yet are sunny in winter; E. South and east shade area increases in size and desirability toward evening.

illustration).

By orienting the house more toward the southeast, this area would obtain earlier afternoon shade. The north side would then receive more hot afternoon sun, but can be shaded by properly located trees.

One serious problem of a south orientation, especially in the hot-climate regions in late spring and early fall, is that the angle of sun is low and the south-facing walls receive direct hot sun a good part of the day. During the period when the sun is at its highest point (the summer solstice, June 21), the sun on the south walls can be easily

controlled with an open-beam type roof extension covered with vines or with an overhang. But when the sun is lower, this becomes less effective, and only vertical shading can intercept the hot sun's rays during these months. It is well to realize, however, that the shade area becomes progressively larger on the north side as the sun goes lower in the south.

South-facing living areas can be made more comfortable in summer by providing dense tree or vine shade overhead, using as much moist turf as possible beneath, and keeping the sun off walls, paving, and glass. Tall de-

ciduous shrubs or small trees, planted so that one looks into their shaded and cooler north sides, greatly reduce glare and the simmering view of hot areas. However, careful selection of plants and their placement should be made to prevent interference with cooling breezes and winter sun.

#### *Keep Sun Off Roofs, Walls, Paving, and Glass*

The coldest exposure is toward the north sky, so vertical shading by trees and vines, if the view to the north is left open, is more effective than horizontal shading providing the same interception of absorption and radiation.

*Roofs:* Experiments have shown that more than 40% of the heat may enter uninsulated houses through the roof. This can be greatly reduced by properly insulating the ceilings and by using white reflectant materials on the roof surface. In addition, the location of trees close to the house can materially restrict the area of the roof exposed to the sun's rays. In some localities, roofs have been covered with growing plants and vines for this purpose. Houses should be located far enough from large trees to be safe from falling branches.

*Walls:* An effective way of reducing the heat inflow through walls not shaded by trees is to cover them with vines. This has two advantages. It shades the wall and cools the air next to the wall surface by moisture evaporation from the living plants. Properly planned roof extensions are also effective.

East and west walls receive much more heat in summer than south walls, largely because they cannot be shielded by ordinary eaves. The heat problem on east walls is less troublesome than west walls, since the soil, wall, and the air temperatures inside and outside have cooled greatly during the night. The heat absorption of walls and areas

on the south can be considerably reduced and delayed by the use of roof overhang, trees, and vines. With proper landscaping, the house walls, soil, and paving will not be warmed to high temperatures until the sun is moving away in the late afternoon. As the sun moves toward the west, its angle becomes lower. Therefore, groups of tall vertical shrubs and trees can effectively provide shade on the west and north walls. This shading cuts off the sun, and the air temperatures will drop early. With a delay in the heating of the walls and surroundings in the morning and a corresponding earliness in the cooling in the afternoon, the temperature extremes are lessened, producing more hours of comfortable indoor and outdoor living.

*Paving:* Paved surfaces absorb and release great quantities of heat. If kept wet, they can serve in place of grass. In most cases this is inconvenient and impractical, and may even increase the discomfort in humid climates. Dark paving materials are usually much warmer than grass, and light-colored materials usually have objectionable glare. In hot regions, it is well to keep all dry paving to a minimum and provide as much shade as possible.

*Glass:* As much as one-tenth of the total heat entering an ordinary house comes through the windows. This amounts to a great deal more with houses having extensive glass areas. Every attempt should be made, therefore, to keep the sun's rays from entering the house. Solar energy passes easily through ordinary window glass if outside protection is not afforded. If sufficient roof overhang, vines on an overhead trellis, or tree shade cannot be used, aluminum foil drapes or reflectors covering the windows will return much of the sunshine back through the glass to the outside without conversion to heat inside the house.



Tradescant in 1631 by René Morin, who in the same year sent him "Holiasses" (whatever they may have been), and "Narcissus Jacobei," probably the "Jacobean lily," (*Sprekelia formosissima*), which was then a rarity.

There are few personal data about him. He was a citizen of Paris, and must have been well established in business in May, 1619, when he signed the marriage contract of his younger brother, Pierre Morin le jeune, dit troisième. We infer that he died in 1657, or possibly the beginning of 1658, from the "Advis aux Curieux" appended to Pierre Morin's *Remarques necessaires pour la culture des fleurs*, issued early in the latter year. The author states that, besides the plants already mentioned in his book, he has many of great rarity that had come to him so lately he had not yet had time to catalog them, on the death of his brother, René Morin, who in his lifetime had been as great a "curieux" as any in all Europe. The word "curieux" is rather elusive; it sometimes meant a collector or "amateur" in the sense of "fancier," but René Morin was an expert as well as a lover of plants.

Pierre Morin's "Advis" suggests his brother's special interests. It notes a few groups like shrubs and woody plants, herbaceous perennials, foliage plants, and above all, bulbs. These comprised hyacinths, Colchicum, Narcissus, Muscari, specially handsome sorts of "Couronne-impériale" and "Lys-Narcisse des Indes," fine anemones, a great variety of cyclamens, and many tulips, among which the new species from China were said to be of surpassing beauty.

The *Catalogus plantarum horti Renati Morini* (1621) indicates that he began to specialize in bulbs very early. This twenty-six page pamphlet offers many species in Anemone, Calchicum, Crocus, Cyclamen, "Dens caninus" or Erythronium, "Dipcadi sive Muscari,"

Fritillaria, Hyacinthus, Iris, Liliun and "Martagon," Ornithogalum, Ranunculus, and tulips, of which he had forty-five sorts, including named varieties of *Tulipa serotina* that must have been prized bulbs in that era. Many of these had Dutch names, and I wonder if his "Honneste" could not have been the "Tulipa Honesti" that was figured by Crispin van de Passe, the Younger, in his *Hortus floridus* (1614), which was said to be named for its grower, Honestus.

Florists or nurserymen, then as now, grew what they could sell, but René Morin's stock appears to have been rather select. He had to have the "Couronne-impériale," the "Flos passionis," and the "Ioucqua" (*Yucca*), items no amateur should be without; but he also had "Siringa caerulea lusitanica sive Lilac Mathioli." The lilac was already in Paris in 1601, when it was listed in Jean Robin's *Catalogus stirpium*, but that may have been an individual specimen, whereas Morin in 1621 was probably growing it for the trade. He called it "lusitanica" (Portuguese), and may have got it as such, since exotics were often named from Mediterranean lands where they had temporarily sojourned on their way to England or France from their original homes in Africa, the East Indies or the Levant. René Morin's lilac was accompanied by another shrub often found with it in New England gardens, "Sambucus rosea," the "Guelder rose" or "Snowball" (*Viburnum Opulus* var. *sterilis*), which had also been in Jean Robin's *Catalogus* (1601), and was soon grown extensively in the gardens of Europe.

I may seem to give more importance to Morin's *Catalogus plantarum* (1621) than it merits. It was actually the first organized French trade list, though it sets no prices, but it does give the time of blooming of each plant. It is notable, not only as a "first," but because it is



well arranged, with plant names usually in Latin rather than the vernacular, which makes it easier to compare with contemporary botanical works. There is, moreover, an advantage in its limited size (only twenty-six pages), which gives a good view of Morin's stock and his scope as a collector of rare plants.

It is to be remembered that René Morin was a "florist," who grew plants for other people's gardens; hence his catalog does not represent a permanent collection of individual specimens, but material grown long enough to show its characteristics and build up a stock; or, on the other hand, only long enough to test its popularity or discover its liabilities. I have chiefly dwelt on his offerings of bulbs and Oriental exotics, but he also had a few plants from North America. There were "Phalangion de Virginea" (*Tradescantia*), "Puchemin de Virginea" (*Diospyros*), "Sumac de Virginea" (*Rhus typhina*), all of which must have come to him by way of England (possibly from Tradescant); "Cardinalis planta" (*Lobelia cardinalis*), "Martagon canadence flore luteo" (*Lilium canadense*), "Apocynum syriacum" (*Asclepias syriaca*), and "Sanguisorba sive Pimpinella maior" (probably *Sanguisorba canadensis*), from New France. For some of these Morin's *Catalogus plantarum* (1621) is the oldest printed record, although some of them had been in England and others may already have been in the garden of Jean Robin in Paris for some years. The garden of René Morin was undoubtedly one of the main stepping stones between France and England in the distribution of the first plants brought from the northern colonies of America.

Practically nothing is known about René Morin's activities from 1635 to the time of his death, but several books contain species with the label "Morini," which must have been imported or developed during those years, and some

of them undoubtedly by him. The *Museum Tradescantianum* (1656) of John Tradescant, Jr., has about thirty such plants, some of which may have been in the garden of the elder Tradescant from the time he got them from "Mr. Rene," while others could have been received from either of the two brothers at later dates.

Denis Joncquet's *Hortus, sive Index onomasticus plantarum, quas excolebat Parisiis* (1659) credits to the Morins about sixty plants, chiefly bulbs, with an occasional intriguing species such as "Grossularia indica hirsuto fructu majore," which seems slightly incongruous among the flowers. In my observation the names of persons following those of plants in this work do not so often denote authors in the usual sense, as growers or donors of the plants. Some of the items labelled "Morini" can be found in Pierre Morin's *Remarques necessaires pour la culture des fleurs* (1658), and the varieties of *Crocus* and *Ranunculus* were probably his; but the numerous varieties of *Cyclamen* must have been from René's collection, as some of their names suggest the geographical sources of new cyclamens mentioned by Pierre in his "Advis aux Curieux," which he had received on the death of his elder brother. Probably few of these were absolutely new, as some had been listed in 1621 in the *Catalogus plantarum horti Renati Morini*, and others were mentioned in Sir Thomas Hanmer's *Garden Book* (1933, p. 64-65), as having been grown in England for some years prior to 1659. Sir Thomas does not associate any of them with René Morin, though he may have bought cyclamens from him, as he got a lot of plants from his younger brother Pierre; but his descriptions identify several of the Morin cyclamens listed in Joncquet's *Hortus*.

It would be rash to assume that René Morin was the cyclamen expert of his

time, but the efforts of his later years were undoubtedly given to the introduction of these and other choice bulbs. Although he did not leave behind him a conspicuous record, throughout his life René Morin seems to have merited the epithet of "curieux"—a zealous and discriminating collector and grower of rare plants.

*Pierre Morin, "le jeune, dit Troisième"*

He is best known for his book, the *Remarques nécessaires pour la culture des fleurs* (Paris, C. de Sercy, 1658), though most of those who mention it do not appear to have examined its contents, which, although they leave the reader with new questions, dispel some generally quoted misconceptions. He was sometimes confused with his brother René, and only two of his contemporaries clearly distinguish him. Cornut, in his *Canadensium plantarum historia* (1635, p. 78), says that "*Gladiolus æthiopicus*" (*Antholyza æthiopica* L.) had flowered in the garden of "Petrus Morinus" in October, 1633; and Sir Thomas Hammer noted in his "Pocket Book" a letter to "Moryn (P. Moryn le Jeusne dit troisieme)" in June, 1656.

Few documents on Morin can be found, but E. T. Hamy published considerable data in his article: *Le fleuriste Pierre Morin le jeune, dit troisième* (Paris, Muséum d'Histoire naturelle, *Bulletin*, 3:186-190, 1897). Hamy found in the Archives Nationales the marriage contract of Pierre Morin and Françoise de la Brosse, dated May 4, 1619, and from it reasonably concluded that Morin was born towards the close of the preceding century. This document gives the names of his parents, both deceased, and shows why he was called "the third," since not only his father, but also his oldest brother, had the same forename. His two older brothers, Pierre Morin "l'ainé," and René Morin, both citizens of Paris,

were his witnesses. His bride was the daughter of Hierosme de la Brosse, a cousin of Guy de la Brosse, who was then physician to "Monseigneur le Prince" (Henri II de Bourbon, Prince de Condé), and afterwards distinguished as a botanist and the first "Intendant" or resident director of the Jardin des Plantes (originally called Jardin royal des Plantes Médicinales). Hamy adds other bits of historical background, and some misinformation about Morin's publications. It is unfortunate that an article so useful is not completely accurate in all respects.

In 1619, Morin's address was Rue Thorigny, Parish of Saint-Gervais, but in 1651 and later his garden was "scitue au Faux-Bourg Saint-Germain, proche la Charité," which was on the Rue Taranne where it was afterwards crossed by the Boulevard Saint-Germain. Henri Sauval, in his *Histoire et recherches des antiquités de la ville de Paris* (1724, v. 3, p. 4), says it was one of the most celebrated for rare plants, and that it contained the first "filaria" in Paris. This must be an error, because *Phillyrea angustifolia* and *P. latifolia* are listed in the *Catalogus stirpium* (Parisii, 1601) of Jean Robin, as well as the *Herball* (1597) of Gerard, from whom Robin may have got them; while, on the other hand, Gerard got many plants from "John Robin" in Paris. It is also doubtful whether Morin had "filaria," as he was not much interested in shrubs, and this one is found only in a section of his book that was not written by him. *Phillyrea*, however, had such vogue in Sauval's time, that the name might appeal to anyone looking for data on the "famous" florist.

John Evelyn gives a first-hand account of two visits to "Mr. Morine" in his *Diary*, April 1, 1644, and May 23, 1651, although he does not give his forename or his location. He says the

garden "is of an exact oval figure, planted with cypress, cut flat and set as even as a wall: the tulips, anemones, ranunculuses, crocuses, etc., are held to be of the rarest, and draw all the admirers of that kind to his house during the season." On both occasions Evelyn noted Morin's miniature paintings of his best flowers, done "by rare hands." There were many fine floral painters in that period, and it seems to me that some esteemed prints of unknown origin may have been made from specimens in Pierre Morin's garden.

Evelyn seemed more interested in Morin the virtuoso, than in his plants or garden. He remarks on the "curiosities" and works of art in Morin's house at one side of the garden, and his collection of butterflies and insects, and, after describing the latter, says "he showed me the remarks he had made on their propagation, which he promised to publish." A careless reader might suppose this referred to the floricultural *Remarques*, which Morin was said to have had under consideration for many years; but on his second visit Evelyn again observed that his host was compiling a natural history of insects. The idea of Pierre Morin as an entomologist was so unusual that one of my friends made an extended search in the bibliography and literature of entomology but found no trace of his activity either as author or collector.

Besides his *Remarques necessaires pour la culture des fleurs* (Paris, 1658), he published only the *Catalogues de quelques plantes à fleurs qui sont de présent au jardin de Pierre Morin le jeune, dit troisième, fleuriste*. These consist of four separate lists of tulips, ranunculus, iris, and anemone, issued in 1651 with continuous paging, and in 1655 separately paged, with some of the individual lists considerably enlarged and rearranged. There is no indication that he issued other catalogs, but his series of 1655 was reprinted practically

verbatim in his *Remarques necessaires* in 1658.

Morin was later credited with other works, notably the *Traité des œillets*, which was included in all issues of the *Remarques* after 1667, and the *Nouveau traité pour la culture des fleurs* (Paris, 1674), both of which were hoaxes of the printer, Charles de Sercy. The first was exposed by Ardène in his *Traité des œillets* (1762), as an adaptation of the anonymous *Jardinage des œillets* (Paris, 1647). The *Nouveau traité pour la culture des fleurs*, and a citrus pamphlet of the same date, both mainly derived from Agostino Mandirola's *Manuale de' giardinieri*, were listed with other titles in a privilege granted to de Sercy for a reprint of the *Remarques necessaires*; and, as no other authors were named, all these works were at one time or another credited to Pierre Morin. These false attributions were tolerated by Hamy, who was also guilty of citing page references to the *Nouvelle édition* of the *Remarques necessaires* (Paris, 1694), while ostensibly citing the original edition of 1658.

