

CULTIVAR CHECKLIST FOR ENGLISH OAK (*QUERCUS ROBUR*)

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Abstract. Cultivars of the English oak (*Quercus robur*) are described and discussed. Most English oak cultivars currently available in the nursery trade are propagated by seed and, although selected to a standard as seedlings in the nursery, they still possess considerable genetic diversity in many characteristics. Such cultivars are not "clones", and the potential variation in non-morphological traits must be appreciated when selecting cultivars for planting or assessing their performance.

In compiling cultivar checklists of landscape trees over the past few years, we have become acutely aware that each genus represents its own set of problems. Such is certainly the case in the oaks (*Quercus* sp.), which are probably the most numerous and widespread broadleaved trees in the North Temperate Zone.

There are no recent authoritative monographs on *Quercus*; and the delineation of subgenera is still not settled. Furthermore, the methods of propagation and maintenance of cultivars in *Quercus* demands special treatment. There are also problems of how best to present the checklists, given the format we use and the restriction on length imposed by publication in a journal. Thus, we have chosen to initiate what must be a series on oak cultivars with an analysis of the cultivars of the so-called English oak (*Q. robur* L.). This species belongs to the subgenus *Quercus* (= subg. *Lepidobalanus* Endl.), the white oaks, and is the most widely planted exotic oak in the United States. In addition, the wide range of cultivars in this species will allow us to address problems of cultivar definition that will be met throughout the genus. The English oak was once known as *Q. pendunculata* Ehrh., and many of the cultivars listed below were selected and described under this Latin epithet.

Even before the concept of "cultivar" was introduced in 1953, the variants selected and grown for horticultural purposes have posed problems of classification. Rehder (7) listed 11 "varieties" of *Q. robur* in his "Manual", but in his "Bibliog-

raphy" (8), he changed all of these to the rank of formae. The utilization of the cultivar concept has not necessarily clarified the situation.

Part, or perhaps most, of the trouble in determining what oak variants are truly cultivars is the lack of knowledge about their method of propagation. In many other genera, it was obvious from the references, or from current production techniques, that most of the cultivated selections were vegetatively propagated by grafting or from cuttings. Thus, there would be little doubt they could be termed "cultivars", according to the strictest interpretation of the "Code" (1). However, oaks do not readily root from cuttings and grafting propagation of oak cultivars has virtually ceased in North American nursery practice because of significant problems of graft incompatibility. It is unlikely that oak grafting was any easier a century ago, but the propagation of even a few plants may have constituted sufficient "success" for preservation in arboreta, botanical gardens, or private plant collections.

So, let us assume that the propagation and production of most of the variants in *Quercus*, especially the more "popular" or widely grown selections, was primarily by seed. This does not mean that the deviant characteristics were entirely genetically "dominant", but merely that those characteristics were present in a sufficient proportion of the seed-propagated population to make their propagation by seed a desirable or profitable technique.

The most recent edition of the Code (1, Article 11c) lists, among the acceptable cultivar categories, "A cultivar consisting of cross-fertilized individuals which may show genetical differences but having one or more characters by which it can be differentiated from other cultivars". Thus, the Code allows for seed-propagated cultivars. However, the examples given in the Code in support of this category relate only to progenies in which

each and every individual grown from this seed possesses the particular distinguishing characteristic of that cultivar. The Code does not, and perhaps cannot, deal specifically with seed-propagated cultivars selected to certain standards by nurserymen from seedling populations in which the proportion of plants having the distinguishing characteristic(s) may vary widely from year to year, and from nursery to nursery, depending on the genetic backgrounds of both the seed-bearing tree and those trees acting as pollinators.

Let us consider 'Fastigiata', which is probably the most widely grown English oak cultivar in the United States.

The crown form or growth habit of trees is frequently considered a complex characteristic controlled by many genes, and this may be true. However, there is ample evidence that crown habit is strongly inherited in *Quercus*. Irgens-Moller (4) cited the experiments of Oppermann (5) in Denmark that showed a strong positive correlation between the form of the mother tree and that of its progeny in *Q. robur*. Furthermore, Oppermann stated that pendulous progeny were found in each of three open-pollinated generations grown from seed of a tree with pendulous branches. Piatnitsky (6) reported that the fastigate growth habit of *Q. robur* was a dominant characteristic, and Esson (2) found that two of three seedlings grown from acorns of a fastigate tree were also fastigate.

We can assume that different nurseries might obtain their seed for the propagation of 'Fastigiata' from different fastigate trees. Likewise, these fastigate seed-trees may have come from different sources. Are all of the trees within pollinating distance of each fastigate tree of "normal" form or are there several fastigate trees growing together? If there are several fastigate trees within pollinating distance, do they have a common origin? If they do, what will be the effects of inbreeding (crossing between trees of common parentage)? There are usually no answers to these questions. Thus, all we can expect from the final crop sold under the name 'Fastigiata' is that the trees will be fastigate. We should not be surprised that some are narrower, and some are wider, or that some are quite susceptible to powdery mildew while others seem to be resistant. By culling out inferior plants and by careful selection during the

time the trees are in the nursery, the nurseryman may arrive at a final product that may, indeed, resemble a clone.

As noted in our cultivar listings, nurserymen in the Netherlands have long been aware of the potential problems that could arise if each of them sought to produce fastigate English oak. Therefore, it has been mandated that within the Netherlands, the cultivar name 'Fastigiata' may only be applied to plants produced by the Koster Nursery. It is doubtful whether this type of regulation would be possible in the United States.

As testimony to the strong heritability of the fastigate growth habit, there are more than 20 cultivars which combine fastigate form with various abnormal leaf characteristics. Presumably these arose in cultivation from cross-pollination between fastigate trees and trees having the different leaf types.

The leaf characteristics of English oak are also heritable. Funk (3) reported that 29% of the seedlings from a tree with white-variegated leaves also exhibited various degrees of variegation. The general inheritance of reddish leaves resulting from anthocyanin pigmentation is well known from experience in Norway maple and the "copper" European beech. Leaf shape variation, either unlobed or with deep lobes, is also passed on to a variable proportion of the progeny. We grew open-pollinated seedlings from the cultivar 'Salicifolia' at the U.S. National Arboretum, and were able to select nearly 30% unlobed seedlings that appeared to be quite uniform. However, some of these seedlings were very susceptible to powdery mildew, while others were resistant.

