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AN INTRODUCTION FROM THE EDITOR

As editor, I would like to welcome all our readers to this first publication of the International Oak Society Journal. Given adequate time and opportunity, I anticipate that many more are to follow.

Most of the articles included are of an introductory nature, to ease our way into the horticultural arena before getting involved with exact specifics and scientific debate. Since this is an international organization, I have tried to include a diversity of material that might circumspect the continuity of the whole. But I feel strongly that the articles are stimulating and worthy of bringing together in this first issue. It was also important to get this journal published so that more people could get involved and contribute their knowledge on the wonderful genus *Quercus*.

The I.O.S. evolved out of a very informal correspondence and seed exchange between Steven Roesch in America and Susan Cooper in England. As they exchanged miscellaneous seeds, their requests centered around on species in particular, namely oaks, and thus began the I.O.S. Mr. Roesch took it upon himself to contact people around the world who were interested in oaks and to set up a network of seeds. When I got involved in the I.O.S. I saw the need for centralization and some kind of literature that could unite its members. I sent letters to addresses that Steven Roesch had given me, asking for help and contributions to what was at first suggested as the I.O.S. Journal.

On future publications, we hope to spotlight at least on oak species and try to involve ourselves more thoroughly into the science of propagating and growing oaks. We would also like to promote our seed exchange and encourage our readers to write to each other and explore the numerous species of oaks available.

We - the members of the International Oak Society - are very excited about the newly named National Tree of the United States: the genus *Quercus*! If you are concerned about global warming, you probably know that planting more trees is something that we all can do to help. However, even with massive reforestation efforts, our climate situation will deteriorate further before it begins to stabilize. During the expected lifetime of the shade trees that you might plant next spring, our anthropogenic greenhouse effect may force the natural ranges of many mesic tree species north into Canada, if they survive at all. So, if you live in an area where such trees may be in jeopardy, increase your odds by planting tougher species that are adapted to the projected shift in climate isopleths -- PLANT OAKS!

Oak trees are an ancient and diverse tribe comprised of species that collectively will thrive in the best, but handle many of the worst, planting sites we have to offer. As early as 1924, the famous Oak student, William Trelease, had recorded 371 *Quercus* species in the Western Hemisphere. Most of them occur in the Nearctic Realm, chiefly in the United States and Mexico. The genus includes ecological generalists that are broadly adapted as well as specialists tailored to some of our most severe sites. From a landscape horticulture perspective, let's review some of the better known and most promising examples.

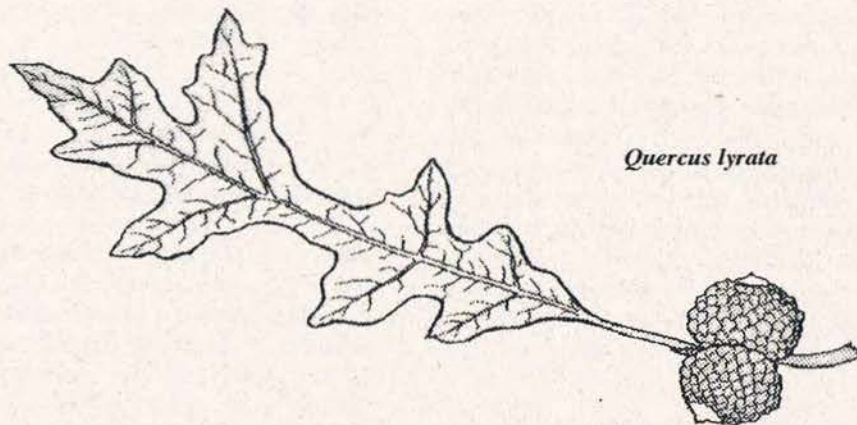
#### AN OAK FROM YESTERDAY

In the past, "Oak" unfortunately has meant "Pin Oak" (*Quercus palustris*) to many people. *Quercus palustris* is a nurseryman's tree: easy to propagate; easy to transplant; fast growing; and naturally blessed with a marketable, excurrent growth habit. However, the tree must be pruned into a lollipop to fit the average yard without

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## AMERICAN OAKS IN THE LANDSCAPE

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having its pendent, persistent lower limbs usurp the entire lawn. Its low, twiggy growth frequently becomes a traffic hazard in boulevard plantings.

The species also is notoriously intolerant of high pH soils, a trait which frequently is not expressed until the tree is well established in the landscape with its roots exploring beyond the transplanted, acidic nursery soil ball. Suddenly one summer, perhaps with the catalytic effect of the drought, the hapless homeowner might discover that he has planted a chlorotic invalid of a tree that must be acidified, chelated, injected or replaced. Except for those who have moist, acidic soil and plenty of ground-level growing space to accommodate its drooping lower branches, the overused *Q. palustris* should be considered the Oak of the past.

For the 1990's and beyond, there are other Oaks that truly are outstanding performers. Demand for quality landscape trees is increasing so that progressive nurs-

erymen now recognize this market and feel comfortable investing in the production of such species. As the public becomes ever more aware of true "value" landscaping, the supply/demand spiral will bring still more diversity to the *Quercus* sections of nursery catalogs.

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#### OAKS FOR TODAY -- BLACK OAKS (Subgenus *Erythrobalanus*)

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The Black (or Red) Oak subgenus is purely American, being endemic to the Western Hemisphere. It includes many of the faster growing and most colorful species of *Quercus*. One of the earliest Oaks to follow *Q. palustris* into popularity throughout much of the United States has been *Q. rubra*, the Northern Red Oak. It is a handsome, pollution-resistant species with a clean branching pattern, good crimson or other fall color and attractive dark bark that develops smooth ridges which almost appear as stripes on vigorous specimens. The tree is relatively easy to transplant (in the early

spring, as with most Oaks) and if moved when two inches or less in diameter, it recovers quickly. Once established, it is quite drought resistant.

The fast-growing *Q. rubra* can become one of our largest deciduous trees in a relatively short time. It is amenable to most average soils, but will respond best to its favorite - rich, well drained, moist, cool clay-loam. The acorns are variable in size and shape from provenance to provenance and from tree to tree. I currently am testing progeny at Starhill Forest from individual well-formed trees with large acorns (for mast production) as well as some with small acorns (for smaller birds and for landscape use with minimal litter problems), and several researchers are making selections for timber production as well.

This species is one of our hardiest Oaks, growing naturally (with somewhat reduced stature) as far north as Lake St. John, Quebec. For more southerly regions, and especially where poor soil or imperfect drainage is a concern, *Q. shumardii* (Shumard Oak) is an almost identical substitute. Another closely related, beautiful southern species useful in poor, dry soils is *Q. falcata*, the Southern Red Oak, which has particularly attractive foliage on selected individuals. For those dry soil conditions of the North, *Q. velutina* (Eastern Black Oak) is a hardy tree with spectacular foliage, from scarlet budbreak through glossy maturity to amber senescence. It is more prone to decay than some others, though, and should be trained when young into a strong growth form with a single dominant leader.

Those who seek a tree more reminiscent of the conical *Q. palustris* might try *Q. coccinea* (Scarlet Oak) on upland or sandy sites, or the fast-growing *Q. nutallii*

(Nuttall Oak) on heavy soils and low ground. Both trees are brilliantly colored in autumn and closely resemble *Q. palustris* in form and foliage.

Another very good choice within subgenus *Erythrobalanus* for landscape use is *Q. imbricaria* (Shingle Oak). Admittedly inferior for timber purposes, this species seems to have been created purely for ornamental horticulture. Its uniform, dense oval growth habit also is comparable to *Q. palustris*, but more rounded and less pendulous. It becomes a medium-sized tree, more suited to the scale of residential suburbia than our largest Oaks. Its acorns are small and inoffensive from a litter standpoint, sifting down among blades of grass or chunks of mulch until they are claimed by birds or squirrels.

*Quercus imbricaria* is as easily transplanted as any oak and is one of the most adaptable of generalists to a variety of exposures and soil types. Its fall color is interesting but not always understanding, varying from greenish-gold to crimson to a warm russet-brown. Many of its leaves may persist through most or all of the winter, adding to its ornamental, screening and wildlife value. While *Q. imbricaria* is hardy throughout most of the central and eastern states, southerners also might try the similar, narrower-leaved *Q. phellos* (Willow Oak) or the equally popular and highly variable *Q. nigra* (Water Oak). Both are at home in wet, sandy or tight soils and have foliage and habit akin to *Q. imbricaria*.

*Quercus marilandica* (Blackjack Oak) is a "scrub" species that can be attractive, dense, small tree for those who have less room. Although often slow growing and unkept in its rigorous native habitats, which range from dune sand to adobe clay, this species makes a pleasant, tough little tree

when brought into cultivation at a young age or grown from seed; do not attempt to transplant wildlings of any size, though, unless you are equipped to dig to China! Other "scrub" Black Oaks, including *Q. ilicifolia* (Bear Oak), *Q. georgiana* (Stone Mountain Oak) and *Q. laevis* (Turkey oak) also can be domesticated into attractive small trees where they are adapted and available locally. They all have beautiful fall color, ranging from russet-orange of *Q. marilandica* to scarlet in some of the others and are impervious to drought. For those so inclined, these diminutive species might serve well as subjects for miniature culture as Bonsai or Penjing, for topiary, or as anchors for the shrub border.

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#### MORE OAKS FOR TODAY THE WHITE OAKS (Subgenus *Lepidobalanus*)

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The White Oak subgenus, which is considered by many authorities to include several minor European and Asian sections, classified as separate subgenera by others, includes the species with the greatest stature, longest lifespans, sweetest acorns, most durability, and slowest growth rates of the Oaks. Due to the absence of significant peroxidase enzyme incompatibilities (per Dr. Frank Santamour), this subgenus is much easier than *Erythrobalanus* to propagate asexually by grafting, so horticultural selections of some species already are available in the nursery trade.

As Andrew Jackson Downing wrote in 1847 of "our finest and hardest Oaks - rich in foliage and grand in every part of their trunks and branches" his description singles out most precisely the tree that I consider to be the standard-bearer for the entire White Oak subgenus - *Q. macrocarpa*, the Bur Oak. An adaptable inhabitant of

many landscapes, from prairie groves and savannas to both upland and riparian forests, it ranges from the Texas Gulf coast to the latitude of Reindeer Island in Lake Winnipeg, Manitoba! Throughout this vast range, *Q. macrocarpa* is the archetype of permanence and venerability.

It begins life as a slow-growing, awkward, sparsely branched sapling - the ugly duckling of Oaks. Then it attains a diameter of about three inches and starts a transformation into a rugged, massive monarch with a potential lifespan of many centuries. The characteristic corky bark and picturesque form improve as the tree matures, and old age can be associated with immense size in the more hospitable portions of its range. Favorable growing conditions also can coax the tree into episodic flushing (buds breaking summer dormancy and adding a second year's growth the same Year). This tends to compensate to some extent for its usual slow growth rate.

