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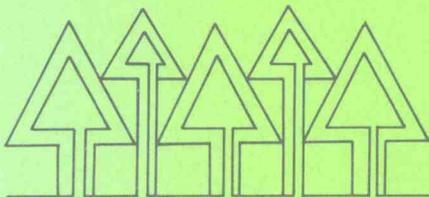
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**THE GENUS *Pseudotsuga*:
HISTORICAL RECORDS AND
NOMENCLATURE**

R.K. HERMANN



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INTRODUCTION

The pioneers who came to the American Northwest in the second half of the 19th century encountered vast forests dominated by a tree that is today known worldwide as Douglas-fir. Aside from its economic importance in North America, this tree has probably become the North American conifer most widely cultivated outside its natural range. The interest in this species has led to a voluminous body of literature scattered through a multitude of publications in many languages. This tremendous proliferation of literature, however, makes an overall view of the subject ever more difficult. This publication is the first in a series attempting to summarize current knowledge of Douglas-fir (referring to *Pseudotsuga menziesii* unless otherwise noted) and the other species of the genus.

NOMENCLATURAL HISTORY

Douglas-fir was discovered by the Scottish physician and naturalist Archibald Menzies (1754-1842) on the shores of Nootka Sound on the west coast of Vancouver Island, British Columbia. Menzies, who accompanied Captain Vancouver on the journey to Northwest America (1791-95) as ship surgeon on board the *Discovery*, did not mention this tree in his journal (Menzies 1923). He brought back, however, a specimen of Douglas-fir which the British botanist Lambert described in 1803 without having seen the cones. Lambert (1803) wrote: "As for the cones, can give no account of them, those which were brought by Mr. Menzies having been unfortunately mislaid." The year when Menzies collected this specimen has been cited variously as 1791 (Sargent 1898; St. Paul 1901; Harrer 1925; Little 1953; Debazac 1964; Sziklai 1967), 1792 (Frothingham 1909; Hennig 1951; Peattie 1953; Flöhr 1958; Hofman 1964; Delvaux 1966), 1793 (Little 1979), 1795 (Fitschen 1930), and 1797 (Antoine 1840; Nuttall 1842-49; Elwes and Henry 1909, p. 811-836; Franco 1950; Krajina 1956). Menzies probably made the collection in the summer of 1792, the only time the *Discovery* is known to have cruised along the coast of the Pacific Northwest.

After Menzies, Meriwether Lewis collected specimens of Douglas-fir on the banks of the Columbia River near its mouth in 1805 or 1806 (Pursh 1814; Coues 1893, p. 831-832). David Douglas made another collection in the same region between September 2 and 15, 1826 (Douglas 1914). The exact location of collection was not indicated by Douglas, but it must have been in the vicinity of Ft. Vancouver. On these three collections rest the many names that have been applied to Douglas-fir.

The tree's involved nomenclatural history has resulted in much confusion about its proper scientific or botanical name (Little 1948). The following account of the many name changes is supplied to provide a better understanding of the problem.

Botanical Names

At the beginning of the nineteenth century, Lambert (1803) described Douglas-fir from Menzies' collection as *Pinus taxifolia* (fig. 1). He did not know that in 1796 Salisbury had already named another tree, now known as *Abies balsamea* (L.)

Mill., as *Pinus taxifolia*. By present rules of nomenclature, therefore, *Pinus taxifolia* Lamb. is an illegitimate name.