There are two options available for dealing with these seed-propagated progenies containing varying proportions of plants with the desired characteristic(s). We can accept them as cultivars or create a new nomenclatural category. We believe they should be treated as cultivars. "Cultivar" refers to variants that are cultivated and the final crop of plants sold for landscape use are the ones "cultivated." It matters not whether that final crop constitutes 90% or 10% of the original seedlings. As long as the plants sold possess the characteristics "as advertised", they constitute a cultivar. Rigid selection procedures in the nursery must be practiced.

Certain old and valid cultivar names, such as 'Fastigiata', are well established and quite descriptive and probably should be retained in the trade. However, if nurserymen produce other seed-propagated fastigiate cultivars with outstanding landscape potential, especially pest resistance, and the morphological characteristics approach those of a previously described cultivar, they should not use the older name 'Fastigiata'. In such cases, new cultivar names should be applied, with adequate description and International registration to differentiate the new cultivars from any others.

The listings that follow show the range in variation possible within English oak, and which may be possible in many oak species. For the purposes of this list, we have used boldface capitals for **VALID CULTIVAR** names and lightface capitals for **INVALID CULTIVAR** names.

ACUTILOBA (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 618) — as *Quercus pedunculata acutiloba*; leaves with short, pointed lobes.

ALBOMARMORATA (C. van Kleef, Sieboldia 3(46): 374-377, 1877) — as *Q. pedunc. albo-marmorata*, leaves marbled with white. According to B.K. Boom, Nederl. Dendrol. Ver. Jaarb. 20: 37-120, 1954-55, this tree was first described (and perhaps found) by C. de Vos, Woordenboek, 1867, p. 99, as *Q. pedunculata fol. arg. marmorata*.

ALPHA (H.J. Grootendorst, Dendroflora Nr. 17, 1980, p. 24-33) — upright with pyramidal crown, branches at an angle of about 30° from main trunk; a selection of the N.A.K.B. (Nederlandse Algemene Keuringsdienst voor Boomkwekerij — General Netherlands Inspection Service).

ARGENTEA (L. Dippel, Handbuch der Laubholzkunde 2, 1892, p. 63) — as *Qu. ped. argentea*; leaves with yellowish-white tips or spots.

ARGENTEO-MARGINATA (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 625) — as *Quercus pedunculata foliis argenteo-marginatis* Hort.; leaves glossy-green and somewhat bluish, with an irregular, but sharply defined white border. Name ending changed to correct orthography (B.K. Boom, Nederl. Dendrol. Ver. Jaarb. 29: 37-120, 1954-55).

ARGENTEO-PICTA (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 625) — as *Quercus pedunculata foliis argenteo-pictis*; first leaves in spring are green, but second or summer growth almost completely white, later becoming green and white marbled. Name ending changed to correct orthography (B.K. Boom, Nederl. Dendrol. Ver. Jaarb. 20: 37-120, 1954-55).

ARGENTEOVARIEGATA (B.K. Boom, Nederl. Dendrol. Ver. Jaarb. 20: 37-120, 1954-55) = **VARIEGATA**.

ARGENTEO-VARIEGATA ELEGANS (T. Ottolander, Sieboldia 5(16): 124-126, 1879) — as *Q. ped. arg. var. elegans*; without description.

ARGENTEO-VARIEGATA NOVA (T. Ottolander, Sieboldia

5(16): 124-126, 1879) — as *Q. ped. arg. varieg. nova*; leaves large and marbled dull white.

ASPENIIFOLIA (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 622) — as *Quercus pedunculata asplenifolia* Hort.; leaves with numerous, very deep, pointed and narrow lobe-like incisions; thin, pendulous branches; tree of smaller size than the species.

ASPENIFOLIA GRACILIS (H. Jager and L. Beissner, Die Ziergeholze, Ed. 3, Weimar, 1889, p. 289) — as *Q. pedunculata asplenifolia gracilis*; without description.

ATROPURPUREA (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 626) — as *Quercus pedunculata foliis atropurpureis* Hort.; with dark brown-violet foliage, similar to copper beech; its origin is uncertain. According to W.J. Bean, Trees and Shrubs Hardy in the British Isles, Ed. 8, vol. III, 1976, p. 510, this tree is very slow-growing, only reaching 30 or 40 feet in height.

ATROSANGUINEA (E. Petzold and G. Kirchner, Arboretum Muscaviense, 1864, p. 626) — as *Qu. p. atrosanguinea* Hort.; in synonymy with **ATROPURPUREA**.

AUREA (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 624) — as *Quercus pedunculata aurea* Hort.; leaves with broad golden-yellow bands; obtained from the Travemunder Nursery as *Qu. sessilis aurea*.

AUREA ELEGANS (C. van Kleef, Sieboldia 3(46): 374-377, 1877) — as *Q. pedunculata aurea elegans*; leaves large, flamed with dull yellow.

AUREA ELEGANTISSIMA (L. Dippel, Handbuch der Laubholzkunde 2, 1892, p. 63) — as *Qu. ped. aurea elegantissima*; leaves yellow-green, wide golden-yellow stripes, or also with completely green-yellow leaves. May = **AUREA ELEGANS**.

AUREA LEUCOCARPA (W.J. Bean, Trees and Shrubs Hardy in the British Isles, Ed. 8, vol. III, 1976, p. 508) — probably = **AUREA**.

AUREO-BICOLOR (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 624) — as *Quercus pedunculata aureo-bicolor*, leaves with numerous, yellow and white streaks, therefore appearing tri-colored; name apparently taken from a nursery catalog (James Booth and Sons, Flottbeck, Germany).

AUREO-MARGINATA (K. Koch, Dendrologie 2, Part 2, 1873, p. 29) — with yellow-bordered leaves, as in 'Aureo-variegata'. Koch did not differentiate between the two. Considered invalid because of the confusion of identical descriptions.

AUREO-MACULATA (T. Ottolander, Sieboldia 5(16): 124-126, 1879) — as *Q. ped. aureo-maculata*; with irregular spots often on the margin of the leaf.

AUREO-VARIEGATA (K. Koch, Dendrologie 2, Part 2, 1873, p. 29) — with yellow-bordered leaves, as in 'Aureo-marginata'. Koch did not differentiate between the two. Considered invalid because of the confusion of identical descriptions.

BETA (H.J. Grootendorst, Dendroflora Nr. 17, 1980, p. 24-33) — upright with more or less ovate crown, branches at 30° angle; a selection of the N.A.K.B. (Nederlandse Algemene Keuringsdienst voor Boomkwekerij — General Netherlands Inspection Service).

