



ARNOLDIA

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Cover: Paperbark Maple (*Acer griseum*). Photo: A. Bussewitz.

The Fire Pines

by RICHARD WARREN and ALFRED J. FORDHAM

Author's Note: When an Arnold Arboretum volunteer develops an interest in conifers, he inevitably comes under the stimulating influence of Alfred Fordham. So it happened with me. One day Al remarked on a photograph he had taken of *Pinus attenuata*. The branches were covered with closed cones all the way back to the tree trunk. The conversation then led to the question of how long seeds can remain viable in these cones. Since no answer was easily discovered in reference books, we decided to inquire more deeply. This we did by consulting source material in libraries, writing letters to various experts, and performing our own tests of seed germination in the Dana Greenhouses.

The most consistently serotinous pines, *Pinus radiata* and *P. attenuata*, are not hardy in the Arboretum. I have, however, enjoyed the privilege of frequent trips to Western Ireland where *P. radiata* is planted as a shelter from the high winds of the area. Also, fortunately, a daughter in Marin County, California, lives within an easy drive of the dry elevations of the coastal range where *P. attenuata* thrives. Material for this inquiry was obtained from these sources. (R.W.)

Among the most interesting members of the pine genus are those to which we apply the term "serotinous." The word means "late developing" and describes their distinguishing feature, the habit of holding cones closed on their branches for many years. A strong resin glues the tips of the scales together and these trees do not disperse their seeds at maturity as other pines do. In many cases seeds are not liberated until a forest fire melts the resin; hence the common name, "Fire Pines." Subsequent revegetation of the burned area is of teleological significance for the survival of the species.

Table I lists these pines. The degree to which they demonstrate serotinous tendencies varies between species, and in some of these also according to geographic location. Variation may be seen both in the proportion of cones with persisting closure and in its duration. In some trees of *Pinus banksiana*, *P. clausa*, *P. rigida* and *P. contorta*, for instance, the cones open at maturity. This seldom occurs in *P. serotina*, but later separation of scales and seed dispersion almost always occurs before five years. *P. radiata* plants in the British Isles, furthermore, hold their cones closed for a long period, but in California in exposed sunny positions they may open a year or two after ripening. Badran observed that *P. radiata* from the Monterey Peninsula showed many open cones, particularly those that were more than four years old, whereas those from most specimens found in the Berkeley-Oakland Hills area remained closed. *P. contorta*

TABLE I
SEROTINOUS PINES

West Coast U.S.A.	
<i>P. attenuata</i>	Knobcone Pine
<i>P. contorta</i>	Beach Pine
<i>P. muricata</i>	Bishop's Pine
<i>P. radiata</i>	Monterey Pine
Rocky Mountains U.S.A.	
<i>P. contorta</i> var. <i>latifolia</i>	Lodgepole Pine
Canada and Northern U.S.A.	
<i>P. banksiana</i>	Jack Pine
Eastern U.S.A.	
<i>P. pungens</i>	Table Mountain Pine
<i>P. rigida</i>	Pitch Pine
Southern U.S.A.	
<i>P. clausa</i>	Sand Pine
<i>P. serotina</i>	Pond Pine
Mexico	
<i>P. greggii</i>	Gregg's Pine
<i>P. oocarpa</i>	No common name
<i>P. patula</i>	Spreading-Leaved Pine
<i>P. pringlei</i>	Pringle's Pine
Mediterranean	
<i>P. halepensis</i>	Aleppo Pine
<i>P. pinaster</i>	Maritime Pine

also demonstrates the influence of climate on the serotinous habit. The cones of plants in coastal regions open promptly, whereas those in the Rocky Mountain and Intermountain regions are persistently serotinous. Cones of *P. attenuata* are virtually unknown to open under influences other than fire, decay, or attack by wildlife or insects. This persistence may be the result of its restricted geographical distribution in the California coastal mountains. Genetic factors also seem to play a part (Fig. 1).

The retention of cones by serotinous pines even after opening is characteristic. In the New England area it is familiar to us in the cone-peppered silhouettes of *Pinus rigida*, and in Canada of *P. banksiana*.

The relation between the cone and the branch on which it remains is of note. In the specimens of *Pinus radiata* we have observed, the cones most recently matured have had pedicels of 1 cm. As the branch has grown in diameter, the pedicels have been swallowed so that by the third or fourth year the cones have become sessile. In cones up to thirty years of age, the pedicel has continued to stretch and their bases have remained tightly pressed against the branch. In other species such as *P. banksiana* and *P. attenuata*, however, the woody tissues have been observed to grow out around the cone

Fig. 1. Closed cone characteristics can vary from tree to tree in the case of Pinus banksiana. At right is a specimen collected from a tree where some cones were closed and some were open. Below is one in which all cones are closed. Both trees were siblings grown together in a nursery row. Still other plants in the same population had cones that were all open. These characteristics are genetic, and it is not uncommon to see trees in native habitats whose cones are all serotinous growing beside trees with cones all open and still others that contain some of each. Photos: A. Fordham.



so that it becomes embedded and actually disappears within the wood (Figs. 2 and 3). Why this occurs in some species and not in others is unknown. Coker suggests that it is pure mechanics, the breadth of the surface presented to the branch being less in the narrower cones of *P. attenuata* and *P. banksiana* than in the broader ones of *P. radiata* and *P. muricata*.

The degree to which advancing age of cones may influence the germinating ability of seeds should be of particular interest to the Arnold Arboretum since Professor C. S. Sargent seems to have been among the first to ask the question. He received a branch of *Pinus contorta* from Dr. George Englemann (Fig. 4) four and a half years



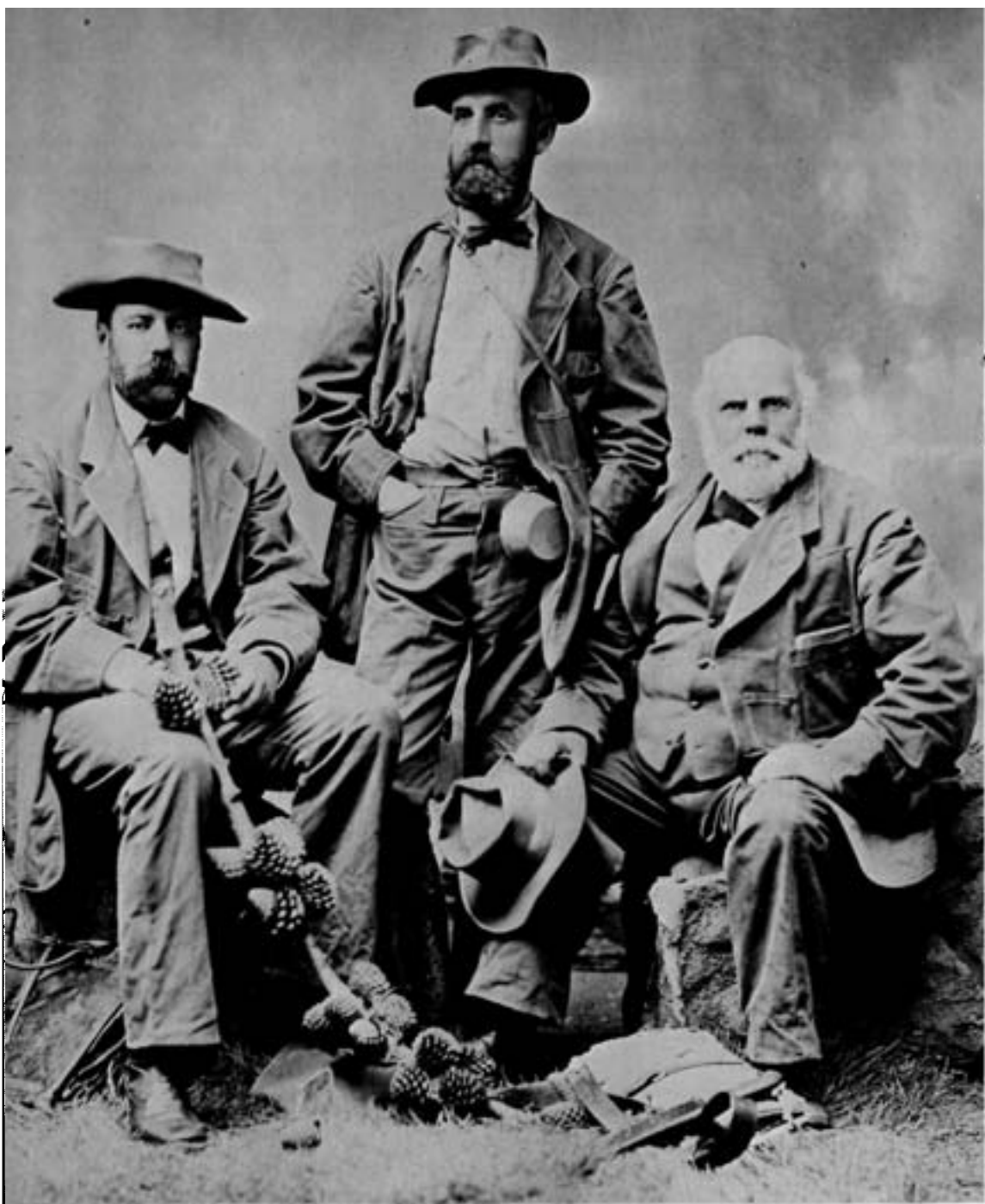
Fig. 2. Cones of Pinus banksiana in various stages of embedment. Sister trees in the same nursery row did not engulf their cones as did this one. Photo: A. Fordham.



Fig. 3. A transverse section of a *Pinus banksiana* tree trunk, from the same tree that provided Fig. 2. It was collected at a 5-foot level from a fast growing tree in a nursery row and shows nine annual growth rings. The embedded cone is one of a pair that originated nine years ago at the tip of a shoot that was about 1/4-inch in diameter. As the trunk increased in girth during the first four years, the cone was forced outward and this caused the pedicel to elongate. Wood that formed during the fifth annual growth increment surrounded the cone and this process continued each year until only the tip remained uncovered after the 1976 growing season. In the course of another year, it seemed probable that it would have been completely hidden and the sound seeds it contained would then be lost for reproduction.