The leaves of *Q. macrocarpa* are deprived of the brilliance that enlivens many other Oaks in autumn, but they are dark and lustrous all summer, with contrasting abaxial surfaces that flash in the wind. *Q. macrocarpa* is undaunted by heat, cold, drought, flash floods, prairie fires, a wide soil pH range, climbing boys, and city conditions. The only serious threats affecting it are lightning and "bulldozer blight," both of which frequently are fatal to old patriarchs.

While local provenances are recommended in general for planting all trees, I am successfully growing *Q. macrocarpa* individuals from seed sources several hundred miles north and south of my location. Such trees appear quite distinct from their local counterparts, in evidence of the clinal variation (or introgression) for which the species is well known, but they are growing

well here in Illinois under cultivation. It will be interesting to compare their sizes and growth forms in a few hundred years!

*Quercus macrocarpa* is named for the tangerine-sized fruits of some southern provenances, particularly those in the Wabash Valley of Illinois and Indiana. However, like those of *Q. rubra*, the acorns vary considerably in size among different ecotypes. They can be so sweet that selections have been made for nut tree orchard planting. Obviously, these acorns will not constitute a serious litter problem in the maintained landscape if squirrels and other wildlife, livestock or health food enthusiasts, have access to them!

This species should be grown from seed, transplanted when small, or tended as a spontaneous volunteer if possible. Larger specimens can be moved with a mechanical transplanter that will dig a deep, conical rootball, or hand-dug if they were undercut by the nurseryman when young. The root physiologists who claim trees don't have taproots (based upon research in claypan soils) have never dug a *Q. macrocarpa* grown in good loam; a three-inch tree can have a carrot sixteen feet long!

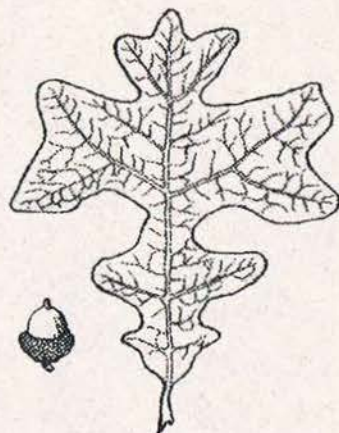
If you like *Q. macrocarpa* but need a tree that's easier to transplant, or more tolerant of soggy soil, try some of its first cousins: *Q. lyrata* (Overcup Oak) or, in cold climate areas, *Q. bicolor* (Swamp White Oak). *Quercus lyrata* is a round-headed, lustrous, southern swamp substitute which can be grown at least as far north as central Illinois from northern seed types. The more northerly *Q. bicolor* reputedly is the easiest of the White Oaks to transplant; it has attractive peeling bark on its smaller branches, and color-contrasting ("bicolored" leaves, which shimmer in the wind like those of *Q. macrocarpa*. Along with *Q. lyrata*, it toler-

ates tight or wet soil and thrives on better sites when planted in the landscape, but neither tree shares the tolerance of *Q. macrocarpa* for high pH.

*Quercus michauxii*, the Swamp Chestnut Oak, is a tree of similar habits. It has fiery autumn color, which shows to advantage against its nearly white bark, and develops into a tall and majestic specimen. If you need one of the Chestnut Oaks for drier sites, *Q. prinus*, the Rock Chestnut Oak, is a tough and colorful tree available at many nurseries. And if extremely high pH soil is your concern, whether wet or dry, choose *Quercus muehlenbergii*, the Yellow Chestnut Oak or Chinkapin Oak - nothing else will do as well. All of the trees in this group have sweet acorns, attractive bark and foliage, and interesting branching patterns.

The real comparison for all White Oaks (and all other Oaks as well) is *Quercus alba*, the Eastern White Oak. An ancient, dramatic, open-grown *Q. alba* is a Druid's dream and probably was the actual inspiration for Downing's 1847 admiration. Nearly as hardy and picturesque as *Q. macrocarpa*, this species' population has a more eastern concentration (and was very common in the Hudson Valley that Downing knew so well) but shares much of the central range of *Quercus macrocarpa* also. *Quercus alba* is a superior timber tree and has excellent fall color, among the best of its subgenus. The tree is limited horticulturally by immitigable slow growth and difficulty in transplanting, and has a preference for acidic soil; but, like *Q. macrocarpa*, it will be the living legacy we leave for our great-grandchildren when lesser trees have followed us to the grave.

As with subgenus *Erythobalanus*, the ranks of subgenus *Lepidobalanus* include some species that are scaled down to smaller



*Quercus stellata*

spaces. *Quercus stellata* (Post Oak) can become fairly large but usually is a medium-sized tree. It has heavy, glossy foliage that may yield good color over an extended fall season. Once established, the species is drought immune, but it is extremely slow to develop and cannot be transplanted easily in larger sizes.

Still smaller species include *Quercus prinoides*, the Dwarf Chestnut Oak of the midwestern and eastern states, *Q. gambelli* (Utah White Oak) of the Rocky Mountains, and many others of the deep South, Southwest and far West. They make interesting pets for the small garden and have the same potential for creative pruning as the shrubby *Erythobalanus* species.

Around the milder maritime fringes of the United States, several outstanding native Oaks are adapted locally. The magnificent *Q. virginiana* (Southern Live Oak) and its evergreen counterparts in California, together with the awesome *Q. lobata* (Valley Oak), *Q. douglasi* (Blue Oak), and *Q. garryana* (Gary Oak) are White Oaks which should be preserved where they occur and planted where they are adapted.

Many interesting Oaks, both trees and shrubs, also inhabit semi-arid portions of the Southwestern United States and Mexico. Many are evergreen and some of those which occur at high elevations may have potential for selection or breeding for cold tolerance farther north. Perhaps evergreen Oaks will be a possibility for mid-latitude areas of the United States in the future.

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#### OAKS FOR TOMORROW THE CLONES AND HYBRIDS

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It seems that horticulturists never are content with plant species, no matter how diverse and useful those species might be. We all want to find something special, or be creative and tinker with nature. Now that cloning and grafting problems with Oaks are being overcome, *Quercus* can serve as an endless source for such delights.

Individual trees of many species can be highly variable, inviting selection for various horticultural qualities. And with (but not between) their respective subgenera, Oaks seem to be almost universally interfertile -- spontaneous hybrids are everywhere, and serious plant breeders can foster thousands more by planting allopatric species in close proximity or by intervening directly with transfer of pollen from distant areas. We are just beginning to explore the possibilities of artificial pollination of Oaks.

Hybrid Oaks can offer three major advantages:

1. The opportunity to garnish good species with special qualities from related species
2. The introduction of heterosis ("hybrid vigor") for faster growth, better color, etc., than that expressed by either plant.
3. The excitement of exploring the unknown and the potential for discovery.

Several Oak hybrids are beginning to appear in the nursery trade already, as seed or F2 seedlings. One of the most promising for future release as F1 clonal material is a selection of *Quercus x saulii* (*Q. prinus* pistillate x *Q. alba* staminate) which displays brilliant fall color over an extended season on a tree with outstanding form, foliage and vigor. Another is not yet a determined cross of *Q. alba* by *Q. macrocarpa* and/or *Q. muehlenbergii*, which exhibits all of the best qualities of *Q. alba* on a tree with exceptionally fast growth. Several hybrids of American *Lepidobalanus* species with European and Asian species also show tremendous promise.

This introductory article has merely scratched the surface of the potential *Quercus*, the United States' National Tree. While it seldom is advisable to encourage exclusive use of any genus as a monoculture, Oaks should become a primary component of the Americas' nucleus of trees for the future. Δ



*Quercus macrocarpa*

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## THE ORIGIN, HISTORY AND DEVELOPMENT OF THE ARBORETUM TROMPENBURG, ROTTERDAM, HOLLAND

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BY J.R.P. van HOEY SMITH

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The history of the arboretum started in 1820 when a small country seat was built in the village of Kralingen, now part of Rotterdam, 4 km from the center of the city. The owners had their permanent house and work in Rotterdam, but the weekends were spent at Kralingen. The house was not built on poles, as is the custom now, but on casks with long willow branches in them. These were put vertically on the earth and loaded, whereby the willow twigs bend outwards and so give a considerable carrying capacity. This old-fashioned way of making foundations is a consequence of the weak structure of the underlying soil.

Forty percent of Holland, also Rotterdam, lies under sea level, our arboretum by four meters! During the floods of 1953, the dykes were half eaten away by the water before the tide turned and saved us. Originally, the Rhine Maas Delta consisted of peat swamps and in the Middle Ages, and also later, these were used commercially and the peat was removed for burning. Of 20 to 30 meters of soft peat, 4 meters were removed and the rest flooded again at each tide. So, a small layer of heavy river clay covers the thick peat layer and mud was deposited on top. The peat still contains many stems of oaks, birches, and alders. When digging our swimming pool, the stem of a heavy oak had to be removed. The wood was still in perfect condition and used for repairing a Viking ship, uncovered by the reclaiming Zuiderzee. Furthermore, a reclaimed area with dykes around is called a "polder" and when the water was pumped out of the polder Kralingen, long

straight ditches were dug, each about 45 meters apart. "Trompenburg" consisted of three plots, 45 meters wide but 350 meters long. In 1820 when the house was built, only the middle plot was laid out as a garden and the other plots remained meadows.

Our soil consists of a layer of good disintegrated mud of about 50 cm and on a layer of heavy impenetrable clay of about 30 cm. All this clay on the 20 m of loose light peat. The clay must be kept carefully, because when this is removed, the oxygen enters the peat, which disintegrates and the soil collapses. This circumstance means that only a small but very fertile layer of garden soil is available and in dry periods we have to water often, as nothing comes up from below and roots cannot penetrate the clay. And this in a country of plenty of water, where the water is controlled so carefully. We know this from experience as a former head gardener once thought it would be a very good thing to remove the clay from an area of 10x10 meters. Still now, 40 years later, we have to bring in, each year, new soil, the old having sunk away.

The Romans built through the swamps corduroy roads, which were discovered in Holland in several places. These were built from wooden sticks 2 m long and with a diameter of 10 cm, connected to each other and in this way formed a reliable road. We brought sand on to our roads and when the road sagged, new sand was put on top. The more sand, the quicker sagging went on. Now the modern method of building roads in Holland is by one of two systems: removing all the sand and replacing that by bales of peat moss, then covering by asphalt, or, the second method, digging



*Quercus robur 'Heterophylla'*  
Photograph by M. Nigel Wright

by huge dredgers a canal, removing all the peat down to the original sand 20 meters below and after that, filling the canal with and again. Both methods are very expensive and one may be astonished that we nevertheless have good roads.

Trompenburg was bought by James Smith, a Rotterdam shipowner and agent in 1850. His grandfather had come from England more than a century earlier and he still had both the English and Dutch nationalities. He immediately extended the house and in 1870 ordered the well-known Dutch garden architect, Zocher, to lay out the western part. His son, William, planted a long alley on the edge of the eastern part in 1900. James van Hoey Smith got the opportunity to lay the basis of the present arboretum and his son now completes his work. William added the name "van Hoey" for his son in order to prevent confusion in the shipping business to England, where the name James and Smith being too common.