BIFORMIS (E. von Arnim, Mitt. Deutsch. Dendr. Ges. 28: 322, illus., 1919) — as *Quercus pedunculata biformis*; tree approximately 100 years old, growing in the author's garden in Zernikow, lower leaves on all shoots are unlobed and smaller than normal, upper leaves are deeply lobed as is usual for the species, leaves in the middle of the

- shoot show the transition between the two leaf forms.
- BULLATA** (David, Rev. Horticole 5: 168-170, 1846) — name found in catalogs from Germany or countries near Germany; probably = **CUCULLATA**.
- COCHLEATA** — According to B.K. Boom, Nederl. Dendrol. Ver. Jaarb. 20: 37-120, 1954-55, this name was applied by the nursery of J. Makoy, Luik (Liege), Belgium, Cat. no. 116, p. 25, 1874, to a selection considered more correctly named 'Contorta' = **CONTORTA**.
- COLUMNEA** — Name found in the records of the Plant Sciences Data Center of the American Horticultural Society; plant at Longwood Gardens, Kennett Square, Pennsylvania, PI 265643. However, according to the USDA Plant Inventory No. 168, p. 123, 1960, this tree was obtained from H.A. Hesse (nursery), Weener, West Germany, as *Quercus petraea* (Mattuschka) Lieblein 'Columna'.
- COMBLEAF** (H.P. Kelsey and W.A. Dayton, Standardized Plant Names, 1942, p. 508) = **PECTINATA**.
- COMPACTA** (Royal Gardens, Kew Hand-list of Trees and Shrubs Grown in Arboretum, 1896, Part II, p. 195) — as *Quercus pedunculata* var. *compacta*, Hort.; without description.
- COMPLICATA** (T. Ottolander, Sieboldia 5(16): 124-126, 1879) — as *Q. ped. fol. complicatis*, similar to 'Heterophylla' but leaves narrower and more curled up.
- COMPTONIIFOLIA** (K. Koch, Dendrologie 2, Part 2, 1873, p. 27) — with an intermediate leaf form between 'Fenessii' and 'Salicifolia', brought into the trade as *Qu. comptoniaefolia*. A. Lavalée, Arb. Segrezianum, Paris, 1877, p. 200, listed *Q. pedunculata Fenessii dissecta (comptoniaefolia)*, apparently as a synonym of this selection.
- CONCORDIA** (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 625) — as *Quercus pedunculata Concordia* Bth. Cat.; leaves entirely yellow, received from the Flottbecker Nursery (James Booth and Son, Flottbeck, Germany) but thought to have come from France. According to W.J. Bean, Trees and Shrubs Hardy in the British Isles, Ed. 8, vol. III, 1976, p. 508, this selection appeared at Van Geerts' nursery, Ghent, Belgium, about 1843 and had reached England by 1868.
- CONTORTA** — According to B.K. Boom, Nederl. Dendrol. Ver., Jaarb. 20: 37-120, 1954-55, this selection was given two different names in the same year; C. de Vos discovered it in the nursery Bakhuizen, Boskoop, the Netherlands, and described it as *Q. pedunculata contorta* (Sempervirens 3, p. 302, 1874) and the nursery J. Makoy (see **COCHLEATA**) introduced it as *Q. robur cochleata* in the same year. We have accepted 'Contorta' as valid in accordance with B.K. Boom (l.c.) and G. Krussmann, Handbuch der Laubgehölze, Berlin, 1978, vol. 3, p. 106; leaves cochleariform (spoon-shaped), with normal lobes.
- CRISPA** (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 618) — as *Qu. p. crispa*; foliage dark green, underside of leaves pale green, margins curled.
- CRISTATA** (A. Henry, Gard. Chron. 61: 34, 1917) — as *Quercus pedunculata* var. *cristata*; tree growing in Savernake Forest, Wiltshire, England, known locally as the Cluster oak; leaves small, clustered together (owing to the reduced shoot growth), twisted, very oblique, the midrib dividing blade into two unequal parts; characteristics coming true from acorns collected from the parent tree. According to W.J. Bean, Trees and Shrubs Hardy in the British Isles, Ed. 8, vol. III, 1976, p. 509, the present garden stock is almost certainly descended from acorns from the original tree.
- CUCULLATA** (David, Rev. Horticole 5: 168-170, 1846) — as *Quercus pedunculata cucullata*; apparently known in German catalogues under the name "bullata" which is more suited to the plant since the leaves are convex and not hooded; the name 'Cucullata' is retained since it was introduced as such in France; leaves with nearly regular serration rather than lobes, and the margins are contracted to produce a convex upper surface.
- CUCULLATA LONGIFOLIA** (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 622) — as *Quercus pedunculata cucullata longifolia*; leaves long and narrow, shallow-lobed or nearly entire and blistered.
- CUCULLATA MACROPHYLLA** (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 622) — as *Quercus pedunculata cucullata macrophylla*; leaves larger than those of 'Cucullata'.
- CUCULLATA MICROPHYLLA** (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 622) — as *Quercus pedunculata cucullata microphylla*; leaves very small, obovate, shallow-lobed or nearly entire, severely blistered; plant of dwarf, shrub-like habit.
- CUCULLATA VARIEGATA** (T. Ottolander, Sieboldia 5(16): 124-126, 1879) — as *Q. ped. cucullata fol. elegans varieg.*; leaves somewhat curled toward the underside, edges with bright golden spots.
- CUPREA** (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 626) — as *Qu. p. foliis cupreis* Hort.; originated in England, similar to 'Purpurea' but of less decided coloration; the leaves in unfolding are likewise purple, later more red-green, of a copper-like color. Name changed to correct orthography.
- CUPRESSOIDES** (B.K. Boom, Nederl. Dendrol. Ver. Jaarb. 20: 37-120, 1954-55) — as *Quercus robur* L. cv. 'Cupressoides'. This name is apparently based on a tree originally described as *Qu. p. fastigiata cupressinoides* (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 620). We can find no reason to change the name having priority, and to maintain uniformity with many of the older fastigiata cultivars, we have retained **FAS-TIGIATA CUPRESSINOIDES**.
- DAUVESSE** (H.P. Kelsey and W.A. Dayton, Standardized Plant Names, 1942, p. 508) = **DAUVESSEI**.
- DAUVESSEI** (B.K. Boom, Nederlandse Dendrologie, Wageningen, 1972, p. 130) — as *Q. r. var. dauvessei* (de Vos) R., a synonym for **PENDULA**. Should = **PENDULA DAUVESSEI**.
- DISSECTA** (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 618) — as *Qu. p. dissecta*; leaves with numerous deeply cut lobes.
- DIVERSIFOLIA** (A. Lavalée, Arb. Segrezianum, Paris, 1877, p. 199) — as *Q. pedunculata diversifolia*, without description.
- DOUMETII** (E. Andre, Rev. Horticole 66: 17-18, 1894) — as *Quercus pedunculata Doumeti*; a chance seedling discovered in the Arboretum of Baleine, France and named for M. Doumet-Adanson; introduced into commerce by the nursery Treyve, Moulins, France; leaves lacinate. Name changed to correct orthography.
- ELEGANS TRICOLOR** (L. Beissner, E. Schelle, and H. Zabel, Handbuch der Laubholz-Benennung, Berlin, 1903, p. 81) — as *Quercus peduncul. elegans tricolor*; leaves with multi-colored variegation.
- FASTIGIATA** (J.C. Loudon, Arboretum et Fruticetum Britannicum, London, 1838, vol. 3, p. 1731-1732) — as *Q. p. fastigiata*, based on *Q. fastigiata* Lam. Dict. 1. p. 725