Cones of *Pinus banksiana* often appear in multiples of two and three. This illustration shows one of a pair that continued to grow, and evidence of one that failed six years ago. The annual rings show that at that time the cone was entirely exposed (not embedded at all) and may have been destroyed by a squirrel seeking seeds. It is interesting to see how annual growths have filled the void. Photo: A. Fordham.

after it had been collected from a tree in Colorado in 1874. Five years later, on planting the seeds, he observed germination for the years 1869 through 1872, but not for 1873, the most recent year, nor for the earlier years of 1865 and 1868. He commented that "this experiment is unsatisfactory owing to the want of seeds of 1866 and 1867 and because those of 1873 had probably never fully developed. It is only interesting in view of the fact that it may possibly lead to this subject being more fully investigated. It is particu-



*Fig. 4. Charles S. Sargent, Francis Skinner and George Englemann posed in Monterey, California, in 1880 toward the end of their summer trip in connection with the U. S. forest census. Note that some of the cones on the branch Sargent is holding are open and some are closed, a normal occurrence for *Pinus radiata* in coastal areas (see text).*

larly desirable to obtain and test the seeds from old serotinous cones of such species as *P. serotina*, the Florida Pine, *P. inops* var. *clausa* (*P. clausa*) *, *P. Tuberculata* (*P. attenuata*) *, *P. muricata*, and *P. insignis* (*P. radiata*) *. There are always facilities for making such experiments at the Arboretum when sufficient material can be obtained."

Although throughout the world much effort has been put into investigating methods to increase the yield of seeds of serotinous pines for forestation purposes, little attention has been devoted to answering Sargent's question: How long *can* the seeds remain viable in the cones? Now, nearly one hundred years later, we have used the Arboretum's facilities to test the influence of age on germination of seeds of cones from *Pinus radiata* collected in West Cork, Ireland. The following discussion will tell us of this experiment together with what we have been able to discover of others.

In 1909 Professor W. C. Coker of the University of North Carolina procured cones of *Pinus serotina* up to fourteen years old and germinated seeds from all years. Badran in 1949 observed germination of seeds of *P. radiata* from cones up to ten years old, and of *P. attenuata* from those up to twenty years old. Other allusions to the very long viability of seeds are Bowers, fifty years; Kotok, eighty years; Mason, seventy-five to eighty; and Mills, one hundred fifty — all for Lodgepole Pine (*P. contorta* var. *latifolia*). Exact documentation of these observations has not been possible because the original reports have not been available to us. Mirov only states: "Seed viability may be preserved within the cone for an amazingly long time." After making his tests and finding viability up to five years he said: "There are records of much longer viability of pine seeds, but it is difficult to say how reliable they are."

Our experience with two limbs from the Irish trees was as follows: In limb #1 (Fig. 5), the cone ages ranged from one to twenty-six years. We found fertile seeds up to and including twenty-one years of age, but no germination in years twenty-two through twenty-six. In limb #2 we tested twenty-one cones ranging in age from one to twenty-six years. The twenty-six-year-old seeds did not germinate. Also infertile, however, were seeds from the years two, three and five. Otherwise, all years up to twenty-four showed fertility. In sum, these two experiments showed that seeds can be viable at least up to twenty-four years. Our observation of infertility in seeds older than twenty-four years is of interest. It is clear, however that the limited scope of the experiment prevents general conclusions about maximum age of fertility with respect to the species as a whole.

We were curious about the possible cause of infertility in the cones of limb #2. On external examination and sectioning of the seeds, the twenty-six-year-old specimens all appeared sound but yet did not germinate. In the young infertile years the cones looked sound

* Names in parentheses inserted by present authors.

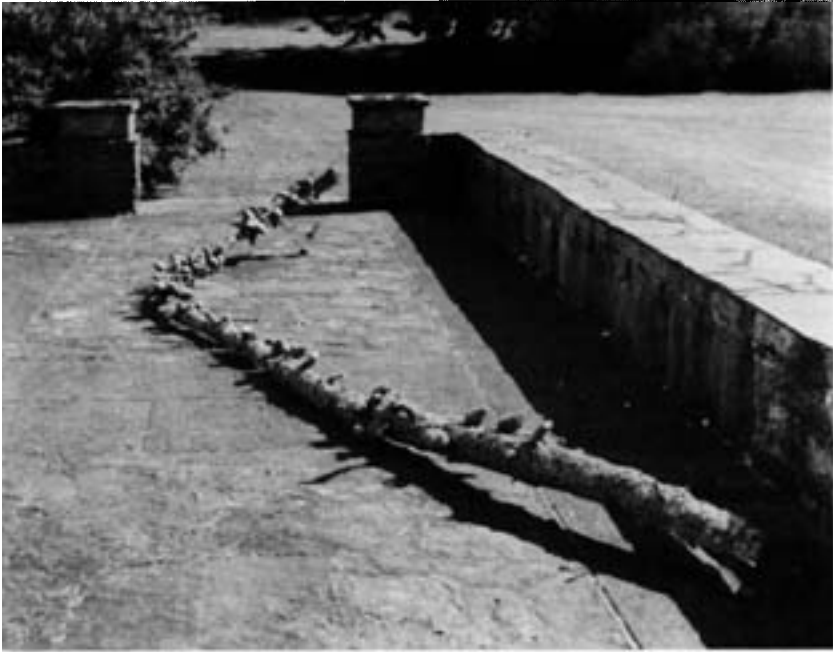


Fig. 5. Limb #1 showing cone whorls spanning twenty-six years. Photo: R. Warren.

but many of the seeds were shriveled or empty. This implies that the older seeds became infertile from aging whereas the younger ones had undergone some injury.

The effect of cone age on the percentage of seeds germinating from a batch of *Pinus radiata* and *P. attenuata* was documented by Badran who found a gradual decrease with time in the production of seeds that germinated. He observed also that the total number of seeds per cone, although varying between specimens, was not related to age. The percentage of empty seeds increased only slightly with age, but not in proportion to the decrease in germination. Thus, age adversely affected many apparently full seeds; furthermore, the time needed for germination was increased in the older seeds. Vogl observed no change in the above features with the passing of time, but the report does not give exact ages.

The number of seeds sown was carefully counted in one of our *Pinus radiata* limbs. We observed great variation in germinating capacities, but, as Badran noted, germination appeared to decrease with age until the last two years (twenty-two and twenty-four) when only one and three seeds, respectively, out of thirty germinated.

One further question that logically arises is whether the cones are living or dead. Although this has not been studied extensively, it is assumed that those that remain sessile must be dead, since the pedicels have become so stretched within the wood. Sargent, already mentioned, found that seeds from cones on a branch of *Pinus contorta*, taken from a tree four and one-half years before, germinated well. We have germinated seeds taken from a tree that had been dead for at least five years. Furthermore, Mirov states: "In the author's experience a *P. attenuata* cone kept at room temperature for twenty-seven years yielded germinable seed." There is not reason to suppose that seeds in a cone on or off the branch should deteriorate if kept at appropriate conditions of temperature and humidity.

Estimation of a cone's age is not always simple. This is particularly so in *Pinus radiata* where additional flushes of growth each year may produce more than one cluster of cones. Counting the number of whorls can thus result in an overestimate. This feature renders slightly unreliable many written reports involving age of cones, since the method of dating, though not usually stated, is assumed to be such a count. The annual growth rings are a reliable method, provided one recognizes that certain dry years may cause rings to be incomplete. Thus, the procuring of a total cross-sectional specimen, rather than a core sampling, is the safest method. The worry about false rings (those caused by a resumption of growth in a year when growth was temporarily arrested by some unfavorable environmental condition) can be allayed by the rarity of this occurrence and the different appearance of false rings from true ones. They fade gradually, both to the outside and the inside, whereas the true ring shows a sharp cutoff externally.

Another method of determining age, according to Badran, is the bunching together of the bud scales and the horizontal constrictions at the nodal points where the terminal buds were forced into a resting period. This is useful for only the first few years of growth, since these landmarks tend to fade with age.

In dating the cones on our two branches we used tree rings, where possible, from cross sections of the limbs. Where this was not possible because of unavailability of the sections, we counted whorls. Where there was a discrepancy between the numbers derived from the two counts, we chose the lesser in order to err on that side rather than to overestimate age.

We made other incidental observations. Although stratification of seeds in cold is not considered necessary for optimum production in *Pinus radiata*, we found in comparing one set stratified for three weeks at 4°C and one not, that the former germinated in 50 per cent to 75 per cent of the interval of time needed for the latter. Cold, however, did not produce fertility in the infertile years.

The farmers in Ireland who grow their own *Pinus radiata* trees open the cones by exposure to direct flame. Early foresters used this method. We tried opening cones by direct flame in a broiler for four to twenty-four minutes, by boiling for two to five minutes, and by heating in an oven (kiln) at 50°C (120°F) for twenty-four to forty-eight hours. Although seeds procured by each method germinated, the kiln method seemed to us the most satisfactory because with it there is no worry about seed damage if heating is carried on too long. We learned that if either of the other two methods is used, the duration of heating should be less than that tried in our experiments; not more than ten to fifteen seconds in boiling water or two to three minutes close to a flame. This is because the cone scales separate gradually after the resin is dissolved. Vogl states that in *P. attenuata*, shedding of seed does not start until one to twelve hours after heating, and that it continues up to three days later. Our impression was that this applies to *P. radiata* also. In using either rapid method for opening cones, it is important that they be removed from the heat after opening has only partially begun. Although it was of interest that boiling for five minutes and direct flame exposure to a 5-inch distance for ten minutes did not hinder germinative ability nor germinative capacity (which occurred in up to 90 per cent of the seeds so procured) there must be a limit of time after which these temperatures will kill seeds.

Badran observed a falling off in the germinative capacity of seeds with progressing years and commented on the apparent soundness ("fullness") of many of the infertile seeds. We found this also; all twenty-nine seeds that did not germinate from the twenty-two year-old cone from limb #2 looked quite healthy externally.

Although arithmetical precision cannot be hoped for in describing these features of the various serotinous species, this does not diminish our sense of wonder at the extreme patience with which these trees wait to protect and reproduce their kind in the face of their natural enemy, fire.

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- Dr. William J. Libby, Department of Forestry and Genetics, University of California, Berkeley
- Albert G. Johnson, Research Associate, University of Minnesota, Chaska, Minn.

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Arnold Arboretum Introductions: The Second Fifty Years (continued) - 1923-1972

by RICHARD A. HOWARD

In a series of papers concerning the history of the Arnold Arboretum compiled in honor of its First Century, Dr. Donald Wyman prepared a list of plants received at the Arnold Arboretum between 1923 and 1972. The first part of this list including *Abelia* through *Fraxinus* was published in *Arnoldia* (32 (1): 30-43, 1972). It largely represented plants received during the years when Donald Wyman served as horticulturist and many of the plants were obtained by him during several trips to Europe. The list as published was "to be continued" and through oversight the remainder of the manuscript was misplaced. We continue here, for the record, what was begun in 1972.