The opportunity arose from a circumstance at the time considered a disaster, namely, the Dutch Elm disease. Looking back, we may now consider this to be a blessing to the arboretum, although elsewhere it remains a disaster, as there has not yet been found an equivalent substitute for planting roads and dykes. Imagine, that if the 400 large elms were still growing then only a forester could enjoy the long straight stems under which not even grass would grow.

James van Hoey Smith managed the garden from his father's death in 1919 until 1950 when he retired to his country seat. His son took over, extended the oak collection, already started by him, changed more meadows into gardens and started several new collections, such as the rhododendron collection, which contains now 800 species

and hybrids. Also the succulent collection, started by James van Hoey Smith just after World War I, as a result of a visit to the Canary islands, is continued and extended by the writer. Every spring the big specimens are removed from the greenhouse into the open and so contribute to the general interest and attraction of the Arboretum. As specialization we grow 350 taxa of succulent *Euphorbia*.

The yearly rainfall is 760 mm. The climate is more continental than in England and we have 10°F more frost. The 10° just prevents us from growing the beautiful rhododendrons of hardiness 3 and even some of hardiness 4 in the R.H.S. Rhododendrons Handbook are doubtful. From 1963 on, many big-leaved rhododendron have been tried, but that year was the last with a severe winter. *Rhododendron fictolacteum* flowered last year for the first time. The soil is very fertile, pH about 4.5, ideal for rhododendrons. *Araucaria araucana*, although growing in several places in Holland, always froze at Trompenburg. Now a specimen has been planted on top of a hole filled with old bricks and roofing tiles in a small quantity of soil. This specimen has grown slowly, this way. *Quercus coccifera*, definitely not hardy in the normal way, was planted on top of a low brickwall and also in this way grows slowly but will be hardier. Instead of improving the soil, which most gardeners do, we have to reduce fertility sometimes.

The first plantings of dendrological interest were made about 1870. Before that date from the original plantings of 1820, only some oaks remain. From the 1900 plantings, we still have a *Gymnocladus dioica* and a *Fraxinus xanthoxyloides* var. *dumosa*. The latter had to be moved 80 meters, which was done with complete success with a frozen ball of 4 meters in diameter. During three years everything was

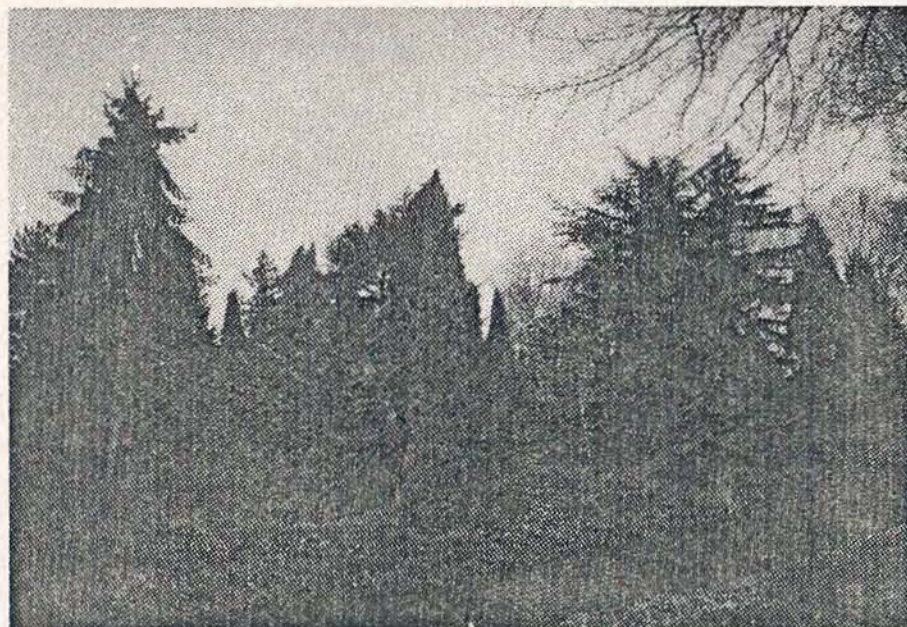
prepared for removal and photographs of the event appeared in the Rotterdam newspapers.

James van Hoey Smith was the first to plant interesting trees on a larger scale with the positive intention of starting an arboretum. As stated before, only after all elms had been removed, could he carry out these plans. From 1928 onwards every year he ordered plants from Hesse, Germany and Vilmorin, France, apart from local nurseries. Every Sunday, together with his sons, he visited some nurseries and ordered plants. His son, the writer of this article, went on ordering, but now also from Messrs. Hillier, England. Moreover, he himself is collecting, ordering seeds and scions and getting plant material from all over the world.

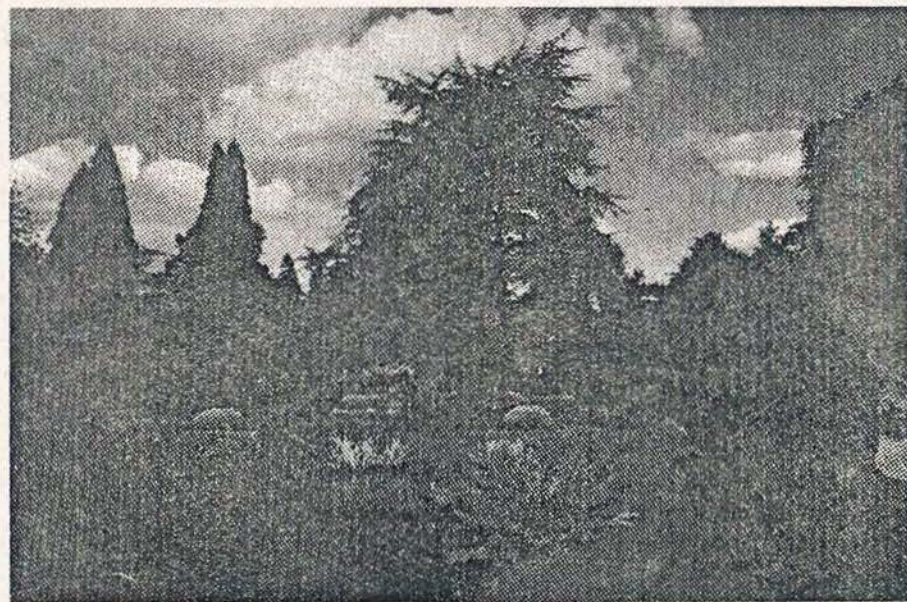
The Arboretum consists of five parts, laid out at different times. Originally, there were only three plots. The fourth and fifth plots were added in 1965:

I. In 1820 the center of the three original parts was laid out as a garden in English landscape style. We find here a couple of common oaks left from the plantings of 1820; the elms having been cut down. The orchards, vanished by their original shape, have been maintained. Now it is transformed into a beautiful group of Blue Atlas cedars, another part was replanted with different rhododendrons.

II The western part of the original plots was laid out, also in English landscape style, in 1870 by Zocher, who also laid out the Rotterdam municipal park and many other famous gardens. Apart from a *Thuja plicata* and a *Taxodium distichum*, only some ashes, old taxus, a Ginkgo and a 100 year old group of orange-red azalea, *R. japonicum* remain of the 1870 plantings. A meadow with sheep attracts visitors. In 1928 part of the



*Conifer Garden from South*



*Goldfish Pond*

Photographs by J.R.P. van Hoey Smith

meadow was made into a pinetum.

III. The eastern part of the original plots was edged in 1900 by an avenue mainly of elms with some interesting trees in between. After the First World War, a herbaceous border, rose garden, goldfish pond, heather garden and succulent house were laid out on this plot and the original vegetable garden was made a nursery for woody plants only.

IV. "Perenhof," situated east of Plot III, was transferred to the management of the arboretum in 1965 in order to synchronize its maintenance with that of the arboretum. It was also laid out around 1820 in English landscape style but had been terribly neglected. It has been reorganized completely, maintaining the English style.

V. "Woudesteyn," situated east of Plot IV, was leased also some years ago from the municipality of Rotterdam in order to extend the Arboretum. During wartime it was allotment gardens, but these were given up after nothing had been done and the clearing was tremendous work. At the present time it has shrub borders also the dahlia collection is planted there.

Of special interest to visitors are:

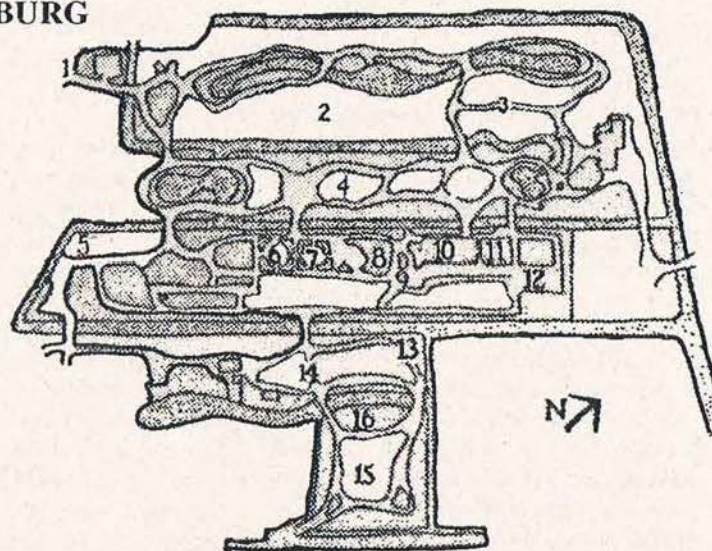
1. Collection of oaks, 94 species and 100 cultivars; of these 20 are evergreen.
2. Collection of beeches, 50 taxa.
3. Collection of rhododendrons, 325 species and 475 hybrids.
4. *Ginkgo biloba* with 13 cultivars.
5. *Liriodendron* in 2 species, 8 cultivars.
6. *Cedrus*, 4 species and 24 cultivars
7. *Chamecyparis*, 7 species, 135 cultivars
8. *Pinus*, 40 species and 145 cultivars.

The above is only a small part of the total collection of over 3,000 woody plants among which outstanding items are:

## MAP OF THE ARBORETUM TROMPENBURG

### Legend

- |                     |                        |
|---------------------|------------------------|
| 1. Entrance         | 9. Succulents          |
| 2. Pony meadow      | 10. Forcing House      |
| 3. Pinetum          | 11. Succulent Hothouse |
| 4. Atlas Cedar Hill | 12. Nursery            |
| 5. Evergreen Oaks   | 13. Open-air theatre   |
| 6. Rose Garden      | 14. Perenhof           |
| 7. Goldfish Pond    | 15. Woudesteyn         |
| 8. Heather Garden   | 16. Dahlias            |



*Fraxinus xanthoxyloides* var. *dumosa*, 90 years old, most 20 years ago.

*Picea omorika* 'Expansa' found by the writer 50 years ago.

*Pinus pumila*, 'Dwarf Blue' the plant from which Mr. den Outden described this form.

*Quercus pontica*, 50 years old.

*Quercus dentata*, 50 years old.

*Quercus pontica* x *dentata*, 35 years old, (Q. 'Pondain').

*Quercus macranthera* x *frainetto*, 35 years old, (Q. 'Macon').

*Fagus sylvatica* 'Aureopendula', 40 years old.