- (1785); resembling in general form the Lombardy poplar, questionably native to the Western Pyrenees. Considered a botanical forma by O. Schwarz, Monog. Eich. Eur. 1: 107, 1937. Since the fastigate characteristic comes true from seed, the N.A.K.B. (Nederlandse Algemene Keuringsdienst voor Boomkwekerij — General Netherlands Inspection Service) has exclusively applied the name, as a cultivar, to material sold by D.A. Koster (Nurs.), Boskoop, the Netherlands (H.J. Grootendorst, Dendroflora Nr. 17, 1980, p. 24-33). However, among seed propagated material there will be a degree of variation in the fastigate growth habit, and nurseries throughout the world may obtain seed from various trees.
- FASTIGIATA AHLFVENGRENII** (L. Beissner, E. Schelle, and H. Zabel, Handbuch der Laubholz-Benennung, Berlin, 1903, p. 79) — as *Quercus peduncul. fastig. Ahlfvengrenii* C. Boile.; without description.
- FASTIGIATA ATROPURPUREA** (A. Lavalley, Arb. Segrezianum, Paris, 1877, p. 199) — as *Q. pedunculata fastigiata foliis atropurpureis*, without description.
- FASTIGIATA AUREO-BICOLOR** (A. Lavalley, Arb. Segrezianum, Paris, 1877, p. 199) — as *Q. pedunculata fastigiata aureo-bicolor*, without description.
- FASTIGIATA AUREO-PUNCTATA** (H. Jager and L. Beissner, Die Ziergeholze, Ed. 3, Weimar, 1889, p. 289) — as *Q. pedunculata fastigiata foliis aureo-punctatis*; yellow-variegated-leaved "pyramidal" oak.
- FASTIGIATA CUCULLATA** (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 620) — as *Quercus pedunculata fastigiata cucullata* Hort.; of pyramidal growth, leaves with narrow, pointed, almost tooth-like lobes and very strongly concave, light-colored.
- FASTIGIATA CUPRESSINOIDES** (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 620) — as *Qu. p. fastigiata cupressinoides* Hort.; Cypress-like pyramidal oak; with narrow, oblong leaves.
- FASTIGIATA ELATA** (A. Lavalley, Arb. Segrezianum, Paris, 1877, p. 199) — as *Q. pedunculata fastigiata elata*; without description.
- FASTIGIATA EXCELSA** (H. Jager and L. Beissner, Die Ziergeholze, Ed. 3, Weimar, 1889, p. 289) — as *Q. fast. excelsa* (de Vos); vigorous growth, therefore the branches are less inclined to turn down.
- FASTIGIATA GRANGEI** (Royal Gardens, Kew Hand-list of Trees and Shrubs Grown in Arboretum, 1896, Part II, p. 197) — as *Quercus pedunculata* var. *fastigiata Grangei*, Hort.; without description.
- FASTIGIATA HETEROPHYLLA** (A. Lavalley, Arb. Segrezianum, Paris, 1877, p. 199) — as *Q. pedunculata* var. *fastigiata heterophylla*; without description.
- FASTIGIATA MACROPHYLLA** (A. Lavalley, Arb. Segrezianum, Paris, 1877, p. 200) — as *Q. pedunculata fastigiata macrophylla*; without description.
- FASTIGIATA MONSTROSA** (T. Ottolander, Sieboldia 5(16): 124-126, 1879) — as *Q. ped. fastigiata monstrosa*; with large leaves.
- FASTIGIATA NOVA GRANGEI** (L. Dippel, Handbuch der Laubholzkunde 2, 1892, p. 62) — as *Q. pedunculata fastig. nova Grangei*; with somewhat vigorous growth, branches steeply ascending.
- FASTIGIATA OXYACANTHIFOLIA** (L. Beissner, E. Schelle, and H. Zabel, Handbuch der Laubholz-Benennung, Berlin, 1903, p. 80) — as *Quercus peduncul. fastig. oxyacanthifolia* Hort.; without description.
- FASTIGIATA PUNCTATA** (C. van Kleef, Sieboldia 3(46): 374-377, 1877) — as *Q. pedunc. fastigiata fol. punctatis*; leaves with bright white punctuation, young leaves marked with red; obtained from the nursery of C. de Vos, Hazerswoude, the Netherlands.
- FASTIGIATA PURPUREA** — according to G. Krussmann, Handbuch der Laubgeholze, Berlin, 1978, vol. 3, p. 107, this selection was raised from seed of 'Fastigiata' by the nurseryman Klenert of Graz, Austria, about 1895; pyramidal form, young growth and leaves dark purple, gradually becoming very dark green.
- FASTIGIATA RUBRA** — according to W.J. Bean, Trees and Shrubs Hardy in the British Isles, Ed. 8, vol. 3, 1976, p. 509, nothing is known of this selection "offered by the Lawson Company of Edinburgh earlier in the last century, but presumably it was similar" to 'Fastigiata Purpurea'.
- FASTIGIATA TORTUOSA** (Royal Gardens, Kew Hand-list of Trees and Shrubs Grown in Arboretum, 1896, Part II, p. 197) — as *Quercus pedunculata* var. *fastigiata tortuosa* Hort.; without description.
- FASTIGIATA VARIEGATA** (Royal Gardens, Kew Hand-list of Trees and Shrubs Grown in Arboretum, 1896, Part II, p. 197) — as *Quercus pedunculata* var. *fastigiata variegata* Hort.; without description.
- FASTIGIATA VIRIDIS** (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 620) — as *Quercus pedunculata fastigiata viridis* Hort.; leaves somewhat darker and of firmer texture than those of 'Fastigiata'.
- FENNESSI CUPREIS** (A. Lavalley, Arb. Segrezianum, Paris, 1877, p. 200) — as *Q. pedunculata Fennesii cupreis*, without description; with the synonym *Q. Robur nigra* Hort. — Fl. des serres, XVII, tab. 1783 = **NIGRA**.
- FENNESSII** — according to W.J. Bean, Trees and Shrubs Hardy in the British Isles, Ed. 8, vol. 3, 1976, p. 510, this selection was raised by the nursery Fennessey and Son of Waterford, Ireland, about 1820; J.C. Loudon, Arboretum et Fruticetum Britannicum, London, 1838, p. 1732-1735 (illus.), included it in his var. *heterophylla* and therefore it has erroneously acquired the cultivar name 'Heterophylla'. Leaves variously shaped, some long and narrow without lobes, others deeply and raggedly cut, usually hang loosely from branches.
- FILICIFOLIA** (W. Neubert (ed.), Deutsches Magazin, 1855, p. 31-32, illus.) — as *Quercus filicifolia*; propagated by Alfred Topf (nurseryman), Erfurt, Germany, from a tree which apparently arose as a seedling of *Quercus pedunculata*, leaves fern-like, back of leaves with strong venation, a generally pyramidal tree.
- FURST SCHWARZENBERG** (L. Dippel, Handbuch der Laubholzkunde 2, 1892, p. 64) — as *Qu. ped. Furst Schwarzenberg*; leaves of second growth of shoot with white spots, leaves at the tip of the shoot pink. Original seedling was found before 1884 in the horticulture school at Eisenberg in Moravia (Czechoslovakia) and was propagated by the Spath nursery, Berlin, beginning in 1884 (H.L. Spath, Mitt. Deutsch. Dendr. Ges. 22: 118-144, 1913).
- GAMMA** (H.J. Grootendorst, Dendroflora Nr. 17, 1980, p. 24-33) — tree with broad crown and heavy branches at 90° - 45° angle from the trunk; a selection of the N.A.K.B. (Nederlandse Algemene Keuringsdienst voor Boomkwekerij — General Netherlands Inspection Service).
- GOLDEN** (H.P. Kelsey and W.A. Dayton, Standardized Plant Names, 1942, p. 508) = **CONCORDIA**.
- GRACILIS** (K. Koch, Dendrologie 2, Part 2, 1873, p. 28) — a

