New Trees for Urban Landscapes

by Gary L. Koller

Across North America, nurserymen, landscape architects and horticulturists recommend specific tree species for urban use. Usually the trees are selected because of tolerance to infertile and compacted soils, drought, reflected heat, atmospheric pollutants, salts, and adaptability to limited maintenance.

Because plants are sought that thrive under the widest range of adverse conditions, the potential list of acceptable trees is restricted to perhaps fifty or sixty known and used species, varieties and cultivars. Of this total, perhaps fifteen or twenty are used commonly in a specific location because of availability, ease of transplanting, growth rate and cost.

The urban trees most commonly planted in North Temperate areas include the following: Acer platanoides, Acer rubrum, Acer saccharum, Cornus florida, Crataegus phaenopyrum, Crataegus crusgalli, Fraxinus americana, Fraxinus pensylvanica, Ginkgo biloba, Gleditsia triacanthos var. inermis, Liquidambar styraciflua, Malus sp. (Crabapples), Platanus occidentalis, Prunus sargentii, Pyrus calleryana, Quercus palustris, Quercus rubra, Sophora japonica, Tilia cordata and Zelkova serrata. These species are successful and popular, but there also has been an explosion of cultivars of each. This has resulted in the fact that more and more streets and parks are being planted to a wider array of fewer species of plants. This monoculture of trees can cause disastrous effects if they are attacked by insects and disease. Environmental stresses such as high water table, air pollution, abnormally low winter temperatures or highway de-icing salts also influence the health and well-being of the plants. An example is the American Elm (Ulmus americana). Plants across North America have been ravaged by Dutch Elm disease regardless of variation in form, foliage and growth rates, and attempts to locate disease resistant cultivars have been ineffective.

Species diversity in any living community adds long term stability to the total complex of organisms. Because of the few species presently utilized, coupled with the abundance of cultivars, urban foresters often recommend that no city or town plant more than 10% of the total tree population to a single species, including cultivars. Cultivars of a species might show variation in growth rate, form, flowers or autumn coloration, but possess essentially identical resistance, or lack of resistance, to environmental and cultural pressures.
This author believes that the cultivar approach to street tree selection has been overworked and has deprived our urban landscapes of the full richness of species diversity. The Arnold Arboretum traditionally has encouraged the introduction and testing of new plant species such as the following four trees, which have had limited but successful use under urban growing conditions.

*Cedrela sinensis*  
*(Toona sinensis)*  
Zone 4?  Height: 50-70 ft.  Spread: 40-50 ft.  
Family: Meliaceae  Nativity: China

Chinese Cedar possesses several landscape features that contribute to the success of an urban tree species: it is rapid growing; thrives in a wide diversity of soils; is tolerant of high applications of road salts; and has an open canopy that allows the passage of filtered light. It produces a clear yellow autumn color and the bark has distinctive plates that loosen to become shaggy strips. Most interesting is the fact that the leaves and young shoots can be eaten.

In sunny open situations the tree’s habit is upright and spreading, reaching heights of 60-70 feet and spreading 30-50 feet, a shape adapted to specimen use. When the tree is crowded or shaded, however, it tends to stretch upward producing a long thin bole with a spreading tuft of foliage at the top. This habit allows the tree to be used in groves where it develops visually exciting stem clusters.

*Cedrela* is undemanding from a cultural standpoint. Soil pH can be acid or alkaline; it requires a well drained soil and prefers full sun. Because of its limited cultivation in North America, little to no data has been collected on damage from insects and diseases. Hardiness has been observed to −25°F. During the winter of 1976-77, a large multi-stemmed plant at the Rowe Arboretum in Cincinnati, Ohio, survived with no dieback, according to Michael Dirr of the University of Illinois, Urbana.

Fall is the Cedrela’s season of ornamental beauty, for the cool nights and shortening days trigger the change from light green summer foliage color to clear pale yellow which contrasts beautifully with the tan-brown color of the shaggy bark. Seed pods high in the canopy open and fall to the ground, and their resemblance to tiny flowers makes them useful additions to projects using dried plant material for Christmas decorations.

From a landscape perspective this plant possesses several features that may detract from its use. It seeds vigorously, sends up root suckers, and has a useful landscape life of only sixty to eighty years before it begins senescence.

People who are not inclined to grow it for ornamental reasons may want to test Cedrela as a food source. The leaves and young shoots
are very tasty, possessing a distinct flavor somewhat similar to that of onions. According to Dr. S. Y. Hu of the Arnold Arboretum, Cedrela is a delicacy in China. Shoots and leaves are picked as they emerge in spring and before the shoots expand more than 4-6 inches. Omelets are made using the following recipe: chop and brown onions; as the onions turn color, add minced shoots and leaves of Cedrela. Toss lightly, slowly stir in beaten eggs, add salt and pepper to adjust seasoning and cook to desired consistency. Dr. Hu states that the plant is eaten more frequently in northern China where temperatures are cooler, for in Szechuan and southern areas the young shoots have a bitter flavor.