*Quercus robur* 'Pendula', 40 years old.

*Liriodendron tulipifera* 'Fastigiatum', 50 years old.

*Liriodendron tulipifera* 'Mediopictum', 40 years old.

*Liriodendron tulipifera* 'Crispum', 40 years old.

*Liriodendron tulipifera* 'Integrifolium', 40 years old.

Many visitors ask how we have succeeded in collecting such an assortment. Indeed, a great deal we have received in an unusual way. A witch's broom that we found in a *Picea sitchensis*, gave a new dwarf-sitka spruce *Picea sitchensis* 'Strypemonde'. When driving from the airport to the city of Hamburg, I saw a nice umbrella-shaped shrub. It proved to be a weeping oak, a much better form than the existing one. This shrub is the mother of our *Quercus robur* 'Pendula' over the pergola.

From *Fagus sylvatica* 'Zlatia', the golden beech, I got several plants with leaves ranging from yellow to green, deep purple to yellow-brown. From *Fagus sylvatica* 'Rohanii' I got many incised forms in colors also between green, purple-green and yellow (*F. sylvatica* 'Rohan Gold'). *Fagus sylvatica* 'Dawyck', thought to be sterile, fruited and 40 percent were fastigiate. These 40 percent consist of mainly the original green form, but also some in dark-purple and yellow. Now, 20 years later, these seedlings are 10 m high and are a welcome

extension to the nursery assortment, as they keep their dense fastigiate habit very well. They are now available under the names of *F. sylvatica* 'Dawyck Purple', 'Dawyck Gold', and 'Red Obelisk'.

Our Arboretum of only 5 hectares (13 acres) has limited possibilities. Therefore, we have to make use of every inch. Specializing is essential under such circumstances, not only in species, but also from a selected species only the interesting and nice trees are kept. Moreover, our principle is that the trees must grow in aesthetically justified circumstances. This means that we cannot plant too close, that we do not plant similar trees next to each other. Asked for by visitors what is our system of management, I always answer, "My system is having no system." But I have four guidelines:

1. I mix as much as possible, evergreens and deciduous, so that in winter the garden is also beautiful.
2. I give much attention to colors, not planting next to each other two different pinks.



3. I keep the vistas open.

4. The axe (now chainsaw) is my paintbrush.

Also visitors many times ask why they see and how we manage to produce only beautiful specimens in nice surroundings. The answer is very simple: we cut vigorously every plant that is growing badly. This especially refers to some conifers, which grow well when young. As soon as they are around 30 years old, they get thin and leggy. We cut them and replace them by young ones. *Abies* and *Picea* in our climate and in our Arboretum have to be replaced generally after such a term and specialists declared that the reason is that our climate does not give them enough rest in winter. They need lower temperatures then and in summer, in dry periods, our air lacks the moisture they always have in the mountains. *Pinus* and *Juniperus*, however, do not suffer at all.

Moreover, just after the elm disease, many large specimens of common trees were planted in order to give shelter. Now these have done their duty and can be removed. We do this very slowly, in order not to disturb the public, who also, in Holland, protest against every tree cut down. Sometimes, we have to make a choice between two trees when they touch each other. Doing nothing is also a decision, which often results in two ugly trees instead of one nice one.

In 1956 a foundation was formed with the purpose of securing the Arboretum for future generations. The foundation, partly financed by the van Hoey Smith family and partly by the Foundation Volkskracht, in 1970, also got support from the Rotterdam Municipality and so its importance was officially confirmed. This was important as our Arboretum is visited not only by botanists and dendrologists, but also by many

Rotterdam citizens, who look for a nice, quiet place to relax from the turmoil of the Rotterdam city, with its harbors, industry, oil refineries, etc. They all enjoy the blessing of this oasis of green.

In 1991 we had 45,000 visitors and for 1992 four gardening groups from the USA already booked for a guided tour.

### QUERCUS GENUS IN ARBORETUM TROMPENBURG

In the Arboretum Trompenburg we grow in the park and in the nursery 93 species and 84 cultivars and have more or less a reference collection. We also grow oaks of minor interest. However, having at our disposal only 5 hectares, we are obliged to specialize. We do not grow the many local forms of *Q. robur* and *Q. petraea*. I simply have to select (by lack of space) in a very personal way and with a personal taste, which is of course very unscientific. However, all differences are easily visible and in that way I can show everybody the specific features of the oaks we grow.

The full list of 177 oaks is available to anyone asking for it. Below you find in alphabetical sequence only those which grow well and have proved to be of interest for parks and gardens:

*Quercus acuta* from Japan, an evergreen species with big leathery leaves, needs protection when young. Now we can only cover the lower parts of the trunk and the 25 year old 6 m tall bush fruits yearly.

*Quercus acutissima* from Japan, Korea and China is of medium size, deciduous and the serrate leaf resembles that of *Castanea*, but is narrow and -- contrary to *Quercus variabilis* -- is bright green underneath.

*Quercus alba*, the common American White Oak, growing from Eastern Canada to Florida. The name *alba* refers to the white bark. In Europe they do not grow to the size they reach in America, where 50 m tall is not unusual. In autumn the deeply lobed leaves color from red to purple-red. Acorns imported from America are often infested with worms and all acorns with round holes should be destroyed immediately. No doubt that some selection done with seed from the wild or with seed from one of the few European trees will result in a well growing clone. The wood is of the same good quality as our common oak.

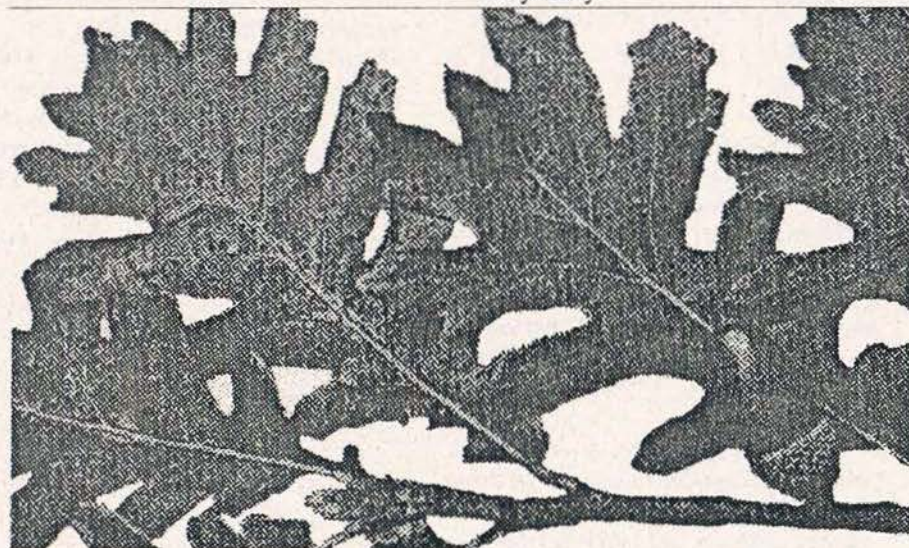
*Quercus aliena* var. *acuteserrata* from China, Korea and Japan has toothed leaves of 15-20 cm. It is a deciduous but smaller tree.

*Quercus bicolor* from eastern North America. It is a large tree with leaves grey beneath and can be easily recognized by the many dead young shoots in the crown and a bark peeling off like a birch.

*Quercus castaneifolia* from Caucasus, Persia has *cerris*-like buds with long narrow scales. The leaves are larger than *Q. cerris* with sharp pointed teeth. Like *cerris* it grows very well in chalky soil. It is difficult to buy a true specimen!

*Quercus cerris* from Southern Europe and Turkey is a large tree and grows fast in all soils. It is very wind-resistant. The leaves are very variable. The large acorns have cups with long scales. The reason why this tree is never used in forestry is that the trunk easily splits in winter, which makes it of no value. Its cv '*Variegata*' is a small tree with creamy-white margined leaves.

*Quercus coccifera* from the Mediterranean is a slow growing, dense, evergreen shrub. The small leaves are very prickly and in Turkey and Morocco they are the main food for goats. In those countries whole areas are covered by this oak and after having been eaten down every year, they show a great variety of topiary shapes. Plants grown from seed collected in cool areas are very hardy.



Photograph by J.R.P van Hoey Smith

*Quercus x Macon*

*Quercus dentata* from Japan, Korea and China makes a smaller tree with remarkable large leaves, sometimes 30 cm long and 18 cm wide. They often remain on the tree until next spring. It has, however, very small round acorns of 1 cm diameter and fruits abundantly in Trompenburg. The young shoots are yellow-brown and downy. It is one of my favorites. From America came a cultivar with deeply cut leaves. They arrived grafted on *Q. macrocarpa* stock. In the next year, the stock threw off the scion. Two other importations did exactly the same. Then we imported scions and grafted them on *Q. robur*. No success. The following year on *Q. dentata* own seedlings. No success. The next year on *Q. portica* own seedlings. No success. We nearly did not dare to ask our American grafts for more scions. However, then the grafts on own seedling *Q. macranthera* and *Q. Macon* F.2. were successful and we now await to see which will prove to be the best stock. After 8 years experimenting, we now have three year old specimens.

*Quercus falcata*. From seeds received from Eastern U.S.A. in 1959, we selected a specimen with the typical leaf with two long pointed lobes. It moreover has a good conical habit. It has not the red autumn color like many other red oaks. It is astonishing that in their native habitat red oaks seldom hybridize, although they grow together in the wild. Occasionally, however, they do and in the Monographie des Chenes of the French Professor Camuz one finds many. We have *Quercus x ludoviciana* (*Q. phellos x falcata*) but why is the hardiness insufficient?

*Quercus frainetto*. In the wild the leaves are very variable from *petraea*-shape to our *frainetto* from the nurseries. One should realise that our usual *frainetto* is a beautiful double-lobed selected clone, which

should have a cultivar name and is always propagated vegetatively. Some years they produce acorns abundantly and one can make selections with still deeper cut double-lobed leaves. However the clone we usually grow is so nice and makes such a good tree, that further selections are a waste of energy.

*Quercus garryana* from western North America, especially Oregon. This oak is of medium size with a short stout trunk and a wide-spreading crown. The leaves are shiny dark green above and deeply cut into oblong lobes. This beautiful oak, one of the few in America, which with *Q. alba* belongs to the White Oaks, should be planted much more frequently and grown from seed. Will nurserymen please see to it that it becomes readily available?

*Quercus glandulifera* from Japan, Korea and China is one of the oaks from which in 1951 acorns were collected in Kew and one grew at Trompenburg into a beautiful large tree. The leaves are small with gland-tipped teeth.

*Quercus ilex* from the Mediterranean grows in England into a large tree. In Central Europe it is generally only a large shrub. This evergreen tree with leaves like *Ilex* is not hardy here when grown from acorns collected in a London park, those will be hardy. Either those trees, already introduced in the 16th Century, are from a selected hardier clone, or they have adapted themselves to colder weather. In England-called Holm Oak--it is found in every park and larger garden and it should be planted widely both on the European Continent and in America.