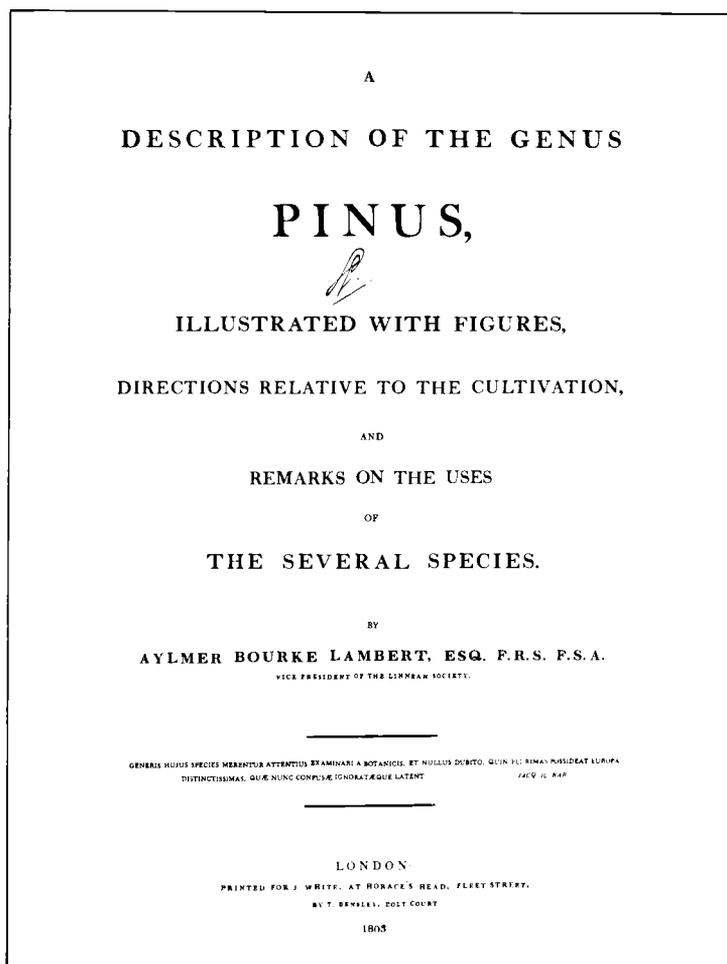


FIGURE 1.

Title page of first treatise in which Douglas-fir was described (as *Pinus taxifolia*).

As pointed out by Little (1949), the specific epithet *douglasii* was published in the third edition of Lambert's (1832) *Description of the Genus Pinus* as *Pinus douglasii* Sabine ex D. Don in Lambert. In the fourth edition of this book, Lambert (1837) made the following comments about naming the tree:

"The materials whence my former account of this species was derived, were so imperfect and the name I had applied by no means a happy one; and the more especially as the silver fir has been called *Abies taxifolia*, I gladly adopt the name of *Pinus douglasii* in honor of the indefatigable botanist to whom I am indebted for the specimens from which I have been enabled to complete my description and plate of the species. ... It was first observed by my friend Mr. Menzies, in the voyage of Captain Vancouver, but the specimens being without cones, it was not clear until Mr. Douglas had supplied us with these, that I became acquainted with its essential characters."

Prior to the appearance of Lambert's fourth edition, Rafinesque (1832) published the name *Abies mucronata* for Douglas-fir. It was based upon the field description by Lewis and Clark and upon the specimens that had been identified

by Pursh (1814) as *Pinus taxifolia* Lamb. A new combination, *Abies douglasii* (D. Don) Lindl., was made by Lindley (1833) and was adopted in a few other works shortly afterward.

The specific epithet *douglasii* was retained with the transfer of Douglas-fir to the genera *Picea* (Link 1841) and *Tsuga* (Carrière 1855) and finally to the newly created genus *Pseudotsuga* (Carrière 1867).

From specimens of Douglas-fir collected between 1884 and 1888 by Mearns in the Mogollon and San Francisco Mountains of Arizona, Britton (1889) made the combination *Pseudotsuga taxifolia* (Lamb.) Britton. Subsequently, Sudworth (1897) used the name *Pseudotsuga taxifolia* (Poir.) Britton, apparently regarding this as the same combination with the substitution of "(Poir.)" for "(Lamb.)." Sudworth considered Britton's combination to be based on *Abies taxifolia* Poir., which he at that time believed was the earliest name legitimately published for Douglas-fir. By modern rules the combination based on Poir.'s name would be written as *Pseudotsuga taxifolia* (Poir.) Britton ex Sudworth. However, by these same rules, the name *Abies taxifolia* Poir. (1804) is itself illegitimate. The following year Sudworth (1898), in discussing the nomenclatural history of Douglas-fir in great detail, rejected his own earlier combination *Pseudotsuga mucronata* (Raf.) Sudworth (1895), a combination which incidentally was still considered correct 50 years later by Gleason (1955). In two subsequent publications, Sudworth (1908, 1918) retained the name *Pseudotsuga taxifolia* (Poir.) Britton. In his check list of forest trees, however, Sudworth (1927) used *Pseudotsuga taxifolia* (Lamarck) Britton instead, as Britton had not mentioned Poir. when publishing this name in 1889.

Ten years later, the scientific name of Douglas-fir was discussed once more, this time by Sprague and Green (1938). They concluded that it should be *Pseudotsuga taxifolia* (Poir.) Rehder on the basis of *Abies taxifolia* Poir. As Little (1944) pointed out shortly afterward, in proposing this combination as new with Rehder as the author, they overlooked the fact that it had been made 41 years earlier by Sudworth, who mistakenly cited Britton as the author.