Hamy says that only in 1658, when seized by a serious illness, Morin decided to publish the *Remarques necessaires pour la culture des fleurs*, which he had been "meditating" over forty years. However, the publisher's preface or address to the reader merely says that the book would have come out in better shape but for the illness that befell the author at the beginning of printing, *from which there was no hope of his immediate recovery* [italics mine], and apologizes for the errors of style and typography resulting from lack of the author's supervision.

It seems probable that the book was almost entirely put together by the printer, Charles de Sercy. It went through the press speedily, as the privilege was granted January 14 and registered February 19, 1658, and the first

printing was done March 12. And while the author had no opportunity for revision, the publisher had a chance to tamper with the contents, as his preface says the text is entirely by Morin, except some pages on woody plants which were inserted from another source, as the publisher was persuaded that something of the kind was needed to complete the work. Herein he was in error, as Morin himself showed no interest in woody plants and includes very few in his lists; so this section of the book is quite incongruous.

This preface says the book contains the observations of Monsieur Morin during more than forty years' experience, and that all the plants mentioned are grown by him in his garden. This fact can be confirmed by some of the allusions in other works, and there is no reason to doubt the authenticity of his own text. In spite of a subconscious query whether the printer made other changes, it is the book of Pierre Morin.

I believe he planned a publication, perhaps a revision and enlargement of his *Catalogues de quelques plantes à fleurs*, which had already required a second issue and may well have been in such demand as to justify a third. The author's preface, "Aux Curieux de Fleurs," has an authentic flavor, and his "Advis" at the end of the volume, referring to plants received after the death of his brother René, so recently that he had not yet had time to list them, suggests an intention of revising his *Catalogues*. If his manuscripts were meanwhile left in the hands of the printer, the latter may have taken advantage of the author's illness and maybe intervening death to arrange the material according to his own ideas. There is no trace of Pierre Morin after this time, and the printer, Charles de Sercy, must have made a good thing out of the *Remarques nécessaires pour la culture des fleurs*, as it was reissued a dozen times in the next forty years.

There never was a genuine new edition, although later ones were enlarged by the *Traité des œillets* that was afterwards falsely attributed to Morin.

As a practical manual of floriculture, the book does not justify its grandiose title, as it gives no culture in the usual sense; but it may have been the first to list plants according to soil and climatic conditions, and it should have been helpful to gardeners to find so many exotics listed under vernacular names and treated with reference to ordinary garden culture. It has a calendar of operations necessary in the flower garden, and another showing the time of blooming of each plant, which may well be the first floricultural calendar ever printed. These must have been popular, as also Morin's *Catalogues de quelques plantes à fleurs*, which occupy a considerable part of the volume.

The *Catalogues* may have been more used in England than in Paris. There are numerous allusions to Morin in the *Garden Book* of Sir Thomas Hanmer of Bettisfield, written in 1659 but not published till 1933. He bought many bulbs from Morin, though I do not know whether he got any herbaceous perennials. A comparison of his *Garden Book* with the Morin *Catalogues* of 1655 (as reprinted in the *Remarques nécessaires*) shows that Hanmer had all but a few of the bulbous irises and ranunculuses, and a slightly smaller proportion of the anemones and tulips. He must have bought largely from Morin's *Catalogues*, and we find an item in his "Pocket-book" in June, 1656, in regard to ranunculuses and anemones ordered from "Moryn (P. Moryn le Jeusne dit troisieme)." Sir Thomas made many trips to the Continent, but his *Garden Book* does not indicate that he personally visited Pierre Morin, as Evelyn had done.

Morin created an innovation in the description of irises, which was noted by Hanmer, a great amateur of this

flower. In his *Garden Book* (1933, p. 38), he writes: "Monsieur Moryn, a famous florist in France, hath printed a Catalogue in French of above three score severall sorts [of bulbous irises], which hee had growing in his garden in Paris about two years since, whereof wee have many now in England. Hee names and describes them thus, calling the three falling leaves Fall [*langues*], the three leaves which stand up Standards [*estendarts*] or Sayles sometimes, and the three little tongues or short leaves lying on the Falls Arches [*mentons*]." Although I have not seen the originals of the *Catalogues de quelques plantes à fleurs*, the one used by Hammer was probably that of 1655, in which the list of bulbous irises was considerably altered and enlarged. It was reprinted verbatim in the *Remarques nécessaires pour la culture des fleurs* in 1658; so we can at least date the terms "standard" and "fall" as far back as 1655.

It is also interesting to find in Morin's *Remarques nécessaires* a few of the plants recently introduced from North America. In his list of "plants that love a fat and moist soil," there are "Phlanagion de Virginie" (*Tradescantia virginiana*), "Eupatorion de Canada" (*Eupatorium purpureum*), "Calceolus mariae de Canada" (probably *Cypripedium reginae*), "Serpentaire à trois feuilles d'Amérique" (*Arisaema triphyllum*); also three genera that were named by Morin: Anapodophyllon, Hydrophyllon, and Sanguinaria. The last had been briefly described by Cornut as "Chelidonium maximum Canadense acaulon"; but Dillenius, in his *Hortus Elthamensis* (1732, v. 2, p. 335-336), distinguished it from the other celandines (*Chelidonium*), and called the new genus *Sanguinaria*, crediting this name to Morin. Hydrophyllon was established by Tournefort in his *Elémens de botanique* (1794, p.

71-72), and the genus adopted by Linnaeus, with a Latin termination. Anapodophyllon was likewise established by Tournefort (l.c., p. 204-206), but was changed by Linnaeus to Podophyllum.

Morin may at an earlier time have grown more American species, but as the Canadian introductions began to lose their novelty, he may have continued to grow only a few plants that were hardy, popular, or particularly striking, such as the "Jack-in-the-Pulpit" (*Arisaema triphyllum*), the "May-apple" (*Podophyllum peltatum*), and "Joe-Pye weed" (*Eupatorium purpureum*).

His later career must have been mainly devoted to cultivation and trade in bulbs. Evelyn specially remarked his bulbs in 1644, and his *Catalogues de quelques plantes à fleurs*, issued in 1651, had to be enlarged and reissued in 1655. The acquisitions that came to him on the death of his brother René included many fine bulbs, which he had planned to offer in an orderly catalog. It may be remarked that, during the best part of the lives of the two brothers, Europe had become excessively bulb-minded, so that both opportunity and expediency developed their expert knowledge in this field. But apparently this was ended almost simultaneously for both, as there is no trace of Pierre Morin after the date of his brief "Advis" about his brother's posthumous collections, and it may be that Pierre died about the time of the publication of his *Remarques nécessaires pour la culture des fleurs* in 1658.

While his book offers little floricultural information of present value, it must be recognized that his careful classification of ornamental plants according to cultural requirements and garden uses was an important contribution at that time. And his application of a simple terminology to the identification of iris varieties, which had become hope-

lessly unwieldy, reveals Pierre Morin as a gardener of superior intelligence. The epithet of "famous florist," so often parroted, may be accepted with reservations; it was probably due to his large business in fashionable flowers rather than his expert knowledge of cultivation. It is certain that he catered successfully to the popular taste in flowers in his own times, but it may be that the three American plants he named, which were probably of slight interest to most visitors to his garden, will prove his most enduring link with posterity.

*Jean Morin, "The Englishman"*

There was a third Morin, of whom little is known, but who was probably related to the florists René and Pierre. Cornut evidently knew them all, as in his *Canadensium plantarum historia* (1635) he distinguishes "Petrus" (p. 78), "Renatus" (p. 112), and "Ioannes" (p. 157). Of the latter he says that "Narcissus japonicus rutilo flore" (*Nerine sarniensis*), the Guernsey lily, which had been brought from Japan a few years earlier, was by the unremitting care of "Ioannes Morinus" brought into bloom on the seventh of October, 1634. Joseph Jacob, in a note on *The Knight of the Golden Tulip*, in the *Gardeners' Chronicle* (iii, 69:174-175, April, 1921), overlooked the forenames, referring to the grower of *Nerine* as though he had been Pierre Morin "le jeune, dit troisième." James Douglas, however, whose *Lilium sarniense* (London, 1725) is quoted by Jacob, gives it as "Johannes," remarking that his garden was seen by Morison twenty-three years later.

In 1657, the Scottish physician Robert Morison was in charge of the celebrated garden of the Duc d'Orléans at Blois, and knew many of the foremost botanists and growers of Europe, some of whom he mentions in connection with rare plants. In his *Plantarum*

*historia* (1699, 2:368-369), he describes the "Lilionarcissus Indicus maximus sphaericus floribus plurimis liliaceis," which he had seen in bloom in Paris, in September, 1657, "apud Johannem Morinum, Anglum vulgo dictum." Morison is the only authority I can find for the epithet of "the Englishman," which may have been used to distinguish this man from others of the same name. There were at least two moderately well-known Jean Morins living at this time, and earlier, between 1612 and 1620, an anonymous botanical artist, or possibly two of them, whose work is known by the pseudonym of "L'Anglais"; but I have been unable to identify my particular Jean Morin with any of these.

Jean Morin may have been somewhat "famous" because of his luck with these two individualistic bulbs. The Guernsey lily, *Nerine sarniensis*, excited much interest, and the plant described by Morison also had a considerable history before it came to his notice, perhaps before Morin had heard of it. It was the *Brunsvigia* of Heister, which had long before been described by Ferrari in his *De florum cultura* (1633, p. 125-129), with an illustration of the flowering scape resembling a many-branched candlestick. Ferrari, moreover, said it had first been introduced in Paris, where it had not bloomed, but after a few years in Rome it responded favorably to that environment (probably it was actually due to the maturity of the bulb). Whether he had tried it when it was first brought to Paris or not, presumably Morin did not grow it successfully till long after it had flowered in Rome, and perhaps shortly before 1657. Morison cited Ferrari's name for the plant, and Jonquet, in his *Hortus, sive Index onomasticus plantarum quas excolebat Parisiis* (1659), neatly tied loose ends together in his entry: "Narcissus indicus liliaceus sphaericus

Ioann. Bapt. Ferr. Candelabrum Morini." The name used later, "Candelabra flower," was undoubtedly due to its striking inflorescence and without reference to Morin's term, but his "Candelabrum" was the earliest popular name.

Joncquet's handling of all the Morin contributions, including the "Candelabrum," under the simple label "Morini," leads to the conclusion that Jean was a member of the florist family, perhaps a younger brother or nephew of Pierre or René. Although his claim to distinction lay in his success with two notable exotics, it is improbable that his skill as a gardener was allowed to lapse during the score or more years between Nerine and Brunsvigia, and it may have contributed largely through the years to the success of the more noted members of the Morin family.

This account consists largely of data on plants, and gives little personal history of the Morins. There is a great deal of contemporary French literature that might yield details about them, but I have been able to examine very few of the letters, travels and memoirs of seventeenth-century France. E. T. Hamy, whose data on Pierre Morin

have been quoted here, made some search in documents of the period, but there must be quantities of manuscript and ephemeral printed material that have never been explored. Somewhere there may be details to give substance to these fragmentary outlines.

The lives of the Morins spanned a period of great activity in acquisition and exchange of new plants. This culminated in the establishment of the Jardin royal des Plantes Médicinales and its development as a botanical institution of superior authority and importance under Guy de la Brosse, but following his death the garden lapsed into a temporary decline and, during the latter phase, botanical ascendancy briefly passed to the Jardin de Blois, under Morison, Brunyer, Marchant, and the botanical painter, Nicolas Robert. We cannot find that the Morins collaborated with either of these princely institutions, but their own activities must have been largely influenced by them; hence their personal contributions to botany and gardening may complement the wider history of botany in seventeenth-century France.

September 14, 1953

# The Begonias Collected by Thomas MacDougall

GLADYS C. NOLAN AND ELMER J. LORENZ

Since the first begonia was introduced in 1777, these beautiful plants have played an important role in bringing enjoyment to many garden enthusiasts. Plant explorers penetrated into the vast wilderness of tropical and subtropical portions of the world as time progressed and they sent back seeds and plants of countless new species of begonias.

Due to the beautiful foliage and flowers, begonias have always been near the top of the plant hobbyists' list. The continued addition of new species accumulated by plant collectors played an important part in keeping interest in this plant so keen.

No contemporary plant collector has contributed so many outstanding new Mexican species of begonias of interest to the student of *BEGONIACEAE* and to plant lovers as Thomas MacDougall of New York. For the past two decades, as winter approaches, Mr. MacDougall leaves on a collecting trip to the little known areas on the Isthmus of Tehuantepec. From this rich plant wonderland he has sent back seeds and plants of many newly discovered or rediscovered species of not only *BEGONIACEAE* but also *CACTACEAE*, *ORCHIDACEAE*, et al.

The writers requested some personal information with regard to this plant collector and received the following information from Dr. Harold E. Anthony of the American Museum of Natural History:

"I have known Thomas MacDougall since about 1940. I learned of him through some interesting Mexican succulents which appeared in the New York trade and which I traced back to

their source. I looked him up at 4000 Boston Road at the nursery where he spends most of his time when not on a field trip to Mexico. From that time on I have enjoyed the friendship of one of the most versatile and competent plantmen it has been my good fortune to meet.

"Thomas MacDougall began trips to Mexico back about 1930 when he walked from Tehuantepec to Oaxaca City. He leaves New York in October or November when the pressure of landscaping eases off, journeys to the general region of the Isthmus of Tehuantepec and there finds plenty to keep him occupied until March or April when he returns for the spring nursery activity in New York. He is a quiet, modest person and one needs to know him for some time to discover the many things which he undertakes on his Mexican trips. Although he is a professional nurseryman, he is an interested student of the Indian cultures and of the animal life. He has made collections of the mammals, the reptiles and amphibians and other items for museums and naturalists in the States. He speaks some of the local Indian language, is studying their way of life and he has a sympathetic understanding of their problems which makes him an acceptable and welcome visitor in regions not always hospitable to outsiders. His plant interests, however, are the topics which call for the most attention in this article for their breadth should make the name of MacDougall almost a household term wherever plant lovers meet. He has collected a great many plants that were new to science and has brought back and made available many





THOMAS MACDOUGALL

*Ladislaus Cutak*

others that were botanical rarities. One of his most prolific fields has been the cactus and the succulents, but perhaps the name of MacDougall is oftenest associated with begonias.

"Mexico is rich in begonias and the species are varied with the result that each different plant association is likely to have its own particular begonia representative. The Isthmus of Tehuantepec is a happy hunting ground for the begonia collector, and Mr. MacDougall has taken full advantage of these favorable circumstances. If he had brought back none other than *Begonia Mazae*, the begonia cult would be heavily in debt to him. Time and again when some attractive begonia is written up the reader discovers the name of MacDougall enters as one of the active principals in bringing it to light."

The begonias discovered by Mr. MacDougall are unbelievably diversi-

fied. One is a miniature for the window gardener, while another is a giant having tremendous leaves and a very tall flowering stalk. One was found growing in caves, a most unusual environment for this plant family.

The seed which Mr. MacDougall collects are sent to the begonia specialist, Mr. Rudolf Ziesenhenné of Santa Barbara, California. This well known plantsman grows the new collections to maturity under ideal conditions and, after the plants have flowered, the long process of identifying each begonia begins. A careful check is made to determine if the plant is a new species and then the information is forwarded to Mr. Edgar Irmscher, of Stuttgart-Hohenheim, Germany, a world authority on *BEGONIACEAE*. A further comparison is made by him and, if the plant is found to be a new species, the proper International Rules of Nomenclature

are followed and a description of the new begonia appears in a recognized botanical publication.