*Quercus ilicifolia* from eastern U.S.A. is a spreading shrub. In the Arboretum Tervueren near Brussels, it lines groups of large trees. The leaves of the Red oak--although, not colouring in autumn--are white

felted beneath, persist in the winter, and many leaves then turn and show their white side against the dark brown of other leaves. The acorns are black with yellow stripes.

*Quercus imbricaria*, also from eastern U.S.A. is another favourite of mine. I planted a specimen when I was 17 in 1939 and now it is already a large tree of 18 m tall and the trunk has a diameter of 60 cm at 1.70 m. The leaves are entire, narrow, oval and dark green. Although Hillier says that is has rich autumn colours, this has not been our experience. It produces many good acorns, which come fully true. I can recommend this tree for every purpose.

*Quercus libani*. In its native habitat, Syria and Turkey, it is a medium size tree, with us only a large shrub. Its small, serrate, narrow leaves are as conspicuous as the large acorns. At Trompenburg it hybridized with *Q. cerris* and all those hybrids are named *Q. x libanerris*. One of them I am discussing in the hybrid-section of this article.

*Quercus macranthera* from the Caucasus and North Persia is a fast growing medium to large tree. It can be easily recognized by its stout one year shoots clothed with a yellow-brown velvety tomentum. The young bark can be grey with long wide plates and only a few furrows. This robust looking tree has an interesting dense compact appearance.

*Quercus marilandica* from eastern United States is a small slow growing tree of spreading habit. The dark green glossy leaves are triangular and tawny yellow beneath. The clone from nurseries is a selection with really magnificent leaves, which justify its planting in the garden.

*Quercus mongolica* var. *grosseserrata*

from Japan, together with *Q. aliena* var. *acuteserrata* suffers with us from die-back of young branches, as do several other East Asiatic species. Both are very similar and have large and wide serrate leaves. Although both are said to be medium size trees, at Trompenburg it looks as if at maturity they will reach a considerable size.

*Quercus myrsinifolia* from China and Japan is a beautiful small densely branched, evergreen, compact tree. The shining leaves are lanceolate, green above and grey beneath. Although said to be tender, it has survived the last three severe winters undamaged.

*Quercus palustris* from eastern North America is said to grow in wet conditions. My experience is that it grows best in dry places and even in a street it is a success. The deep cut, pointed leaves are very similar to those of *Q. coccinea* but they are smaller and sometimes the autumn colour is as good. Unlike *Q. rubra* and *Q. coccinea* the tree does not make the large size branches, but grows into a column. Also the many dead small branches in the crown, which are very persistent, are a help to its recognition.

*Quercus petraea* has its habitat in all Europe and Turkey. It grows more columnar than *Q. robur* and the bark is less furrowed. Unlike *Q. robur* the leaves have a 1 cm petiole, the vein is yellow, the fruits are sessile and the buds are pointed. Owing to the taller trunk, the timber is more valuable than that of *Q. robur* and is often used for plywood. In forestry, especially in Germany, *Q. petraea* is mostly growing in mountain areas and the famous Spessard-Oaks are all *petraea*. Even standing alone it never has the wide-spreading habit of *Q. robur*. *Q. robur* is robust, *Q. petraea* is elegant.

Several cultivars are available: *Quercus petraea* 'Columna' is fastigiate with leaves like *Q.p.* 'Mespilifolia'. *Quercus petraea* 'Mespilifolia' can reach a large size and has a narrow 15-20 cm, most entire dark, glossy green leaves. It is a solitary beauty in a park. *Quercus petraea* 'Lacinieata Crispa' is most interesting. The leaves of the first shoot are long and very narrow, like threads. The second, St. John's shoot, has more or less normal leaves. Consequently it then makes a very untidy tree and is more peculiar than beautiful.

*Quercus phellos*, the Willow Oak, from eastern United States is a large tree with small entire willow-like leaves. It is a striking tree with a good shape.

*Quercus phillyreoides* is the eastern Asiatic form of *Q. ilex* and is hardier. It grows to a large shrub. The leaves of this evergreen are oval, leathery bronze-green with minute teeth. It should always be planted in a groups, to get acorns, cross-pollination is required. This oak is ideal when an evergreen shrub is required.

*Quercus pontica* from Armenia, Caucasus and North East Turkey, generally grows as a large shrub and can in 20 years reach 6 m tall and 6 m wide. The large leaves are very similar to those of *Castanea sativa*, but wider. The large sessile acorns fall early in September and the shrubs start fruiting when 1 m tall. This tree by itself in a lawn as in Trompenburg is quite a sight. Grafting is difficult and from seed it grows very slowly. It is one of my most beloved treasures.

*Quercus pyrenaica* grows wild in S.W. Europe and Italy to a medium to large sized tree. The deeply cut, lobed leaves are pubescent on both sides. In nurseries generally the cv. 'Pendula' is sold and the normal

growing species is very rare. I like it so much because of the leaves.

*Quercus robur* is too common to give much attention. However, it has many cultivars, of which I would recommend the following: *Quercus robur* 'Atropurpurea' is a very slow growing purple-leaved oak, mostly not larger than a shrub, suitable for a small garden. *Quercus robur* 'Concordia' generally also remains a yellow-shrub, but I have seen larger fruiting specimens in eastern Europe. From seed of one of these the Arboretum Trompenburg has a promising normal-growing specimen. *Quercus robur* 'Cristata' has deeply lobed, folded and curled leaves. Our specimens are from 1951 Kew acorns and also our present crop comes true from seed for 50 percent. *Quercus robur* 'Fastigata' is well-known, although not always grafted from a good specimen. Therefore, more selection work is needed, so that only first class material becomes available. *Quercus robur* 'Pecinata' only reaches large shrub size. The leaves are very deeply cut and only long, narrow, pointed lobes are all that are left. We tried one thousand acorns and not one came true. *Quercus robur* 'Pendula' has drooping branches, but grows to a large size. It is very suitable to train over a pergola. *Quercus robur* 'Salicifolia' is a very interesting oak. Hillier puts it in the *petraea*-group, because of the petioles of the leaves. The very small acorns, however, have very long petioles. The leaves on a young tree still have some lobes, but mature trees have only entire leaves. From seed it comes true for 100 percent. Its origin I do not know. It was known in Germany in 1873 and I doubt whether it grows anywhere else in the wild. I would not object when it attains species-rank.

*Quercus rubra* is too common for comment, but has one outstanding cultivar,

*Q. rubra* 'Aurea'. It was found in 1878 in Holland between seedlings and comes true from seed for a good percentage. Planted against a dark background of large conifers, it can make a marvelous sight.

*Quercus sadleriana* from Oregon and California is sometimes creeping, but can in the wild reach a height of 2 in. It has small pontica-like leaves on stout branches. It is fully hardy and one of the smallest oaks.

*Quercus trojana*--old name *Q. macedonica*--is very similar to *Q. libani*. It grows in the Balkans and in Turkey. The small leaves, however, are glossy dark green and they remain in brown colour on the tree all winter. That accounts for its very compact impression.

*Quercus variabilis* from China, Korea, Formosa and Japan has serrate leaves similar to *Q. acutissima*, but they are white beneath. The bark is corky and is very beautiful when mature, as seen at Kew. The hardiness is a problem and consequently the origin of the seed is very important. Acorns from Eastwood Hill in New Zealand produced seedlings, which freeze down to the ground every year. A plant from acorns collected at high altitude in Mount Omei, China, however, is doing very well.

*Quercus warburgii* is of uncertain origin. The only original tree is growing in the Botanical Garden at Cambridge, England, and I doubt very much whether it is a species or a cultivar. Seedlings could solve that problem, but at Cambridge the acorns are always collected by birds and squirrels before ripening. However, my young graft had some good acorns two years ago, but the seedlings of one year old look very uniform and very similar to *Q. robur*. They will have to be examined for several more years, before any conclusion can be drawn.

It is a semi-evergreen tree and when just out, the leaves are a beautiful pink and have a petiole like *Q. petraea*.

This article would not be complete without mentioning some of the hybrids as well and I restrict myself to only those, which are interesting to grow. In the Monographie des Chenes of Camus many hundreds of hybrids are described, but these are mostly of no interest and not available anywhere.

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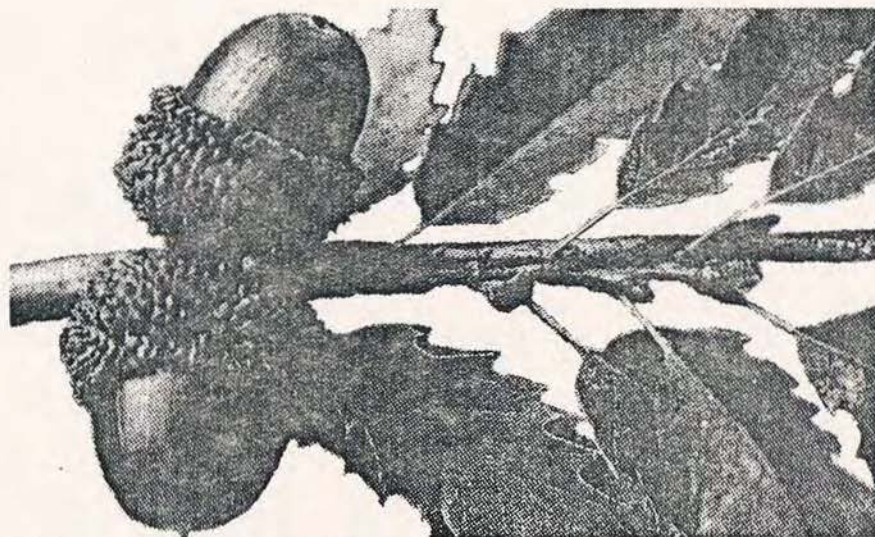
#### HYBRIDS

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*Quercus* x *hispanica* is a group of seedling-hybrids of *Q. cerris* and *Q. suber*. These species hybridize very easily and the seedlings are very variable. The leaves vary from both parents to every thinkable intermediary form and the bark does the same. The second generation seedling (F<sub>2</sub>) are even more variable. Out of this enormous quantity of hybrids, some have been given cultivar names and these should be propagated vegetatively. From *Q. suber* all inherited the evergreen leaves and sometimes the corky bark. From *Q. cerris* originates the large size. Best known, already in 1763, is *Q. x hispanica* 'Lucombeana', a full size tree. 'Diversifolia', has very peculiar leaves and 'Ambrozyana' originates from Mlyany, the estate of Count Ambrozy in Czechoslovakia.

*Quercus* x *leana* is *Q. imbricaria* x *Q. velutina*. The leaves are long and lanceolate like *imbricaria*, however, with a few, sharp pointed lobes. They are leathery like *velutina*. The latter property distinguishes it from *Q. x heterophylla* (*imbricaria* x *rubra*), which has the same, but thin leaves.

*Quercus* x *libanensis* (*libani* x *cerris*) originates from the Arboretum Trompenburg. The leaves are intermediate



Photograph by J.R.P. van Hoey Smith

*Quercus x libanerris*

between the parents, but it has the growth and will grow the size of *cerris*. The first seedling was named *Q. x libanerris* 'Trompenburg'. Later a seedling appeared with the same good growth, but serrate leaves, exactly the size of *libani* and acorns even larger than those of *libani*. This outstanding cultivar I named *Q. x libanerris* 'Rotterdam' and the vigorous narrow habit makes it very suitable for street-planting.