At mid-century, the Portuguese botanist Franco (1950) reported that the name *Abies taxifolia* had been validly published in 1803 by Du Tour and in 1804 by Desfontaine to describe *Abies alba* Mill., the European silver fir. Franco (1951) also noted that the volume containing *Abies taxifolia* Poir., generally accepted as published in 1804, did not appear until 1805 and thus lacked priority over the names by De Tour and Desfontaine. Consequently, he rejected the name *Pseudotsuga taxifolia* (Poir.) Britt. because *Abies taxifolia* Poir., upon which it was based, was a later homonym¹ of *Abies taxifolia* Desf. and thus illegitimate according to present nomenclatural rules. Franco further noted that Mirbel (1825) in his "Essai sur la distribution géographique des conifères," which summarized the geographic distribution of all conifers then known, validly published *Abies menziesii* Mirb. as a new name for *taxifolia* Lamb. non Desf. This new name had not been listed in the *Index Kewensis* and probably thus had remained obscure. Because *Abies menziesii* was the next oldest name after *Abies taxifolia* Poir., Franco proposed the new combination (with corrected spelling) *Pseudotsuga menziesii* (Mirb.) Franco.

This name change was repeatedly contested and led to numerous and sometimes lengthy arguments among botanists (Little 1952; Boivin 1954; Franco 1954; Krajina

¹Homonym = an identical name for two different species.

1956; Ross 1956; Shinner 1956; Stafleu 1956a, 1956b; de Witt 1956). Foresters were particularly resistant to the latest change of name for Douglas-fir, and the Society of American Foresters (1954, 1955a, 1955b, 1956) passed several resolutions recommending restoration of the name *Pseudotsuga taxifolia*.

Little adopted *Pseudotsuga menziesii* (Mirb.) Franco as the scientific name for Douglas-fir in his *Check List of Native and Naturalized Trees of the United States*, and so did Krüssmann (1960) in *Die Nadelgehölze* which superseded Fitschen's (1930) *Handbuch der Nadelholzkunde*. Today the name *Pseudotsuga menziesii* (Mirb.) Franco has won almost universal acceptance except in Europe, where *Pseudotsuga taxifolia* (Poir.) Britton, and *Pseudotsuga douglasii* (D. Don) Carr. are still in use.

The chronological sequence of scientific names for Douglas-fir can be summarized as follows:²

- | | |
|--|-------------------|
| <i>Pinus taxifolia</i> Lambert, Descr. Genus Pinus ed. 1, 1:51, pl. 33 (1803); non Salisbury (1796). | (Lambert 1803) |
| <i>Abies taxifolia</i> Poirét in Lamarck, Encycl. méth. Bot. 6:523 (1804) based on <i>Pinus taxifolia</i> Lamb.; non Du Tour (1803); non Desfontaine (1804). | (Lamarck 1804) |
| <i>Abies menziesii</i> Mirbel, Mém. Mus. Hist. Nat. (Paris) 13:63,70 (1825); as "Menziezii." | (Mirbel 1825) |
| <i>Pinus douglasii</i> Sabine ex D. Don in Lamb., Descr. Genus Pinus ed. 3, 2:unnumb. page, pl. 47. (1832). | (Lambert 1832) |
| <i>Abies mucronata</i> Rafinesque, Atl. J. 1:120 (1832). | (Rafinesque 1832) |
| <i>Abies douglasii</i> (D. Don) Lindley, Penny Cycl. 1:32 (1833). | (Lindley 1833) |
| <i>Picea douglasii</i> (D. Don) Link, Linnaea 15:524 (1841); as "Douglassi." | (Link 1841) |
| <i>Tsuga douglasii</i> (D. Don) Carrière, Traité Conifèr. ed. 1:192 (1855). | (Carrière 1855) |
| <i>Pseudotsuga douglasii</i> (D. Don) Carrière, Traité Conifèr. ed. 2:256 (1867). | (Carrière 1867) |
| <i>Pseudotsuga taxifolia</i> (Lamb.) Britton, N.Y. Acad. Sci. Trans. 8:74 (1889). | (Britton 1889) |
| <i>Tsuga taxifolia</i> (Lamb.) Kuntze, Rev. Generum Plant. 2:802 (1891). | (Kuntze 1891) |

²In this and subsequent lists, all entries are cited in standard taxonomic format and are followed (right margin) by the appropriate reference to Literature Cited at the end of this publication.