As before, the plants are listed alphabetically under the names by which they were received or listed in *Index Semina*. A few names indicated by an asterisk (*) cannot be verified in standard references, including *Index Kewensis*. In general, the names follow the nomenclature of *Rehder's Bibliography of Cultivated Trees and Shrubs* although some are now accepted as either hybrids or cultivars. These names are indicated by the sign of multiplication (×) in the case of hybrids, or are cited in single quotation marks when accepted as cultivars. We recognize that some modern works by Bean, Hillier and Krussman have realigned species concepts, cultivar status or established synonymies. We retain the original form of the name in many cases for historical perspective and for the opportunity of verifying such new assignments. A parenthetical (A) has been added following a name when the accession is still alive within our collection. As Dr. Wyman stated, "The Arboretum has long had a policy of sharing its introductions with other institutions and unfortunately we do not know whether plants which have died for us may have survived in other institutions." We repeat his request that "if any individual has firsthand knowledge that some of these have been introduced into America before the dates herein listed, we will be glad to hear about it and delete them from this list." We also would like to know of living propagations of these plants elsewhere in the United States, to help establish hardiness records.

Name	Record No.	Country	Year
<i>Fraxinus ornus</i> var. <i>juglandifolia</i>	462-25	Holland	1925
<i>Genista lydia</i>	1334-51	England	1951
" <i>patula</i>	497-39	Asia Minor	1939
" <i>tinctora</i> var. <i>anxantica</i>	575-71	Switzerland	1971
" <i>tinctoria</i> var. 'Plena'	2216-25	England	1925
" <i>tinctoria</i> 'Royal Gold' (A)	407-65	Holland	1965
<i>Gleditsia caspica</i> 'Nana'	19816	England	1926
" <i>triacanthos</i> f. <i>inermis</i> 'Columnaris' (A)	491-66	W. Germany	1966
<i>Gymnocladus dioicus</i> 'Variegatus'	156-66	England	1966
<i>Hamamelis</i> × <i>intermedia</i> 'Arnold Promise' (A)	231-67	Arn. Arb.	1963
" " 'Diane'	678-66	Belgium	1966
" " 'Fire Charm'	1137-65	Holland	1965
" " 'Helena'	1138-65	Holland	1965
" " 'Hiltingbury'	562-65	England	1965
" " 'Jelena' (A)	584-65	England	1965
" " 'Ruby Glow'	684-60	Holland	1960
" <i>japonica</i> 'Flavo-purpurascens Superba'	307-59	Holland	1959
" " 'Magic Fire' (A)	161-69	England	1969
" " 'Sulphurea' (A)	282-66	England	1966
" <i>mollis</i> 'Brevipetala'	588-49	Holland	1949
" " 'Gold Crest' (A)	43-67	England	1967
" " 'Pallida'	564-65	England	1965
" <i>vernalis</i> 'Lombart's Weeping'	1110-67	Holland	1967
" " 'Orange Beauty' (A)	165-66	Holland	1966
<i>Hedera helix</i> var. <i>poetica</i>	149-65	Italy	1965
<i>Hibiscus syriacus</i> 'Admiral Dewey'	626-23	France	1923
" " 'Coelestis'	632-23	France	1923
" " 'Caeruleus Plenus'	633-23	France	1923
" " 'Leopoldii'	424-56	England	1956
" " 'Leopoldii Plenus'	435-65	England	1965
" " 'Mauve Queen'	426-56	England	1956
" " 'Monstrosus'	641-23	France	1923
" " 'Roseus Plenus'	646-23	France	1923
<i>Hydrangea serrata</i> 'Chinensis'	283-66	England	1966
" " 'Preziosa'	2099-65	England	1965
<i>Hypericum japonicum</i>	661-34	Holland	1934
" <i>kouytchense</i>	211-52	England	1929
" 'Rowallane'	555-64	Ireland	1964
<i>Iberis pectinata</i>	799-63	England	1963
" <i>pinnata</i>	156-62	Belgium	1962
" var. <i>correifolia</i>	471-64	England	1964
<i>Ilex</i> × <i>altaclarensis</i>	528-34	China	1934
" <i>crenata</i> 'Golden Gem'	5-66	Holland	1966
" " 'Lutea-variegata'	592-36	England	1936
" <i>sebertyi</i>	1610-63	New Caledonia	1963
<i>Indigofera pseudotinctoria</i>	1076-57	Japan	1957
<i>Jasminum artense</i> *	1609-63	New Caledonia	1963
" <i>azoricum</i>	90-62	Scotland	1962
" <i>bignoniaceum</i>	278-62	New Zealand	1962
" <i>didymum</i>	1194-63	Fiji	1963
" <i>humile</i> f. <i>farreri</i>	96-62	Scotland	1962
" <i>humile</i> f. <i>wallichianum</i>	802-62	Scotland	1962
" <i>kerstingii</i>	913-63	Ghana	1963
" <i>leratii</i>	1332-63	New Caledonia	1963
" <i>marianum</i>	1049-64	Guam	1964

Name	Record No.	Country	Year
<i>Jasminum neocaledonicum</i>	1268-63	New Caledonia	1963
" <i>noumeense</i>	1333-63	New Caledonia	1963
" <i>polyanthum</i>	95-62	Scotland	1962
" <i>rex</i>	85-62	Scotland	1962
" <i>subhumile</i>	97-62	Scotland	1962
" <i>trifoliatum</i>	98-62	Scotland	1962
" <i>volubile</i>	1496-63	Lord Howe Island	1963
<i>Juniperus chinensis</i> 'Glauca'	953-38	England	1938
" " 'Mathot'	335-65	W. Germany	1965
" " 'Raizuka'	1783-65	England	1965
" " 'Smithii'	1051-71	England	1971
" <i>communis</i> 'Dumosa' (A)	1785-65	England	1965
" " 'Pendulina'	339-65	W. Germany	1965
" " 'Silver Lining'	1091-68	England	1968
" <i>sabina</i> 'Elegantissima'	341-65	W. Germany	1965
" " 'Reflexa'	1052-71	England	1971
" <i>semiglobosa</i> (A)	1165-61	Russia	1961
" <i>serevschanca</i>	264-36	Russia	1936
<i>Kalmia intermedia</i> (A)	624-64	France	1964
" <i>latifolia</i> 'Clementine Churchill'	1518-66	England	1966
<i>Kerria japonica</i> 'Aureo-vittata' (A)	525-36	France	1936
<i>Koelreuteria paniculata</i> 'Fastigiata'	498-37	England	1937
<i>Laburnum anagyroides</i> 'Aureum'	213-40	England	1940
<i>Larix decidua</i> var. <i>polonica</i> (A)	1633-25	Ireland	1925
" <i>gmelini</i> var. <i>olgensis</i>	648-64	Poland	1964
" <i>lubarskii</i> *	91-69	Estonia	1969
<i>Lavandula spica</i> 'Folgate'	440-65	England	1965
" " 'Hidcote'	441-65	England	1965
" " 'Hidcote Blue' (A)	560-63	England	1963
" " 'Hidcote Pink'	442-65	England	1965
" " 'Nana'	307-53	England	1953
<i>Ligustrum chenaultii</i>	151-31	France	1931
" <i>vulgare</i> 'Atrovirens'	464-36	Germany	1936
" " 'Auriflorum'	61-40	Hungary	1940
" " 'Densiflorum'	484-27	England	1927
" " 'Fastigiatum' (A)	554-65	England	1965
" " var. <i>italicum</i>	357-25	Ireland	1925
" <i>walkeri</i> (A)	29-65	Holland	1965
<i>Lindera citriodora</i>	1194-64	Japan	1964
" <i>erythrocarpa</i>	1192-64	Japan	1964
" <i>megaphylla</i>	542-35	China	1935
" <i>umbellata</i> f. <i>membranacea</i>	556-71	Japan	1971
<i>Liquidambar orientalis</i>	503-37	England	1937
<i>Liriodendron tulipifera</i> 'Contortum'	164-49	Ireland	1949
<i>Lonicera</i> × <i>bella</i> 'Polyantha' (A)	1314-62	Holland	1962
" <i>glehnii</i>	891-65	Russia	1965
" <i>lanata</i> (A)	887-65	Russia	1965
" <i>lanza</i> *	471-60	Scotland	1960
" <i>maackii</i> 'Erubescens'	31-65	Holland	1965
" <i>modesta luchanensis</i> (A)	765-36	China	1936
" <i>paradoxa</i>	889-65	Russia	1965
" <i>simulatrix</i>	888-65	Russia	1965
" <i>tatarica</i> 'Arnold Red' (A)	243-49	Arn. Arb.	1949
" " 'Nana'	302-59	Holland	1959
" 'Tremonia'	21-66	W. Germany	1966
" × <i>xylosteum</i> 'Nana'	220-39	Poland	1939