In mid- to late summer, old leaves are boiled in water and the liquid is used in baths for the relief of heat rash.

During a recent trip to the People’s Republic of China, Dr. Richard A. Howard noted that Cedrela (Toona) is often interplanted in peach orchards where it is kept low and compact by continuous cropping for the edible foliage. In other areas, trees growing beside houses appeared as topiary sculptures for they are frequently climbed for the judicious removal of young stems and leaves.

The wood is reddish-brown, fine-grained and used in China as a substitute for mahogany. It is one of the best of the Chinese woods for furniture and wood details in building interiors.

Cedrela sinensis lining Vernon Road, Mt. Airy, Philadelphia, Pa. Photograph taken October 1976. Plants estimated to be approximately 80 years old. Photo: G. Koller.
Propagation experiments conducted at the Morris Arboretum in Philadelphia have proven that this tree is easily reproduced vegetatively. Best results were obtained by taking hardwood cuttings 6–8 inches long from juvenile or young trees in January or February. The cuttings were inserted in a soil mix of equal parts peat, perlite and sand and placed under mist or in a closed case. Bottom heat was maintained at 80°F. Cuttings rooted and began growth in eight to ten weeks and produced a plant 24–30 inches tall by the end of the first growing season.

According to Arnold Arboretum propagation records, seeds need no pretreatment prior to germination. However, a note indicated that seedlings are highly prone to damping off, so appropriate precautions such as a sterile soil, fungicidal soil drench and good air circulation around the seedlings may be helpful.

We have been unable to locate a commercial source for this tree in North America. However, specimens exist at the following public gardens which may share propagating material with interested nursery-people. Arnold Arboretum; Morris Arboretum; Skylands Botanic Park, Ringwood, N.J.; Morton Arboretum; National Arboretum; University of Washington Arboretum; Planting Fields Arboretum; Dawes Arboretum.
Eucommia ulmoides
Hardy Rubber Tree
Zone 5 Height 40–50 ft. Spread: 40–50 ft.
Family: Eucommiaceae Nativity: C. China

The lustrous dark green foliage of this tree is distinct and dramatic enough to set it apart from neighboring trees. The leaves are toothed and deeply veined, and resemble those of the American Elm. Its clean foliage is an asset to municipal arborists for where it has been used it has needed no spray applications to control insects and disease; in fact, no foliage problems have been reported.

Plant habit is variable and ranges from horizontal and wide-spreading branches to more ascending branching producing a rounded form. Ralph Shugurt, horticulturist at American Garden Cole, says that young seedlings produce straight stems but tend to be bushy and require corrective pruning for a good branch structure.

Eucommia is the only North Temperate tree that contains latex. During World War II, latex supplies from the South Pacific were restricted because of armed conflict. At this time, Eucommia was evaluated to determine its potential for use in creating a domestic rubber supply. The quantity and quality were low and extraction methods difficult, however, and these factors combined to eliminate its use as an economic crop; as a result the tree was almost forgotten.

At some point, street tree plantings were started in Cleveland, Ohio, and Indianapolis, Indiana, and as these trees reach maturity they are proving to be adaptable and desirable, attracting the attention of local landscape architects.
Eucommia is known medicinally as Tu-chung. Here a Chinese man transports bark to market where it will be brewed into tea, valued for centuries as a tonic medicine. Photographed in Yunyang Hsien, Eastern Szechuan, China, in July 1910 by E. H. Wilson.

Limited street tree trials indicate that the trees are tolerant of acid and alkaline soils and require only good drainage. Preferred exposure is full sun as growth rate and plant form are inferior under shaded conditions. They seem to possess a high tolerance to air pollution, which is perhaps due to a thick cuticle and a slick, glossy leaf surface from which dust and dirt easily slide. Tolerance of reflected heat and light, drought and restricted root space seem to be high.

The plant is interesting medicinally, for it has had a long history of use in Chinese herbal medicine and is known as Tu-chung in this context. The bark of Eucommia is roasted and used to prepare a tea that lowers blood pressure. In 1976, researchers at the University of Wisconsin analyzed the extract and isolated and synthesized the major anti-hypertension principle. During 1977, the People's Republic of China banned all export of the bark because of its extensive use and limited supply; as a result, bark is extremely expensive and hard to obtain in Chinese-American stores.

Left: Eucommia is valued for its glossy, dark green foliage which is remarkably free of insects and disease. Photo: G. Koller.
Right: Eucommia contains latex, and in this photograph the bark has been arranged to display the elastic fibers. Fruits are shown above. Photographed in Ichang, China, in 1911 by E. H. Wilson.
This male plant of Eucommia has a height of 30 feet and a circumference of 4 feet. Photographed near Patung Hsien, China, in January 1909 by E. H. Wilson.

Young trees are said to flower and fruit at the age of seven years. Insignificant flowers emerge in spring before or with the appearance of leaves. Separate plants are male or female and the female trees bear light green winged fruits 1½ inches long. The fruits contain 27% oil, and in China this oil is extracted for various industrial uses.