- Pseudotsuga mucronata* (Raf.) Sudworth ex Holzinger, USDA Div. Bot., Contrib. U.S. Natl. Herbarium 3:266 (1895). (Holzinger 1895)
- Pseudotsuga taxifolia* (Poir.) Britton ex Sudworth, USDA Div. For. Bull. 14:46 (1897). (Sudworth 1897)
- Abietia douglasii* (D. Don) Kent in Veitch, Man. Conifer. ed. 2:476 (1900). (Kent 1900)
- Pseudotsuga taxifolia* (Lamb.) Britton ex Sudworth, USDA Misc. Circ. 92:28 (1927). (Sudworth 1927)
- Pseudotsuga taxifolia* (Poir.) Rehder ex Sprague and Green, Kew Bull. Misc. Inform. [1939]:80 (1938). (Sprague and Greene 1938)
- Pseudotsuga menziesii* (Mirb.) Franco, Bol. Soc. Broteriana (Sér.2) 24:74 (1950). (Franco 1950)

Common Names

According to Schwerin (1922) an Indian word for Douglas-fir was *Mula*. If other Indian names for this tree existed, knowledge of them has been lost.

European settlers and lumbermen in the American West coined numerous names for Douglas-fir in the 19th century. Sudworth (1927) compiled the following list of trade and local names:

Red fir (Oregon, Washington, Idaho, Utah, Montana, Colorado, trade), yellow fir (Oregon, Washington, Idaho, Montana, trade), Douglas fir (entire Douglas-fir region, trade), Douglas spruce (Montana, Colorado, California), cork-barked Douglas spruce (California), Oregon pine (Oregon, Washington, California, trade), red pine (Idaho, Utah, Colorado), red spruce (Colorado), fir (Montana, trade), spruce (Montana), Puget Sound pine (Washington), Douglas yellow fir (trade), Oregon fir (trade), Pacific Coast Douglas fir (trade), Montana fir (trade), national yellow fir (trade), golden rod Douglas (trade), yellow Douglas fir (trade), and Santiam quality fir (trade). Additional names are black fir, western pitch pine, Bear River pine (Booth 1877), and black spruce (Lemmon 1879).

The attributes *red* and *yellow* refer to wood characteristics of Douglas-fir. Coarse-grained wood is often distinctly reddish brown, hence the name red fir. Yellow fir derives its name from fine-grained wood, which is usually clear yellowish brown. The difference in color is related to the age of the trees. Red, coarse-grained wood is formed as long as the tree grows rapidly in diameter, whereas late stages of growth produce yellow, finely grained wood. The opinion that red and yellow woods represent different botanical varieties of Douglas-fir was prevalent in the last century, especially in Europe (Booth 1903). Sudworth (1908) pointed out the fallacy of this belief.

In Canada, the tree has also been referred to as British Columbia fir (Dominion Forestry Branch 1923). In New Mexico, according to Standley (1920), Douglas-fir is sometimes called *piño real*, and Mexican names for it include *hallarin* (Coahuila); *abeto*, *piño de corcho* (Hidalgo); *piñabete*, *cahuite*, and *acahuite* (Durango).

The name Douglas-fir was adopted by the U.S. Forest Service (Frothingham 1909) after a census of lumbermen revealed that it was used more than all other names combined. Although Douglas-fir is a misnomer, because the tree does not belong to the true firs, it has become the principal common name throughout North America. A possible explanation for coining the name was given by Jepson (1910, p. 116): "Its trunk bark resembles that of a fir in the pole and often adult stage. While this is the only fir-like characteristic in a field view of Douglas-fir, nevertheless woodsmen recognize a tree by the trunk and therefore call this species fir." The provisions for the spelling of common names of plants as adopted at the Seventh International Botanical Congress at Stockholm in 1950 called for hyphenating the name as Douglas-fir. Hyphenation of this name is becoming widely accepted.

Apparently, the name Douglas-fir has been used in Great Britain since the tree's introduction to that country by David Douglas. In the German-speaking parts of Europe, the tree was originally known as *Douglasfichte* (Douglas spruce). Other names which came into use were *Douglastanne* (Douglas-fir), *Duftfichte* (aromatic spruce), and *Douglasia*. Beissner (1893) considered *Douglasia* an unfortunate choice because genera in the families Primulaceae, Lauraceae, and Verbenaceae already bore the name *Douglasia*. Booth (1903, p. 39) lamented that "Douglas spruce had this name for 75 years and acquired thousands of friends under it. Douglas spruce has priority over the unscientific names *Douglasia* and Douglas-fir."