selection cultivated in France as *Qu. gracilis*; with a slender, somewhat weak habit, whose elongate leaves are dentate or slashed.

GRANBYANA (Royal Gardens, Kew Hand-list of Trees and Shrubs Grown in Arboretum, 1896, Part II, p. 197) — as *Quercus pedunculata* var. *granbyana* Hort.; without description. According to G. Krussmann, *Handbuch der Laubgehölze*, Berlin, 1978, vol. 3, p. 108, this selection is probably only in cultivation in England; growth broadly conical.

HENTZEI (L. Beissner, E. Schelle, and H. Zabel, *Handbuch der Laubholz-Benennung*, Berlin, 1903, p. 80) — as *Quercus peduncul. hentzei* Hort.; without description.

HETEROPHYLLA — First considered as a variety of *Q. pedunculata* by J.C. Loudon, *Arboretum et Fruticetum Britannicum*, London, 1838, vol. 3, p. 1732-1735, who stated several selections of this "variety" were being grown, as well as seedlings which came fairly true from seed. A. Rehder, *Bibliography of Cultivated Trees and Shrubs*, Arnold Arboretum of Harvard University, 1949, p. 131, stated that K. Koch, *Dendrologie 2*, Part 2, 1873, p. 27, considered this name as a forma. We consider the name *heterophylla* valid at the cultivar level.

HETEROPHYLLA CUCULLATA (L. Beissner, E. Schelle, and H. Zabel, *Handbuch der Laubholz-Benennung*, Berlin, 1903, p. 80) — as *Quercus peduncul. heterophylla cucullata* Hort.; without description, but with the synonym *Quercus peduncul. diversifolia cucullata* Hort.

HETEROPHYLLA DISSECTA (E. Petzold and G. Kirchner, *Arboretum Muscaviense*, Gotha, 1864, p. 624) — as *Quercus pedunculata heterophylla dissecta* Hort.; very similar to 'Heterophylla' but distinguished by its weaker and more compact growth, leaves also smaller and of a firmer consistency, with numerous deeply cut and pointed lobes.

HETEROPHYLLA HENTZEI (T. Ottolander, *Sieboldia 5*(16): 124-126, 1879) — as *Q. ped. heterophylla hentzei*, a propagated form of the "Heterophylla-type". This may be the same selection mentioned by E. Petzold and G. Kirchner, *Arboretum Muscaviense*, Gotha, 1864, p. 624, which was received from the garden director Hentze at Cassel, France; very similar to 'Heterophylla' but leaves somewhat more delicate.

HODGINSII (J.C. Loudon, *Arboretum et Fruticetum Britannicum*, London, 1838, vol. 3, p. 1735) — as *Q. p. hodginsii*, *Lodd. Cat.*, ed. 1836; plants at both the Horticultural Society's Garden and Messrs. Loddiges' (Nurs., Hackney, England); having a more fastigate growth habit and much smaller leaves than the species.

HOLOPHYLLA (A. Rehder, *J. Arnold Arboretum 1*: 121-146, 1919) — as *Q. robur f. holophylla*; plant was received as *Q. sessiliflora longiflora* at the Arnold Arboretum (Jamaica Plain, Massachusetts) in 1903 from the nursery of Jac. Jurrison & Zoon, Naarden, Holland; name changed to avoid confusion with the older name 'Cucullata Longifolia'; elliptic to oblong, entire leaves obtuse at apex and auricled at base, fruit borne on very long and slender stalk.

HORIZONTALIS (E. Petzold and G. Kirchner, *Arboretum Muscaviense*, Gotha, 1864, p. 620) — as *Qu. p. horizontalis*; tree with trunk approximately 5 ft. high, then forming an umbrella-shaped crown, branches horizontal; propagation attempted in Moscow but not successful.

INCISA (K. Koch, *Dendrologie 2*, Part 2, 1873, p. 27) — apparently available in the nursery trade; not individually de-

scribed but said to be one of several selections whose leaves are narrow and leaf lobes elongate and constricted.

INVOLUTA (A. Lavalley, *Arb. Segrezianum*, Paris, 1877, p. 200) — as *Q. pedunculata foliis involutis*, without description. Name changed to correct orthography.