Propagation is easily accomplished by use of seeds, which can be collected in the autumn and planted directly into seedbeds outdoors with no treatment of the seed coat. Seeds to be started indoors require sixty to ninety days of stratification at 40°F prior to planting. Germination is rapid and the majority of the seedlings will be 12–18 inches tall at the end of the first growing season, with a few reaching 24–30 inches tall. Ralph Shugart reports that seedlings vary in vigor, leaf size and leaf color.

Chinese literature indicates that hardwood cuttings can be taken from one-year branchlets during early spring, before the leaves unfold. We have not yet attempted to test this propagation method at the Arnold Arboretum.

Commercial sources seem to be nonexistent in New England. The plant is available wholesale from American Garden Cole, Circleville, Ohio.
Pistacia chinensis

Zone 5

Height: 40-60 ft.

Family: Anacardiaceae

Pistacia chinensis has achieved popularity as a street tree in southern California, but it is virtually unknown in eastern and midwestern gardens. One might ask why this tree is so little known and grown. I believe it is because the plant's hardiness potential has never been fully evaluated and because there has been so little in the way of publicity promoting this tree species. This author has observed large plants growing at the Glen Dale Plant Introduction Station near Washington, D.C., at the Morris Arboretum in Philadelphia, and at the O. E. White Research Arboretum in Boyce, Virginia. At each location, the plant seemed not only to be surviving, but thriving.

In attempting to evaluate cold hardiness potential, I contacted Dr. William Ackerman of the National Arboretum. He related that scions were received at the Plant Introduction Station in Glen Dale, Maryland, from trees at the Plant Introduction Center in Chico, California. Grafting took place in 1959 and two plants are being grown today. At the end of the 1977 growing season, or eighteen years from grafting, plant A had a D.B.H. of 8 inches, a height of 20 feet and a spread of 16 feet. Plant B had a D.B.H. of 6 inches, a height of 15 feet and a spread of 18 feet. They also have fifteen plants grown from seed in 1962. In 1977, at the end of the fifteenth season, the plants averaged a D.B.H. of 4 inches, were an average of 14 feet tall and had an average spread of 10 feet. Dr. Ackerman further states that the lowest temperature to which the plants have been subjected since they have been grown outdoors in Maryland has been \(-10^\circ\text{F}\), with no apparent dieback or structural damage from ice and snow.

Paul Meyer, Curator at the Morris Arboretum, states that their plant had no damage when winter temperatures dropped to \(-15^\circ\text{F}\) during the winter of 1976–77. Their plant was received as a B&B plant in 1961 and at the time of the coldest weather it was well established in its growing location and sheltered by a hill from sweeping winds.

Michael Dirr has observed one plant fifteen to twenty years old growing in a home landscape in Champaign-Urbana, Illinois. The plant is 15 feet tall and is protected from the sweeping west winds by a house. While the plant hasn't grown well, it has survived temperatures of \(-20^\circ\text{F}\) during the winter of 1976–77.

During the spring of 1977, the Arnold Arboretum received twenty test seedlings, 6 inches tall, from Monrovia Nursery Co. in California. These plants were left out-of-doors for the 1977–78 winter in an unprotected saran house. Minimum temperature for the winter was \(-1^\circ\text{F}\) and there was a deep and constant snow cover from early
January through mid-March. In spring 1978, the seedlings were transplanted to a larger growing area and in late July fifteen plants survive. We are not sure whether the five plants that died off did so because of lack of hardiness or because of transplant difficulties.

These successes are by no means fair or reliable indicators of hardiness, but they do illustrate that the plant may be harder than generally assumed and cultivation is worth attempting in areas with winter temperatures as low as −15°F. Unfortunately, plants now grown in North America seem to represent limited genetic diversity because most have originated from the same source. To extend the plant's useful landscape range, we need to secure seedling populations grown from northern, high elevation locations in the People's Republic of China or northern areas of Korea.

Pistacia chinensis at the ascent of Féi-Yüel-ling, near Tung River, China. Tree has a height of 80 feet, a stem circumference of 10 feet, and is growing at an altitude of 6500 feet. Photographed in August 1908 by E. H. Wilson.
The compound leaves of Pistacia are an ornamental reddish-purple as they emerge, turning to a light green at maturity. Autumn color ranges from yellow-orange through reddish-purple and color varies among seedlings; individual seedlings differ from season to season. Dr. Skimina of Monrovia Nursery Co. reports that in southern California trees are not colorful but in cooler areas the autumn foliage ranges from orange to red. Dr. S. Y. Hu recalls that during her childhood in the People's Republic of China an annual event was a trip to Senyatsen Tomb National Park near Nanking to see the brilliant autumn display provided by Chinese Pistache.

In this species, sexes are separated into male and female trees. Flowers are insignificant, but, according to Dr. Ackerman, fruiting clusters are extremely ornamental, frequently with a mixture of blue-green (fertilized) and bright red or sometimes white (unfertilized — with empty seed capsules) fruits in the same or adjacent fruit clusters. Growth seems to be more rapid in male plants.