Name	Record No.	Country	Year
× <i>Macludrania hybrida</i> (A)	471-36	Germany	1936
<i>Magnolia campbellii</i> 'Charles Raffill'	2106-65	England	1965
" 'Charles Coates'	633-66	England	1966
" <i>denudata</i> 'Picture'	2105-65	England	1965
" " 'Purple Eye'	288-66	England	1966
" × <i>highdownensis</i>	350-49	England	1949
" × 'Kewensis'	1374-63	England	1963
" × <i>lobneri</i> 'Leonard Messel'	290-63	England	1963
" " 'Merrill' (A)	367-42	Arn. Arb.	1952
" <i>officinalis</i> var. <i>biloba</i>	666-65	England	1965
" <i>salicifolia</i> 'Concolor'	2109-65	England	1965
" × <i>soulangiana</i> 'Stricta'	75-57	England	1957
" " 'Superba'	552-52	England	1952
" <i>wilsonii</i> f. <i>taliensis</i>	194-68	England	1968
<i>Mahoberberis aquicandidula</i> (A)	423-48	Sweden	1948
" <i>aquisargentii</i> (A)	422-48	Sweden	1948
<i>Malus</i> × <i>gloriosa</i> (A)	398-36	France	1936
" × <i>moerlandsii</i> (A)	643-38	Holland	1938
" 'Blanche Ames' (A)	22994	Arn. Arb.	1955
" 'Barbara Ann' (A)	677-64	Arn. Arb.	1964
" 'Donald Wyman' (A)	232-54	Arn. Arb.	1970
" 'Dorothea' (A)	22765	Arn. Arb.	1943
" 'Golden Hornet' (A)	742-55	England	1955
" 'Henrietta Crosby' (A)	531-49	Arn. Arb.	1949
" 'John Downie'	593-27	England	1927
" 'Henry F. Dupont' (A)	229-57	Arn. Arb.	1955
" 'Mary Potter' (A)	230-13	Arn. Arb.	1947
" 'Pretty Marjory' (A)	294-58	Holland	1958
" 'Upton Pyne' (A)	743-55	England	1955
" 'Van Houttei' (A)	288-58	England	1958
" 'Wisley' (A)	746-55	England	1955
<i>Menziesia ciliicalyx</i> 'Purpurea'	620-65	England	1965
<i>Metasequoia glyptostroboides</i> (A)	3-48	China	1948
<i>Morus alba</i> 'Venosa'	2152-25	England	1925
" <i>truaviensis</i> *	512-49	Czechoslovakia	1949
<i>Myrica rubra</i>	1084-57	Japan	1957
<i>Osmanthus austro-caledonicus</i>	1269-63	New Caledonia	1963
" <i>badula</i>	1607-63	New Caledonia	1963
" <i>monticola</i>	1270-63	New Caledonia	1963
" <i>vaccinioides</i>	1606-63	Maquis	1963
<i>Ostrya multinervis</i>	33-49	China	1949
<i>Pachysandra terminalis</i> 'Variegata'	525-25	Scotland	1925
<i>Parrotia persica</i> 'Pendula'	164-66	England	1966
<i>Parthenocissus tricuspidata</i> 'Gigantea'	370-65	W. Germany	1965
" " 'Glorie de Boskoop'	447-36	Germany	1936
<i>Philadelphus coronarius</i> var. <i>speciosissimus</i>	2095-25	England	1925
" <i>henryi</i>	741-33	Wales	1933
" <i>keteleeri</i>	419-23	France	1923
" <i>pekinensis kansuensis</i>	396-26	China	1926
" <i>purpureo-maculatus</i> 'Bicolor'	1719-25	France	1925
" <i>subcanus</i> var. <i>wilsonii</i>	1116-24	England	1924
" 'Beauclerk'	340-49	England	1949
" 'Belle Etoile'	1631-25	France	1925
" 'Burfordensis' (A)	358-49	England	1949
" 'Contraste'	1463-51	England	1951
" 'Dame Blanche'	651-26	Germany	1926

Name	Record No.	Country	Year
<i>Philadelphus</i> 'Enchantment'	1674-24	France	1924
" 'Fleur de Neige'	1721-25	France	1925
" 'Girandole'	1722-25	France	1925
" 'Schneeschnmelse' (A)	298-63	Holland	1963
" 'Silver Rain'	282-63	Canada	1963
" 'Unique'	1148-65	Holland	1965
<i>Picea abies</i> 'Compacta'	2204-25	England	1925
" " 'Humilis'	644-67	England	1967
" " 'Phylicoides'	646-67	England	1967
" " 'Pumila Nigra'	1056-71	England	1971
" " 'Stricta' (A)	2190-25	England	1925
" " 'Waugh'	649-67	England	1967
" <i>intercedens</i>	501-40	Japan	1940
" <i>orientalis</i> 'Doverside Pendula'	983-68	England	1968
" <i>nutans</i>	477-36	Germany	1936
" <i>pungens</i> 'Spekii'	659-67	England	1967
" <i>pungsaensaensis</i>	502-40	Japan	1940
" <i>tonaiensis</i> (A)	503-40	Japan	1940
<i>Pieris floribunda</i> 'Elongata'	183-57	England	1957
" <i>japonica</i> 'Bert Chandler'	1521-66	England	1966
<i>Pinus ayacahuite</i> var. <i>brachycarpa</i>	519-49	Mexico	1949
" <i>cembra</i> 'Columnaris'	978-68	England	1968
" <i>halepensis</i> var. <i>brutia</i>	1148-63	Yugoslavia	1963
" <i>hamata</i>	300-71	Russia	1971
" <i>koraiensis</i> 'Winton'	1795-65	England	1965
" <i>maximartinezii</i>	131-71	England	1971
" <i>mugo</i> 'Kokarde'	490-66	W. Germany	1966
" <i>nigra</i> 'Pygmaea'	824-66	England	1966
" <i>parviflora</i> 'Brevifolia'	366-65	W. Germany	1965
" <i>pumila</i> 'Compacta'	977-68	England	1968
" " 'Dwarf Blue'	409-65	England	1965
" " 'Jermyns'	1794-65	England	1965
" " 'Nana'	976-68	England	1968
" <i>sylvestris</i> 'Compressa' (A)	666-67	England	1967
" " 'Doone Valley'	1000-68	England	1968
<i>Platanus hybrida</i> var. <i>hispanica</i>	561-23	England	1923
" " 'Microvec'	1948-65	Belgium	1965
" " var. <i>parviloba</i>	563-23	England	1923
" <i>orientalis</i> var. <i>insularis</i>	337-39	England	1939
" 'Suttneri'	1984-65	W. Germany	1965
<i>Polygonum aubertii</i>	815-24	England	1924
<i>Populus candicans</i> 'Aurora'	825-66	England	1966
" <i>canescens</i> 'Macrophylla'	340-39	England	1939
" <i>fredroviensis</i>	222-39	Poland	1939
" <i>rogalinensis</i> *	223-39	Poland	1939
" <i>tremula</i>	14352	England	1924
" " 'Erecta'	163-39	Sweden	1939
" " 'Pyramidalis'	829-26	Sweden	1926
<i>Potentilla davurica</i> 'Stocker's Variety'	137-66	England	1966
" <i>frikartii</i> *	390-63	Switzerland	1963
" <i>fruticosa</i> 'Barnbarroch Hybrid' (A)	141-66	England	1966
" " 'Beanii'	141-60	England	1960
" " 'Bowles Variety' (A)	148-66	England	1966
" " 'Buttercup'	2120-65	England	1965
" " 'Clotted Cream'	145-66	England	1966
" " 'Compacta Kornik'	405-66	Poland	1966

Name	Record No.	Country	Year
<i>Potentilla fruticosa</i> 'David Ayling'	134-66	England	1966
" " 'Donard Gold'	138-66	England	1966
" " 'Elizabeth'	611-65	England	1965
" " 'Farreri Prostrata'	343-39	England	1939
" " 'Farrer's White'	366-58	England	1958
" " 'Friesengold'	110-57	W. Germany	1957
" " 'Golden Charm'	146-66	England	1966
" " 'Jackman's Variety'	175-55	England	1955
" " 'Katherine Dykes' (A)	1560-51	England	1951
" " 'Klondike'	140-66	England	1966
" " 'Lady Daresbury'	146-60	England	1960
" " 'Logan' (A)	2123-65	England	1965
" " 'Maanely's' (A)	81-57	Holland	1957
" " 'Minstead Dwarf'	670-65	England	1965
" " 'Moonlight' (A)	1561-51	England	1951
" " 'Nana Argentea'	345-39	England	1939
" " 'Northam' (A)	83-69	England	1969
" " 'Nyewoods'	2126-65	England	1965
" " 'Rhodocalyx'	28-67	England	1967
" " 'Sulfurea'	112-57	W. Germany	1957
" " 'Tangerine'	1064-62	England	1962
" " 'Walton Park'	612-65	England	1965
" " 'What-Not'	136-66	England	1966
" " 'White Rain'	143-66	England	1966
" " 'Woodbridge Gold'	142-66	England	1966
<i>Prunus campanulata</i> 'Plena'	341-49	England	1949
" <i>cerasifera</i> 'Elegans'	1780-25	England	1925
" " 'Fastigiata' (A)	224-39	Poland	1939
" " 'Hessei'	669-36	France	1936
" " 'Nigra'	670-36	France	1936
" " 'Woodii'	162-31	France	1931
" <i>curdica</i>	656-64	Poland	1964
" <i>domestica</i> 'Plantierensis'	614-23	England	1923
" <i>fenzliana</i> (A)	938-27	Tiflis	1927
" <i>gigantea</i> *	1781-25	England	1925
" 'Hally Jolivette'	231-44	Arn. Arb.	1944
" <i>incisa</i> 'Moerheimii'	502-38	Holland	1938
" <i>laurocerasus</i> 'Zabeliana'	404-36	France	1936
" <i>macrocarpa</i> *	932-24	England	1924
" <i>monticola</i>	613-23	England	1923
" <i>padus purdomii</i>	100-24	China	1924
" " 'Watereri'	608-23	England	1923
" <i>persica</i> 'Russell's Red'	230-40	England	1940
" <i>pseudoarmeniaca</i>	804-35	Yugoslavia	1935
" <i>scopulorum</i>	772-38	England	1938
" <i>setulosa</i>	1330-25	China	1925
" <i>spinosa</i> 'Plena'	478-25	England	1925
" <i>subhirtella</i> 'Autumnalis Rosea'	235-40	England	1940
" " 'Pendula' A. J. Ives selection (A)	514-37	England	1937
" " 'Plena'	255-36	Germany	1936
" " X <i>yedoensis</i> (A)	393-34	England	1934
" <i>tenella</i> 'Alba'	1659-25	England	1925
" <i>tianschanica</i> *	19-71	Russia	1971
" <i>webbii</i>	497-32	Yugoslavia	1932
<i>Ptelea nitens</i> (A)	660-69	Rumania	1960