Recent descriptions include the following new species and these are available at the present time to interested growers:

*Begonia Mazae* Zies. (*The Begonian*, Vol. XIV, 8.) Collected (1946) in Ocozocoatula rain forest, Chiapas, Mexico, and named to honor Don Lisandro Maza, a frequent host to the collector, this plant is a smooth, erect, evergreen perennial twelve to eighteen inches tall. The light green stem is banded with conspicuous dark red rings above the stipules which are persistent, prominent, pale green and acuminate. The lettuce-green petioles, which are slightly longer than the leaf blade, are dotted with red lenticels. The leaves, ovate acute, cordate at the base, with long acuminate tips, are palmately nerved, three and a half to five inches long with barely dentate margins, slightly turned under; the sinus is a conspicuous light green, the upper leaf surface dark olive-green, continuing along the paler green veins, diminishing to a yellow-brown-green at the edges, the whole surface having a satin-like texture. The undersurface of the leaf is a blood red with a deeper area of color following the surface edge pattern. Inflorescence (in late winter and early spring) is an axillary cyme extending beyond the leaves, of many fragrant flowers, white to pale pink, minutely dotted on the reverse side with currant-red. The ovary is light green with many red spots, the three wings tipped with currant-red.

This plant is of a lovely texture and growth habit with strikingly beautiful inflorescence due to the contrast of light flowers and dark ovary wings. It has been used extensively by California hybridizers as a parent stock for many fine new dark-leaved begonias since the

dark red undersurface characteristic is readily apparent in its many offspring.

*Begonia MacDougalli* Zies. (*The Begonian*, Vol. XIV, 11; *Missouri Bot. Gard. Bul.*, Vol. XXXIV, 2 (habitat photographs)). Collected (1946) on the lower levels of the Ocozocoatula rain forest, Chiapas, Mexico, and named to honor its discoverer, this herbaceous perennial has a smooth, very thick and closely internoded creeping rhizomatous stem. The large, deciduous stipules are flesh-colored and covered on the outside with matted downy hairs while developing but are smooth at maturity. The three and one half foot (in habitat) smooth petioles are erect, flesh-colored, with greenish-white lenticels, thick at the base, tapering to the leaf junction. The palmately compound leaf blade has seven- to ten-lobed, fleshy leaflets, each one about ten inches long and four inches wide at maturity, lanceolate bilobed with long acuminate tip, serrate margins, shining, bare, upper surface dark green, underside dull green. The nerves are alternately feathered up to the eighth nerve where the midrib splits into two nerves of approximately the same size at a forty degree angle and from this point two lobes are formed; the nerves henceforth are pinnately veined. The immature foliage is without this angled lobe and the underside is covered with inconspicuous brown, downy hairs. The inflorescence (January to April) is an erect cyme on an eight to nine foot peduncle (at maturity), bearing many small white two-petalled flowers. The ellipsoidal light green ovary is three-winged, capsule three-celled.

This fine plant, though unsuitable for the window garden, is a magnificent addition to the tropical conservatory or collector's greenhouse. Outstanding for the compact growth on the rhizome, palmate foliage and regal inflorescence, it is well worth every effort given to its



THOMAS MACDOUGALL

*Begonia cavum*, in cave at Santiago Lachiguiri, Oaxaca

cultivation. It has proved a fine parent stock for hybridizing, producing many beautiful palmately-starred-foilage offspring.

*Begonia cavum* Zies. (*The Begonian*, Vol. XV, 1; Vol. XVIII, 8, (habitat photograph)). Collected (1946) in a small cave at Cerro Jilott, Oaxaca, Mexico. Probably no begonia exists in such an unusual environment. The lima-bean shaped tubers were found tightly wedged in the interstices of the limestone walls of the cave. These unusually shaped tubers are clothed in a coat of thick fibers which may be removed in layers like tree-bark. This small begonia, about three inches high, possesses few leaves. The persistent green stipules are longer than they are wide, with smooth margins; round, smooth, shining petioles are approximately three-fourths inch long. The dull green, unequal, ovate-acuminate leaves, two and a half inches long by a half inch wide, are smooth surfaced and prominently palmately veined with

doubly toothed margins. An axillary, round peduncle, three to four inches long, bears an inflorescence of three white flowers (all summer).

Filaments of begonias are usually free, or nearly so, but in *B. cavum* they are united to form a cylinder with the top ends free. Also, unlike other begonias, the placenta is attached to the inner walls of the capsule instead of the central axis. Due to the unusual structure of this species it could not be placed in any of the existing *Begonia* sections, hence a new one was created. This is described as *Begonia* Section *Dissepbegonia*.

This plant will probably prove to be only a collector's item due to its period of dormancy, lack of color and scarcity of foliage. It is unique, however, because of its unusual habitat and inflorescence and will be of particular interest to all students of *BEGONIACEAE*.

*Begonia hispidavillosa* Zies. (*The Begonian*, Vol. XVII, 1, with drawings.) Collected (1948) on limestone

rocks in shade on Cerro Aizul (5000-6000 feet altitude), Oaxaco, Mexico, in rain forest, this herbaceous perennial has a creeping and branching rhizomatous stem with the foliage confined to the growing tips. The dark green rhizome is dotted with whitish lenticels and dark red blotches between the close internodes, the leaf scars surrounded by white hairs. The persistent, triangular stipules are currant-red, covered with semi-stiff white hairs which become red at the edges at maturity; eight-inch spinach-green petioles, dotted with long narrow greenish-white lenticels and covered with half-inch stiffish white hairs, arise from a currant-red dot. The

irregularly ovate leaves with spinach-green surface are covered with half-inch semi-stiff white hairs and are palmately ten-veined; the base is cordate, tip almost acuminate and the margins minutely toothed; the undersurface of lighter green is thickly covered with fimbriated white hairs on the veins. Mature foliage is about seven inches long by five inches wide. A spinach-green eighteen-inch peduncle, rising from the leaf axil, is covered with currant-red dots at the base of fimbriated hairs which completely clothe it. The inflorescence (fall and winter) is a light-red, many-flowered, evenly divided cluster of two-petalled flowers. The

*Begonia MacDougalli* (Pulled up and moved to a clearing for photographing).

THOMAS MACDOUGALL (Courtesy of Rudolf Ziesenhene)



ovary, about a half inch long, has three unequal wings, the basal one being slightly larger.

This light green begonia, covered with stiff white hairs, which give it a frosty appearance, is especially striking in bloom since the light red flowers make a startling contrast. An excellent house plant for winter color, its normal blooming period, it may prove an interesting parent stock for unusual offspring.

*Begonia chivatoa* Zies. (*The Begonian*, Vol. XVII, 3, with drawings; *Natl. Hort. Mag.*, Vol. XXXII, 1, with photo.) Collected (1946) at San Jose Quinaite, Oaxaca, on the slopes of Cerro Chivato (8000 feet altitude) and named for its habitat, this herbaceous twenty-eight inch perennial is an erect, seldom branched plant. The thick, fleshy stem, becoming woody at maturity, is closely internoded and dotted sparsely with whitish red-tipped lenticels. Persistent stipules, fringed with scalelike hairs, quickly dry to a papery texture. Pod-greens smooth, four- to eight-inch petioles are spotted with reddish lenticels and covered thinly with shaggy hairs. The smooth, spinach-green, unequal cordate, almost bare, palmately-veined leaves are usually irregularly lobed, about seven inches long and five inches wide, with finely dentate, slightly hairy margins of Indian red. The undersurface is the same color with the veins sparsely shaggy-haired and bordered with the Indian-red of the upper margin. The many-flowered, two-petalled, carmine-tinted inflorescence (December to February) rises well above the foliage on a dull, pod-green axillary peduncle which is covered with reddish-brown dry hairs. Ovary unequal, three-winged.

Found growing on limestone outcrops in rich humus, this begonia, with leaves only on the tip growth, obviously requires a dormant period after flowering.

*Begonia Boweri* Zies. (*The Begonian*, Vol. VII, 4, with drawings.) Collected (1948) on the shady banks of a stream flowing down the Sierra Madres (4000 feet altitude) in Oaxaca, Mexico, this herbaceous perennial was named to honor Miss Constance Bower, well-known hybridist of San Diego, California. The creeping, freely-branching rhizome is entirely foliated and the beauty of the blood-red internodes is further enhanced by whitish lenticels and firm white hairs which surround the pale brown leaf-stem scars. Persistent acuminate stipules of papery texture guard the round, light green three and a half inch petioles which are vertically red-striped, dotted with greenish oblong lenticels and sparsely covered with downward pointing white hairs arising from a red base. The irregular, cordate-ovate, acuminate, palmately seven-veined leaves are of a firm texture, two inches long and one inch wide, light green with variable brown-black patches along the margins. A satiny sheen covers the whole surface of the leaves and the undersurface is light green with spots of blood-red following the same pattern as the upper surface. The dentate margins, slightly waved, are fringed with gracefully up-turned, firm white hairs, giving the appearance of long eyelashes. A few-flowered inflorescence (January to March) rises well above the foliage on an axillary peduncle with the same appearance as the petioles and the two-petalled white flowers are dotted with red on the undersurface of the petals. Ovary bluntly, irregularly three-winged.

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*Begonia purpusii* →

*Begonia mazae*

(Photographs by MR. MACDOUGALL, courtesy of MR. ZIESENHENNE)

*Begonia Boweri*

*Begonia francisii*

(Photographs by ELMER J. LORENZ.)



This beautiful begonia is ideally suited to the window garden due to its dwarf habit and a well grown plant is always fully clothed with the very lovely foliage.

*Begonia Kenworthyi* Zies. (*The Begonian*, Vol. XVII, 7, with drawings.) Collected (1948 and 1949) in Ocozacoatula, Chiapas, Mexico, and one of the handsomest introduced to date, this begonia was named to honor Eva Kenworthy Gray of La Jolla, California, a hybridist and pioneer begonia grower. It is an herbaceous perennial with erect, thick, fleshy upright stem, five to ten inches in height, non-branching, with the leaves confined to the tip. Spinach-green internodes, about a half inch apart, are marked with abundant whitish lenticels below the tan leaf scar which is bordered on the lower edge with light-green, scalelike hairs with fimbriated ends. The uneven, triangular, pod-green persistent stipules encircle the white hair-fringed base of the petiole. Petioles, three to seven inches long, are soft light green, faintly dotted with currant-red and greenish-white lenticels and are softly covered with a gray "bloom" ending in a dark-red cuff of deeply fimbriated hairs which encircle the stem at the junction of the leaf blade. The unequal, five-lobed leaf, cordate at the base, tapers gradually to a long point, bending downwards, with dentate margins tipped with minute dark red hairs. A mature leaf varies from five to twelve inches long and eight inches wide with five to six light green palmate veins, the grey-green surface splotched with red toward the margins and the entire upper surface covered with a glaucous plumlike bloom; the undersurface is a warm red between the pale green, deeply prominent veins. The many-flowered, two-petalled white inflorescence (December to March) rises seven to ten inches on a smooth pod-green axillary peduncle,

thinly dotted and striped with red and white lenticels, and is covered with the soft gray bloom which marks the petioles. The paired branches of the flower clusters are of unequal length with early deciduous leaflets at their base. Ovary elliptical, three-winged.

This magnificent plant, found on cliffs in dry country, will not tolerate "wet feet." It is outstanding because of the glaucous blue-green surface with its underlay of red which lends it a metallic, jewel-like appearance, its sturdiness and stiff leaf texture and the unbelievable beauty of its lacy sprays of flowers. It has proved an excellent rock garden subject in partial shade in southern California though it will tolerate considerable sun which brings out more color in the foliage.

*Begonia Francisii* Zies. (*The Begonian*, Vol. XVII, 10, with drawings.) Collected (1949) on a moist shaded bank of the lower slopes of Volcano Tacana near Rio Mala, (3500 feet altitude) Chiapas, Mexico, this begonia was named to honor Myrtle Shepherd Francis, the daughter of Theodosia Burr Shepherd, pioneer begonia grower of Ventura, California.

This vinelike creeper is an herbaceous perennial with fleshy, smooth, continuously branching stem, eight inches or longer, covered with foliage, the tip always rising from the surface of the soil and rooting at the nodes. The closely internoded three- to five-inch stem is covered with rusty-brown, shaggy hairs and is interspersed with small, whitish lenticels; the persistent, unequal triangular stipules are light green with a reddish keel. Light green petioles, interspersed with tiny white lenticels, are covered with rusty-brown hairs. The moderately fleshy, peltate, unequal spoon-shaped, sharp-pointed leaves are glossy dark green with seven palmate, light green veins, the margins unevenly dentate. The undersurface is a pale

pure red at the margins and between the light green veins, the latter sparsely covered with red-brown hairs. The two-petalled white inflorescence (July and August) is a few-flowered cyme, with axillary, light green peduncle covered moderately with red-brown hairs. Ovary blunt, unequal three-winged, with larger wing on the upper surface, all delicately tinted with red from the covering of red-brown hairs. This begonia, so streamlined with its delicately horizontal growth and the unusually large wing on the upper surface of the capsule, is truly the personification of modern jet propulsion in the plant world.

*Begonia aridicaulis* Zies. (*The Begonian*, Vol. XIX, 5, with drawings.) Collected (1950) on the bank of a stream flowing through a coffee plantation at Pochutal, (5000 feet altitude) Oaxaca, Mexico, this herbaceous perennial was given the above name, which means "dried stem" due to its unusual appearance. The creeping, scarcely branching rhizome appears ligneous and withered, is marked with occasional white lenticels and as the completely foliated stems are weak, they bend down and have the unusual habit of creeping from right to left, changing directions at the leaf node. The persistent stipules quickly dry to a papery texture. The cordate, ovate, acuminate firm-textured, smooth, pale yellow-green leaves are palmately silver-green veined. The undersurface usually a glossy green, though in some plants the underside is red, with the veins sparsely reddish-brown haired. The few-flowered, two-petalled white inflorescence (February and March) is borne on an axillary peduncle five to six inches high. Ovary unequal, three-winged.

Discovered growing among mosses, ferns and other moisture-loving flora, this plant may be somewhat difficult in

cultivation but should be of interest to growers of miniature begonias, since, if left undisturbed, it forms a bushy plant about six inches high.

The following begonia was not originally discovered by Mr. MacDougall. It was first found by the well known plant collector, Dr. Charles A. Purpus, (1914) growing on a moist rocky bank in Chiapas, Mexico. This species has existed for nearly forty years merely as an herbarium specimen until rediscovered. *Begonia Purpusii* was named by Dr. A. D. Houghton in 1923 when preparing his Ph.D. thesis "A MONOGRAPH OF THE BEGONIACEAE OF NORTH AMERICA." This work was never officially published but is in the Library of the University of California at Berkeley.

*Begonia Purpusii* Houghton (*The Begonian*, Vol. XIX, 9, with photographs.) Rediscovered (1949) near Rio Mala on the lower slope of Volcano Tacana, this perennial, erect-stemmed, shrubby plant takes on the characteristic of a trailer or climber if suitable support can be found, such as a rock or tree. Bare brown stipules are slightly persistent; four- to six-inch petioles are thickly covered with reddish hairs which become sparse at maturity. The oval, four-sided leaves, three and a half inches long and four inches wide, are unequal, four to six lobed, palmately veined with lesser veins uniting to form a net work, the margins slightly dentate. Upper leaf surface is dark green and bare; under surface light green, bare except on the veins which are red-hairy. The white inflorescence rises in a crowded cyme on five to seven bare peduncles. Ovary bare, two-winged.

This plant has proved most satisfactory in cultivation for the beauty of its compact, shining foliage and upright habit of growth.

It is interesting to note that all of the begonias discovered by Mr. MacDou-



gall and introduced to date have been found at altitudes ranging from 3000 to 8000 feet. There is one exception, *Begonia MacDougalli*, which was found at 1100 feet. Several begonias were growing in humus on or among limestone rocks and along the banks of streams. Such habitat notes are always of importance in the successful culture of these species. High altitude means cool growing conditions while humus and limestone indicate a growing medium of composted leaves, a sweet soil, probably

almost neutral in reaction, and excellent drainage. The high altitudes, conducive to clouds and mist, indicate also a high humidity is required for complete success with these begonias.

Four of the above described species have been used extensively in hybridizing, namely: *B. Mazae*, *B. Boweri*, *B. Kenworthyi*, and *B. MacDougalli*. Beautiful and outstanding hybrids have already been introduced and the authors hope to present the best ones in another article in the future.