All people questioned stated that this tree is free of insects and disease, easy to transplant and tolerant of urban conditions, adapting to acid or alkaline soils. One notable attribute is adaptability to drought conditions, perhaps due to its tap root which provides strong anchorage as well as the ability to reach deeper water sources. *Pistacia chinensis* requires good soil drainage and exposure to full sun to encourage optimum growth and best form.

The pinnately compound foliage creates an open canopy allowing the passage of filtered light. Correspondents observe that small groves of the plant are often more effective visually than are single specimen plants.

Growers state that the plant is somewhat floppy in youth and requires staking and corrective pruning in order to develop good structure and a high canopy. General consensus from the nurserymen and landscape architects who know and grow this plant is that *Pistacia chinensis* deserves more widespread use.

While this plant has potential modern applications, ancient and traditional uses are many. According to the *Illustrated Manual of Chinese Trees and Shrubs* by Chen Yung, the wood is light yellow, fine-grained, and in China is used for furniture, farm implements, stakes and carving. Monks in the mountains of Chekiang and Hupeh pick and dry the tender young shoots for later use as a tea. The fruits are gathered by farmers and pressed to remove the oil which is used in cooking and to fuel lamps.

*Pistacia chinensis* is easily propagated by seeds. Prior to planting, the pulp should be removed and the seed should be soaked in water for sixteen hours. No information was discovered regarding vegetative propagation of this species.

Plants are available wholesale from Monrovia Nursery Co., in Azusa, California.

*Trunk of the largest specimen of Pistacia chinensis E. H. Wilson observed in China.*
Sorbus alnifolia
Korean Mountain Ash
Zone 5 (4?) Height: 30-60 ft. Spread: 25-50 ft.
Family: Rosaceae Nativity: China, Korea, Japan

Korean Mountain Ash combines abundant flowers and fruit production, golden to orange-bronze autumn color and attractive smooth gray bark, giving it a multiseason landscape value and making it the perfect choice for the home as well as the urban setting.

Flat-topped terminal clusters of single white flowers ¾-inch across appear in early May; young trees show alternate-year flowering and fruiting characteristics. Highly ornamental small, pea-sized fruits ripen in September and vary in color from bright reddish-pink to reddish-purple, color being dependent on seedling variation. As the fruit ripens, the leaves change from dark green to a stunning blend of oranges and browns. The autumn foliage provides a colorful stage to highlight the outer fruit clusters; the inner clusters are hidden. Autumn color is most effective after the leaves have fallen away and the small reddish-pink fruits stand alone. Due to the abundance of fruits and the bright coloration, they provide a glow or aura to the tree in the waning autumn sunlight.

Growth rates are moderate in young trees and slow as the tree reaches maturity. Habit varies depending on training during young stages. The plant can be grown single-stemmed by encouraging

Sorbus alnifolia combines golden to orange foliage and bright red to purple fruit for a stunning autumn display. Photo: G. Koller.
branching to begin at the 8- to 10-foot level. Where space is available, the tree can be grown multistemmed from directly above the soil level and will develop into a huge rounded mass 40–50 feet tall.

During the winter the rounded silhouette is enhanced by the tracery of the smooth silver-gray stems and larger branches. The branches are strongly upswung giving rise to narrow crotch angles which one would assume to be structurally weak. However, this author’s observations fail to reveal a propensity to damage from ice loads and strong winds.

*Sorbus alnifolia* adapts to an acid or alkaline soil pH and is not particular as to soil type as long as drainage is adequate. Fibrous branching roots contribute to ease of transplanting and rapid re-establishment.
Sorbus alnifolia can be grown multistemmed or headed up to create a single stemmed street tree. Mature habit is rounded. Photo: G. Koller.

Preferred exposure is full sun. While this species thrives in a wide climatic range along the East Coast and Midwest, it seems to perform best in cooler areas from the ornamental perspective of autumn foliage and fruit color. Damage from insects and disease are minimal, although this author has seen mild cases of leaf spotting and the tree is said to be susceptible to fire blight.

Mountain-ash (Sorbus aucuparia), a related species, has been widely used as a street tree in some northern areas. However, success has been greatly reduced because it is prone, especially under stress, to attack from stem borers which cause the tree to decline and die at an early age. Sorbus alnifolia, on the other hand, seems to resist borers, giving this species the attribute of longer survival potential under urban conditions.

Korean Mountain Ash is easily grown from seed which is collected in the autumn, cleaned of fleshy pulp and placed in outdoor seedbeds for germination the following spring. Indoors, a cold stratification at 40°F for sixty days ensures optimum germination.

During spring 1979, this plant will be available in the Boston area from Seltzer's Garden City, Inc., in Newton, and from Weston Nurseries in Hopkinton; it is available wholesale from Princeton Nurseries in Princeton, New Jersey. Seeds may be obtained from Koryodang International Flower Service, Central C.P.O. Box 1718, Seoul, Korea.