Name	Record No.	Country	Year
<i>Pterocarya fraxinifolia</i> var. <i>dumosa</i> (A)	348-65	W. Germany	1965
<i>Pyracantha coccinea</i> 'Kasan' (A)	1249-51	Holland	1951
" " 'Orange Giant' (A)	2059-65	Holland	1965
" " 'Orange Glow'	412-65	Holland	1965
<i>Pyronia veitchii</i>	518-37	England	1937
<i>Pyrus salicifolia</i> 'Argentea'	672-36	France	1936
<i>Quercus benderi rubroides</i>	697-65	W. Germany	1965
" <i>borealis maxima</i> 'Aurea'	1985-65	W. Germany	1965
" <i>cerris</i> 'Ambroziana'	2129-65	England	1965
" <i>coccinea</i> 'Splendens'	147-29	England	1929
" <i>hartwissiana</i> (A)	906-34	Bulgaria	1934
" <i>kewensis</i>	831-38	England	1938
" <i>petraea</i> 'Columna'	413-65	Holland	1965
" <i>pubescens</i> 'Crispata'	59-59	Holland	1959
" <i>velutina</i> var. <i>rubrifolia</i>	765-24	England	1924
<i>Rehderodendron macrocarpum</i>	410-32	China	1932
<i>Rhamnus diamantiaca</i>	603-62	Russia	1962
" <i>petiolaris</i>	1745-25	England	1925
" <i>ussuriensis</i>	1293-71	Russia	1971
<i>Rhododendron brachycarpum</i> var. <i>lutescens</i>	231-27	Scotland	1927
" <i>esetulosum</i>	261-71	Sweden	1971
" <i>hirsutum</i> 'Flore Pleno'	1969-65	England	1965
" <i>hawakamii</i> *	215-70	Formosa	1970
" <i>kotschyi</i>	1625-65	Rumania	1965
" <i>mucronatum</i> 'Lilacinum'	546-65	England	1965
" <i>rufum</i>	189-27	China	1927
" <i>traillianum</i>	258-71	Sweden	1971
" <i>vernicosum</i>	259-71	Sweden	1971
" <i>viscosum rubescens</i>	517-65	England	1965
" 'Ardens'	56-57	England	1957
" 'Ballerina' (A)	537-65	England	1965
" 'Balzac' (A)	1472-60	England	1960
" 'Bartholo Lazzari'	578-52	Holland	1952
" 'Basilisk'	513-65	England	1965
" 'Beaulieu' (A)	533-65	England	1965
" 'Brazil' (A)	1464-60	England	1960
" 'Brides Bouquet'	1920-65	England	1965
" 'Bright Straw'	536-65	England	1965
" 'Caprice'	531-65	England	1965
" 'Cecile'	535-65	England	1965
" 'Col. F. R. Durham'	580-52	Holland	1952
" 'Cunningham's Sulphur'	77-57	England	1957
" 'Daybreak'	1925-65	England	1965
" 'Dr. M. Oosthoek'	582-52	Holland	1952
" 'Edward Henry'	171-57	England	1957
" 'Eisenhower' (A)	314-60	England	1960
" 'Embley Crimson' (A)	545-65	England	1965
" 'Evening Glow'	250-57	England	1957
" 'Exquisita'	173-57	England	1957
" 'F. de Koninck'	174-57	England	1957
" 'Firefly'	540-65	England	1965
" 'Fireglow'	563-65	England	1965
" 'Floradora'	200-57	England	1957
" 'Freya'	532-65	England	1965
" 'Gallipoli'	565-65	England	1965
" 'General Vetter'	668-57	Holland	1957

Name	Record No.	Country	Year
<i>Rhododendron</i> 'Ginger' (A)	1467-60	England	1960
" 'Glowing Embers'	1180-53	England	1953
" 'Goethe'	499-57	England	1957
" 'Gog'	541-65	England	1965
" 'Gold Dust'	1922-65	England	1965
" 'Golden Eye' (A)	1463-60	England	1960
" 'Golden Horn' (A)	1470-60	England	1960
" 'Golden Oriole'	1921-65	England	1965
" 'Golden Sunset' (A)	1179-53	England	1953
" 'Goldsworth Orange'	197-57	England	1957
" 'Grandeur Triumphante' (A)	518-65	England	1965
" 'Gwynnid Lloyd'	1923-65	England	1965
" 'Homebush' (A)	534-65	England	1965
" 'Hotspur' (A)	524-65	England	1965
" 'Hotspur Red'	529-65	England	1965
" 'Hugh Wormald' (A)	528-65	England	1965
" 'Hugo Hardyzer' (A)	1257-50	Holland	1950
" 'J. Jennings' (A)	542-65	England	1965
" 'Joseph Baumann'	587-52	Holland	1952
" 'Kesselringii'	1-69	Denmark	1969
" 'Klondyke' (A)	523-65	England	1965
" 'Knighthood' (A)	514-65	England	1965
" 'Konigin Emma'	588-52	Holland	1952
" 'Koster's Brilliant Red'	591-52	Holland	1952
" 'Magnifica'	176-57	England	1957
" 'Marion Merriman'	1471-60	England	1960
" 'Mathilda'	667-57	Holland	1957
" 'Mrs. Gustave Guillemot'	65-57	England	1957
" 'Nancy Buchanan'	515-65	England	1965
" 'Orient' (A)	1926-65	England	1965
" 'Perfecta'	590-52	Holland	1952
" 'Persil'	530-65	England	1965
" 'President Carnot'	584-52	Holland	1952
" 'Royal Command'	1175-53	England	1953
" 'Royal Lodge' (A)	538-65	England	1965
" 'Samuel Taylor Coleridge' (A)	496-57	England	1957
" 'Satan' (A)	525-65	England	1965
" 'Seville' (A)	527-65	England	1965
" 'Soft Lips'	1927-65	England	1965
" 'Strawberry Ice'	516-65	England	1965
" 'Sugared Almond'	1928-65	England	1965
" 'Surprise'	1929-65	England	1965
" 'Tangiers'	1930-65	England	1965
" 'Tunis' (A)	522-65	England	1965
" 'Volcano' (A)	73-57	England	1957
" 'Von Gneist' (A)	664-57	Holland	1957
" 'Westminster'	526-65	England	1965
" 'Whitethroat'	674-65	England	1965
<i>Ribes dikuscha</i>	1448-66	Russia	1966
" <i>janczewskii</i> (A)	1001-65	Russia	1965
" <i>sanguineum</i> 'Carneum'	1456-51	Holland	1951
<i>Robinia</i> × <i>hillieri</i>	325-53	England	1953
" × <i>holdtii</i> 'Britzensis'	638-65	England	1965
" <i>pseudoacacia</i> 'Coluteoides'	578-65	England	1965
<i>Rosa alba</i> var. <i>incarnata</i>	435-56	England	1956
" " <i>maxima</i>	332-56	England	1956

Name	Record No.	Country	Year
<i>Rosa andersonii</i>	100-36	England	1936
" <i>blochiana</i>	1101-65	Sweden	1965
" <i>calocarpa</i>	2047-25	England	1925
" <i>canina inermis</i>	2083-25	England	1925
" <i>centifolia bullata</i>	110-53	England	1953
" " <i>parvifolia</i> (A)	334-56	England	1956
" <i>ditrichopoda</i> (A)	1102-65	Sweden	1965
" <i>dumalis</i>	854-25	France	1925
" × <i>dupontii</i>	2085-25	England	1925
" <i>gallica maxima</i>	111-53	England	1953
" <i>giraldii</i>	533-28	Czechoslovakia	1928
" <i>kochiana</i>	776-25	Ireland	1925
" <i>marcyana</i>	900-25	Denmark	1925
" <i>moyesii</i> 'Geranium' (A)	21-52	England	1952
" " 'Nevada' (A)	336-56	England	1956
" " 'Underway' (A)	22-52	England	1952
" <i>multiflora thunbergiana</i>	2075-25	England	1925
" <i>omeiensis</i> 'Astrosanguinea'	2077-25	England	1925
" " <i>polyphylla</i>	528-37	England	1937
" <i>pendulina</i> 'Flore Plena'	125-53	England	1953
" <i>pteragonis</i> 'Redwing' (A)	1425-51	Holland	1951
" <i>roopae</i> (A)	821-60	Czechoslovakia	1960
" <i>scharnkeana</i> (A)	114-66	Holland	1966
" × <i>wintoniensis</i>	297-36	England	1936
<i>Rubus</i> × <i>fraseri</i> (A)	2137-65	England	1965
" <i>nemorosus</i>	2032-25	England	1925
" <i>spectabilis</i> 'Flore Plena' (A)	99-66	Scotland	1966
" × <i>tridel</i> 'Benenden Beauty' (A)	96-66	Scotland	1966
<i>Salix aegyptiaca</i>	534-33	Sweden	1933
" 'Aglai'a'	663-71	Belgium	1971
" <i>alpigena</i>	585-23	England	1923
" <i>argophylla</i>	2038-65	France	1965
" <i>argyracea</i> (A)	357-67	Sweden	1967
" <i>canariensis</i>	528-33	Germany	1933
" <i>caspiaca</i> (A)	434-62	Czechoslovakia	1962
" <i>chlorostachya</i>	359-67	Sweden	1967
" <i>eriocephala</i>	465-33	Germany	1933
" <i>friesiana</i>	308-60	Czechoslovakia	1960
" <i>glabra</i>	480-33	Germany	1933
" <i>grandifolia</i> (A)	482-33	Germany	1933
" <i>hegetschweileri</i>	152-67	Sweden	1967
" <i>kangensis</i>	704-71	Belgium	1971
" <i>koriyanagi</i>	157-67	Sweden	1967
" <i>lasiogyne</i> (A)	2036-65	France	1965
" <i>lasiolepis</i>	2037-65	France	1965
" <i>matsudana</i> 'Pendula'	457-23	China	1923
" " 'Tortuosa'	458-23	China	1923
" <i>melanostachys</i> (A)	656-71	Belgium	1971
" <i>microstachys</i>	437-62	Czechoslovakia	1962
" <i>muscina</i> (A)	670-71	Belgium	1971
" <i>myrsinites jacquiniana</i>	898-60	Czechoslovakia	1960
" <i>nigra falcata</i>	2170-25	England	1925
" <i>purpurea itrenta</i>	662-71	Belgium	1971
" <i>retusa vitabeliana</i>	899-60	Czechoslovakia	1960
" <i>rorida</i>	153-67	Sweden	1967
" <i>rutiliana</i> * (A)	411-66	Poland	1966