JOREAUENSIS MACULATA (L. Dippel, *Handbuch der Laubholzkunde 2*, 1892, p. 63-64) — as *Qu. ped. Joreauensis maculata*; leaves, especially of the second flush of growth, with yellow spotted variegation.

LACINIATA (K. Koch, *Dendrologie 2*, Part 2, 1873, p. 27) — name found in the nursery trade for one of several selections with narrow leaves and elongate, constricted leaf lobes. May have originated in Loddiges Nurs., Hackney, England, as *Q. laciniata* (see J.C. Loudon, *Arboretum et Fruticetum Britannicum*, London, 1838, vol. 3, p. 1732 — as synonym for *Q. p. heterophylla*).

LACINIATA MACULATA — Name found in the records of the Plant Sciences Data Center of the American Horticultural Society; plant at Longwood Gardens, Kennett Square, Pennsylvania, PI 272073. According to the USDA Plant Inventory No. 169, p. 56, 1961, this tree was obtained from the Vuyk Van Nes Nursery, Boskoop, the Netherlands. May have been described before Jan. 1, 1959, but considered an invalid name at this time.

LATIFOLIA CUCULLATA (T. Ottolander, *Sieboldia 5*(16): 124-126, 1879) — as *Q. ped. latifolia cucullata*; with very broad, short leaves, bending downwards, rapid growth.

LATIMACULATA (L. Dippel, *Handbuch der Laubholzkunde 2*, 1892, p. 63) — as *Qu. ped. latimaculata*; leaves with yellowish-white tips or yellowish-white spots.

LEUCOCARPA (C. van Kleef, *Sieboldia 3*(46): 374-377, 1877) — as *Q. pedunc. leucocarpa*. T. Ottolander, *Sieboldia 5*(16): 124-126, 1879, considered this selection = **AUREA**.

LIGINII — Name found in the records of the Plant Sciences Data Center of the American Horticultural Society. Tree at the Morton Arboretum, Lisle, Illinois, received from the Munich Botanic Garden in 1930. May = **UMBRACULIFERA LIGINII**.

LOBELESS (H.P. Kelsey and W.A. Dayton, *Standardized Plant Names*, 1942, p. 508) = **HOLOPHYLLA**.

LONGIFOLIA (W.J. Bean, *Trees and Shrubs Hardy in the British Isles*, Ed. 1, vol. II, 1914, p. 321) - as *Q. pedunculata* var. *longifolia*; tree at the Arnold Arboretum (Jamaica Plain, Massachusetts). A. Rehder, *J. Arnold Arboretum 1*: 121-146, 1919, changed the name to *Quercus robur f. holophylla* to avoid confusion with an older name which included "longifolia".

LONGLEAF (H.P. Kelsey and W.A. Dayton, *Standardized Plant Names*, 1942, p. 508) = **HETEROPHYLLA**.

LYRATA PUNCTATA (L. Beissner, E. Schelle, and H. Zabel, *Handbuch der Laubholz-Benennung*, Berlin, 1903, p. 80) — as *Quercus peduncul. lyrata punctata* Hort.; without description.

MACROPHYLLA (E. Petzold and G. Kirchner, *Arboretum Muscaviense*, Gotha, 1864, p. 618) — as *Qu. p. macrophylla*; with very large leaves and luxuriant foliage.

MACULATA — According to B.K. Boom, *Nederl. Dendrol. Ver. Jaarb. 20*: 37-120, 1954-55, it is unclear whether the two plants introduced separately under this name are identical; de Vos, *Woordenboek*, 1867, p. 99, described *Q. pedunculata fol. maculata* as his own introduction with leaves first green, changing to spotted with yellowish-white; however E. Petzold and G. Kirchner, *Arboretum*

Muscaviense, Gotha, 1864, p. 626, described a similar plant, *Qu. p. foliis maculatis* Bth. Cat., received from James Booth and Sons (Nurs.), Flottbeck, Germany. Whether or not these two citations refer to the same selection, that plant described by de Vos (l.c.) is still extant in the Netherlands (Boom, l.c.).

MARMORATA (A. Rehder in L.H. Bailey, Standard Cyclopedia of Horticulture, Ed. 2, vol. V, 1916, p. 2888) — one of a number of variegated forms of no great ornamental value, often in cultivation.

MATTERHORN (S.A. Spongberg, AABGA Bull. 15(3): 67-70, 1981) — tree selected by Milton Baron, East Lansing, Michigan, introduced by J. Frank Schmidt & Son Co., Boring, Oregon; symmetrical, ovoid crown, having a height/width ratio of 1.15. Plant Patent No. 3706, April 22, 1975, scanty fruit production.

MICROPHYLLA (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 618) — as *Qu. p. microphylla*; with very small leaves, the foliage remarkably more delicate than the species.

MONSTROSIFOLIA (L. Beissner, E. Schelle, and H. Zabel, Handbuch der Laubholz-Benennung, Berlin, 1903, p. 80) — as *Quercus peduncul. monstrosifolia*; without description.

MULTICAULIS (L. Beissner, E. Schelle, and H. Zabel, Handbuch der Laubholz-Benennung, Berlin, 1903, p. 80)) — as *Quercus peduncul. multicaulis* Booth.; without description.

MUTABILIS (L. Beissner, E. Schelle, and H. Zabel, Handbuch der Laubholz-Benennung, Berlin, 1903, p. 80) — as *Quercus peduncul. mutabilis* Hanstein.; without description.

NIGRA (L. Van Houtte, as L. VH., Flores des Serres 17: 119, 1868, illus.) — tree found by a castle in England; leaves deep purple in color.

NIGRICANS (K. Koch, Dendrologie 2, Part 2, 1873, p. 28) — one of several selections with especially dark red-brown leaves.

OBTUSILOBA (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 618) — as *Qu. p. obtusiloba*; leaves not large, almost lyrate, lobes blunt and rounded.

PALLIDA (L. Dippel, Handbuch der Laubholzkunde 2, 1892, p. 64) — as *Qu. ped. pallida*; with pale yellowish-green leaves.

PARVIFOLIA (L. Beissner, E. Schelle, and H. Zabel, Handbuch der Laubholz-Benennung, Berlin, 1903, p. 80) — as *Quercus peduncul. parvifolia* Hort.; with the synonym *Quercus Hodginsii* Loddig. = **HODGINSII**.

PAUCILOBA (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 618) — as *Qu. p. pauciloba*; leaves with deep, but only solitary, rounded lobes.

PECTINATA (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 624) — as *Quercus pedunculata pectinata* Hort.; similar to 'Filicifolia' but lobes of leaves not as deeply cut, more pectinate (like the teeth of a comb).