In this article I have proposed four trees that are old-timers in American botanical gardens and may prove to be tough, adaptable materials for urban landscapes. What is needed now is a group of progressive nurserymen, street tree commissioners, landscape architects and individual homeowners who will install test plantings for long-term evaluations under a variety of growing conditions. Only in this way will we adequately determine the cultural and environmental adaptability of these new trees for urban landscapes.
First Impressions of the Arnold Arboretum

by Michael Dirr

First impressions are often the most critical and permanent in one's assessment of a person, place or plant. Presently I am on sabbatical leave at the Arnold Arboretum of Harvard University and have literally fallen in love with the institution. If one is interested in studying, photographing and enjoying hardy woody plants, then the Arnold Arboretum is the place to visit. Nowhere else (and I have visited a plethora of plant collections) are the species and cultivar diversity so rich, the records so profuse and creditable, the library so voluminous, the propagation so detailed, and the people so enthusiastic. The Arnold Arboretum is truly America's greatest garden. I have come to appreciate it as a treasure trove of woody plants unrivaled on the North American continent and perhaps the world.

Traditions ooze from every nook and cranny of the Administration Building and one feels that somewhere in the shadows (and there are many) lurk the spirits of Charles S. Sargent, the indomitable first director; Ernest H. Wilson, the great plant explorer; and Alfred Rehder, whose literary contributions are the standards by which other botanical and horticultural offerings are gauged.

The historical aspects of the Arboretum are well documented through the writings of Sargent, Wilson, Wyman and Sutton. The institution is steeped in tradition and there is a type of magic in the name Arnold Arboretum. Among botanists, horticulturists and gardeners, the Arboretum is a household word and this cannot be said of any other institution. The Arboretum's staff has made numerous literary contributions to botany and horticulture. I think of Sarg en'ts classic work, Manual of the Trees of North America, with the excellent drawings by C. E. Faxon. Rehder's Manual of Cultivated Trees and Shrubs is considered the bible for woody plant identification. Presently Stephen A. Spongberg is revising Rehder's Manual and incorporating his own unique ideas and style which will result in a better publication than the original. Wilson’s prosaic descriptions of the Arnold Arboretum's collections in the Aristocrat series make for relaxing reading. Wyman's books, Trees for American Gardens, The Gardening Encyclopedia, and others provide tremendous visibility for the Arnold and actually have opened the living collections to the gardeners of the world. His books were the most popular texts for woody plant material courses through the 1950's and 1960's.
Willingly, or otherwise, Wyman influenced several decades of horticultural students.

The two periodicals, *Arnoldia* and the *Journal of the Arnold Arboretum*, are vehicles for the dissemination of popular and scientific information, respectively. *Arnoldia* can be appreciated by the lay gardener as well as the scientist. Articles may range in scope from wreathmaking and the Director's report to excellent treatises on specific plants. Specific issues may treat poisonous plants or, as in the case of Robert Hebb's "Low Maintenance Perennials," consume several issues and assume book status. *Arnoldia* articles are written for enjoyable and informative reading. One does not have to read through a glossary to make sense of the various offerings. My University of Illinois students are introduced to *Arnoldia* and many become subscribers. *Arnoldia* is a great literary bargain in the vast sea of horticultural literature. The *Journal* is much more scientific and represents a scholarly (refereed) vehicle for taxonomic research. I have browsed and read many arboretum and botanical garden publications and for quality and quantity of information none compares with *Arnoldia* or the *Journal*.

The Arboretum library offers an excellent selection of periodicals and books. References that are not available in the University of Illinois library (fourth largest in United States) have found their way into the Arboretum stacks. The library also houses unusual items, such as John Wister's *Swarthmore Plant Notes*. These volumes are laden with Dr. Wister's evaluations of the plant collections at Swarthmore College and represent a tremendous compilation of horticultural information.

The Arnold has maintained good records through the years. Painstaking record keeping might seem like an obvious necessity for every arboretum, but in reality seldom occurs. The Arnold's collection is of documented, authentic origin which is a tremendous attribute for serious researchers. Propagation is one of my research, as well as avocational, interests and these records have proved invaluable.

The Arnold's herbarium contains one of the most complete collections of cultivated plants in the world. Most people cannot appreciate the herbarium aspect of an arboretum, but it is as important as the library, the living collections, and the records.

My principal reason for coming to the Arnold on sabbatical was to work with the living collections. It is here that I derive the greatest satisfaction. I am a plantsman and would as soon study plants as eat. Some days I find myself lunching at 3:00 p.m. simply because I became so engrossed in the collections. I have asked myself repeatedly that if this sort of thing is occurring when green is the dominant color, what will happen in fall and spring?