Name	Record No.	Country	Year
<i>Salix sendaica</i>	435-62	Czechoslovakia	1962
" <i>siegertii</i> (A)	689-71	Belgium	1971
" <i>songarica</i> (A)	392-66	Poland	1966
" <i>turanica</i>	433-62	Czechoslovakia	1962
" <i>wardiana</i>	2179-25	England	1925
" <i>viminalis</i> 'Continental' (A)	404-66	Poland	1966
" " 'Longifolia' (A)	407-66	Poland	1966
" <i>waldsteiniana</i>	150-67	Sweden	1967
" <i>zatugensis</i> * (A)	672-67	England	1967
<i>Sambucus koreana</i> *	415-66	Poland	1966
" <i>latipinna</i>	731-64	Latvia	1964
" <i>nigra</i> 'Rosea Plena'	505-41	England	1941
" <i>racemosa</i> 'Laciniata Aurea'	356-39	England	1939
" <i>tigranii</i> *	1097-65	Sweden	1965
" 'Frue Barmstedterin' (A)	127-65	W. Germany	1965
<i>Schisandra repanda</i>	552-71	Japan	1971
<i>Schizophragma hydrangeoides</i> 'Roseum'	37-67	England	1967
<i>Sinojackia rhederiana</i>	1318-30	China	1930
<i>Sophora aubia</i> *	435-63	Thailand	1963
" <i>microphylla</i>	1085-69	New Zealand	1969
" <i>japonica</i> 'Alba Variegata' (A)	193-68	England	1968
" " 'Variegata'	157-66	England	1966
<i>Sorbaria grandiflora</i>	696-25	France	1925
" <i>kirilowi</i>	428-30	China	1930
" <i>tobolskiana</i> *	394-66	Poland	1966
<i>Sorbus amelosorbus</i>	1242-51	Holland	1951
" <i>aria</i> 'Majestica' (A)	1475-51	England	1951
" <i>aucuparia</i> 'Backhousei'	1806-25	England	1925
" " 'Dirkenii'	1807-25	England	1925
" " 'Praemorsa'	753-65	France	1965
" " 'Pendula Variegata' (A)	488-65	Holland	1965
" " 'Rowancroft Pink Coral' (A)	1154-65	Holland	1965
" " 'Sheerwater Seedling' (A)	490-65	Holland	1965
" <i>bakonyensis</i>	329-69	Holland	1969
" <i>caucasica</i>	1296-71	Russia	1971
" <i>decora</i> 'Nana' (A)	501-57	England	1957
" <i>devoniensis</i>	646-64	Ireland	1964
" <i>esserteauana</i> 'Flava'	680-65	England	1965
" <i>gayeriana</i>	1313-70	Holland	1970
" <i>glabrata</i>	815-38	England	1938
" <i>harrowiana</i>	283-59	England	1959
" × <i>hybrida</i> 'Gibbsii'	645-25	England	1925
" <i>insignis</i>	682-65	England	1965
" <i>intermedia</i> var. <i>arranensis</i> (A)	1534-51	England	1951
" <i>lancifolia</i> (A)	1106-65	Sweden	1965
" <i>latifolia subcuneata</i>	826-38	England	1938
" <i>norvegica</i>	1108-65	Sweden	1965
" <i>oligodonta</i>	142-34	China	1934
" <i>pluripinnata</i>	243-40	England	1940
" <i>pseudovertesensis</i>	1314-70	Holland	1970
" <i>prattii</i> var. <i>subarachnoides</i>	467-24	England	1924
" " <i>tatsiensis</i>	149-34	China	1934
" <i>reducta</i>	1345-51	England	1951
" <i>rhamnoides</i>	780-38	England	1938
" <i>sargentiana warleyensis</i>	115-62	England	1962
" <i>schneideriana</i>	170-65	Russia	1965

Name	Record No.	Country	Year
<i>Sorbus simonkaina</i>	173-66	Holland	1966
" <i>sognensis</i> *	1111-65	Sweden	1965
" <i>subarranensis</i> *	1112-65	Sweden	1965
" <i>subpinnata</i>	720-25	Sweden	1925
" <i>subsiniilis</i>	350-59	Sweden	1959
" × <i>thuringiaca</i>	1812-25	England	1925
" × " 'Fastigiata'	513-27	England	1927
" <i>umbellata</i>	41-23	Scotland	1923
" × <i>vagensis</i>	820-38	England	1938
" 'Hilling's Spire' (A)	284-64	England	1964
" 'Joseph Rock'	683-65	England	1965
" 'Maidenblush' (A)	415-65	Holland	1965
" 'Meinichii' (A)	681-65	England	1965
" 'Old Pink'	416-65	Holland	1965
" 'Scarlet King' (A)	417-65	Holland	1965
" 'Wilfrid Fox' (A)	687-65	England	1965
<i>Spiraea</i> × <i>arguta</i> 'Compacta'	1255-51	Holland	1951
" × " 'Graffsheim'	368-65	W. Germany	1965
" × " 'Grestenii'	418-65	Holland	1965
" × <i>bumalda alba</i>	675-36	France	1936
" <i>canescens glaucophylla</i>	363-39	England	1939
" <i>concinna</i>	1979-25	England	1925
" <i>difformis</i>	1980-25	England	1925
" <i>fontenaysii</i> 'Rosea' (A)	14-66	W. Germany	1966
" <i>gieseleriana</i>	1981-25	England	1925
" <i>humilis</i> (A)	1005-65	Russia	1965
" <i>media glabrescens</i> (A)	2154-65	England	1965
" <i>nipponica tosaensis</i> (A)	688-65	England	1965
" <i>nivea</i> 'Alba-Rosea'	718-65	W. Germany	1965
" <i>notha superlatifolia</i>	491-36	W. Germany	1936
" <i>polonica</i> *	398-66	Poland	1966
" <i>pulchella</i>	1987-25	England	1925
" <i>rosthornii</i>	413-66	Poland	1966
" <i>semiplena</i> *	22-66	W. Germany	1966
<i>Staphylea colchica</i> 'Coulombieri Fastigiata' (A)	480-65	W. Germany	1965
" " <i>kochiana</i> (A)	557-65	England	1965
<i>Stravaesia davidiana salicifolia</i>	877-63	France	1963
<i>Styrax japonica fargesii</i>	156-34	France	1923
<i>Symphoricarpos albus nanus</i>	650-56	Holland	1956
" × <i>chenaultii</i> 'Erecta'	614-52	Holland	1952
" × <i>doorenbosii</i>	670-56	Holland	1956
" <i>orbiculatus</i> 'Variegatus'	317-56	England	1956
" 'Mother of Pearl'	673-56	Holland	1956
<i>Syringa</i> × <i>henryi</i> 'Alba'	512-36	France	1936
" × <i>nanceiana</i> 'Floreale' (A)	1729-25	France	1925
" × " 'Rutilant' (A)	23-32	France	1932
" <i>rhodopea</i>	453-33	Germany	1933
" × <i>swegiflexa</i>	701-36	Germany	1936
" <i>tomentella rosea</i>	1576-51	England	1951
" <i>velutina</i> 'Excellens' (A)	24-32	France	1932
" <i>yunnanensis</i> 'Rosea' (A)	1578-51	England	1951
" 'Abundance'	287-68	Russia	1968
" 'Alexey Maressyev'	286-63	Russia	1963
" 'Alphonse Bouvier' (A)	391-59	W. Germany	1959
" 'Candeur'	30-32	France	1932
" 'Capitan Gastello' (A)	186-67	Russia	1967

Name	Record No.	Country	Year
<i>Syringa</i> 'Comte Adrien de Montebello' (A)	281-63	England	1963
" 'Fraicheur'	1102-67	Holland	1967
" 'Franz Chopin'	1104-67	Holland	1967
" 'G. J. Baardse'	1156-65	Holland	1965
" 'Galina Ulanova' (A)	180-67	Russia	1967
" 'Gortensia' (A)	176-67	Russia	1967
" 'Herman Eilers'	1099-67	Holland	1967
" 'India'	174-67	Russia	1967
" 'I. V. Michurin' (A)	175-67	Russia	1967
" 'Izobilije' (Plenty)	190-67	Russia	1967
" 'K.A. Timeryazen' (A)	189-67	Russia	1967
" 'Kapriz'	182-67	Russia	1967
" 'Krasavitsa Moskv'y'	177-67	Russia	1967
" 'Leonid Leonow'	172-67	Russia	1967
" 'Lights of Donbase'	290-68	Russia	1968
" 'Luminifera'	2156-65	England	1965
" 'Marengo' (A)	41-32	France	1932
" 'Maud Notcutt' (A)	1586-65	England	1965
" 'M. I. Kalinin'	291-68	Russia	1968
" 'Makowickii' (A)	1098-67	Holland	1967
" 'Margot Gruenwald'	1100-67	Holland	1967
" 'Marshall Vasilesky' (A)	181-67	Russia	1967
" 'Metschta' (A)	192-67	Russia	1967
" 'Montesquieu' (A)	42-32	France	1932
" 'Mrs. H. J. Cran'	1101-67	Holland	1967
" 'Niebo Moskv'y' (A)	185-67	Russia	1967
" 'Olimpiada Koliesnikova' (A)	187-67	Russia	1967
" 'Pol Robson'	184-67	Russia	1967
" 'Pioneer' (A)	183-67	Russia	1967
" 'Prairial'	513-36	France	1936
" 'President Lebrun' (A)	679-36	France	1936
" 'Prodige' (A)	45-32	France	1932
" 'Prof. Edmund Jankowski'	1105-67	Holland	1967
" 'Puritan' (A)	1373-63	England	1963
" 'Russkaya Krasavitsa' (A)	193-67	Russia	1967
" 'Savonarole'	518-36	France	1936
" 'Savoyer'	1103-67	Holland	1967
" 'Souvenir de Claudius Graindorge' (A)	680-36	France	1936
" 'Sovietskaia Arktika'	191-67	Russia	1967
" 'Stefan Makowiecki'	309-66	Belgium	1966
" 'Sumierki' (A)	173-67	Russia	1967
" 'Tankman' (A)	289-68	Russia	1968
" 'Zarya Kommunizma'	178-67	Russia	1967
" 'Znamya Lenyna' (A)	179-67	Russia	1967
<i>Tamarix tetrandra</i>	1972-25	England	1925
<i>Taxus baccata</i> 'Adpressa Stricta'	694-36	Germany	1936
" " 'Cavendishii'	1024-38	England	1938
" " 'Columnaris Suecica'	820-58	Sweden	1958
" " 'Hessei'	695-36	Germany	1936
" " 'Omberg' (A)	819-58	Sweden	1958
<i>Thuja occidentalis</i> 'Indomitable' (A)	1797-65	England	1965
" " 'Tetragona'	1085-68	England	1968
" " 'Wanadyke Silver'	1088-68	England	1968
" <i>plicata</i> 'Cuprea'	689-65	England	1965
" " 'Hillieri'	194-32	England	1926
" " 'Semperaurens' (A)	617-65	England	1965