PENDULA — First treated as a variety of *Q. pedunculata* by J.C. Loudon, Arboretum et Fruticetum Britannicum, London, 1838, vol. 3, p. 1732, who stated that a tree of pendulous habit had been introduced as *Q. pendula* by Messrs. Loddiges (Nurs., Hackney, England) who had obtained the tree from the Lewisham Nursery where it had been discovered in a seed-bed about 1816; however, other trees of pendulous habit were being grown in other places in England, and seed from such trees produced trees of similar pendulous habit.

PENDULA DAUVESSEI (T. Ottolander, Sieboldia 5(16): 124-126, 1879) — as *Q. ped. pendula Dauvessi*; a fast growing tree with long, slender, pendulous branches.

PENDULA HETEROPHYLLA (A. Lavallee, Arb. Segrezianum, Paris, 1877, p. 200). — as *Q. pedunculata pendula heterophylla (laciniata)*; without description.

PENDULA LIBANI (H. Jager and L. Beissner, Die Ziergeholze, Ed. 3, Weimar, 1889, p. 289) — as *Q. pedunculata pendula Libani*; (stands next to the cedar of Lebanon in Paris' "Jardin des plantes"), with very long, thin, rod-shaped twigs.

PENDULA SALICIFOLIA (L. Beissner, E. Schelle, and H. Zabel, Handbuch der Laubholz-Benennung, Berlin, 1903, p. 80) — as *Quercus peduncul. pendula salicifolia* Hort.; without description. First noted by E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 621, as *Qu. p. salicifolia pendula* Hort.; plant received from the nursery of J. Mohnhaupt, Breslau (Wroclaw), Poland.

PETIOLARIS (A. Lavallee, Arb. Segrezianum, Paris, 1877, p. 200) — as *Q. pedunculata petiolaris*; without description.

PICTURATA (T. Ottolander, Sieboldia 5(16): 124-126, 1879) — as *Q. ped. picturata*; leaves divided to the mid-rib, with very regular, long, pointed lobes.

PROSTRATA (H. Jager and L. Beissner, Die Ziergeholze, Ed. 3, Weimar, 1889, p. 289) — as *Q. pedunculata prostrata*; with attenuated branches.

PUBESCENS (J.C. Loudon, Arboretum et Fruticetum Britannicum, London, 1838, vol. 3, p. 1731) — as *Q. p. pubescens* Lodd. Cat., ed. 1836; leaves downy beneath, plants at Messrs. Loddiges's (Nurs., Hackney, England).

PULVERULENTA (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 626) — as *Qu. p. foliis pulverulentis*; received from the nursery of J. Mohnhaupt, Breslau (Wroclaw), Poland, under the name *Qu. glande dulci* Hort.; considered by the authors to be a mistake; leaves with abundant and fine yellowish-white striations and flecks, similar to that of *Acer campestre pulverulentum*. G. Krussman, Handbuch der Laubgehölze, Berlin, 1978, vol. 3, p. 108, listed a cultivar by this name (and somewhat similar description) but without any reference to origin. Name changed to correct orthography.

PULVERULENTA ALBA (L. Dippel, Handbuch der Laubholzkunde 2, 1892, p. 63) — as *Qu. ped. pulverulenta alba*; leaves of second growth flush marked with white.

PUMILA (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 621) — as *Quercus pedunculata pumila*; an example of this selection in the Arboretum was at that time about 20 years old and 6 feet high by 12 feet wide, long horizontal branches spread over the ground from the base of the tree; selection was propagated and was to be distributed.

PUNCTATA — Name found in the records of the Plant Sciences Data Center of the American Horticultural Society; plant at Longwood Gardens, Kennett Square, Pennsylvania, PI 272074. However, according to the USDA Plant Inventory No. 169, p. 56, 1961, this tree was obtained from the Vuyk Van Nes Nursery, Boskoop, the Netherlands, as *Quercus robur* 'Cucullata'.

PURPLE (H.P. Kelsey and W.A. Dayton, Standardized Plant Names, 1942, p. 508) = **ATROPURPUREA**.

PURPURASCENS — According to A. Rehder, Bibliography of Cultivated Trees and Shrubs, Arnold Arboretum of Harvard University, 1949, p. 130-131, this tree with purple leaves was first described by de Candolle, Rapp. Voy.

Bot. Sud-ouest 1: 19 (in Mem. Soc. Agric. Dep. Seine 12: 299), 1808. W.J. Bean, Trees and Shrubs Hardy in the British Isles, Ed. 8, vol. III, 1976, p. 510; adds that de Candolle's 1808 description was based on a tree in the Maule Forest, near Le Mans, France. Although it is unclear whether this particular tree was ever vegetatively propagated, seed may have been gathered and seedlings grown.

- PURPUREA** (J.C. Loudon, Arboretum et Fruticetum Britannicum, London, 1838, vol. 3, p. 1735) — as *Q. p. purpurea*; young shoots and leaf petioles tinged with purple, young leaves almost entirely purple, grown by Messrs. Loddiges (Nurs.), Hackney, England.
- PYRAMIDAL** (H.P. Kelsey and W.A. Dayton, Standardized Plant Names, 1942, p. 508) — as a synonym for **FAS-TIGIATA**.
- ROYAL** (H.P. Kelsey and W.A. Dayton, Standardized Plant Names, 1942, p. 508) = **PURPURASCENS**.
- RUBICUNDA** (L. Beissner, E. Schelle, and H. Zabel, Handbuch der Laubholz-Benennung, Berlin, 1903, p. 81) — as *Quercus peduncul. rubicunda* Hort.; without description.
- RUBRINERVA** (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 627) — as *Quercus pedunculata rubrinerva*; found in the Arboretum, not especially striking but distinguished by the shiny blue-green foliage with red petioles and midrib; possibly a hybrid with *Q. sessiliflora* Salisb. (*Q. petraea* (Mattuschka) L. ex Liebl.). Without further evidence of hybridity, we have simply included it under *Q. robur*.
- SALICIFOLIA** (J.C. Loudon, Arboretum et Fruticetum Britannicum, London, 1838, vol. 3, p. 1732) — as *Q. salicifolia* Hort.; in synonymy with *Q. p. heterophylla*. Leaves almost completely without lobes, willow-like (K. Koch, Dendrologie 2, Part 2, 1873, p. 27).
- SANGUINEA** (L. Dippel, Handbuch der Laubholzkunde 2, 1892, p. 63) — as *Quercus pedunculata sanguinea*, Bechst. Forstbot., p. 333, with numerous synonyms given. Apparently = **PURPURASCENS**.
- SCOLOPENDRIFOLIA** (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 624) — as *Quercus pedunculata scolopendrifolia*, the leaves are sessile, oblong, narrow, with shallow lobes, undulating and blistered; in addition, the green of the leaves progresses to a yellowish color at the margins.
- SKYMASTER** (S.A. Spongberg, AABGA Bull. 15(3): 67-70, 1981) — tree selected by Milton Baron, East Lansing, Michigan, introduced by J. Frank Schmidt & Son Co., Boring, Oregon; narrow, pyramidal crown with a height/width ratio of 1.52, habit resulting from an unusually strong leader together with less widely diverging lateral branches. Plant Patent No. 3707, April 22, 1975, light fruit production.
- SPLEENWORT** (H.P. Kelsey and W.A. Dayton, Standardized Plant Names, 1942, p. 508) = **ASPLENIIFOLIA**.
- STRIATA** (A. Lavalley, Arb. Segrezianum, Paris, 1877, p. 201) — as *Q. pedunculata striata*; without description but with the following reference: Illustr. hort. XVII, p. 44. Original reference not seen.
- STRYPEMONDE** (B.K. Boom, Nederl. Dendrol. Ver. Jaarb. 20: 37-120, 1954-55) — original tree found on J.R.P. van Hoey Smith's father's estate "Strypemonde", Rockanje, the Netherlands, propagated by grafting by van Hoey Smith, Rotterdam, and grown at the Arboretum Trompenburg, Rotterdam, the Netherlands; slow growing tree or