Allow me to share some thoughts and opinions related to specific members of the living collections. When I walk through the maple collection I wonder why *Acer griseum*, paperbark maple, *Acer mandshuricu*m, Mandchurian maple, *Acer triflorum*, three-flower maple,
The mature bark of Acer triflorum is ash-brown, loose, and vertically fissured. Photo: D. Wyman.
and *Acer mono*, painted maple, do not play a more prominent role in modern landscapes. Our gardens are poorer because of their paucity. Their small stature, fall coloration, bark, insect and disease resistance are unrivaled. Unfortunately, propagation difficulties limit wholesale distribution. The maples are a diverse group and the range of aesthetic attributes places them at the forefront of all landscape plants.

The *Phellodendron amurense*, Amur corktree, along Meadow Road is one of my favorites. Although old age and physical abuse are contributing to decline, it remains one of the most picturesque of all Arboretum offerings. The low-slung, corky-textured branches curve skyward and terminate in flat tiers of foliage. In this same area the *Tilia*, lindens, almost overwhelm one in late June and July with their enticing fragrance. *Tilia × euchlora*, Crimean linden, *Tilia japonica*, Japanese linden, *Tilia petiolaris*, pendent silver linden, and *Tilia tomentosa*, silver linden, are my favorites. The *Aesculus*, buckeyes and horsechestnuts, meld with the lindens and provide a fine show during May. A valuable exception is *Aesculus parviflora*, bottlebrush buckeye, which produces white, cylindrical, bottlebrush-shaped inflorescences in July. This is one of the very finest native shrubby landscape plants for sun or shade, yet is uncommon in American gardens.

The shrub collection is a favorite haunt and I attempt to walk through a portion every day. The *Vitex*, chaste trees, and *Potentilla*, cinquefoils, offer late season color. *Buddleia*, butterfly-bush, could not have been more appropriately named and a rose called ‘Arnold’ flowers out of synchronization. The rose hips of glistening orange and red attract my camera. I do not always know where to turn next for there never seems to be sufficient time for everything. *Clethra alnifolia*, summersweet clethra, white and pink, spice the garden. The bees treat them provincially and often I am buzzed as I attempt to secure a close-up.

The forsythia and lilacs are resting and appear nondescript during the summer and autumn months but will become the stars of Bussey Hill Road next April and May. Further on the *Halesia*, silverbells, rank among my favorites with their pendulous, white, bell-shaped flowers. They are four-season ornamentals and deserve wider useage. In the same area (Center Street beds), one finds the *Styrax*, snowbells, more handsome specimens of which I have not seen. At the end of a grassy path between the *Ilex*, holly, and *Corylopsis*, winter-hazel, resides a spectacular *Parrotia persica*, Persian parrotia. *Parrotia* is a member of the witch-hazel family with pest-resistant foliage, quilt-work bark, and a uniqueness that defies description. E. H. Wilson would have certainly called this an ‘Aristocrat’.

The conifers, hornbeams, beeches, and birches are worth more than a casual look. Crabapples, hawthorns, and mountain-ashes appear endless. The Chinese walk, before the summit of Bussey Hill, is laden with outstanding plants. The stewartias, whether in flower, fall color, or bark are spectacular. There is an impressive specimen

*Chionanthus retusus* in flower has been likened to a fleecy dome of snow. Photo: H. Howard.
Winter outline of Tilia tomentosa emphasizes the uniform growth habit and smooth gray branches.
The graceful, flowing outline of Aesculus parviflora makes it an ideal choice for shrub borders and underplantings. The adaptability to full sun or heavy shade permits its use in many landscape situations.

of Chionanthus retusus, Chinese fringetree, which in flower has been likened to a fleecy dome of snow. The oldest paperbark maple in this country is nestled among the stewartias. The infamous Davidia involucrata, dove tree, for which E. H. Wilson endured much pain and suffering, resides in this most exclusive of neighborhoods.

If I seem enthusiastic it is not without reason, for the Arnold possesses a great collection of woody plants. The institution is not immune to problems, however. The Administration Building is showing its age and needs refurbishing; the city has encroached and encircled the Arboretum making it more vulnerable to the invasion of man; and many of the plants are old and require considerable maintenance to keep them in presentable condition.

Tradition tends to dictate the Arboretum’s practices and programs where innovation and change would prove most beneficial. I envision a computerization of records so that information storage and retrieval could be easily facilitated. Photographic equipment could be updated and perhaps an artist/photographer added to the staff. Plant breeding might be initiated and propagation research could be expanded to include tissue culture. Although woody plants have proven rather difficult to propagate by this method, what better place to advance the frontiers than at the Arnold Arboretum?

The Arnold is the best at what it does and can be even greater. Its publications rank among the best in botanical and horticultural literature. It has contributed much to American gardens. Perhaps more has been given than will ever be received or properly recognized. It is America’s Greatest Garden.

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The beautiful flowers of Stewartia are evident in July when most gardens suffer from a paucity of color. Photo: P. Bruns.
New Director Is Appointed

Peter Shaw Ashton, formerly Senior Lecturer in Botany at Aberdeen University, Scotland, became the fifth Director of the Arnold Arboretum on July 1. He succeeds Richard Alden Howard, who resigned from the post to devote full time to research on subtropical plants.