*Quercus* 'Macon' (*macranthera x frainetto*) also originates from Trompenburg. The leaves are frainetto-like, but the indumentum of the young shoots and the buds are pure *macranthera*. However, the acorns are 3-4 cm long and only 0.5-0.8 cm wide. It makes a beautiful tree.

*Quercus petraea* 'Columna' is the hybrid of *Q. petraea* 'Muscaviensis' and *Q. robur* 'Fastigiata'. When young, the habit is good, but it starts broadening after 15 years. At Trompenburg it fruited already abundantly and then it mendels back to the parents, but between them we found two with a better compact fastigiata shape. *Q. petraea*

'Westcolumn' has 'Columna' leaves, is 8 m tall and 60 cm wide. *Q. petraea* 'Eastcolumna' is the same size, but only one leader on top, much smaller leaves, consequently the first impression is better.

*Quercus* 'Pondaim' (*pontica x dentata*), at Trompenburg the parents grow near each other and between *pontica* seedlings this oak appeared, which is intermediary between the parents. The leaves are very large, but serrate like *pontica* and the growth and size are that of *dentata*. It keeps the leaves in winter. A very remarkable tree indeed.

*Quercus x turneri* (*ilex x robur*), in Dutch nurseries this was the only available evergreen oak, at the time under the name *Q. austriaca sempervirens* and *Q. x turneri* var. *pseudoturneri*. It can grow to a medium size, but is very wide. The green leaves fall down in spring when the buds open. It was raised in the nursery of Mr. Turner of Essex, England, in the late 18th Century. It is the hardiest of all evergreen oaks, even when in a severe winter it drops its leaves at very low temperatures. Δ

## THE GENUS QUERCUS IN ROMANIA

BY DR. STELIAN RADU

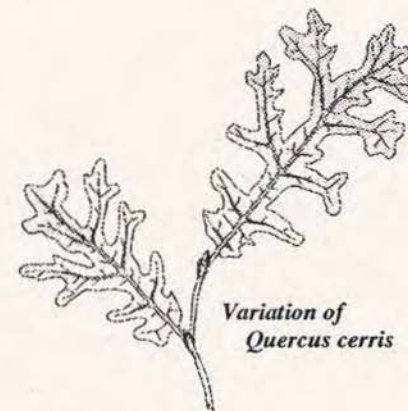
Seven species of oaks, belonging to the family group *Cerris* (Spach. & Oaerst) and *Lepidobalanus* (Endl. & Oesrt) subgenus, are spontaneously growing in Romania. All together, they roughly cover 2,970 acres, which represents about 19 percent of forested land. Another 20 exotic oaks were introduced and cultivated in forests and parks.

Due to their silvicultural importance, the Romanian native oaks were thoroughly studied during the past 50 years from different points of view: botanical, ecological, genetic, typological, edaphic, mensurational, diseases and pests control, including the wood properties and uses. Abundant Romanian literature is available on these topics.

For a short and general note, addressed to the International Oak Society members, we have tried to compile some basic data. The nomenclature, occurrence, soil requirements and uses of Romanian oaks are listed in the following table.

The great diversity of sites and compositions of stands, formed by these species, is well reflected in existing classifications. Therefore, oak forests were studied and described: 141 forest types (Purcean, Pascovschi, 1968), 104 site types (Chirita, Stanescu, 1990).

Producing high quality wood, the oak forests exert multiple productive (climatic, hydrological, and erosion control) functions. But during the centuries, the natural oak forests endured a strong antropic pressure. The deforestations, application of coppice



Variation of  
*Quercus cerris*

systems, abusive forest pasture, prolonged and frequent droughts, strong defoliations and finally, air pollution and acid rains - produced an appreciable weakness of some oak ecosystems.

The so-called 'dieback' ('deperissement') of oaks, frequently recorded in Europe during the last decades, is noted also in Romania, particularly in European and sessile oaks, and sometimes on other species. The oak forests are subjected to sophisticated sylvicultural systems, relying on natural regeneration. But seed crops are, unfortunately, rare, particularly in last decades.

In the frame of scientific cooperation and exchanges of biological materials, our research station is able to locate seed crops for these species and to organize the collection and dispatching through the post (with necessary documents of provenance and phytosanitary certificates) of some small quantities of acorns, in exchange of North American or Asiatic forest and amenity tree seeds. Special requests must be directed in advance to: Forest Research Station & Arboretum, str. Biscaria, 1 Jud. Hunedoara, R-2625, Simeria, Romania. A catalog of seeds and plants for exchange is published annually by our research station. Δ

NOMENCLATURE, OCCURENCE, SOIL REQUIREMENTS  
AND USES OF ROMAINIAN OAKS

\* Explanation of Soil Requirements:

I - TROPICITY: 1=poor; 2=middle; 3=rich; 0=wide variability

II - ACIDITY: 1=acid; 2=moderate acid; 3=weak acid; 4=neutral; 5=alkaline

III - HUMIDITY: 1=xerophyte; 2=mesoxerophyte; 3=mezophyte; 4=mesohygrophyte; 5=hygrophyte; 0=wide

SCIENTIFIC AND COMMON NAMES	SYNONYMS	VARIABILITY	OCCURENCE		MAX. HEIGHT (FEET)	SOIL REQUIREMENTS*				TIMBER VALUE	AMENITY VALUE AND USES	OTHER REMARKS
			GENERAL	ROMANIA		I	II	III	TEXTURE			
<i>Quercus petraea</i> (Matl.) Liebl. (Sessile oak)	<i>Q. sessiliflora</i> salisl. <i>Q. sessilis</i> Ehrh.	-ssp. <i>petraea</i> -ssp. <i>polycarpa</i> (Schur.) 500' -ssp. <i>dalenchampii</i> (Ten.) 500' -climate and edaphic ecotypes	Europe Carpath-Balk. -Caucas. Alps-Carpath. -Balkan	-hills & piedmonts  -pure and mixed stands	100(130) 85 100	0 0 0	2-3 2-3 1-3	3(4) 2 2-3	coarse	good & remarkable (some provenances)	-subf. <i>mespilifolia</i> (Wall.) Schw. -f. <i>lacinata</i> -f. <i>longifolia</i> - seldom cultivated in parks	-deep, drained soils -shallow or skeleton soils -shallow or skeleton soils
<i>Quercus robur</i> L. (English Oak)	<i>Q. pedunculata</i> Ehrh.	-v. <i>tandiflora</i> Czern -var. <i>praecox</i> Czern -var. <i>robur</i> -var. <i>puberula</i> -great variability of leaves, acorns & habit	Europe	-plain....hills  -pure and mixed stands	130(165)	0	1-4	0	loamy-sandy.... sandy-loamy	good & remarkable (some provenances)	-f. <i>fastigiata</i> (Lam.) Schw.  - used in parks as as single tree or in groups	-deep, loose, drained soils
<i>Quercus cerris</i> L. (Turkey oak)			Mediterranean	-forest steppe.... hills  -pure and mixed stands	100(130)	0	1-3	1-2	sandy-loamy....clayey	good - medium (forms with white heartwood better than red ones)	- seldom cultivated	- compact or dense soils
<i>Quercus frainetto</i> Ten. (Hungarian oak)	<i>Q. conferta</i> kit		Balkan	-forest steppe.... hills  -mixed (seldom pure) stands	130	0	1-3	1-2	sandy-loamy....clayey	good	-extremely decorative	-compact or dense soils
<i>Q. pedunculiflora</i> C. Koch (Greyish oak)		-var. <i>pedunculiflora</i> Schuz. -var. <i>virescens</i> C. Koch	Pontic (around Black Sea)	-forest steppe  - pure and mixed stands	130	3	3-4	2	medium coarse	good	-seldom cultivated	-loose, sandy soils -subthermic sp., identified & described by Alex. Borza (1936)
<i>Q. pubescens</i> Willd. (Pubescent oak)	<i>Q. lanuginosa</i> Thuill.		Mediterranean	-forest steppe.... hills  -open stands, shrub size	13-50 (65)	2-3	4-5	1	sandy-loamy.... clayed loamy	insignificant		- skeleton, calcic soils -subthermic sp.
<i>Q. virgiliana</i> Ten.			Mediterranean	-forest seppe.... hills  -open stands, shrub size	65	2-3	4-5		sandy-loamy.... clayed loamy	reduced		-skeleton, calcic soils -subthermic - thermic sp.

**AN OAK COMMON IN FRANCE - THE ENGLISH OAK**  
(*Q. robur* L. and *Q. pedunculata* Ehrh)

BY STEPHAN BRAME, VILLENEUVE, LECOMTE, FRANCE

The English Oak is found in almost all the French territories except in the extreme South (Mediterranean region) and in the mountains above 1000 m high. It grows in a large part of temperate Europe. It puts up with different climates, in oceanic as well as in continental climates, and grows in all types of soils - acid and alkaline. However, it is often replaced by *Q. pubescens* in chalky and hot sites. The species is able to colonize in the same dry or damp ground, but it only reaches a large size (30 or 40 m high) in rather deep soils with a little dampness and in luminous exposure.

There are many natural oak plantations located in very superficial grounds, the roots of *Q. robur* are able to grow in the clefts of the rocky soils where, however, it may reach a rather large size. The part played by this oak in the improvement of poor soils due to the dead leaves is important and allows the installation of a more exact species. The tree sprouts vigorously after falling and then the few shoots that were thrown out are also able to attain a large size.

Although it is quite hardy here, it is frequent to see marks of frost on old trunks - on poor soils. It is used as a reserve of copse because it is a very good wood for fuel.

The old specimens isolated along the road or in the pasture have a big and rather short trunk with a typical rounded crest. The large trees found in the forests produce a more long trunk. The wood is searched for framework because it is very tough and not very attacked by insects.

In our country, the only tree able to overtop and to eliminate the English Oak is *Fagus sylvatica*. The acorns produced by the big trees are often abundant and are eaten by rodents, wild boars and some species of birds (Jay). The English Oak is able to live for several centuries. There is a variety of *Q. robur* not very rare and found in the eastern part of France (*Q. robur* var. *tardissima*), called here June Oak, because it unfolds its leaves about one month after the type and is never injured by spring frost.