## Concerning Hypocyrtas

PEGGIE SCHULZ

If you are looking for a small plant to tuck into an extra window garden or greenhouse space, why not try growing the Gesneriad, Hypocyrtas?

There are possibly twelve species, originating mostly from Brazil, but there seems to be only one species, *Hypocyrtas nummularia*, in cultivation. For a number of years I have grown and enjoyed this little Gesneriad. It is much-branched and trails over the pot edge in a very pretty fashion. The leaves are small, one-half to three-fourth inch in length, but when in active growth they form such a dense mat it is difficult to see the pot in which the plant is growing.

Hypocyrtas grow contentedly in any soil you may have found suitable for gloxinias or African-violets. Equal parts of well-rotted leaf mold, sand, and garden loam, form a combination much to their liking. I also find that they do exceptionally well in a packaged substance, "Black Magic."

This little Gesneriad is fibrous-

rooted, and it is propagated mainly through little nodules or stem swellings which appear directly below the leaf clusters. There are about three of these potential plant-makers to every inch of stem. Nip as many off as you wish and plant them in moist sand, vermiculite, or peat moss. If you are a window gardener, give these nodules a makeshift greenhouse by placing a drinking glass over them.

Hypocyrtas are in active growth from mid-December until late July or August. My plants usually start showing buds in mid-May. You will have no trouble deciding about their rest period. In early fall they gradually begin to shed leaves and go into a state of semi- or total dormancy.

If you are growing them in a window garden, try to place them near an east or south exposure. They also thrive under fluorescent lights or in Wardian cases. Day temperature of about seventy degrees Fahrenheit is to their liking; night temperature of sixty-five

helps keep them sturdy and compact.

You will obtain a few blossoms on year-old *Hypocyrtas* and you certainly have a right to expect a glorious show on two-year-olds. The little flowers are so unique you will want to call in all of your friends to share with you their strange beauty. The plant derives its name from the Greek words *hypo*, meaning under, and *kyrtos*, meaning curved. The flower is, indeed, under-curved. In fact, it is shaped like a fireman's helmet. Individual *Hypocyrtas* flowers are brilliant scarlet, about an inch wide, and topped with two contrasting color rings—black and yellow. For the first two days the flower appears to be completely solid. Gradually the top expands into little more than the width of a pin head. I have never been able to make this little plant set seed. A Brazilian friend told me that he had never seen seed on wild plants so perhaps it depends on propagation via the growth nodules.

Supply extra humidity for this Gesneriad by setting the potted plant atop moist gravel or by sinking the entire pot into a larger moss-lined pot.

During its dormant weeks it can be stored in the basement or under the bench in the greenhouse. I like to leave it in the Wardian case and reduce its supply of water. When I note little green leaves sprouting, usually in January or February, I bring it into the

light. As the leaves mature I supply every-other-week feedings of organic or soluble fertilizer.

Last year a South American friend sent me a cutting of *Hypocyrtas radicans* which arrived in such a state that I could not revive it. There was very little similarity between it and the familiar *H. nummularia*. It apparently grew erect and had elliptic, shiny leaves. Perhaps some day I will be fortunate enough to acquire a living specimen of this plant.

There is very little historical literature to be found on *Hypocyrtas*. Fritsch gives a limited description in *Naturlichen Pflanzenfamilien*. If you are fortunate enough to possess or can borrow copies of *Curtis' Botanical Magazine*, these plates will be of interest to you: 4346, 7468, and 4047.

There are three other species which at various times have been described but no longer seem to be in cultivation:

*H. glabra*, which bears rather shiny leaves from a red-purple stem. The flowers are scarlet and orange.

*H. pulchra*, supposed to be a beautiful foliage plant. The ovate leaves are four-to-five-inches long, brown above, red beneath. The flower has a decidedly swollen throat and it is scarlet and yellow.

*H. strigillosa*, which grows erectly to two feet. Its flowers which appear in May are also scarlet and yellow.

# *Oxalis Corniculata*

## An Interesting Weed

WALTER C. BLASDALE

The conception of a "Struggle for Existence" in the plant kingdom, upon which Darwin's Theory of Evolution is largely based, finds application in the art of gardening. Those who take pleasure in growing plants for the gratification of their artistic sensibilities find themselves forced to deal with plants whose constitutions enable them to grow and reproduce more vigorously than cherished ornamentals. Although the estimation of the beauty of such plants is largely a matter of personal taste, any species which is decidedly aggressive and has but little charm is quite certain to be put into the "plant out of place" category. The one which I am here concerned with has become so widely distributed, without any intentional effort on the part of the human species, clearly possesses a high degree of aggressiveness. As to its ornamental features, I am obliged to admit that it has some charm, even though I am frequently obliged to devote many hours to the wearisome task of eliminating it from my lawn. In this paper I am especially concerned with certain of the peculiarities upon which its aggressiveness depends.

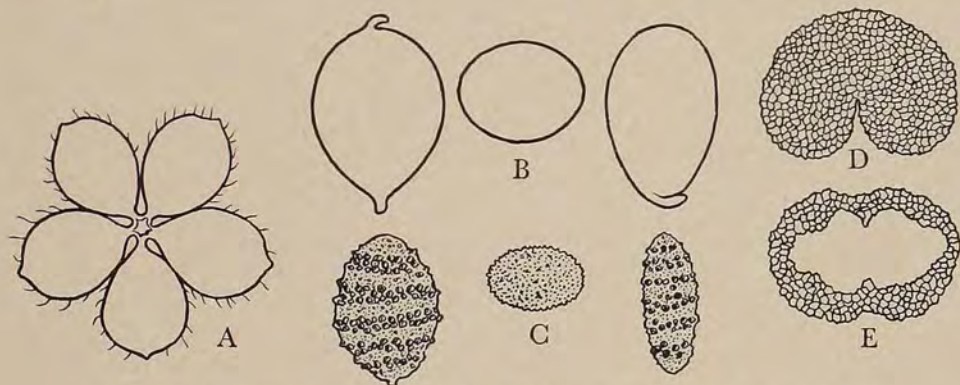
The Latin name which appears in the above title represents the most widely known of the three hundred or more species of the genus *Oxalis*. It was discovered by the Flemish botanist D'Ecluse (Clusius) in Spain as early as 1549 and was later discovered and described by him from many parts of Europe. He considered it related to the species of *Trifolium* (clover), which relationship is suggested by its long leaf stalks bearing three nearly horizontally poised leaflets at their

ends, but it was soon recognized that it was only remotely related to that genus. At an early date attention also was called to the pleasing acidity of its leaves which led to some use of it as a component of salads. The discovery of species having similar leaves and acidity induced Tournefort to establish in 1703 a new group of such species under the name of *Oxus* (sour) which was changed to *Oxalis* by Linnaeus in 1753 by combining *oxus* with *als* (salt). It is one of the most easily recognizable genera of plants, with the largest aggregations of species in South Africa, Central America and South America. In California, we have four native and at least an equal number of introduced species.

From Europe *O. corniculata* L. was introduced, presumably by means of seed present in soil or packing material accompanying specimens of economic plants, to the shores and islands of the Mediterranean, then to the Madeira and Azores Islands, the West Indies, North America and South America. It is now found in certain portions of all the continental areas and many of the larger and similar islands. I will list only Australia, New Zealand, Java, Sumatra, Japan, the Hawaiian and Falkland Islands. There are certain habitats from which it was reported at so early a date as to suggest that it is indigenous to them also. Only recently I was surprised to find it listed among the plants collected in the Provinces of Shan Tung and Kiang Nam of China in a book by Sir George Staunton, which presents a detailed account of the journey of an emissary sent by the King of Great Britain to

the Emperor of China in 1797. Since that expedition initiated the exchange of commodities between Europe and North China, it seems improbable this *Oxalis* could have reached that part of China at so early a date. A similar line of thought is aroused by an account of the vegetables of East India by J. J. Ochse of the Botanic Garden at Buitenzorg, Java, in which he states that *O. corniculata* "is spread all over Java from the plain to the top of the mountains, in sunny or shady places, by preference in swampy, moist and sticky soil and in paddy fields."

a circle more or less united at their bases and forming two groups of anther-bearing filaments, alternately longer and shorter, resulting in two rings of anthers well separated from each other as to the height at which they are sustained in the corolla tube. The central ring of five pistils bears green stigmas, all supported at the same level but slightly below the upper row of anthers. Each flower develops into an elongated capsule nearly an inch long. When mature, they stand well above the foliage and are conspicuous. Linnaeus thought they resembled



Sketches Illustrating the Capsule and Seeds of *Oxalis Corniculata*

*O. corniculata* is a herbaceous perennial of small size which, unlike the majority of the species, does not produce bulbs or tubers. Its seedlings develop a long tap root and erect, or more generally, horizontal branches which travel along the ground surface and also develop tap roots. It is one of the relatively few species which appear to be adapted to life in temperate climates but also grow profusely in South Africa and central India.

The flowers are produced on rather long stalks, bearing from one to five petioles, each supporting a single flower. The rotate corollas are composed of five yellow petals which close up like those of a morning-glory when there is no sunshine. The ten stamens make up

horns and with that thought in mind gave the species the name *O. corniculata*. A cross section of a nearly ripe capsule is shown (A) in the accompanying series of sketches magnified by the factor eight. The five components of the capsules (carpels) are attached to each other through a central axis; each one contains a single seed attached to the axis by a very short stalk (funiculus). Since the point of attachment to the axis is slightly higher than the other end of the seed, which extends fully to the other end of the carpel, the seeds hang downwards somewhat and make the outline of its form somewhat distorted. The peripheral walls of each carpel flare outwards to form a central ridge along

the full length of the capsule and, as soon as the seeds are ripe, a slit appears along this line through which the seed escapes. Each of the five carpels contains a single tier of seeds. In this specimen there were eight in each tier.

By removing a mature but not fully ripened seed from a capsule and studying it under a microscope, it will be found to have a plumlike form as shown in the upper row of three sketches (B). Each sketch is a profile view of the same seed in a plane which includes two of the three longest of the three rectangular axes. The one at the left includes the longest (vertical) axis and the next to the longest (left to right) axis. It portrays one of the two largest faces of the seed. The sketch at the right includes the longest and shortest and portrays one of the two narrower faces; the central sketch portrays the seed as viewed from a point on the central axis. Actually the longest axis, which is the full length of the seed, measures approximately a fifteenth of an inch; in this and all of the following sketches, the actual dimensions have been multiplied by the factor eighteen.

Each seed is pure white, translucent and of glistening smoothness. When sufficiently matured, it will be discovered that the white surface is that of an enclosing membrane because the outline of the reddish brown seed can be seen through it. Similar membranes are features of the seeds of most of the species of *Oxalis* but are extremely rare in other genera. They are connected with another remarkable peculiarity, namely, the ability of such seeds to "explode" as soon as they are ripe. It would not have been possible to remove and handle the seed as just described if they had been fully ripe. If a capsule-bearing stalk whose seeds are fully ripe is removed from a plant, placed under a glass tumbler turned upside down and then brushed with a solid object, one or

more often a series of explosions will take place. The impact of each seed upon the wall of the tumbler can be heard, but the speed at which they move is too great to be followed by the human eye. This procedure provides both the separated seeds and the membranes (in which they were enclosed) for observation.

The general form of the seed is shown in the second row of sketches (C). They are also profile views, oriented in the same way as those of the upper row. Comparison of the two rows shows that the encircling membrane makes up a fairly large percentage of the unexploded seed and that the seed itself is decidedly thin as compared with the membrane-covered seed. Each seed suggests the kernel of an almond both as to form and color. The microscope also shows that the skin of the seed is traversed by from five to ten transverse ridges, each rather broad at base but culminating in a narrow, jagged edge interrupted by short, rounded protuberances of greatly varied form and size.

The separated membranes always consist of a single piece of tissue which has assumed a very different form (D) from that which it had before the explosion (B). The change seems to have resulted from a tear originating from near the point at which the funiculus was attached to the seed and that tear has spread in opposite directions along the central line of the broadest face of the seed, one of which is shown in B. This tear caused the membrane to divide into two, partially separated, symmetrical halves, thereby greatly increasing the width of the membranes compared with that shown in B. This suggestion is confirmed by another sketch of a membrane which had stood for a half hour after the explosion and had begun to contract. It is oriented as if the membrane shown in D had

been turned upside down and viewed from above E. This sketch shows that a much longer tear had started from near the same point as the first and moved in a line at right angles to the first. The two tears made an opening wide enough for the escape of the enclosed seed. The edge of the cavity into which one looks takes on varied forms in different specimens as the membranes curl up and shrink. Still another remarkable fact is that during the explosion the balloonlike membrane turns itself inside out. The chief evidence for this is that the outer surface of the exploded membrane is no longer smooth but shows the imprint of the corrugations which cover the outer surface of the seed itself. I have not been able to discover specimens showing how or suggesting why this operation became a necessary part of the explosion.

Several German botanists have zealously studied the structure and behavior of these membranes, especially in *O. acetosella* and *O. stricta*. It was found that they were composed of four layers of thin-walled, rather large cells in addition to a fifth composed of smaller and thicker-walled cells. It is probable that the thick-walled layer was able to resist the pressure which accumulated within the membrane until it gave way with explosive violence. The full details as to how and why these processes take place have yet to be worked out. A summary of what is known about them was published by Fritz Overbeck in 1923 of Vol. 62 of *Jahrbucher fur Wissenschaftliche Botanik*, page 258-281. In this paper I have been concerned with the mechanism as observed in *O. corniculata* only.

There are several other genera which include species whose seeds are scattered explosively. The mechanism concerned in them is simpler than in that of the species of *Oxalis* and it is the

capsules, rather than the seeds, which explode. It depends upon tensions accumulated in the fibrovascular bundles of the valves which enclose the seeds that arise as the valves begin to dry out. Familiar examples are found in *Lathyrus* (Sweet pea), *Impatiens* (Touch-me-not), and *Alstromeria* (Peruvian lily).

There can be no question that the aggressiveness of the species under discussion is increased by its seed-scattering mechanism. By the time the capsules are ripe, they are held well above the ground surface and the seeds are scattered over a circular area eighteen inches in diameter. This must add appreciably to the number of favorable opportunities for the development of seedlings. Nevertheless, I question whether this is as important an item as several others. The group of physiological characters which enable the species to flourish under a variety of environments is of much greater importance. It grows vigorously in the cool damp climates of the British Isles and Iceland and also in the dry and hot climates of Asia Minor and South Africa. In California, it makes some growth throughout the entire year and produces seed from April to November; if not disturbed, it lives for at least as many as seven years and spreads over at least a square foot. It grows equally well in sunshine or shade, in a humus-rich soil or a gravel bed. It has none of the smothering capacity of a dandelion or the English daisy, but its long, delicate branches easily insinuate themselves through the leafage of a lawn and ripen their capsules unless decapitated by a lawn mower.

Finally, I would note that I have not been able to detect any differences in the aggressiveness of the purple-leaved and green-leaved forms of the species.

# Recent Advances In Horticulture

FREEMAN A. WEISS

## *Molybdenum*

Long in use as an alloy of iron in making hard, tough, high-speed cutting tools, molybdenum has recently been gaining recognition as an essential plant nutrient. The initial demonstration of its wide occurrence in plant tissues dates back nearly a quarter of a century, but it was not until 1939 that Arnon and Stout in this country, and almost simultaneously Piper in Australia, presented experimental proof of its essentiality for plant growth. It is now generally regarded as an indispensable element in the nutrition not only of the higher green plants, but also of algae and certain molds and bacteria.

Even though this is a relatively recent discovery in plant physiology, there would be no warrant for mentioning it under the caption of this article were it not for the more recent demonstrations, chiefly in Australia and New Zealand, of astounding effects of minute applications of molybdenum in bringing hitherto unproductive land into useful crop-bearing condition. Furthermore, evidence is being found, as analytical methods are refined, of certain plant growth abnormalities in this country, which are traceable to molybdenum deficiency and are correctable by minute applications of this element. The whiptail disease of cauliflower is one such example. In some of Florida's citrus groves and truck crop areas, molybdenum is one of the twelve elements now regularly supplied in fertilizer practice.