shrub with especially thick buds, leaf form very diverse, the more normal with deeply and irregularly cut lobes, the abnormal leaves found mainly on summer growth, are very narrow with a single lobe or entirely without lobes.

- SUBEROSA** (von Seydel, Mitt. Deutsch. Dendr. Ges. 28: 322, 1919) — as *Quercus pedunculata suberosa*; tree about 20 years old found in the author's woods in Gosda, Germany, two to three year old shoots have thick corky ridges as in *Ulmus campestris suberosa*, bushy, branched growth habit.
- SUBINTEGRA** (E. Petzold and G. Kirchner, Arboretum Muscaviense, 1864, p. 618) — as *Quercus pedunculata subintegra*; leaves broad, apex rounded, only very shallowly and bluntly lobed.
- TARAXACIFOLIA** (L. Beissner, E. Schelle, and H. Zabel, Handbuch der Laubholz-Benennung, Berlin, 1903, p. 80) — as *Quercus peduncul. taraxacifolia* Hort.; without description.
- TORTUOSA** (F. Schwerin, Mitt. Deutsch. Dendr. Ges. 28: 160-167, illus., 1919) — as *Quercus pedunculata tortuosa*; Mr. Ammann, Zurich, Switzerland, sent to Schwerin a photograph of this old, broad-crowned tree, with a twisting (left) habit. No information as to cultivation.
- TRICOLOR** (K. Koch, Dendrologie 2, Part 2, 1873, p. 28) — yellow and white striped leaves.
- UMBRACULIFERA** (G. Krussmann, Handbuch der Laubgehölze, Berlin, 1978, vol. 3, p. 108) — almost spherical growth habit, cited Nederl. Fl. Pomona t42(3) (= var. *umbraculifera* Chanceler.). Original reference not seen.
- UMBRACULIFERA LIGINII** (L. Beissner, E. Schelle, and H. Zabel, Handbuch der Laubholz-Benennung, Berlin, 1903, p. 80) — as *Quercus peduncul. umbraculifera Liginii* Rothe; without description.
- UNDULATA** (E. Petzold and G. Kirchner, Arboretum Muscaviense, Gotha, 1864, p. 618) — as *Qu. p. undulata*; bushy growth, leaves dark green and wavy.
- VARIEGATA** (R. Weston, The Universal Botanist and Nurseryman, London, 1770, p. 231) — as *Quercus rob. varieg.*, Silver-striped Oak; leaves finely variegated with white.
- VARIEGATED** (H.P. Kelsey and W.A. Dayton, Standardized Plant Names, 1942, p. 508) = **VARIEGATA**.
- WEeping** (H.P. Kelsey and W.A. Dayton, Standardized Plant Names, 1942, p. 508) = **DAUVESSEI** or **PENDULA**. May = **PENDULA DAUVESSEI**.
- WESTMINSTER GLOBE** (S.A. Spongberg, AABA Bull. 15(3): 67-70, 1981) — tree selected by Milton Baron, East Lansing, Michigan, introduced by J. Frank Schmidt & Son Co., Boring, Oregon; an expansive tree with a broadly hemispherical crown and a height/width ratio of 0.76. Plant Patent No. 3708, April 22, 1975, extremely heavy fruit production.

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ABSTRACTS

DAVIS, RICHARD K. 1984. **Roots: studies question some common beliefs.** Am. Nurseryman 160(9): 78-81.

Research is finding that many commonly held beliefs about roots—and field practices based on those beliefs—may have to be reconsidered. For example, root systems are generally shallower and wider spreading than often thought, and they may expand asymmetrically, with the greatest root distribution lying to the north. For most trees, the area of densest root growth is 5 to 15 inches below ground. There is only limited growth above that depth, and root development drops off rapidly below 15 inches. Because most subsoils are unsuitable for root growth, large taproots rarely develop. Trees, however, do have “sink” roots that develop periodically off large structural roots. The orientation of most roots is horizontal, not vertical. Because of the wide lateral spread of a tree’s root system, up to 98 percent of its roots is left behind when the tree is dug for transplanting.

HOSEY, TIMOTHY and BOB PERCIVAL. 1984. **Hiring the ‘right’ employee begins with the interview.** Am. Nurseryman 160(12): 77-80.

It is difficult to judge people by their resumes. It is equally difficult to judge people by calling the references on their resumes. In fact, about the only way to judge whether a prospective employee is right for the company is by sitting down with him, face-to-face, for an interview. Planning an interview allows the employer to keep control of the interview, to gather all the important information needed for an intelligent decision about the applicant, and to compile the information in as short a time as possible. The chemistry between the interviewer and applicant is important. The interviewer should ask himself whether he likes the person and whether any differences in thinking will be detrimental to the business. He should also consider whether the applicant would bring any new and needed strengths to the company. Written notes should be prepared before the interview. These help the interview flow smoothly and quickly, reduce the chances of forgetting important questions, keep the applicant from thinking the interviewer is incompetent, and allow the interviewer to administer the same questions to each candidate.