An expert in plant classification and the flora of the Asian Tropics, Peter Ashton was born in 1934 in Boscombe, England. He attended Stowe School in Buckinghamshire and received his M.A. and Ph.D. degrees in botany from Cambridge University.

Between 1957 and 1962, Ashton spent three years in Brunei (northwest Borneo) and two years in Cambridge, England, serving as Forest Botanist to the Government of Brunei. From 1962 to 1965 he was Forest Botanist to the Government of Sarawak (northern Borneo), and in 1965 became United Nations Consultant in Forest Botany to the Special Fund Development Project in southern Cambodia. In 1966 he began teaching at Aberdeen University as a Lecturer in Botany; since 1972 he has held the post as Senior Lecturer.

Ashton, whose research and teaching interests include tropical biology, trees, and ecology, has conducted botanical research in Ceylon with the Smithsonian Institution, and in Malaya for the Royal Society of London and the International Biological Programme. A Fellow of the Royal Society of Edinburgh and of the Linnaean Society of London, he is the author of several books and numerous papers on the taxonomy of dipterocarp trees and the ecology of far eastern rain forests.

Peter Ashton, his wife, Mary, and three children (Peter Mark, Meldlard John, and Rachel Mary) will make their new home at the Arboretum's Case Estates in Weston.
ARNOLDIA REVIEWS


Frank Ludlow, naturalist and educator, and George Sherriff, professional soldier, met in Kashgar in the winter of 1929. Finding that they shared an interest in the flora and fauna of the eastern Himalayas, they planned a series of expeditions to systematically cover the Himalayas of Bhutan and Tibet. Between the years 1933 and 1949, they produced numerous botanical discoveries, introducing to England countless plants that had been overlooked by earlier explorers of the same territory, primarily within the genera Rhododendron and Primula. Their extensive and detailed notes on each collection were of great importance in the taxonomic classification of the Himalayan flora.

This volume, compiled largely from the diaries and correspondence of Ludlow and Sherriff, will give the reader a vivid image of the land, the people, and the plants of the eastern Himalayas, as well as a feeling for the two explorers as individuals. In all cases of plant collections, the specimen's collection number is noted, increasing the book's value to the botanist. As is generally the case with accounts of such expeditions, the book abounds with descriptions of exotic locales and excellent photographs of the terrain and of individual plants. The photographs have all been reproduced in muted tones and with their corners cropped diagonally to give the impression of old prints in a scrapbook. To some this might seem too "cutesy," but I found it pleasant.

One annoyance, however, was the type style used. The "t" consistently appears to be wearing an accent aigu, and the Italic style includes characters (notably the "d" and "h") that are considerably more decorative than readable. This reviewer found it quite impossible to read for any length of time without eyestrain — very irritating when the subject matter was so engrossing.

JENNIFER HICKS


The word pharmacognosy means the study of drugs and other economic products obtained from natural sources. The formidability of the term prevented the author from using it in the title, but that is what the book is about. She has written for two groups: (1) the pharmacologic students who need a reference source in a field that has become relatively neglected in the curriculum, and (2) the consuming public. The latter group is particularly important because recent years have seen the laity acquire an unprecedented thirst for knowledge of things medical and a strong interest in the consumption of natural products, both food and drugs.

I am not equipped to enter the discussion alluded to by the distinguished professors who wrote the forewords, as to how far the curriculum of schools of pharmacy should continue this movement away from natural products and towards synthetic drugs and their clinical uses. But I can vouch for the great interest the volume holds for the consumer group.

The major medicinal plants are arranged according to their twenty-eight families and are listed with scientific and common names and synonyms. Dr. Morton has set up each chapter under parallel headings so that the sources, preparation, constituents (active principles), medicinal uses and toxicities are not omitted in any. One can find without difficulty
that reserpine is the most active ingredient of *Rauwolfia serpentina*, or Serpent-wood of the Dogbane family, Apocynaceae, and that it is native to Southern Asia where it was used for snake bite and nervousness for 4,000 years before its modern recognition for the treatment of high blood pressure. The methods of cultivation of the plant and the extraction of reserpine are outlined in detail, as are its toxic effects if the doses are too large. All the other products are treated in the same manner. Some of them are familiar, such as castor oil (*Ricinus communis*); some not, such as cade oil (*Juniperus oxycedrus*) for dermatitis. Some are an essential part of our therapeutic armamentarium; for example, digitalis for heart disease (*Digitalis purpurea* or foxlove). Others are not, such as marshmallow (*Althaea officinalis*) used as a demulcent and emollient (incidentally, no longer an ingredient of the confection).

The orderly arrangement is carried into two appendixes. The first is a list of plants that, although still listed in the Pharmacopoeia and used in patent medicines, have fallen into clinical disuse. Examples are *Salicin* from *Salix*, the original source of aspirin, which is now made synthetically, and witch hazel from *Hamamelis*. The second appendix is a list of plants that are used only as vehicles, lubricants, and flowers. Examples are the alga, *Furcellaria fastigiata*, or Danish agar used for suspensions and foams, and *Smilax aristolochiacefolia*, or Mexican sarsaparilla, a familiar flavoring agent.