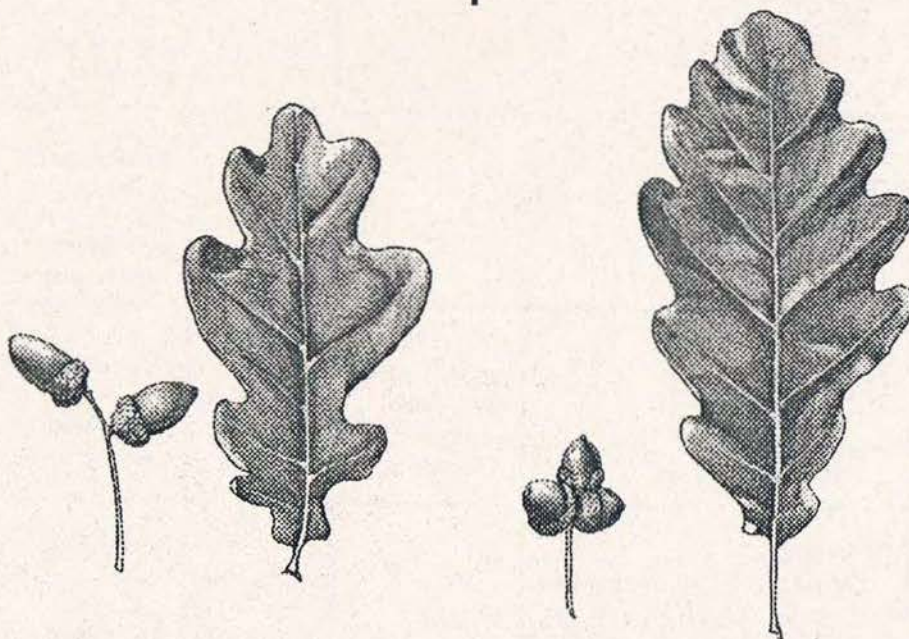
Many other varieties are met in the collections and I think the most striking are:  
-*Q. robur* 'variegata' - leaves variegated with white  
-*Q. robur* 'condordia' - leaves bright yellow  
-*Q. robur* 'asplenifolia' - leave pinnatifid  
-*Q. robur* 'fastigiata' - of columnar shape

The English Oak makes hybrids with almost all the other oaks located in its area:  
-*Quercus x semilanuginosa* = *Q. lanuginosa* x *Q. robur* (= *pubescens*)  
-*Quercus x apennina* = *Q. pubescens* x *robur* x *sessiliflora*  
-*Quercus x intermedia* (*Q. x rosacea*) = *Q. robur* x *Q. sessiflora*  
-*Quercus x andegavensis* = *Q. robur* x *Q. toza*

I grow in my garden a handsome small tree called *Quercus x Hickelii*, a hybrid between *Q. robur* and *Q. montana*.

The following comparative chart is a recapitulation including notes about two oaks often discussed: English Oak and Durmast Oak. Δ

	ENGLISH OAK ( <i>Q. robur</i> L. , <i>Q. pedunculata</i> Ehrh.)	DURMAST OAK ( <i>Q. petraea</i> Liebl., <i>sessiliflora</i> Salisb.)
Shape	- Irregular with curving branches.	-Less irregular with a differentiated top
Leaves	-very short petioles -limbs becoming wider near the top of the leaf -two rounded auricles at the base -dark green and sometimes glaucous - not bright, not leathery	-petioles 1 - 2 cm long -limbs becoming wider at the middle of the leaf -no auricles at the base -shiny green, rather leathery
Acorns	-ovoid cylindrical -borne by long peduncles	-ovoid globular -borne by very short peduncles



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## CALIFORNIA NATIVE OAKS: PAST AND PRESENT

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BY JAMES R. GRIFFIN AND PAMELA C. MUICK

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The fossil record indicates that oaks have been in California for at least the past ten million years. Relatives of most of the California oaks have been found in late Miocene sediments deposited five to thirteen million years ago.

There are approximately sixty species of oaks in the United States, and an estimated three hundred worldwide, primarily in the Northern Hemisphere. Ten tree and eight shrub species of *Quercus* grow in California. California species fall into three different subgenera: the white oaks, *Lepidobalanus*; the intermediate oaks, *Protobalanus*; and the black oaks, *Erythrobalanus*. The subgenera prefix *Erythro* is derived from the Greek word for red. Generally, taxonomists and foresters refer to the *Erythrobalanus* subgenus as red oaks. However, in California and the northeastern United States, this subgenus is known as black oaks. The local usage probably arises from *Q. kelloggii*, black oak, a species in the *Erythrobalanus* that is physically similar to the red oaks in the rest of the United States. Hybridization, which is naturally restricted to crosses within a subgenus, has resulted in eleven named hybrids and ten unnamed hybrids.

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### OAK LIFE CYCLE

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Oaks are monoecious, bearing male catkins and female flowers upon the same individual plant. Flowers are wind-pollinated, and acorns mature in either one- or two-year cycles. The acorns of the white oaks characteristically mature in the fall of the same year the flowers bloomed. In contrast, most of the black oaks exhibit delayed fertilization, similar to some of the pines; acorns mature in fall of the second year.

California white oak acorns do not require a period of dormancy and generally germinate in the fall or winter after dropping. In fact, emerging roots are visible on some blue oak acorns while still on the tree. On the other hand, black oak acorns often respond favorably to a period of cold stratification with rapid germination.

Seedling oaks are temporary. Huge populations of seedlings come and go following good seed crops. Seedlings succumb to a variety of problems including drought, herbivory (both above- and below-ground) and fire. Although physiologically equipped to sprout after above-ground damage, very few seedlings survive and grow to the next stage of maturity, the short sapling stage.

Short sapling oaks have an increased likelihood to survive to adulthood. Short saplings, under four and a half feet in height, have a woody stem and a well-developed root system which serves as a reservoir of energy. Short saplings sprout readily after injuries from fire, drought or browsing, and may be kept in a hedged condition for decades. Only after the sapling's leader reaches above the deer browse line does the sapling proceed to the next level of maturity, the tall sapling stage.

Tall saplings, greater than four and a half feet, above the browse line, gain height and girth rapidly. At this stage, after top death due to burning, they may regain their previous stature within a few years. Saplings gain height before adding girth, and then develop into the next stage of maturity, young trees.

Tree status can be considered the beginning of the reproductive stage of an oak's life. Although timing and triggering mechanisms for sexual maturity are unclear, root and shoot mass, as well as vigor and crown position are components. As an oak matures, it begins to display its characteristic bark and growth form, as well as the cycle and quality of mast, the acorn crop.

The life of a tree can be divided into three stages: young, mature and declining. Young trees usually have a strong ability to sprout from the base after injury. Mature trees may sprout from the stumps of broken branches. However, the ability of mature trees to sprout from the stump is more variable. For instance, blue oak (*Q. douglasii*) and garry or Oregon oak (*Q. garryana*) appear to stump sprout well to mid-side classes, while valley oak (*Q. lobata*) loses this ability earlier. The black and intermediate oaks, as well as most of the shrub species, sprout vigorously after fire.

Disease plays a large part in the life of the adult oak. To quote the British ecologist M.J. Penistan, in his paraphrase of Dryden:

*"The monarch oak, the patriarch of trees  
Springs rising up, then spread by slow degrees  
One hundred years he grows, one more he stays  
Supreme in state, then in one more decays."*

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### WILDLIFE AND OAK HABITATS

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During their long history in California, oaks have evolved strong interrelationships with wildlife. Today, an estimated 5,000 species of insects use oaks, and 1,000

are dependent upon oaks. Approximately 170 species of birds use oaks at some point in their life cycle. Fifty-eight species of lizards, snakes and amphibians are associated with oak habitats. One hundred and five species of mammals, including most of the game species in the state, use the oak resource.

Interactions between disease, wildlife (including feral hogs), and introduced annual plants are avenues of research being explored by contemporary researchers. However, research efforts are uneven across the species in the state.

Approximately ten million acres of California are habitat to the nineteen native species of oak. The California Department of Fish and Game Natural Diversity Data Base recognizes sixty-seven different types of oak habitat. Oaks dominate or co-dominate in 25 plant natural communities, and are characteristic members of 43 others.

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### HUMANS AND OAKS

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California's human history is inextricably interwoven with its landscape and vegetation. Over millennia, native Californians developed many uses of oaks. Acorns were a major item in their diet; acorns were also important for the animals they used for food. Many native American cultures acknowledged their dependence upon oaks through ritual and legend. The near extinction of these indigenous peoples from their ancestral oak populations marked a loss of sophisticated understanding about oak stewardship. Today we cannot fully recover the loss of oak management lore that passed away with these people.

When Franciscan missionaries arrived in 1769 they often located missions in oak woodlands. These missions, and the assoc-

iated Mexican ranchos, had a profound impact on oak woodlands. The introduction of aggressive Mediterranean annual grasses and forbs along with Mexican cattle changed forever the nature of the California grassland and oak woodlands. How many current California residents know, or care, that much of the green woodland understory in spring has been here for less than two centuries?

The arrival of vast numbers of gold miners also had a lasting and negative effect on California oaks. Sonora and Auburn are two classic examples of foothill oak woodland gold mining communities. The Gold Rush also adversely affected the Central Valley oak savannas where agriculture rapidly developed to support the growing population of gold miners.

Even some mining ventures well up into the conifer forests seriously affected the Central Valley riparian oak forests. For example, massive hydraulic mines above Nevada City led to long-term flooding problems in the lower Sacramento Valley. Siltation from the Malakoff Diggins and associated placer mines raised the Yuba River bed on the Valley floor well above its normal level. Graphic reminders of this problem still occur in wet years when the Yuba River floods Marysville and Yuba City.

Riparian oaks in the Central Valley were first cut to fuel steam boats. As agriculture expanded, there was increasing pressure from powerful farming interests to control flooding. Much of the riparian forest, which included impressive valley oaks, was cleared following various flood control projects. Kenneth Thompson, a great student of Sacramento Valley riparian forest, wrote "that with the coming of white man the pristine vegetation [of the Sacramento

*Valley] was modified with a rapidity and completeness unmatched in other parts of the United States."*

Throughout California, major areas of oak woodland remain; but locating healthy, mature, or young regenerating oak stands, unthreatened by agricultural or urban development, is becoming increasingly difficult. Before we enter the next century, Californians should critically evaluate the role of oaks in modern society and how these ancestral landscapes can be preserved amid rapid population growth and land speculation.

Although it is difficult to imagine California devoid of oaks, with treeless foothills or coastal landscapes, the history of Europe and the British Isles gives us pause. At one time Ireland, England and Wales were almost entirely covered with trees--mostly oaks. For many Californians, blue gums and other exotic trees are not an acceptable alternative for our native oaks.

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#### HISTORIC GLIMSPES OF CALIFORNIA OAKS

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Many California explorers and botanists recorded observations of the oak-filled landscapes they encountered. Their comments remind us of the rich diversity of California oaks, ranging from low, arid Mojave Desert slopes--to high, wet ridges in the Klamath ranges.

George Vancouver, commander of the English ship *Discovery*, described valley oaks in the Santa Clara Valley in 1792: "For about twenty miles it could only be compared to a park which had originally been closely planted with the true old English oak; the underwood, that had probably attended its early growth, had the appearance of having been cleared away

and left and the stately lords of the forest in complete possession of the soil which was covered with luxuriant herbage." The magnificent valley oak woodlands of the Sacramento and San Joaquin valleys as well as the larger foothill valleys are noted repeatedly in journals of early travelers.

John C. Fremont discovered the interior live oak on the south fork of the American River in March, 1849, after crossing the Sierra Nevada. Later, on a journey from Sutter's Fort to Los Angeles, he passed through impressive interior live oak groves on the Consumnes, Mokelumne, Stanislaus, and other streams on the east side of the San Joaquin Valley: "The country is smooth and grassy; the forest had no undergrowth; and in the open valleys or rivulets, or around spring heads, the low groves of live oaks give the appearance of orchards in an old cultivated country."