Present interest in molybdenum as a plant nutrient is not, however, in its demonstrated role in correcting a minor deficiency disease of certain

crops, but in its possible value in improving impoverished acid pasture soils on which nitrogen-gathering legumes can not now be grown. This subject is discussed, in a recent number of *Agricultural and Food Chemistry*, by Charles H. Kline, under the intriguing title 'Reclaiming Acres with Ounces.' The author cites experiments in New Zealand in which the application of 2.5 ounces of sodium molybdate per acre resulted in an increase of herbage of subterranean clover greater than was obtained from three tons of limestone, and a total yield five times as great as that of nontreated plots. Where lime and molybdenum (at the above rate) were used together, the application of 650 pounds of lime produced a greater yield than two tons without molybdenum. From the fact that molybdenum is known to accumulate in the root nodules of legumes, and has been shown to be essential or at least beneficial to the symbiotic fixation of nitrogen, Dr. Kline points out that in wide areas of the United States where difficulty has been encountered in establishing legumes, the fault may be a deficiency of molybdenum. He states that where as much as two or three tons of lime per acre are considered necessary for the establishment of legumes, and would cost twelve to eighteen dollars, the same benefit might be obtained from the application of a few ounces of sodium molybdate, costing fifteen to twenty-five cents. Application is made by ground spraying or airplane dusting at a dollar per acre. It is to be noted that molybdenum is the only one of the trace elements that becomes more available as the soil becomes more alkaline.

An excess of molybdenum, created by overliming, may result in a deficiency of copper in the herbage, this in turn causing a deficiency disease of grazing animals. Thus, we are reminded again of the intricate and delicate balance between plant and animal nutrition and its relation to our own welfare. Parenthetically one may wonder how the more zealous of the organic gardeners would react to the use of molybdenum—which is clearly a chemical, sometimes beneficial, sometimes otherwise—along with lime, which they condone as a plant fertilizer. At any rate, in Australia they are making two sheep thrive, where formerly one-half starved, on scrub land by merely applying a few ounces of molybdenum per acre.

#### *Copper and Zinc Deficiencies*

To bring the subject of trace-element deficiencies nearer to the familiar purview of horticulture, it may be noted that investigators at the University of Bristol (England) have recently described deficiency symptoms in apples and pears when the level of available zinc or copper in the soil falls below two parts per million. The threshold level of zinc in apple leaves and bark is about ten micrograms per gram of dry matter; that of copper five mcg. per g. Below this level deficiency symptoms become evident. Both types of deficiency disease can be corrected by spraying the trees, either in growth or

when dormant, with the appropriate mineral solution.

Thus the pome fruits are added to the list of plants in which normal growth depends upon the presence of minute but indispensable amounts of copper and zinc. It has long been the practice in the cultivation of the citrus fruits in some regions to supply these elements artificially in the fertilizer or by application to the plants.

In the detection of these minute amounts of mineral in the soil and plant tissues, advantage was taken of the fact that copper and zinc are also essential for the growth of a black mold, *Aspergillus niger*, which can be grown under laboratory conditions on precisely defined nutrient media, and any deficiencies readily identified. The requirement of this mold for zinc was one of the earliest examples of the essentiality of this element for plant growth, and of the use of a micro-organism in soil analysis. Thus are minerals, molds, apples, and perhaps ultimately doctors brought into relationship.

The quandary of organic gardeners as to what is admissible in plant nutrition can not but be deepened by the evidence that copper and zinc—which in other applications are both plant poisons and familiar pesticide ingredients—are also essential for normal plant growth, and sometimes have to be artificially applied.



## A Book or Two

[See explanation of the "(Library)" note on the inside back cover of this issue.]

*Biological Conservation—With Particular Emphasis on Wildlife.* John D. Black. The Blackiston Company, New York and Toronto. 1954. 328 pages, illustrated. \$5.00. (Library).

There are few who are not interested in conservation or at least in some phase of it. Here is a treatment of the subject which will appeal to the average person. It is written in a pleasing style and in logical sequence. The basic facts of conservation, showing the necessity of a balanced relationship between soil, water, plants and animals, are brought out in the first 114 pages. These pages, carefully read, will give the reader an excellent concept of the problems and the need for conservation.

Although the text stresses the part that animal life plays in the overall picture, it brings out forcefully the primary necessity of plants and the water required to support those plants. The chapters on Standing Water and Running Water are of exceptional interest and bring out facts probably unknown to the average person.

The knowledge given in this volume could be a valuable asset to any horticulturist who would readily see applications for gardeners and explain why certain practices exist. Parts 3, 4 and 5 of the text deal with animal life and are interesting and instructive to those who wish to keep game in normal supply. Anyone interested in the groups of animals as treated in the several chapters will find concise discussions followed by bibliographical references which make further research easier.

The overall value of the book is in the detailed descriptions of the various malpractices and the steps that need

to be taken to eliminate the present waste of our biological resources.

Oliver M. Freeman

*Dahlias for Every Garden.* Marian C. Walker. M. Barrows and Company, Inc., New York. 1954. 128 pages, illustrated. \$2.95. (Library).

Within this book one finds the story of the Dahlia. It tells all about growing them in every part of the country, guides the beginner to easy-blooming plants, tells the expert how to prepare them for show table and blue ribbons.

The early history of the Dahlia is presented; guides for selecting Dahlias for specific purposes; the control of the various pests and diseases, etc., as well as the most detailed cultural practices are given.

Sixteen illustrations in color and black and white will impress many to start as beginners as well as helping some of us to start afresh for better results.

*The American Camellia Yearbook 1953.*

Edited for the Society by Arthur C. Brown and Austin Griffith, Jr., Gainesville, Florida. 1953. 409 pages, illustrated. For members only. (Membership, \$5.00 the year.)

As always, there is a nice proportion between articles that deal with the history of the Camellia, the problems concerned in its cultivation, the reporting of new varieties, the activities of the Society in its branches and shows, personal chit-chat and so on. There is also the inevitable section of flower arrangement, with somewhat minor em-

phasis on the poor camellia in many cases. The competition is nicely handled, the judges' comments less interesting than usual, and the winning entries of Class II anything but simple! In the articles there is also nice balance between those that concern the commercial grower and the amateur.

Frankly, the reviewer cannot understand why anyone who has any interest in camellias is not a member, and why anyone who has any garden interest in the areas where camellias grow should not follow suit. There is also a record of the new Constitution and By-Laws which seem uncommonly sound.

The illustrations are many, some in color and of unequal success, many in black and white, usually fine, and some line drawings, clear but inelegant.

There is an interesting if brief detour among the relatives of the camellia, some in cultivation here, most not, and some probably not of value in any place in the United States for outdoor use.

B. Y. M.

*Soils and Fertilizers.* Firman E. Bear.

John Wiley and Son, Inc., New York. 1953. 420 pages, illustrated. \$6.00 (Library).

Revised (Fourth Edition) to fill the need for an up-to-date presentation of general soil information in text-book form, although it can also serve the gardener as an authoritative reference on basic soil and fertilizer principles. What good gardener has not wondered about the reasons for various soil and fertilizer practices that are so often glibly recommended but so inadequately explained? For him (the serious gardener), this book by Dr. Bear offers the opportunity for a deeper understanding of why soils and fertilizers

behave as they do and how they affect the plant. With this knowledge, the gardener can adapt his methods to meet new soil and fertilizer problems with some degree of understanding.

In addition to chapters on Soil Water, Soil Air, Organic Matter, Biological Processes in Soils, Chemical Composition of Soils, and the resources of the major elements needed by plants, are chapters on Origin and Classification of Soils, Soil Conservation and Factors Affecting Plant Growth. The book is well illustrated, contains 157 tables, and lists numerous selected references for further extensive reading.

Dr. Bear is Professor of Agricultural Chemistry at Rutgers University and works closely with the New Jersey Agricultural Experiment Station as Research Specialist in Soils.

Francis de Vos

*The Cultivated Species of Primula.*

Walter C. Blasdale, University of California Press, Berkeley and Los Angeles, California. 1948. 284 pages, illustrated. \$2.50.

It is not very often an editor wishes to mention a title twice. In the case of this monumental work, however, he wishes to bring to the Society's membership the fact that this book is available, that its price has been reduced from \$7.50, and that it is highly recommended for those possessing a love for the primula in any or all of its many forms, as well as to those who have yet to know this rich and varied family.

*Amaryllis—And How to Grow Them.*

Peggie Schulz, M. Barrows and Company, Inc., New York. 1954. 128 pages, illustrated. \$2.95.

Mrs. Schulz has a peculiar skill derived from her own experiences and from her personal world-wide correspondence and makes her presentation of the Amaryllis story equalled only by her last major opus—*Gloxinias—And How to Grow Them*. Her forte (putting her “green thumb” in second) is that singular phenomenon of self expression. Everyone may find the secrets to this flower in her book and everyone will understand her delightful verbiage.

The recent revival of interest in growing Amaryllis is sparked by the introduction of the first complete book on this magnificent flower.

The author gives complete information on growing and collecting the exotic, long-lived, lilylike amaryllis. There is a history of the species, the hybrids, and other members of the clan. She outlines complete planting and growing instructions from seedling and bulb stage to dormancy, at a window, in the garden where the climate permits. She tells how to use colchicine and how to grow seedlings under fluorescent lights. Mrs. Schulz says, “amaryllis have enormous appetites,” and recommends several excellent methods on how to make bulbs bloom and repeat bloom year after year. There are several soil formulas tested by growers in this country and abroad, including her own. The most modern methods of propagation are fully described, as well as how to recognize and eradicate pests and diseases. Fortunately, amaryllis have few enemies.

As a fill-in at the tail end of the book, Clivia, Cooperia, Sprekelia, Nerine, Haemanthus, and so forth, other members of the Amaryllidaceae Family, are given a once-over-lightly—you know, just enough to make us all try to grow every one!

It's a good book and highly recommended to the readers of this review.

LILLY FERGUSON FISK

*The American Rose Annual, 1954.*

Published for the Society, under the Editorship of Fred J. Nisbet, with the assistance of Mary H. Koehler. 278 pages, illustrated.

The arrival of the American Rose Annual each year is an event, even when roses do not make the chief issue in the reader's gardening. This year is not different. There is a most intriguing Foreword by the Editor who faces the eternal problem of dealing with a public that is made up of both beginners and advanced workers.

There is a most interesting article by J. Awdry Armstrong on “Roses for Tomorrow” that indicates some of the trends. Ann P. Wylie of the Department of Botany, The University, Manchester, England, contributes a very long paper on Chromosomes of Garden Roses that should be invaluable to all garden workers, in the rose field, whether the most technical man or the beginner.

There are various papers of regional interest and some of general interest on types of roses, disease problems and all such.

Two papers are of particular interest to the reader, one Dr. Gamble's paper on “Lady Mary Fitzwilliam” a rose that figured largely in the pedigree of fine roses, and particularly through several of her immediate descendants. The other is the progress report on Black Spot investigations, at Beltsville, Maryland, with its special stress on the value of *Rosa bracteata* as a resistant species. We only wish that the project was being carried out in the South where *R. bracteata* is established as a wild plant and where, in gardens, it blooms while many other roses are in full flower, including many old Teas that appear as fool proof to black spot as *R. bracteata*.

No. one who has any interest in roses, no matter how slight, can afford to be without the annual, that comes to members of the Society.

Tropical Trees. (Two Brochures)  
*1947 Catalog of Flowering Tropical Trees.* 48 pages, illustrated, \$1.00;  
*1953 Catalog of Flowering Tropical Trees,* 64 pages, illustrated, \$1.00  
 Written and published by Edwin A. Menninger, Stuart, Florida.

These two catalogs that contain no price lists, though these are available separately on request, are solo performances of distinction. Mr. Menninger for many years has concerned himself with growing all species of flowering tropical trees that might grow in Florida. His writings are familiar to the readers of *The National Horticultural Magazine*, to which he has contributed generously. These, however, give only the barest idea of the extent of his activities and the measure of his successes. The 1947 list is arranged in groups according to the color of the flowers, the 1953 list, in groups that are related botanically. The descriptions are carefully written in prose that the amateur will appreciate and at which the technical man cannot cavil greatly. The illustrations, some in color, are highly informative.

For the Florida gardener who is not content with the stupid things that are done endlessly, they are of greatest value. For the winter visitor, who cannot possibly be familiar with all the things that he sees, they will open many avenues of interest.

Mr. Menninger states his purposes clearly and well, and no one who has not wrestled with the problem of getting material of rare and unusual things, seeing them safely established and growing, can possibly estimate the labor that lies behind these lists. Do not

for a moment imagine that they are mere commercial catalogs, they are far from that and are deserving of the attention of all horticulturists, even those who live far outside the possible range of usefulness of the plants described.

B. Y. M.

*Year Books of the Rose Society of Ontario.* Arthur J. Webster, Editor. 1953. 114 pages (in text). 1954. 139 pages, 2 color plates. Published by the Society, Toronto.

Two of these interesting commentaries on contemporary rose history in our northern neighbor, Canada (the Rose Society of Ontario has members in each of the Provinces), have reached the Review Editor's desk since an issue of this series was first reviewed in these pages. An indication of their physical growth and the innovation of color plates are noted in the publication details given above, but one is even more impressed with the evidence that the contributors to the text, and the Editor—who is both contributor and compiler — are persons who really know their roses. From the overall technical standpoint, the familiar chapters "The Clearing House" — which corresponds to the "Proof of the Pudding" in the *American Rose Annuals*—and "The Rose Analysis"—which has no counterpart in our *Annuals*—are perhaps the most valuable features, but the Symposiums on the Best Twelve (the yellow Hybrid Teas in the 1953 issue, the white or cream H.T.'s in the 1954) are very helpful, too. The Rose Analysis merits special mention. A jury of sixteen (in 1952) and twenty-four (in 1953) rose specialists have rated fifteen leading rose varieties in each of the following categories: 1) Exhibition roses, 2) Hybrid Teas for general garden cultivation, 3) autumn blooming roses,

4) most fragrant roses, 5) climbing and rambling roses, 6) Floribunda roses. It is noteworthy that Crimson Glory is rated either first or second in each of the first four categories; Peace is first in (1) and (2). McGredy's Yellow, Show Girl, and Ena Harkness are the other principal favorites among the Hybrid Teas.

The Clearing House stresses varieties introduced within the last five years, but sometimes revives, for current notice, older varieties whose merits may have been overlooked. A number of articles on special topics, and statistics of the Annual Rose Show (which is held in Toronto about the third week in June) complete the presentation. Rose hobbyists south of the International Border, as well as those to the north, will find these year-books highly informative and delightful to read.

F. A. W.

*Historical Aspects of Organic Evolution.* Philip G. Fothergill. Philosophical Library, New York. 1953. 427 pages, a few line drawings and diagrams. \$6.00. (Library).

It is generally customary in the preface of a book for the writer to publicly acknowledge his own sense of his inadequacies. It is less usual perhaps for a reviewer to follow suit. In this case, the reviewer is only too well aware of his limitations, in fact so much so, that he will not write a review in the sense usually employed by him.

Dr. J. W. Heslop Harrison, who contributes the brief foreword, says that the author had in mind three special objects. "(1) to fill gaps in the literature in respect to the history of the subject and to bring this aspect up to date, (2) to present it in such a manner as to enable both the general and the specialist reader to evaluate the

conflicting meanings that have been applied to the word 'evolution,' (3) by presenting an unbiased account of the subject of evolution to show that even a person believing in a definite and clear-cut religion can also believe in and deal with the subject of evolution without prejudice to his religious beliefs."

It would seem that any serious worker might, if diligent and knowing enough, work through to a distinguished presentation of the data under the first two heads, but the third proposal would appear to the reviewer to be impossible of accomplishment, usually for reasons that are historically available.