Name	Record No.	Country	Year
<i>Thuja plicata variegata</i>	465-59	England	1959
<i>Tilia cordata ascidiata</i> (A)	272-38	Holland	1938
" " 'Handsworth' (A)	653-52	England	1952
" " <i>major</i>	709-52	England	1952
" × <i>europaea</i> 'Corallina'	436-56	England	1956
" × " 'Longevirens' (A)	214-66	Holland	1966
" × " 'Pendula'	130-55	England	1955
" × " 'Wratislaviensis' (A)	485-65	Holland	1965
" <i>flaccida diversifolia</i>	305-66	Belgium	1966
" <i>hillieri</i> * (A)	2159-65	England	1965
" <i>platyphyllos</i> 'Aurea'	1739-25	England	1925
" " 'Begoniaefolia' (A)	655-52	England	1952
" " 'Compacta' (A)	195-66	Holland	1966
" " <i>grandifolia</i>	161-71	Rumania	1971
" " 'Pyramidalis Aurea'	711-52	England	1952
" <i>tomentosa abundantiflora</i>	162-71	Rumania	1971
" " <i>horizontalis</i>	1742-25	England	1925
" " <i>inaequalis</i>	163-71	Rumania	1971
" " <i>parvifrons</i>	165-71	Rumania	1971
" " <i>platyspatha</i>	164-71	Rumania	1971
<i>Torreya fruticosa</i>	504-40	Japan	1940
<i>Tsuga canadensis</i> 'Horsford'	1804-65	England	1965
<i>Ulmus pumila</i> 'Ansaloni' (A)	636-61	Italy	1961
<i>Vaccinium corymbosum</i> 'Goldtraube'	118-57	W. Germany	1957
" <i>cylindraceum</i>	296-59	England	1959
" <i>glaucoalbum</i>	86-25	Germany	1925
" <i>kansaiense</i>	874-60	Japan	1960
" <i>simulatum</i>	211-68	England	1925
" <i>versicolor</i>	1075-57	Japan	1957
<i>Viburnum awabuki</i>	699-63	Japan	1963
" × <i>bodnantense</i>	360-49	England	1949
" " 'Dawn'	1157-65	Holland	1965
" " 'Deben'	530-60	England	1960
" " 'Splendens'	643-61	England	1961
" <i>brevipes</i>	19354	England	1925
" <i>carlesii</i> 'Aurora'	2163-65	England	1965
" <i>cassinoides</i> 'Nanum' (A)	1581-51	England	1951
" <i>dauidii foemina</i>	506-63	Scotland	1963
" <i>erubescens</i> f. <i>gracilipes</i>	349-49	England	1949
" <i>farreri</i> 'Album' (A)	1266-51	Holland	1951
" " 'Bowles Variety' (A)	429-52	Ireland	1952
" " 'Candidissimum'	551-37	England	1937
" " 'Compactum'	552-37	England	1937
" " 'Nanum' (A)	1267-51	Holland	1951
" <i>flavescens</i>	518-63	Scotland	1963
" <i>grandiflorum koreanum</i>	509-63	Scotland	1963
" × <i>hillieri</i>	166-57	England	1957
" × " 'Winton'	194-57	England	1957
" × <i>juddii</i> × <i>carlesii</i>	810-34	Arn. Arb.	1934
" <i>kornicense</i> *	417-66	Poland	1966
" <i>lantana</i> 'Lees'	706-52	England	1952
" " 'Variegatum'	438-59	Holland	1959
" <i>opulus</i> 'Notcutt's Variety' (A)	814-38	England	1938
" <i>plicatum</i> 'Mariesii' (A)	1871-25	England	1925
" × <i>rhytidocarpum</i> (A)	412-36	France	1936
" × <i>rhytidophyllum</i> 'Roseum' (A)	510-41	England	1941

Name	Record No.	Country	Year
<i>Viburnum rigidum</i>	1007-65	Russia	1965
" <i>sieboldii reticulatum</i>	2046-65	France	1965
" <i>sympodiale</i> (A)	529-63	Scotland	1963
" <i>zamoyskianum</i> *	396-66	Poland	1966
" 'Anne Russell'	2162-65	England	1965
" 'Park Farm Hybrid'	343-49	England	1949
<i>Vinca minor</i> 'Azurea'	476-23	England	1923
<i>Weigela</i> 'Aldenham Glow'	521-52	England	1952
" 'Buisson Fleuri' (A)	567-65	England	1965
" 'Descartes'	582-36	England	1936
" 'Eva Supreme' (A)	42-65	Holland	1965
" 'Feerie'	1718-25	France	1925
" 'Ideal' (A)	16-32	France	1932
" 'Looymansii Aurea'	410-60	England	1960
" 'Majestueux' (A)	17-32	France	1932
" 'Nivalis' (A)	44-65	Holland	1965
" 'Perle'	1586-51	England	1951
" 'Saturn'	231-60	Denmark	1960
" <i>wagneri</i>	646-60	France	1960
<i>Zanthoxylum ailanthoides</i>	1612-65	Japan	1965
" <i>alatum subtrifoliatum</i>	811-70	France	1970
" <i>rhoifolium</i>	757-65	W. Germany	1965
<i>Zelkova serrata</i> 'Variegata' (A)	674-67	England	1967



Unusual and Mysterious: The Black Pussy Willow

by RICHARD E. WEAVER, JR.

The Arnold Arboretum's next biennial plant dividend to our Friends will be a rooted cutting of *Salix melanostachys*, the Black Pussy Willow. We have always tried to offer plants that are both desirable and unusual, and this year's choice is no exception. The Black Pussy Willow is a most unusual plant in several respects. First, its origin is unknown and its exact classification is a matter of debate. It has been cultivated by the Japanese for years, but the plant is not known in the wild. Only a single clone exists, and this consists strictly of male plants. Therefore the status of *S. melanostachys* as a distinct species is thrown into considerable doubt. It has been classified as a variety of *S. gracilistyla*, but it differs from that very beautiful Japanese species in a number of important technical characteristics (e.g., non-silky catkins, hairless twigs, shorter scales, etc.) The Black Pussy Willow most likely arose as a hybrid between several willow species. It probably should be called by a cultivar name, and there are several Japanese ones available, but that will be for a willow specialist to decide.

The second unusual aspect of the Black Pussy Willow is the color of its catkins ("pussies"). Black is essentially nonexistent in the plant world. The very few so-called black flowers or other plant structures are invariably very dark shades of red and purple. So it is with *Salix melanostachys* (the species named from the Greek *melano*, meaning very dark, and *stachys* meaning spike or catkin.) The scales of the catkins are a very dark red-purple, beautifully contrasting with the brick-red anthers that turn to yellow as they mature. But do not expect the gigantic catkins seen on sprays of Pussy Willow sold in florist shops. The "pussies" of *S. melanostachys* are rather small, but they are profusely produced, and they are set on reddish twigs.

When your plant arrives, hopefully in April 1978, plant it outdoors, either in a nursery area or in its permanent place in your garden. Small as it may seem to be, it will grow quickly. Perhaps you should soak its roots in water for a few hours before planting, and surely protect it with stakes or chicken wire from lawn mowers and erring feet. Do not take pity on its small size and try to keep it indoors.

Now a few tips for siting and maintenance: (1) Willows tolerate or even prefer moist or soggy soil, but most, including *Salix melano-*

stachys, will do quite well in a drier, but not parched, situation. (2) The more sun the plant receives, the more compactly it will grow, and the more catkins it will produce. It will do reasonably well in partial shade, however. (3) The plant will grow to be a bushy shrub about 10 feet in height and spread. For a few years it may be a bit spindly, so judicious pruning may be required. (4) The catkins appear in early to mid-March, while the yellow, red, or copper flowers of the Witch Hazel, *Hamamelis* \times *intermedia*, are still in good shape, or while the flowers of the Cornelian Cherries, *Cornus mas* and *C. officinalis* are beginning to show color. Siting the Black Pussy Willow against any of these would produce a striking contrast.

The Black Pussy Willow is still rare in the United States. Our original stock was received in 1971 from the Kalmthout Arboretum in Belgium. Enjoy your plant, nurture it, and share it with friends. Cuttings root easily at nearly any time of year.



Collecting Expedition to Japan and Korea

by STEPHEN A. SPONGBERG and RICHARD E. WEAVER, JR.

Why send two of the Arnold Arboretum's staff members on a seed-collecting expedition to Japan and The Republic of Korea? The flora of the former country is about as well catalogued as that of any in the world; most of its outstanding ornamental woody plants are already in cultivation in the West; and several other American arboreta and botanic gardens have recently sponsored collecting expeditions to Japan.

These facts notwithstanding, there are several very good reasons why we embarked with enthusiasm and high expectations on September 1, 1977 for a six-week collecting trip marked by international goodwill and several botanical surprises. First, the Arnold Arboretum was the leader among American institutions in exploring the flora of temperate Asia, yet it had not sent an expedition since E. H. Wilson returned from Japan and Korea in 1918. The time was certainly due for the Arboretum to re-establish its contacts and interests in that part of the world. Second, many of Japan's fine ornamentals are represented in Western horticulture by relatively few original collections — collections that often were made in warmer parts of the country and the resulting plants are not reliably hardy in the northern United States. Could not collections of these same plants from areas with more rigorous climates increase the hardiness range of some fine ornamentals? Third, collections from wild sources, with minimal chances of being hybrids, are valuable for botanical study. And finally, Korea has been largely neglected by American plant explorers, yet in its flora are many plants otherwise known only from China (at present still inaccessible to us) and its climate is in some places more rigorous than that of much of New England.

The first week and a half of collecting were spent on Hokkaido, where our itinerary had been largely arranged by Dr. Tadao Ui, Director of the Botanic Garden of the Faculty of Agriculture of Hokkaido University in Sapporo. We were accompanied by Dr. Katsuhiko Kondo of Hiroshima University, and received support from many Japanese officials. The northernmost of Japan's four major islands, Hokkaido lies approximately between 41 and 45 degrees North Latitude, more or less equivalent to that of New England from southern



Cryptomeria japonica grove on the western, Japan Sea slope of Honshu at Yamadera. Trees in this area exceeded 100 feet in height. Photo: S. Spongberg.

Connecticut to central Maine. Collecting was concentrated in southern Hokkaido where the woody flora is particularly rich, this area being the meeting ground for both temperate and boreal elements. In one small area near Sapporo, the prefectural capital, 108 species of trees are native, the highest concentration in all of the North Temperate Zone. There, two broad-leaved evergreens of considerable ornamental value, *Skimmia japonica* and *Daphniphyllum macropodum* var. *humile*, were collected near the northern limit of their ranges.