Despite such protests, still other names were proposed. Kanngiesser (1926) suggested that the tree be called *Menziese* in honor of its discoverer. Instead, Germans chose *Douglasie*, which is equivalent to *Douglas-fir*, the name suggested by Peattie (1953) for Douglas-fir. Leo Isaac once suggested that the English name could be shortened merely to Douglas.³ Fabricius (1926) advocated, without success, that *Douglasie* be Germanized to *Duglasie*.

Other common names for Douglas-fir include *piño Oregon* and *abeto de Douglas* in Spanish; *le douglas*, *sapin de douglas*, and *pin de douglas* in French; *la douglasia*, *l'abete di douglas*, and *abeto odoroso* in Italian; *de douglas* in Dutch; *douglasgran* in Danish, Swedish, and Norwegian; *douglaskuusi* in Finnish; *doulassova pikhta* in Russian; *daglezja* in Polish; *douglasul* in Rumanian; and *douglasfenyő* in Hungarian.

TAXONOMIC CLASSIFICATION

The genus *Pseudotsuga* Carrière (1867) belongs to the subfamily Abietodeae of the family Pinaceae. The type species is *Pseudotsuga menziesii* (Mirb.) Franco. The type specimen of that species was collected by Menzies on Vancouver Island and is now in the British Museum of Natural History.

³Personal communication by E. L. Little, Jr.

As pointed out previously, Douglas-fir was placed consecutively in the genera *Pinus*, *Abies*, *Picea*, and *Tsuga* until Carrière established a separate genus for it, *Pseudotsuga*. His generic name did not meet with unanimous approval. Sargent (1898) labeled it a barbarous combination of the Greek word *pseudo* = false with the Japanese word *tsuga* = hemlock. Mayr (1890, p. 290) wrote, "One would expect that *Pseudotsuga* would resemble *Tsuga* most of all conifers but Douglas-fir does resemble this genus least of all. Either *Pseudopicea* or *Pseudoabies* would have been a more justifiable name." Kent (1900) proposed to change the generic name to *Abietia* to avoid the ill-suited name *Pseudotsuga*. In spite of such objections, *Pseudotsuga* has been, and must be, retained as the legitimate name of the genus.

According to Little (1979), seven species are recognized within the genus *Pseudotsuga*, two in western North America, and the others of limited range in eastern Asia in mainland China, Taiwan, and Japan. Yet confusion still exists about proper naming of members of this genus because of disagreement about separation into species and geographical varieties. The problem is further compounded by the numerous nomenclatural changes that have been made since the discovery of Douglas-fir.

The North American Douglas-firs

Most North American dendrologists recognize a single species of common Douglas-fir, *Pseudotsuga menziesii* (Mirb.) Franco, in western North America and a related species, *Pseudotsuga macrocarpa* (Vasey) Mayr (bigcone Douglas-fir), in southern California. Sargent (1922) and Sudworth (1927) accepted common Douglas-fir without named geographical varieties. Van Dersal (1938) felt justified in distinguishing two species, *Pseudotsuga taxifolia*, Oregon Douglas-fir, and *Pseudotsuga glauca*, Colorado Douglas-fir, on the basis of 14 different characteristics. However, several of the characteristics used by Van Dersal to separate Douglas-fir into two species are either unreliable or incorrect. Rehder (1940), Fowells (1965), Hosie (1969), and Little (1979) listed one species of common Douglas-fir with two geographical varieties.

Europeans have tended to distinguish more than one species of Douglas-fir (Browicz 1950). Murray (1884) was the first European botanist to recognize two broad geographical variations--one, *Abies douglasii*, on the Pacific coast and the other, the subspecies *Abies lindleyana*, in the Rocky Mountains and Mexico. Mayr (1901) accepted two species, *Pseudotsuga douglasii* on the Pacific coast and *Pseudotsuga glauca* in the Rocky Mountains, as did Morgenthal (1950). Henry and Flood (1920) in their generic monograph on Douglas-fir distinguished *Pseudotsuga douglasii* as the Pacific Coast variant, variety *caesia* as the northern Rocky Mountain variant, and a second species, *Pseudotsuga glauca*, in the Rocky Mountains from Colorado to Mexico. Galoux (1956) maintained that the separate evolution of the coastal and interior forms has been so prolonged, presumably since mid-Pliocene, as to validate the viewpoint of botanists who recognize two distinct species, *Pseudotsuga menziesii* and *Pseudotsuga glauca*.