Charles S. Sargent in 1905 described coast live oak as "A tree, occasionally eighty or ninety feet high, with a short trunk three to four or rarely six or seven feet in diameter, dividing a few feet above the base into numerous great limbs often resting on the ground and forming a low round-topped head frequently 150 feet across . . . usually in open groves of great extent from Sonoma County southward over the coast ranges and islands to San Pedro Matir . . . very abundant and of its largest size in valleys south of San Francisco Bay and their commonest and characteristic tree; frequently covering with semiprostrate and contorted stems the sand dunes of the coast."

Willis Jepson, who hiked and rode for many years gathering information and specimens of California's wild plants, commented on the blue oak in a way that rings familiar to all who have trod the dry foothills in sum-

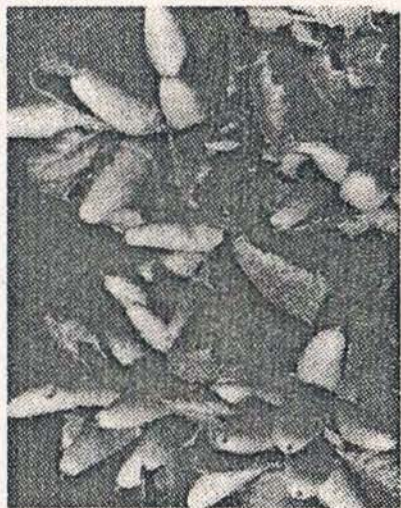
mer. "Not in itself an attractive tree the blue oak, by reason of its form, color, and habit plays a strong and natural part in the scenery of the yellow-brown foothills. Always scattered about singly or in open groves, the trees are well associated in memory with bleached grass, glaring sunlight, dusty trails, although for a few brief days at the end of the rainy season the white trunks rise everywhere from a many-colored cloth woven from the slender treads of innumerable millions of flowering annuals."

Jepson was also greatly impressed with canyon live oak (which has many common names). "In the Sierra Nevada the species is most common and of largest size between 1,500 and 5,000 feet being chiefly confined to the canyons. In size of individuals it reaches greatest development in Mendocino and Humboldt counties, where the most massive trees grow on bottomlands in the



*Quercus kelloggii*





*Quercus agrifolia* valleys. The narrow floor of Hupa Valley is distinguished by its maul oaks, their great size and port. One of these trees, named Old Scotty, is 95 feet high and 125 across the crown. The tallest trees grow on the sharp walls of deep cool canyons, and as such habitats so commonly exhibit well-developed trees the species is often called canyon oak."

Even during the late 1800s Jepson was well aware of the tremendous diversity of oaks in California. Not only does California offer a wealth of oak species, but also the luxury of an even greater number of interesting oak habitats.

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#### MAJOR DISTURBANCES IN THE OAK WOODLANDS

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As California's rural and urban populations grew after the Gold Rush, there was an ever-increasing demand for oak products. Ranchers needed fuel, fencing, and cleared land. The cities also created an ever-growing demand on oak resources. One early example of fuel wood harvest for distant urban areas was near Castroville:

*"On the uplands and low hills east of town there is an almost inexhaustible supply of good oak cordwood, and large trade in which, with San Jose and other points, is carried on by medium of the Southern Pacific Railroad" [Resources of California, April 1881].* These coast live oak forests on Aromas sand hills near Castroville did sprout and formed a new forest. However, the resprouted forest is now being rapidly cleared for strawberry farms and new homes amidst controversy over heavy soil erosion from the steep, sandy hillsides.

In the 1900s the charcoal industry began to impact the oak woodlands. San Luis Obispo County was the major charcoal producing area in the state with the greatest concentration in the Adelaide region west of Paso Robles. There over 1,000 acres per year were cleared for charcoal at the peak of production.

From the 1940s and 1950s, several federally-funded programs encouraged agricultural development and land clearing. One program, started in 1941, was the War Food Program. Another was the Agricultural Adjustment Administration's range improvement program for the Eradication and Control of Destructive and Competitive Plants. Between 1950 and 1980, 4.8 million acres of forest and rangeland were converted to urban and irrigated agricultural land uses.

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#### PUBLIC INVOLVEMENT IN OAK AFFAIRS

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Unlike the state's conifer resources, oaks inhabit private land and have received little management scrutiny from traditional forestry interests. The first public expressions of concern over the long-term future of California's oak communities surfaced in

many parts of the state in the 1970s. Articles and news items about regeneration problems of valley oak and blue oak began appearing in ecological and popular journals. In the April, 1973 *Fremontia*, James Griffin discussed valley oak regeneration problems. In the April 1976 *Fremontia*, V.L. Holland considered regeneration of blue oak and the practice of removing blue oaks from foothill pastures to increase live-stock forage. In September, 1978, Peter Steinhart penned a penetrating summary of the oak situation in *Audubon* magazine entitled "As the old oaks fall," illustrated with David Cavagnaro's superb photographs. And the October, 1983 issue of *Fremontia* was devoted solely to the subject of oaks.

During this period the Heritage Oak committee of Sacramento published a classic booklet "Native Oaks; Our Valley Heritage." The efforts of the committee are an outstanding example of a public service project carried out by Mike Weber and others. Over 20,000 copies have been distributed without advertising.

In the fall of 1987 the organization of a California Native Plant Society oak-hardwood committee was announced with Pam Muick and Joan Stewart as committee co-chairs. The committee defined oak policy and met with other groups to establish research priorities on oak issues.

In 1988 the California Oak Foundation was created as a statewide organization to promote "conservation, restoration, and management of our native oak heritage through practices that encourage its perpetuation and through focus on public education and coordination between the private sectors." The Foundation declared 1990 as the Year of the Oak, and was instrumental in two resolutions which were passed by the state's legislature. The first declared 1990

the Year of the Oak, and the second, contained more far-reaching language. It called for every state agency with responsibility for oak lands to develop a plan for the protection and conservation of their oaks. These plans were to be submitted to the legislature by the fall of 1991.

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#### ERA OF OAK MEETINGS

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Interest in oak woodlands grew in the late 1960s, partly due to California Department of Fish and Game concerns about declining oak habitats. U.S. Forest Service, University of California, and California State University researchers were concerned about adequate oak regeneration. These issues prompted an oak symposium at Scripps College, Claremont in June 1979. It attracted about two hundred attendees who heard fifty-two research reports.

The success of this meeting led to a larger meeting at California State Polytechnic University, San Luis Obispo in November 1985. That event included some 500 attendees hearing 85 research reports. Proceedings of both meetings were published by the Pacific Southwest Forest and Range Experiment Station, U.S. Forest Service, and were instant best-sellers. These publications had considerable impact on the direction of new oak research and on the continuing dialogue about oak regulations.

In January 1989 an oak symposium was convened in Sacramento sponsored by the Range Management Advisory Committee (to the State Forestry Board) with many co-sponsors, including CNPS. All the major interest groups were represented, and a great deal of constructive dialogue about current oak affairs took place. Regular, informal meetings of researchers working on oak-related topics are held annually.

Throughout the state, local workshops and seminars are being held for education and information exchange. Regional meetings have been held at Santa Rosa, Chico, San Diego and Tuolumne County, and more are planned.

Finally, another symposium for oak researchers met at Davis, October 31 through November 2, 1990, sponsored by the University of California Cooperative Extension and the Department of Forestry and Resource Management.

### A QUERCUS REVIVAL

Until recently, most California residents and state agencies have taken oaks for granted. At the turn of the century, between 1890 and 1925, a number of books were published containing natural history information about oaks by authors such as Kellogg, Jepson, Sudworth, Eastwood, and others. Then came a long hiatus.

For over sixty years, little attention was paid to oak preservation or conservation, although specific programs existed for eradicating oaks. During this time, few researchers, in academia, or in state or federal agencies, studied *Quercus*. Since the late 1970s, public and research interest has been enhanced by two USFS-sponsored oak symposia (1979, 1985). These conferences, coupled with state funding, has resulted in new generation of researchers focusing their attention on oaks. Subsequently, our knowledge about oaks has begun to increase rapidly.

As we look towards the next century, we recognize that tremendous changes will continue to occur on the landscape. California's population is predicted to increase by 20 million in the next twenty years. Many of these people will, like us, be

living among the oaks. However, many of these people may not initially value oak habitats in the same ways we do. Our only hope for meeting the needs of the new Californians and sustaining the values of an oak-filled landscape is to develop workable solutions, combining good information and workable policies. Δ

*This article was reproduced from the July 1990 Fremontia issue with the kind permission of Fremontia and the California Native Plant Society.*

**Editor's Note:** Mr Sternberg's article was written with the anticipation that the Oak would be voted as the national tree of the United States, under the National Tree Bill. However, the latest reports available indicate that the bills are still in committee, under the following designations:

House -H.J. Resolution #69  
Senate-S.J. Resolution #113

All members and friends of the I.O.S. residing in America should contact their U.S. Senators and Representatives to expedite action on this matter. Advise them that the National Survey was conducted under the auspices of the International Society of Arboriculture, and that Oaks received 5995 Votes out of 7761 cast for 53 genera! If you would like additional information about the National Tree Bills or the Survey, contact Harry J. Banker of the ISA at 63 Fitzrandolph Road East Orange, NJ 07052

All Drawings by M. Nigel Wright  
Typing and Assistant Editor: Lisa Yankow...whose help and devotion made this publication possible.

Printed on Laser II Printer & Tektronix Phaser III using the Macintosh system. For expenses' sake originals were zeroxed. In the future we hope to use better printing methods.

## THE EXCHANGE LIST

The following is a list of acorns of those who have acorns to offer in exchange for those they would like to obtain. Please write directly to those with whom you wish to exchange.

Stephan Brame  
12 Clos du Fosse Rouge  
77174 Villeneuve le Comte  
FRANCE

**Offering:** *Q. ilex, toza, cerris, occidentalis*, (= *suber* var. *occidentalis*: more hardy than the type), *robur, petraea, pubescens, robur* var. *tardissima*.  
**Wants:** *Q. gambelli, nigra, laurifolia, emoryi, engelmanni, hypolencoides, chapmanni, laevis, incana, myrtifolia*.

Daniel Dumont  
9 Rue des Chafors  
B 5361 Mohiville  
BELGIUM

**Wants:** *Q. veluntia, kelloggii, shumardii, acerifolia, douglassi, nigra, laurifolia, georgiana, virginiana, muehlenbergii, gambelli*. Asian: *Q. variabilis, dentata, glandulifera, pontica, acuta, glauca, myrsinifolia, vibrayana, phylllyraeoides*. Europe: *Q. lustitania, canariensis, afares, macrolepis*.

Dave Kenderes  
5007 Blave Drive  
Fredericksburg, VA 22407

**Offering:** *Q. viginiana, laurilifolia, phellos, nigra, falcata, marilandica, stellata*.

Len Stubbs  
426 East West Road  
Warragul, Victoria  
3920 AUSTRALIA

**Wants:** *Q. meignus, macrophylla*