B.Y.M.

*Plant Growth Substances.* L. J. Audus. Interscience Publishers, Inc., New York. 1953. 465 pages, illustrated. \$6.50. (Library).

The plant scientist has long been interested in the promotion and control of plant growth and, until relatively recent years, has relied almost completely on intelligent pruning and application of fertilizers. Research of the past twenty years has brought about a new method applicable to the adjustment of development within the plant—that of using chemicals as a growth control. And it is with these chemicals that this book is concerned.

A remarkable job is accomplished in making this volume suitable for both the agricultural specialist and the amateur home gardener. The origin and history of the plant-growth regulating substances are presented in a manner which gives enjoyment to the reading and does not obscure the facts, and the reader becomes acquainted with these natural and synthetic chemicals called auxins.

The discussion proceeds with the

practical horticultural practices conducted with these various chemicals. Their effect upon seed germination and upon subsequent growth of seedlings, their use in transplanting of seedlings, their influence on propagation by cuttings, layering, grafting and wound healing, are all carefully presented. Other information pertains to their use in producing seedless fruits, inducing and breaking of dormancy, and of particular interest to the fruit grower, blossom thinning, prolonging the blossom period, and preventing fruit drop. Their use as weed killers is of greater general knowledge.

The book is not devoted entirely to the proven practical value of the plant-growth substances.

The possible future use of materials such as the antibiotics penicillin and streptomycin, for disease resistance, is also discussed.

There is no indication that the book is to be used as a manual, but it does include somewhat general information as to the time and method of application of the chemicals; and, with the aid of the glossary of technical terms, the amateur and serious gardener should receive a great deal from its contents and encounter little difficulty with its presentation.

Bernard T. Bridgers

*The American Rose Annual, 1953.*

Edited for the Society by Dr. R. C. Allen with the assistance of Margaret R. Snyder. Harrisburg, Pennsylvania, 1953. 279 pages, illustrated, color and black-and-white. For members only.

There is a catholic variety in the writing that goes into the make-up of any Rose Annual, and this issue is no different from its fellows. For some tastes, there are too many pieces that

sound like notes from beginners who are writing too soon, but one never knows when the beginner may confound the old-timer. Mr. Bechtel's *Roses in "England and France"* and Francis Meiland's *"On the Way to Better Roses"* are perhaps the longest flights filled with general interest to all readers. For the ghouls, there is Dr. McClelland's *"Survey of Rose Diseases,"* for the bookish, there is Dr. Lawrence's delightful *"History and Nomenclature of the Fairy Roses,"* a number of other pieces that cover background data, and then the many bits of personal lore, some positive, some negative. Poetry, as usual, is pretty Gawd-awful, but the *"Old Carol, Middle English,"* redeems them all. One could wish that a reference as to its source in publication had been added.

The illustrations are about as usual, catalogue size and type of blazing flowers, some with the inevitable smiling female figure, some just black-and-white.

Perhaps the most "exciting" article is that by Mrs. Merrill A. Newman, *"The Rose, Loveliest of Pot Plants"* . . . remember there was a time long years ago when it was so grown?

Of course you are a member of the Society?

B. Y. M.

*Gardening.* (The Complete Garden Book). Montague Free. Permabooks and Doubleday & Company, Inc., New York. 1954. 440 pages, illus. 50c.

Mr. Free has been writing and speaking wisely and simply for many years. Whether people have heeded him as they should, one never knows; and whether they will read this book for what it is, one may never guess.

Without any doubt this volume is the bargain of the year.

It is written simply enough for any beginner with a modicum of common sense. The essentials are all there and, if the directions as to plants and plantings seem to be those for the North, essentially for the Northeast, no matter. Interpretation is easily managed. The few bows made to other parts of the country are almost non-essential for there are too few of them.

There are major chapters devoted to all the phases that have to do with preparing plantings for all parts of the property as well as the smaller units that should be called gardens, whether for flowers, fruits or vegetables. There are chapters that have to do with plants, all for special purposes, and there are the inevitable chapters on propagation and the means of meeting the difficulties arising from disease and insects.

If you are a timid soul and fearful of most books that you might consider "technical," try this one. It will give you a sound beginning and inspire you to further reading and study.

B. Y. M.

*Report of the Thirteenth International Horticultural Congress 1952.* Edited by P. M. Syge. The Royal Horticultural Society, London, England. 1953. Volume I and II, 1297 pages, illustrated. (Library).

When these volumes were received in the office in October of last year, an immediate dispatch was sent to acknowledge their receipt from the R.H.S. and to advise Secretary Lycett that the Report would be reviewed in a forthcoming issue of our Journal. The reviewer was most presumptuous; it is utterly impossible to give an account of the wealth of information in the papers read at the Congress. Every gardener of note and every plantsman with an altruistic interest in horticul-

ture must examine these copies if he wishes to keep abreast of the newer plants and techniques of their production.

Volume I presents the proceedings of the opening and final plenary sessions and a report of the international code of nomenclature for cultivated plants (Discussed in October, 1953, issue of *The National Horticultural Magazine*).

Of further interest to the horticulturists are the excellent articles which appear in both volumes. These presentations give valuable reading on fruit and vegetable crops, ornamental plants, diseases, and stock purity. Volume II is a series of articles on plant breeding, reports on steam sterilization of soils, photoperiodism, irrigation and other environmental controls, and sections devoted to seed and tropical and subtropical plants, concluding with a symposium on citrus.

B. T. B.

*History Of The Rose.* Roy E. Shepherd. The Macmillan Company, New York. 1954. 264 pages, illus. \$4.75. (Library).

This is a delectable book. People who grow roses only for the pleasures of combat, with or without medals, ribbons and all the paraphernalia of shows, may not like it too much, but any one who really cares about the rose, and the reviewer is not referring to that motley crew that "just love roses," will need it. It is a book that can be picked up and put down or read through with almost equal pleasure.

Mr. Shepherd has been growing roses for a long time in his own garden and has traveled enough presumably to know roses in other parts of this country, where the climates in no way resemble that of Medina, Ohio, and in Europe as well.

In the early parts of the book where the beginnings of history are touched upon, rose history, there are the usual stories, but well told this time, and the history of the rose as it relates to culture, society in its historical aspects, and breeding, should interest any intelligent reader. Here those who "just love roses" will discover that there are more families within the family, to speak in broad terms, than he had ever dreamed, and that possibly, if he were a devotee of beauty in all of its myriad forms, he might well learn more of them than the few standardized and accepted forms that must be the first concern of the nurseryman and rose grower who is in it for the money.

The reviewer, who is by no means a passionate and unreasoning lover of roses, has already reread certain portions until the book almost falls open at those pages.

Most of the illustrations are excellent. It would appear that the original photographs in many cases were even better than they appear in the somewhat dulled engravings. This reviewer detests having to turn a book in order to look at illustrations that appear at right angles to the text, but that is a personal bias. The plan does allow, in this case, the use of many more cuts than the other scheme, unless the illustrations were planned years in advance.

There is an excellent index.

B. Y. M.

*Horticultural progress is achieved and, moreover, stimulated, when the curiosity and interest of the amateur "home gardener" makes him—or more likely her—grow plants suitable largely for use in arrangements of flowers, shrubs, tree branches, fruits, nuts, and even vegetables! Nurserymen and florists are besieged by arrangers to produce exotic and unusual material.*

*Thus, the oft-times maligned arranger is responsible for the many new varieties, new colors, new forms of plant material which appear on the horticultural horizon. Isn't this justification for the following reviews on these new books on arrangements? Managing Ed.*

*Flowers in Glass.* Edited by Julia S. Berrall. The Studio Publications, Inc. (in association with) Thomas Y. Crowell Company, New York and London. 1954. 104 pages. 37 black-and-white illustrations, 11 color plates. \$5.00. (Library).

Julia Berrall, well-known author, lecturer, arrangement exhibitor and nationally accredited judge, appreciates the artistry of arrangements in clear glass, although the technique required presents a far greater challenge than in the use of an opaque container. She suggests selecting the congenial textures of roses, lilies, orchids, daffodils, Japanese iris, single peonies, magnolia, or anthurium; and, for the most dramatic effects, the arrangements should be "understandingly staged" in sunlight, candlelight, or lamplight—a beguiling inspiration for self-expression!

Forty-eight single-page illustrations, with eleven in color, show arrangements made by selected "top name" arrangers, each with a brief description of material and mechanics used. Containers of varying sizes and shapes, as well as a wide variety of plant materials from various parts of the country, were chosen to display the true beauty of flowers in a natural way and to encourage arrangers to make greater use of glass containers.

Brief biographical notes are given on each of the following arrangers contributing to the success of this unique book: Julia S. Berrall, Helen Marie Dolman, Anne Elizabeth Erhorn, Marie Johnson Fort, Judith Garden,



Beatrice P. Hendrix, Mary B. Kittel, Betty Merriam, Patricia E. Roberts, Constance Spry and Margaret Watson.  
M.C.L.

*Flower Arrangement Workbook 2.*

Myra J. Brooks. M. Barrows and Company, Inc., New York. 1954. 64 pages, 48 black-and-white photographs. \$2.50. (Library).

This second workbook, written for the more advanced flower arranger, has been published as a result of the enthusiasm for *Workbook 1*, planned essentially for the beginner.

In the twelve short lessons, the emphasis is on selection of plant material and its suitability to the container, and appropriate uses of arrangements in home settings. With the concise step-by-step instructions, the arranger can develop the designs illustrated in the excellent photographs, with garden, roadside or florist's material, using, I hope, originality in the interpretation of the suggestions. Designs are given for paired containers, living plants, special occasions, period and naturalistic arrangements and compositions, flower show exhibits, Christmas decorations and winter bouquets.

M.C.L.

*Junior Flower Arranging.* Katherine N. Cutler. M. Barrows and Company, Inc., New York. 1954. 179 pages. Photographs by Roche. Drawings by Joan Lucas. \$2.95. (Library).

The book is written for children of all ages, explaining simply the principles of design and the mechanics for making flower and fruit arrangements; listing suitable plant material easy to grow and to gather; suggesting nature games and projects—all for the pur-

pose of stimulating interest and imagination of children to recognize and make use of natural beauty around them.

Part III "For Seniors Helping Juniors" of this much-needed guidebook, written by an experienced judge of Junior flower shows, should be of immense value, not only to Junior exhibitors, but to schools and garden clubs interested in all details of staging a flower show for and by children from five to twelve years of age. Mrs. Cutler most obviously believes that "these Juniors are the life blood of the gardening program."

M.C.L.

*Color in Flower Arrangement.* Adelaide B. Wilson. M. Barrows and Company, Inc., New York. 1954. 128 pages. Color photography by Roche. \$5.95. (Library).

Flower arranging, now an accepted decorative art in this country, is a form of artistic expression created by the related use of principles and elements, in which color forms the most compelling element of design. Arrangers and flower-show judges accept the pigment color theory as a working basis, and they must know and recognize spectrum colors and related and contrasted harmonies — monochromatic, analogous; direct, split and double complements; and triads; and should be aware of the kinship of color and texture of container and background to arrangement material.

The author, an experienced teacher and arranger, presents the intricate study of color in flower arrangement by discussion of color in design, color terms, systems, charts, and harmonies. She also gives an excellent list of fifty different color themes for flower-show classes.

Sixteen plates show color as the au-

thor found it in nature, and each natural element is interpreted in an arrangement using familiar materials but in a less familiar way. Each picture, with text following, tells a story of a color harmony. This book should inspire and help arrangers and judges to make a more serious study of color in arrangements.

M.C.L.

*Flower-Show Guide.* Anne Wertsner Wood. M. Barrows and Company, Inc., New York. 1954. 207 pages. \$3.00. (Library).

John C. Wister says, in the foreword: "It is a good omen for the horticultural world that a person so well qualified as Anne Wertsner Wood should write a book on flower shows." From her experience as teacher in Judging Schools, as Field Secretary of the Pennsylvania Horticultural Society, and in lecture programs, she gives complete directions for exhibiting, staging, and judging, to assist those who would put on shows, exhibit in them, and also judge them.

Following a discussion of many kinds of shows throughout the country, there are outlined the duties and responsibilities of the General Chairman and General Committee, and functions of the usual sub-committees. Sample schedules for shows appropriate to each month, and standard terms add to this book's value to both chairmen and exhibitors.

Qualified judging is now based on recognized rules and standards, due largely to the important work of nationally sponsored Judging Schools. The author includes point scales for general judging of collections, displays, specimens, arrangements and special exhibits, and point scales used by twenty-nine separate plant societies, from African-violets to tulips.

This GUIDE should be a *required* addition to every garden club's library, for a careful review before the organization of a show.

M.C.L.

*Songbirds in Your Garden.* John K. Terres. Introduction by Edwin Way Teale. Thomas J. Crowell Company, New York. 1953. 274 pages, illus. \$3.95. (Library).

From a bird lover's viewpoint:

The Audubon Society, by its unlimited activities, has awakened countless throngs of citizens throughout our United States to the fact that birds may easily become your habitual guests at small or no expense. Nothing more timely at this awakening could occur than "*Songbirds in Your Garden* by our own John K. Terres, so eminently equipped by experience with and love for birds from his boyhood to his present-day wonderful bird home in the heart of New York City. Certainly no better guide for attracting birds has been written.

This volume is complete with valuable suggestions for attracting them to your home, and knowledge of foods for the wide range of species you would want for your guests. Many kinds of feeders are described with illustrations and notes on placing them sufficiently above ground as protection from cats and other animals. Mr. Terres gives complete information on building bird houses, and the sizes for many species are given, listing also the best kind of wood to be used, all of this minutely described and illustrated with his own drawings. He shows that these can be constructed at small expense as he himself has done.

The author has given fine hints on planting of ornamental plants and trees with an appendix to the volume which gives an authentic list of those with

fruits which would attract a wide range of song birds. An interesting and important fact is given, showing that information on the food for various song birds was obtained by research of eminent scientists in our federal Department of Agriculture, much of it from examination of contents of bird stomachs. Timely suggestions as to proper food for birds, taking account of nutritional values, are given. ,

Mr. Terres constructed and illustrates a "trolley feeder" for permitting shut-ins to enjoy birds at their windows as freely as we more physically-favored folk enjoy them in the open.

Clever tips are offered as to the help we can be to our feathered friends at nesting time. Bits of string, cotton yarn, or even strips of cloth prove a substitute for the silk of milkweed which our lovely orioles prefer. The beloved little wrens like pins, tacks, or bits of metal. A chapter on hummingbirds is revealing. Feed them sugared water in an artificial flower and they will love it.

The author dots here and there most delightful, amusing, and enlightening personal experiences from childhood on, most amusing indeed, and ever showing what can take place in bird life and in luring them to you. His unlimited activity in every phase of bird life has brought a wealth of helpful hints to countless people less favored, who would otherwise have little knowledge about our birds.

The evidence of bird usefulness in eating insects harmful to our trees is clearly brought out, with particular reference to the chestnut trees introduced here to take the place of our own chestnuts killed by chestnut blight.

An excellent bibliography is given in the appendix with reference to literature in many states and ideas of conservation.

In this period of unlimited effort in

our wild life conservation, this writer feels that Mr. Terres' "*Songbirds in Your Garden*" is a blessing. It should be on every library shelf, especially in the more rural communities and small towns. She considers the volume the most complete source of information today on attracting, feeding, providing nests and houses, baths, and protection of all feathered life, even the young birds, that has come to her eye, a delightful, readable and highly needed and useful volume.

Mary G. Van Meter

From a horticulturist's viewpoint:

The majority of books about birds in gardens leave this reviewer cold. The most common lack, in his personal opinion, is of any interest in gardening with birds as the first interest rather than the secondary, which is doubtless a stupid point of view. The matters are usually made even worse by the plant lists recommended, for nearly every plant is one that would never be chosen if one were thinking first of plants; many are weeds, all that are fruitful are nuisances for litter and seedlings! And most of the books are of definitely limited geographical usefulness.