With the help of Mr. Yojuuro Sato, a short excursion was made into central Hokkaido, where the temperature has gone as low as -40°C . Exciting collections in the lowland forest of this region included *Alangium platanifolium* var. *trilobum* and *Cephalotaxus harringtonia* var. *nana*, probably the northernmost representatives of these plants ever introduced into the United States. The primary objective in central Hokkaido was Mt. Daisetsu, a volcanic massif with still active vents and a very extensive alpine zone. At 2345 meters it is the highest point on the island. The alpine flora there is characterized by a great diversity of shrublets including species of *Rhododendron*, *Vaccinium*, *Empetrum*, *Loiseluria*, and *Sieversia*, a woody relative of *Geum*.

The second major portion of the trip was spent in the northern district of Honshu, the main Japanese island. Here we were accompanied by Dr. Kankichi Sohma, a palynologist from Tohoku University in Sendai, who is well versed in the Japanese flora, and one of his graduate students, Mr. Masamichi Takahashi. Collecting was concentrated on the higher mountains of the district, including: the volcanic Mt. Hakkoda, where *Abies mariesii* and *Tsuga diversifolia* were found at their northern-most stations, and seeds were collected from a dwarf *Hamamelis japonica*; the predominantly serpentine Mt. Hayachine where the most exciting finds were *Betula corylifolia* and *Acer distylum*, a maple with leaves like those of a linden; and the mountains of Nikko National Park where *Trochodendron aralioides*, a primitive evergreen tree, was collected near its northern limit at an elevation of 1000 meters.

In Korea, Mr. Carl Ferris Miller was our host. Several profitable days were spent in Mr. Miller's Chollipo Arboretum on the western coast of Korea south of Seoul, and nearby, seeds of *Koelreuteria paniculata*, the Golden Rain Tree, were collected from one of the two localities where the species is known in Korea. A stop at an old garden on the way back to Seoul yielded one of the trip's major surprises — a fine specimen, in fruit, of *Magnolia officinalis*, the Chinese Umbrella Magnolia, a species very rare in cultivation in the West.

Perhaps the most exciting excursion in Korea was to some of the higher mountains in the northeastern part of the country. Temperatures in this region fell to -30°C . during the winter of 1976-1977, so most of the plants growing there should be hardy at the Arnold Arboretum. Notable collections included *Magnolia sieboldii*, *Paulownia*

coreana, *Diospyros kaki*, the Oriental Persimmon, and *Sapium japonicum*, a small tree in the Euphorbia Family with beautiful autumn coloration, and one that is not even mentioned in Alfred Rehder's *Manual of Cultivated Trees and Shrubs*.

A total of 505 collections were made, representing 327 taxa in 69 families. Included were fifteen species of maple, nine of birch, five of alder (some of which are very beautiful trees), nine of viburnum, six of euonymus, and five of magnolia. With the exception of a single package, of which there fortunately was a duplicate, all of the material arrived safely at the Arnold Arboretum and is now being processed at the Dana Greenhouses. Eventually, representatives will be added to the living collections of the Arnold Arboretum, bolstering our already impressive collection of Oriental plants; others will be used for staff research projects, and the excess will be distributed to other arboreta and botanic gardens.

A future issue of *Arnoldia* will feature a full length article detailing more fully the itinerary, the plants collected, and the people met en route.



Fruit aggregates of *Magnolia hypoleuca*, Japanese White Bark Magnolia, collected on Mt. Hayama in the Yamadera region. Photo: S. Sponberg.



ARNOLDIA REVIEWS

Concord Areas Trees. Ray Angelo. Bedford, Mass.: Concord Field Station. 39 pages, illustrated. \$1.50.

This is an attractive booklet for the identification of tree species growing wild in the area of Massachusetts' Concord Field Station. The instructions for the use of the guide suggest obtaining tree fruits, if these are available, and matching them against the 43 illustrations. Page references then refer the reader to species grouped according to leaf characteristics: needle- or scale-like, alternate or opposite, simple or compound. Within these categories, leaf drawings offer a further aid to identification, aided by brief descriptions of the plants, their habitats and their common and scientific names. A bibliography suggests both popular and technical volumes for further study. This book will serve well as a primer for students and visitors to the Concord area.

RICHARD A. HOWARD

Mille et Un Livres Botaniques, Répertoire Bibliographique de la Bibliothèque Arpad Plesch. Bruxelles: Arcade. 517 pages, 34 colored plates, 36 black and white illustrations. Belgian francs 3900.

This handsomely produced volume is the second catalogue of the botanical and horticultural library of the late Dr. Arpad Plesch (1890-1974) who in 1939 established an experimental garden on the French Riviera, a garden whose aim, he said, was "... to enrich the flora of Europe by the introduction and acclimation of new tropical plants" The first catalogue was prepared in 1954 by Jacques Pley: *Bibliothèque Arpad Plesch La Leonina I. Botanique*. The present catalogue was compiled by Henry-Pierre Gourry.

The catalogue provides complete bibliographic descriptions of many more than the "mille et un livres" of the title, with annotations culled from many sources, but notably from the *Catalogue of Botanical Books in the Collection of Rachel MacMasters Miller Hunt*, as well as Blunt's *The Art of Botanical Illustration* and Nissen's *Die botanische Buchillustration*.

An overview of botanical literature in French and English, from its beginnings through the nineteenth century, is provided in the form of an introductory essay that would have been more helpful had the accompanying black and white illustrations followed the text more closely. The English rendering is marred for the English speaking reader by numerous infelicities of translation. The annotations in the catalogue itself, when from a source other than French, are sometimes attributed, sometimes not; sometimes set apart by quotation marks, sometimes in italics. This lack of uniformity of style is disturbing, and means that the reader must seek out the original annotation. The introductory essay is followed by an alphabetical list of the authors and main works, "from the origins to the nineteenth century," although the entire work is itself a dictionary catalogue, including, it must be said, some twentieth century titles.

There are numerous indices: principal illustrators, a topical subject index, Latin names of cities, and an index of Latin abbreviations and their meanings in German, French and English, to mention but a few. A useful

table of eighteenth century paper sizes (taken from the Hunt catalogue) is given, as is an explanation of the calendar of the French Republic. The generous indexing, however, inspires little confidence — a fault of poor proofreading that let stand such barbarisms as Goëbel for Goebel; as well as Goëthe and Goethe for Goethe.

The Plesch collection as represented by this catalogue no longer exists. The collection was sold at auction by Sotheby's in three sales: June 16-17 and November 17-18, 1975, and March 15-16, 1976. For that reason, if for no other, the catalogue is valuable as a source of reference for the many rare or unique items and the interesting bindings and association copies. It is, however, a source to be consulted with some reservations in view of the many flaws in its execution. It will be most helpful if used in conjunction with the authoritative Hunt catalogue, and, for English botanical and horticultural literature, the recent superb volumes by Blanche Henrey. For works unique to the Plesch Collection, the present volume will serve if used with the Sotheby sales catalogue (3 volumes, 1975-1976) which provides a useful index of provenance.

The book itself, although attractively bound with slip case, is supported in the binding by the paste-down endpapers alone, and will not serve for long without strengthening at the hinges. It is to be hoped that the copies printed on rag paper and bound in full leather will be a more lasting memorial to Dr. Plesch.

LENORE M. DICKINSON

A History of the Orchid. Merle A. Reinikka. Coral Gables, Fla.: University of Miami Press. 316 pages, black and white illustrations. \$15.00.

Orchids were first named when Theophrastus, writing in the fourth century B.C., spoke of their medicinal properties. It was not until the seventeenth century that Europeans began to enjoy them for their beauty, though in the Orient they had been admired for their scent since the time of Confucius. In the nineteenth century, an orchid mania struck England. The sixth Duke of Devonshire paid one hundred guineas for a white Philippine *Phalaenopsis*, while particularly rare specimens commanded up to seven hundred pounds. Today, orchid societies draw as many as 1,500 members to their meetings, and the classification and hybridization of these lovely plants is a continuing challenge.

A prodigious amount of research has gone into this history of the orchid. The author states that with the amount of material he had accumulated he could have written an entire encyclopedia on orchidology. His first section deals with the history, cultivation, and scientific application of orchids and includes a guide to orchid literature. The second section comprises short biographies of the leading figures in orchid history, from Linnaeus to Oakes Ames.

This is a book that should be of great interest to orchid growers, though its specialization will not appeal to a wider public.

CORA WARREN

American Gardens in the Eighteenth Century "For Use or For Delight." Ann Leighton. Boston, Mass.: Houghton Mifflin Company. 514 pages; illustrated. \$17.50 hardcover.

When, in 1970, Ann Leighton published *Early American Gardens*, Walter Muir Whitehill, in an enthusiastic review, exclaimed, "What a perfectly enchanting book!" This present volume surpasses even Mr. Whitehill's encomiums.

A most impressive amount of research has been done, and this is presented in a witty and charming manner. Contemporary sources are copiously quoted on every aspect of both English and American gardening of the period, with an imaginative selection of eighteenth century prints scattered throughout the clear and comprehensive text.

The book begins with chapters on the history of the horticultural development of the Southern and Northern states and continues with detailed accounts of husbandry, naturalists' and botanists' and nurserymen's lists. The correspondence and the records of seed and plant exchanges that took place among such eminent people as Washington, Jefferson, Bartram, Collinson and many others make fascinating reading. There are chapters on medicines, the changing style in gardens (from formal to natural), and chapters on vegetables, fruits and flowers with contemporary, annotated lists of those grown.

There is a 104-page index of the plants most frequently cultivated in eighteenth century gardens with many indigenous flowers added to the list. Each plant is identified by its correct botanical name, and the majority are accompanied by encapsulated accounts of eighteenth century comments on them.

For those interested in horticulture this is a book through which it is a joy to browse. The historian will find a refreshing new approach to America's beginnings, and for those who wish to restore an eighteenth century garden to its original aspects, this work is an essential tool.

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Shad or *Serviceberry* (*Amelanchier canadensis*). Photo: A. Bussewitz. Photographs by Alfred Bussewitz in this issue appeared in "Bark Is Beautiful," an exhibit of his work that was featured at the Arnold Arboretum last winter. Mr. Bussewitz has recently retired as Director of the Massachusetts Audubon Society's Rocky Knoll Nature Center in Milton.

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