Since most medicinal plants are toxic in overdose, the book is also of concern to those dealing with the effects of poisonous plants on man and animals. The illustrations are good, the index useful, and the author has placed a list of six hundred references at the end as a guiding hand for those who wish to proceed further.

In sum, it is a scholarly work on a subject with a wide interest.

**Richard Warren, M.D.**


George Dionysius Ehret (1695-1769) rose from obscure beginnings as a gardener in Heidelberg to become one of the most significant botanical and horticultural illustrators through his efforts for the authors of his lifetime — Sir Hans Sloans, Philip Miller, C. J. Trew, Joseph Banks, and Carl Linnaeus, among others. Mrs. Calmann has written of Ehret's life and associations, citing from correspondence and published works in such a way as to bring the man back among us. Ehret's likes and dislikes, his attention to dissections and botanical detail, his search for patrons and a steady income, his intrigue with new plant material, his preference for living material in contrast to dried specimens, and his prolific lifetime production are well described. She estimates that more than 3,000 of his drawings are extant, and she was able to visit the outstanding collections of his work preserved in England, France, Germany, and the United States.

The drawings selected for reproduction are representative of the development of Ehret's style, and each item is documented so as to present location. The incorporation by Ehret of details and dissections, of insects, butterflies, and snails, and his use of descriptive legends and dedications are well shown. The text contains many references to notes supporting each chapter. Useful indices are given to plants and to persons.

Most teachers, and taxonomists in particular, will value the color reproduction of Ehret's "Tabella" of Linnaeus' Sexual System of Plant Classification, which has been available, generally, only in smaller size and in black and white. Those interested in the history of botany and horticulture will find many useful anecdotes and references. This is a book to read with pleasure, to leaf through to enjoy the pictures, or to use for the immense reference value contained.

**Richard A. Howard**

Unhappily, the high price (20¢ a page) and the text in German will dissuade many from purchasing this excellent small volume. The first section of the book is descriptive and explanatory for general wood anatomy. Diagrams, light photographs, S.E.M. photographs, and charts are used effectively in presenting concisely what is generally verbose and elaborate in anatomy texts.

The second section describes and illustrates the wood of common genera of central Europe. Seven genera of conifers and fifty-one genera, representing thirty-two families, of woody Dicotyledoneae are treated, often with several species of the important genera. Text material describes the general appearance of the plant, its use or distribution; the macroscopic characteristics of the wood and the microscopic characteristics, in distinctive paragraphs. Usually four illustrations form a facing plate, with 25x and 75x magnifications of the cross section, and the radial section usually twice the magnification of the tangential, so that the appropriate characters are well known. The inclusion of such genera as Ilex, Buxus, Hedera, Philadelphus, and Daphne indicates the unusual coverage offered. The volume would be extremely useful in a plant anatomy class that uses campus plants for study.

Two drawbacks should also be mentioned. Several of the plates are foldouts; these buckle with a few uses and must be trimmed. While all the text is on glossy paper, the low quality of the paper of the packet and of the three folded tables is regrettable. One of these, a tabular summary of all taxa included in the text, with vessel element, fibers, rays, and parenchyma, will not stand the long use it is apt to receive.


Basically this is a fine addition to the list of excellent books on Gentians for the gardener. The first half is devoted to discussions of various aspects of the history and cultivation of this wonderful group of plants, and the last half is made up mostly of individual accounts of about fifty of the commonly cultivated species, giving descriptions and cultural tips. Although the book was written for British gardeners, the cultural information generally is valid for us in the United States except that a number of the species included are tender or otherwise culturally unsuited to the climate here in the Northeast.

I can find little fault with the correctness of the information included, and it is well presented. The treatment of taxonomically difficult species complexes, such as Gentiana acaulis and G. verna, and their relatives, is handled sensibly. The chapter on hybrids is the most complete account of this subject presently available, and the sections on South American and New Guinean Gentians are unique in the horticultural literature. The only serious flaw is the treatment of Gentianella. Most authors ignore the very obvious and taxonomically valid distinctions between this genus and Gentiana, so I must give Ms. Bartlett credit for trying. But her chapter on Gentianella includes only the "Fringed Gentians" which some authorities include in another genus, Gentianopsis. The chapter on annuals correctly assigns most species to Gentianella, except for G. bulgarica. Finally, the New Zealand and South American species are included under Gentiana while they are obviously Gentianellas.

The book is well illustrated with generally good color photographs and clear line drawings. Some of the drawings are unfortunately redrawn from previously published works without acknowledgement, one which I recognize being The Gentians of Canada, Alaska, and Greenland, by J. M. Gillett.

Richard A. Howard

Pueraria lobata. Photo: P. Chvany.
ARNOLDIA is a publication of the Arnold Arboretum of Harvard University, Jamaica Plain, Massachusetts, U.S.A.