This book is different on most of these points. The plant lists are arranged for large geographic areas, rather diverse but still not too exciting to gardeners and with a goodly share of weeds.

But the important thing is that the book is intended to give you methods to attract birds, to make them happy when living in the garden and to shelter them through periods of limited feeding, once attracted. The advice is given simply and clearly and is full of the delightful touches that come only from personal experience.

But remember that, if you are a gardener before you are a bird lover,

such a planting program will add to your annual weeding, and that such birds as brown thrashers and towhees will toss all your carefully conserved mulches out on path or lawn for you to clean up as many times a day as you may like or not like; that all sorts of small fry will fly into your greenhouse and investigate flats and large pots of seedlings for any earthworms that may be there, sometimes with disastrous results if you are not near by.

Nevertheless, the reviewer has never done more than a little with the clean-up jobs, even if he wished that birdsown catbriers did not prefer his azalea beds, and that some small fry, never caught in the act, seem to prefer pulling crocus petals apart to see what there may be hidden, since for him the ruby throat has bathed in the fine mist of a rose spray held in hand.

B. Y. M.

*The Rose Annual*, 1954. Produced by the Publications Committee of the National Rose Society of Great Britain. 167 pages (in text), 8 color plates besides halftone illustrations. Croydon, England. 1954.

A characteristic British blend of science and art in the service of the rose. Science is deferred to in articles such as "Plant Physiology for the Rosarian" by G. J. von Abrams, and "Nutrient Deficiencies in the Rose Garden" by T. Wallace. The latter is distinguished among the many articles descriptive of the symptoms of nutrient deficiencies in plants by detailing the conditions actually observed in roses, not merely inferring these symptoms

by observations made on other plants. The actual deficiencies recorded on roses in Britain include, besides the familiar effects of lack of the major elements nitrogen, phosphorus, and potassium those due to deficiencies of calcium, magnesium, iron, zinc, and manganese. The effects of excesses of various mineral nutrients are also described.

The aesthetic and practical features of rose culture are set forth in articles dealing with rose history—"The Royal Rose of England," rose exhibitions and awards, rose travels (American readers will be interested in the comments of Mr. Harry Wheatcroft on his visit to this country last year); roses for decoration—"Artistry with Roses," etc. Perhaps the most sensational item in this Annual is the definite forecast of really blue roses within our time, which is unenthusiastically promised "whether we like it or not." Of much more interest to this reviewer is the series of articles on "My Masterpiece" by such eminent rose breeders as Charles Mallerin, Alex. Dickson, Samuel McGredy (fils), Svend Poulsen, and C. Camprubi Nadal. Each of them modestly disclaims having produced his masterpiece as yet, though the quest is continuing. They do, however, tell just how they bred some of their really fine roses.

The evaluation of rose varieties for various purposes, which has been a regular feature of these Annuals, shows Peace in first place in each category for which it is eligible. Ena Harkness, The Doctor, William Harvey, and McGredy's Yellow are its nearest rivals. Frensham and Fashion are the most popular Floribundas.—F. A. W.

# The Gardeners' Pocketbook

## *Rhododendron Seed Germination in Agar Nutrient Solution*

There are times when a plant grower, having only a very few, small seeds of some valuable sort, would like the assurance of knowing that every seed will have a chance to germinate and grow without loss. Hybridizers, especially when using stored pollen or making unusual crosses, will sometimes recover only a few tiny seeds which, however, may be of significant importance.

This problem has often faced the author when working with crosses from old or stored pollen of the rhododendron, where only a few pollen grains have remained alive to fertilize a flower. Then, too, there are situations, familiar to most rhododendron hybridizers, where crosses produce only a few viable seeds, or where great irregularity prevails among the seedlings of a given cross and the grower desires to preserve the weak as well as the stronger seedlings.

Where stored pollen is used as a means of making crosses between early-blooming and late-blooming plants,<sup>1</sup> I have found that, although seed production can be induced by pollen that is as much as two months old, the viability of the pollen falls off rapidly during the period of storage (using the calcium chloride method), so that only a small percentage of the pollen grains may remain alive after long storage and, consequently, only a few seeds are produced. Sometimes there may be only a dozen good seeds in a capsule that would normally produce three hundred. And yet these may turn into good plants.

In any such instance, there is dan-

ger of losing some or all of the seeds if ordinary open pot-culture is used for germination. As a practical means of avoiding this hazard, I turned to a laboratory method, used for the germination of orchid seeds which was devised about thirty years ago by Dr. Lewis Knudson<sup>2</sup> and later used extensively by orchidists.

Knudson's method has been tried successfully, long ago, on many other kinds of plants besides orchids. These have included ericaceous plants and it was on the basis of such earlier work by Dr. Knudson that this application of the sugar-agar technique for rhododendrons has been made. The author takes no credit for originating any part of this, but merely wishes to report results obtained in its practical application to plant breeding work.

The experiment here reported has been conducted at Cornell University during the last two or three years. The method used is as follows:

The rhododendron seeds are first sterilized to remove harmful bacteria and fungi. Ten grams of calcium hypochlorite is dissolved in 140 ml. (cc) of distilled water; this is shaken, filtered and the clean filtrate is then used to sterilize the seeds. The seeds are put into a test tube, the solution added and the mixture is shaken several times during the thirty to forty minutes required to sterilize the rhododendron seed. The seeds should be taken out when they begin to look yellowish, and may be transferred to the agar solution without rinsing.

Culture tubes, of the type ordinarily employed for bacteriological work, about 1 inch in diameter, are used for

<sup>1</sup>Bowers, Clement G. Preservation, storage and artificial germination of rhododendron pollen. *Proc. 6th Int. Cong. of Genetics*, 2: 10, 1932.

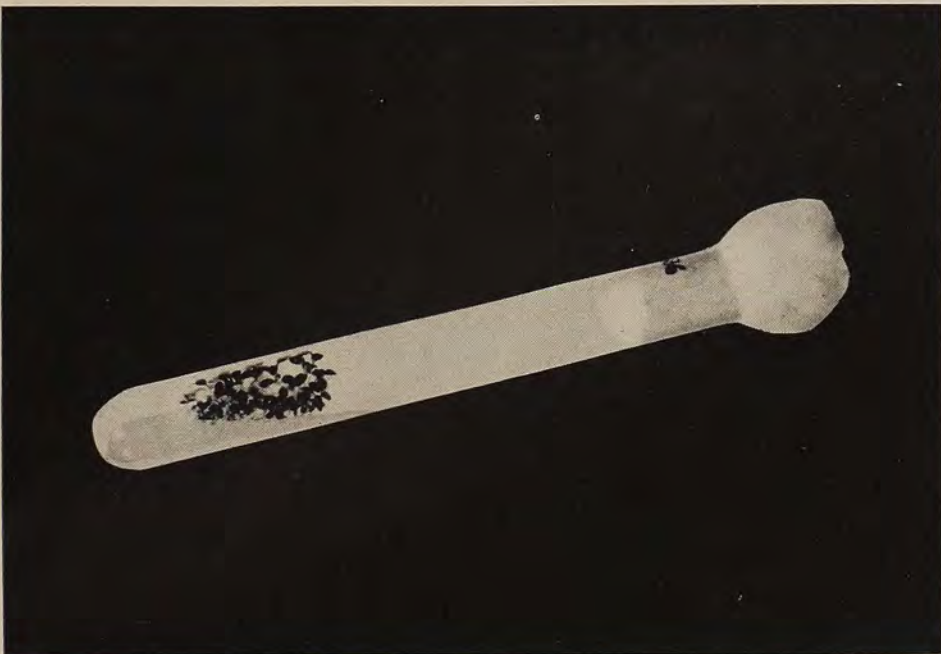
<sup>2</sup>Knudson, L. Non-symbolic germination of orchid seeds. *Bot. Gaz.* 73: 1-25, 1922. Also subsequent papers, including *Bot. Gaz.* 77: 212-219, 1924 and *Bot. Gaz.* 112: 528-532, 1951.

the agar medium. The sugar-agar-nutrient medium itself is Knudson's "Solution C," prepared by the following formula:

Calcium nitrate, Ca(NO <sub>3</sub> ) <sub>2</sub> ·4H <sub>2</sub> O	0.25	gram
Monobasic potassium phosphate, KH <sub>2</sub> PO <sub>4</sub>	0.25	gram
Magnesium sulfate, MgSO <sub>4</sub> ·7H <sub>2</sub> O	0.25	gram
Ammonium sulfate, (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	0.50	gram
Ferrous sulfate, FeSO <sub>4</sub> ·7H <sub>2</sub> O	0.025	gram
Manganese sulfate, MnSO <sub>4</sub> ·4H <sub>2</sub> O	0.0075	gram
Sucrose (cane sugar)	20.00	grams
Agar	12 to 15	grams
Distilled water	1.0	liter

The culture tubes are stoppered with cotton plugs and sterilized, with the solution inside of them, for twenty minutes in an autoclave at fifteen pounds' pressure. They are laid partly

down and cooled with the jelly-like solution forming a "slope," as shown in the illustration. After autoclaving the agar solution is tested for acidity and 1/10 N hydrochloric acid is added in sufficient quantity to adjust the solution to pH 5.0, which is about optimum for most rhododendrons. The sterilized seed is now scattered upon the surface of the agar slope, holding the tube horizontally and spreading the seed with the aid of a platinum needle which has been previously sterilized by passing it through a flame. The cotton stopper, removed during seed-sowing, is replaced and the tube, containing the seeds on the solution, is placed in a temperature of seventy degrees and kept at this temperature during subsequent germination and growth for so long as the seedlings remain in the tube. At Cornell special orchid incubator cases with fluorescent illumination are used, but any Wardian case or greenhouse enclosure where a similar temperature



*Rare hybrid Rhododendron seedlings growing on sugar-agar medium in a culture tube.*

may be maintained, with ordinary daylight, will be adequate. About two weeks are required for germination. The young seedlings are permitted to remain upon the original agar slope and grow inside the culture tube until the first true leaves are formed and the plants are at the ordinary "pricking off" size, at which time they may be removed from the agar and planted in seed-pans or other receptacles. While in the culture-tube, the agar solution slowly loses moisture and the seedlings should not be kept in it after it becomes too dry. In our work, however, we find that unless the seedlings are exceptionally slow, they attain transplanting size before the agar reaches this point. Moisture may be replenished by the use of sterile distilled water.

We have found that pure granulated peat moss makes a satisfactory substance for growing the young seedlings after removal from the culture tubes. It seems to make little difference whether or not the agar adhering to the young roots is washed off before transplanting. We have used four-inch seed pans, and have set the young plants about three-fourths of an inch apart. We have found it desirable to mound up the peat in the top of the pot in order to facilitate aeration and drainage and to avoid damping-off of the seedlings, since they have to be kept in a very close atmosphere immediately upon removal from the tubes. After transplanting, the seed-pans are placed in a small glass case, similar to a Wardian case, and are gradually exposed to more and more air as they grow, until the case is fully open and the young seedlings are permitted to have the free air of the greenhouse. The transition should be a gradual one and care should be taken with the watering during this time. At Cornell the tap-water is "hard" and contains alkaline salts to an extent that is injurious

to rhododendrons, so that distilled water or rain water must be used.

Since the peat does not provide much nourishment for the young seedlings, we have added nutrients occasionally. For this purpose we have found that Knudson's "Solution C," without agar or sugar, makes an excellent fertilizer and produces vigorous growth in the seedlings.

The writer wishes to acknowledge the interest and help of Dr. Lewis Knudson with whom he has conferred during the progress of this experiment, and also of Mr. Russell Mott and others who have performed much of the actual work.

CLEMENT G. BOWERS, *Maine, New York.*

*Comments On Hardiness, Gulf Coast Mississippi*

In these notes, hardiness is meant always as hardiness to cold during whatever months may be considered as winter. Furthermore, it is recognized that too little time has passed for absolute judgments, but like any garden pioneering, a new garden in a new scene always invites enthusiasms from which one may repent later. No attempt is made to cover all the things that might be included, but some comment at the moment seems of use, since other gardeners may be persuaded to attempt what has failed here and reap success.

One would think that the climate of the various towns along the Mississippi Gulf Coast would be almost identical, but this is not so insofar as one can tell from the plants that live and thrive in one town and fail elsewhere. The distance inland from the shore line also seems to have some effect upon results.

This particular garden is inland, about a mile and a half as a bird flies, and is surrounded on the south and east by mixed stands of pine, oak, and other deciduous species. Winds from the west and north have free access, which

is noticeable in winter. Winter, too, means here essentially the months from mid-December through mid-March, with the inevitable mild periods to break up the latter weeks.

Among the shrubs that become almost like herbaceous perennials here, there are several that are well worth growing for what is accomplished during the summer. For example, the charming pigeon-berry, *Duranta repens*, rarely makes a large shrub here, but its ten-foot shoots usually are loaded in early May with showers of lavender blooms, a flowering that repeats in smaller amounts through the summer, and are climaxed in autumn by the golden berries that hang as did the flowers from every nodding shoot. The flowers drop so easily that they are of little use in cutting, but the berries are very decorative in large arrangements. Our plants, near the pale yellow-double oleander, nameless of course, overlap in flowering time, just enough to make a picture. Even when, in a severe winter, the shoots are killed to the ground, enough growth is made so there is some flowering and fruiting.

No one in these parts seems to know whether the *Cestrum* we have is *C. Parqui* or *C. nocturnum* and specimens have not been gathered for checking. This performs here much as a perennial might, dying to the ground each year, and sending up shoots each spring that are laden with greenish-white flowers that open their four lobes each night and fill the air, almost to suffocation, with the heavy scent. When pollinated, they are followed by pure white berries that are almost as decorative as the flowers. The seeds seem highly viable and the seedlings add to the weeding problems of spring.

Equally herbaceous in this area is *Eranthemum nervosum*, but, in this garden, it rarely succeeds in maturing its spikes of wonderfully blue flowers.

Elsewhere it presents no problem. Its kin, now put in the genus *Pseuderanthemum*, sound even more tropical, but of interest on account of the flowering habits. In New Orleans, the *Eranthemum* seems entirely at home and provides flowers in late autumn well into the winter. If potted plants were not so great a bother, it would be a temptation to pot the plant, and overwinter it in the unheated greenhouse.

Whatever *Jacobinia* is grown here lives unhappily in this garden but will overwinter and recover enough to flower sparingly. In gardens at no great distance, planted near a house, it seems to thrive and its summer bloom is welcome.

There, too, the common shrimp plant, *Beleperone guttata* makes a pleasant dull note in the mixed shrub border.

The charming *Russelia*, probably *R. equisetiformis*, lives and sometimes spares a few lovely flowering sprays, but in no way resembles itself as seen in Florida.

Aside from the widely planted *Jasminum primulinum*, the jasmines are not as well represented as they might be, or perhaps they have been tried and found wanting. *J. nudiflorum* is useless for want of winter cold; *officinale* refuses to thrive here; the plant sold locally as *simplicifolia*, which it probably is not, not even under its more correct name of *gracile*, thrives only in the most sheltered places; and the Grand Duke, *J. Sambac*, dies to the ground each winter and blooms sparingly on new wood.

While the annual *Thunbergia alata* self-sows to weediness, the lovely *T. grandiflora* lived here for a few years clambering over a nearby *Eleagnus*, crowning them with its large flowers of delightful lavender blue, but finally died during a cold winter. In other gardens in more sheltered places it lives but not in the luxuriance that



makes it so spectacular in Florida. Its shrubby kin, *T. erecta*, has lived for two winters dying to the ground each year, but this year the root system appears to have had enough vigor to send up shoots that bore a few flowers. These are not as showy as those of the climbing *grandiflora* but are a deeper blue purple with a clearly defined pale yellow throat. If, as is sometimes the case, a constantly developing root system will in time make a plant more tolerant of winter cold, we live in hope, for a lavender-blue flowering shrub for early May will be most welcome.

In a small nursery nearby there is an old plant of abutilon, species unknown, but presumably one of the many cultivated forms that have so mongrel a history. It is located on the edge of a lath house, but in sun and has flowered well for years. This year a rooted cutting from it has been added to the planting here along with another nameless seedling from the same nursery. It is hard to guess just what site will please it here, where there is no lath house nor any similar structure.

*Agapanthus* live in many gardens but rarely flower and nowhere have we observed the massive clumps that are so decorative in California gardens. In pots they behave much better and a collection is being grown on, from which we hope to have reports later. Flowering begins in late May and continues through June, when blue and blue-lavender flowers are more than welcome.

As yet, no one has been found who has tried fuchsia, but probably the summer temperatures will be too high though the temptation is great. The ordinary *Plumbago capensis* flowers well in most gardens, especially those where it can be trained for some height against a wall. As a shrub it is somewhat erratic in flowering. Its kin, *Ceratostigma plumbaginoides*, is being

tried in a nearby garden, and appears to be starting to flower much too soon. Our own *C. Willmottianum* is still too small for reporting.

B. Y. MORRISON, *Pass Christian, Mississippi.*

#### *Increasing Ismene Lily Bulbs*

The Ismene lily, a member of the Amaryllis Family, may be increased by bisecting the bulbs vertically, or by otherwise injuring them. I first called attention to this phenomenon of increase in number after injury in an article in this Journal in the July 1931 issue. I was experimenting at the time with bisecting bulbs, and had but one year's results. Bisecting experiments were conducted not only with the Ismene lily, but with the spider lily and with *Narcissus* 'King Alfred.'

The Ismene lily, *Hymenocallis calathina*, is known popularly as the Peruvian daffodil, and lately has been named by the Amaryllis Society as the American lily. The spider lily, *Hymenocallis tenuiflora*, another member of the genus, is possibly better known than the Ismene lily. While the spider lily multiplies fairly fast by division and offset, the Ismene lily increases slowly by division and offsets, and rarely by seed. The Ismene lily has, for me, rarely doubled in number in a season, even with flowering size bulbs. Twenty-one bulbs planted in the spring of 1934 increased to thirty-one by fall; eleven bulbs planted in the spring of 1952 increased to twenty by fall. On the other hand, bisecting the Ismene lily bulb vertically has increased the number of bulbs from three to sixteen times in one season.

The experiments in bisecting Ismene lily bulbs were begun in the spring of 1930, and carried on in 1931-1932 in Takoma Park, D. C., and in 1952 in Santa Barbara, California. The records of these experiments and other

data in this article are taken from my several Garden Notebooks. Flowering-sized *Ismene* lily bulbs probably between seven and nine inches in circumference were used in the 1930, 1931 and 1932 experiments, while in 1952 the bulb that was bisected was six and five-eighths inches in circumference, and the bulb that was quartered vertically was seven inches. The latter two were dusted with powdered sulphur, immediately after cutting.



*Production from one injured bulb.*

An experiment in bisecting a spider lily bulb was started in March 1933, with one of the eight bulbs received from the Philippines the year previously. The bulb was cut vertically in early March, and was quite dried out when planted on March 24.

In 1930 there were produced from the bisected *Ismene* lily bulb, planted in the spring, seventeen bulbs of all sizes, four of which produced flowers in 1933.

In 1931 there were produced eleven bulbs from the bisected bulb, three of which were large enough to produce flowers in 1933. A photograph shows how the original bulb has split up into two groups. This was taken in February 1932. In 1932 the bisected bulb produced four bulbs by fall. In 1952, seven bulbs were produced by bisecting an *Ismene* lily bulb and seven bulbs were produced by quartering. The bulbs produced by quartering were somewhat smaller than those produced by bisecting. Quartering is therefore not recommended for securing increased bulb production but bisecting the bulbs vertically is recommended.

As for the spider lily, which was bisected in March 1933, only four small bulbs were produced. I considered this a failure, since uncut bulbs produced more. Three large bulbs of the spider lily, which were not cut, produced in 1933 from three to seven smaller offset bulbs, and still remained about the same size as when planted. Bisecting is not therefore recommended for the spider lily, *H. tenuifolia*. One bulb of *Narcissus* 'King Alfred' was treated by cutting vertically about forty per cent of the bulb above the base on November 4, 1933. The larger section including the whole base was then planted, but the plant disappeared, and was gone by June 27, 1935.

So much for artificial wounding of the *Ismene* lily bulbs. What of unintentional wounding of the bulbs? Between 1920 and 1930, on several occasions bulbs wounded in digging in the fall were planted the next spring, and from eight to ten small bulbs were formed by the breaking up of the injured bulbs. In October 1940, three bulbs were split because of injury in digging, followed by the red-stripe disease of the amaryllis. They were planted in the spring of 1941. On October 9, 1941, these three large bulbs had split up, giving twelve,

eight and six respectively, a total of twenty-six bulbs. On October 18, 1951, I dug some *Ismene* lily bulbs, and found that three of them, about nine, eight and seven inches in circumference, had their basal plates torn off. (The basal plate forms the bottom of the bulb in layers resembling small pancakes. The fleshy roots and the fleshy scales that compose the body of this bulb are attached to this plate.) These three bulbs were planted March 4, 1952, and the plants were dug on September 25, 1952. On digging I found that each old bulb had split up, and that there were twenty-six small single bulbs and four double bulbs, that is thirty units. This is an average of ten units of bulbs for each one planted. The instances cited could be duplicated several times from my records.

I have found no mention of this bisecting of *Ismene* lily bulbs, to secure increased production, in any of the books on bulbs studied, such as McFarland, Mueller, Rockwell, Wister in Bailey's *Horticulture*, or in *Hottes' Plant Propagation*. Nor was there such a method described, if I remember correctly, in Schmarse's article in German on the *Ismene* lilies, which I translated for the U. S. Department of Agriculture in 1934.

Summing up the matter where a species of the *Amaryllis* Family does not increase fast by natural means, it would seem desirable to experiment with this method of bisecting the bulb, or by otherwise injuring it, to stimulate production, as I have done with the *Ismene* lily.

ROY G. PIERCE, *Burbank, California.*

#### *Columnnea stenophylla*

In an interesting article *Concerning Columnnea* in *The National Horticultural Magazine*, 32:270-271. 1953, Peggie Schulz refers briefly to my introduction of *Columnnea stenophylla* into cultiva-

tion. Since this is such a very strikingly beautiful plant and in time become increasingly popular, as have other members of the *GESNERIACEAE*, it seems proper to distribute additional available information on its growth habits and culture.

*Columnnea stenophylla* was first recorded in the literature in 1926 when Mr. Paul C. Standley, then at the United States National Herbarium of the Smithsonian Institution, described it as a new species based upon a collection made by Dr. C. A. Purpus from the Finca Irlanda, in the state of Chiapas, Mexico. Another collection from the Cafetal Copalito, state of Oaxaca, Mexico, was also cited at the time of the original description.

In 1940, Mr. Standley received for identification a specimen of a bright red-flowered *Columnnea* from the Finca Mocá, Guatemala, collected by Dr. W. C. Muenscher, and, believing it to represent a distinct species, described it as *Columnnea muenscherei*. Several years later a more careful comparison and study of the Guatemalan *C. muenscherei* with the Mexican *C. stenophylla* showed that the two were identical, and that the Guatemalan plant would have to receive the earlier name of *C. stenophylla*.

It is a very handsome plant, occurring in nature usually as a rather small, epiphytic shrub with two to two and a half feet tall reddish or brown, stout stems, which are somewhat hairy when young. Occasionally, the plant becomes terrestrial, growing upon the forest floor. The dark green leaves are very attractive, having a satiny lustre on the surface and a silvery color beneath. They have a narrow linear or lanceolate shape and vary usually from two and a half to three inches long by one-fifth to one-half an inch wide, and spread out from the stem at a conspicuous angle. The upper surface has a pronounced



*Pot-grown plant of Columnea stenophylla as raised in the Lincoln Park Conservatory.*

furrow running lengthwise along the mid-section of the leaf, while the lower surface is marked by the prominent main midnerve. The margins of the leaves are turned under. On the upper half of the stem myriads of showy red

flowers appear, each one arising on short stalks from the axil of a leaf. The flowers are borne along one side of the stem, so that a mass of them presents a spectacular spray with their deep orange-red or vermilion color splashed



*Close-up giving details of the flowers, natural size.*

contrastingly against a background of dark green shining leaves, an appropriate combination for Christmas. The flowers themselves are notable for their enormous size, measuring nearly three inches long. They have a long slender tube which arches upward, expanding

above into a showy hooded upper galea an inch and a half long and a triangular-oblong, much shorter, lower lobe. Beautiful, long, soft red hairs spread out from the surface of the corolla. At the base of the corolla tube is the leafy green five-parted calyx, whose three-

fourth inch long erect lobes contrast vividly against the red background of the corolla. The two pairs of four stamens meet in a graceful arch along the upper inside of the flower, bearing the soft yellow anthers at the tips.

In Guatemala the species is of very limited occurrence, growing in dense wet forest on the lower and middle slopes of the Atilán and Santa Clara volcanoes, in the departments of Sololá and Suchitepéquez respectively, at elevations varying from 1,000 to 1,500 meters. Here the temperature varies the year round only from sixty-five to seventy-five degrees Fahrenheit, the average annual rainfall approaches two hundred inches, and the relative humidity is very high. New stations for the species will probably be discovered in locations similar to the ones already known on the lower and middle slopes of other volcanoes on the Pacific side of Guatemala.

At the end of 1942, I brought back from Guatemala a couple of living plants of *C. stenophylla* and presented them to Mr. E. Hewitt, then Superintendent of Lincoln Park Conservatory of the Chicago Park System. These plants arrived, unfortunately, in very poor condition and only a couple of leaves remained attached to the stems. One of the plants died, and it was feared that the other would not recover. However, in time, under the careful attention of Mr. Hewitt, the second plant survived and eventually prospered to provide the following comments on the successful culture of this species:

"Upon receipt of this plant in 1941 at the Lincoln Park Conservatory, growing methods were set up to approximate its natural habitat. A temperature of sixty degrees Fahrenheit at night in a fairly humid, shaded place was provided in a house in which begonias were being grown. Being epiphytic in nature, the plant was potted in osmunda fiber. At the end of about two

years the growth progress of the plant proved disappointing and so two of the plants which had been propagated were potted in soil and other conditions were changed until at present growth in all respects appears very good.

"This *Columnnea* prefers a turfy rich soil. A mixture of three parts loam, one part peat and one part rotted cattle manure should suffice. Good drainage is essential. Provide the plant with a night temperature of sixty-five degrees under considerable shade and with considerable humidity.

"The plants are readily propagated by tip cuttings in sand with a bottom heat of seventy degrees and protection from drafts. When rooted, pot into two and a half inch pots in the soil prescribed above and place the plants in a shaded humid house at sixty-five degrees night temperature. Shift the plants into larger pots as they become rootbound. When the plant is shifted into larger pots, bone meal should be added to the soil mixture at the rate of one four-inch pot per wheelbarrow of soil. During the summer and early fall months, the established plants should be fed every two weeks with either liquid manure or with a complete commercial inorganic fertilizer. Do not allow the plants to flower the first year. The plants do not branch freely but increase in size by sending up basal shoots. A profusion of flowers will appear at the leaf axils of all shoots during the second year. The flowering season appears to be somewhere from January to June and there are indications that cultural manipulation can determine the flowering date within these limits. The flowers persist in good condition about three weeks and are of such substance, shape, and color, that they might well be of value commercially. Certainly the plant merits more consideration."

JULIAN A. STEYERMARK, *Curator of Herbarium, Chicago Natural History Museum, Chicago, Illinois.*

*Bauhinia blakeana*

Several attractive ornamental species of bauhinia are grown in the more frost-free areas of Florida, Texas, and California. Among these more common ones are *Bauhinia purpurea*, the fall-blooming bauhinia, *B. variegata* and its white variety *candida*, the winter-spring-blooming bauhinia, and *B. monandra*, the summer-blooming bauhinia. But the rarest and most attractive of all bauhinia species is *B. blakeana*, which until recently was unknown in this country. It has been successfully introduced into Florida and it flowered for the first time in the fall of 1953.

The origin of *B. blakeana* is unknown, but it is said that many years ago one tree grew near the ruins of a house along the seashore in Canton, China. It was discovered there by the monks of the Roman Catholic Cathedral of Canton, who took cuttings of the tree and successfully rooted them. Later it was planted at the Botanical Garden in Hong Kong and still later in a few areas in the Malaya Peninsula. It has since become quite popular throughout Hong Kong where it is propagated by cuttings and marcottage. *Bauhinia blakeana* is known in China as the "Hong Kong" or "Blake's Bauhinia" and also as "Camel's Foot."

In 1908, Mr. S. T. Dunn named the species for Sir Henry Blake, a one-time governor of Hong Kong, whose residence ended in 1903, and a supporter of the Hong Kong Botanical Garden (*Journal of Botany*, pp. 325-326, 1908). Since the flowers of *B. blakeana* are sterile and no seed pods have ever been produced, it must be propagated by cuttings, air layers, or grafted onto other species of bauhinia. Because of this difficulty in propagation, its distribution to other countries has been slow.

In 1952, arrangements were made by the University of Florida, Sub-Tropi-

cal Experiment Station, with the Gardens Department in Hong Kong, to obtain two air layers of this bauhinia, one of which was to be sent to the Department of Agriculture in Guam. The plant destined for the Sub-Tropical Experiment Station arrived in March, 1953, in good condition, being completely dormant but with a good root system in the ball of peat moss. After producing new growth in the slat house, it was planted in the Station's arboretum in June. In early October, flower buds formed and the first flower opened October 19.

The fragrant flowers are "orchid-like," five and a half to six inches across. The five spreading petals, each three inches long and one and a half inches wide, are obovate or elliptical in shape and have an acute apex and a wavy margin. The color is a rich reddish- or rose-purple, almost a crimson, which is classified as a Rhodamine purple 29/1 on the R. H. S. color chart. The standard or lip is uppermost and is darker in color in the veins in the lower two-thirds with white between the veins; the two upper petals are lighter in color and diffused with white near the base; the two lower petals are fairly uniform in color with the veins only slightly lighter. The red color is so intense that it fades only slightly, unlike *B. variegata* which fades to a blue color. The inflorescence, which is an elongating raceme to eight or ten inches, is produced opposite a leaf near the tip of a branch. Flowers are produced from October to March, each flower lasting three to four days. The five pale pink, curved stamens are produced in two sets, three long and two short; five hairlike staminodes are borne at the base. Although the curved pistil seems to be perfectly formed, fruit has never set even when pollinated with pollen from other species of Bauhinia.

The tree is said to grow forty to fifty



*A leaf and two flowers of Bauhinia blakeana.*

feet tall under favorable conditions, but, because of being propagated by air layers, it is usually shrubby and many branched from the base. The leaves are typical of baubinia, two-lobed or split down the middle one-third to a quarter the distance, thus resembling a "camel's-foot," this shape giving rise to one of the common names in Hong Kong. The leaves are six to eight inches long and wide, with nine to thirteen veins; the apices of the lobes are obtuse and the base cordate. The leaves remain on the tree after flowering and are not shed until new leaves begin to appear in April.

Since *B. blakeana* has certain char-

acters of both *B. variegata* and *B. purpurea*, it probably represents either a mutation of one of these or a sterile hybrid of the two species. It resembles *B. purpurea* in the following: 1) beginning to flower in October, 2) petals not overlapping, 3) elongating racemes, and 4) tending to hold its leaves until late spring after flowering is over. It resembles *B. variegata* in the following: 1) continuing to bloom in the winter and spring months, 2) having broad petals, 3) having short pedicels, and 4) splitting of the calyx down one side only.

R. BRUCE LEDIN, *Assistant Horticulturist, University of Florida, Sub-Tropical Experiment Station, Homestead, Florida.*



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