An unusual contribution to the problem of variation of Douglas-fir was made by the French botanist Flous. Originally, Flous and Gausson (1932) accepted two species of Douglas-fir, *Pseudotsuga douglasii* and *Pseudotsuga glauca*. Flous thought it amazing that the genus *Pseudotsuga* should comprise but one species in a territory where the related genus *Abies* possesses 11 species and the genus

Picea 4 species. Accordingly, she segregated several new species and noted that her work had confirmed, just as she had assumed, that *Pseudotsuga* possessed almost as many species as *Abies* in that region (Flous 1934a, 1934b). Altogether, Flous (1937) listed 12 species and one variety of *Pseudotsuga* for western North America.

With few exceptions, Flous' interpretation failed to win general acceptance in North America and Europe. Martínez (1949) recognized four of her species and one variety of *Pseudotsuga* for Mexico. Laing (1961) constructed a key for separating Douglas-fir in British woodlands in accordance with the classification proposed by Flous. Gaussen (1966) in his work on living and fossil gymnosperms endorsed Flous' treatment of the genus *Pseudotsuga*, except that he transferred some of her species to varietal status. Little (1952) in a detailed evaluation of Flous' names listed several objections to her work. Anatomical characters, heavily relied upon by Flous, are not sufficient for classification purposes unless accompanied by distinct differences in the external gross morphology. Macroscopic characteristics used by Flous to distinguish segregates in *Pseudotsuga* are minor, inconspicuous, or inconstant. Another serious objection to Flous' segregates is that for the most part they are not geographically separate or individualized but have overlapping ranges. And finally, her work is solely based upon herbarium specimens, which were cited with various errors in regard to collection and geographic origin.

VARIETIES OF DOUGLAS-FIR, *Pseudotsuga menziesii*

Although the problem of distinguishing varieties of Douglas-fir is far from resolved, the interior variety, variously named Rocky Mountain, Colorado, or blue Douglas-fir, merits taxonomic separation from the coastal variety, also known as Coast, Pacific Coast, Oregon, or green Douglas-fir. Undoubtedly, there are intermediate forms between these two. At present, however, no sound taxonomic basis exists for segregating Douglas-fir into additional varieties, although many Europeans still recognize a third.

The two varieties recognized by North American dendrologists are *Pseudotsuga menziesii* var. *menziesii*, coastal Douglas-fir, and *Pseudotsuga menziesii* var. *glauca* (Beissner) Franco, interior Douglas-fir. They differ in foliage color, cone form, and growth rate, as well as in environmental requirements. Occasionally, objections have been voiced, especially in Europe (Schwappach 1911, Fürstenberg 1923), to the term *coastal* because this variety extends considerably inland beyond the immediate coastal region. However, the names *green* or *Oregon* Douglas-fir are just as misleading because some of the trees have bluish needles, and the variety is not restricted to Oregon. Changing the varietal name, long established by custom, would be pointless because its meaning is perfectly understood.

Europeans have recognized three varieties of Douglas-fir almost since the beginning of this century. In 1902, the German Dendrological Society commissioned Max v. Fürstenberg to procure seed of Douglas-fir from interior British Columbia. Fürstenberg (1904) collected seed in the upper Columbia River region in the vicinity of Field and Golden and in the upper Frazer Valley. He also made arrangements that resulted in shipments of seed from interior British Columbia to Europe until 1913. Subsequently, Schwerin (1907) coined the varietal name *caesia* to describe seedlings from Fürstenberg's original collections

as an intermediate form between the typical coastal Douglas-fir and the blue Rocky Mountain form. The name *caesia* was rapidly accepted and appeared in numerous European publications on Douglas-fir. Schenck (1939) gave strong impetus to continuing use of the names *viridis*, *caesia*, and *glauca* for the coastal, northern Rocky Mountain, and southern Rocky Mountain forms by delineating their ranges in conjunction with a simple classification of climatic growth regions. In Europe, many of the major treatises that appeared on Douglas-fir in the last two decades (Hennig 1951, Eisenreich 1956, Göhre 1958, Hofman 1964), as well as many shorter papers, adhered to the three varieties outlined by Schenck. Apparently synonymous with variety *caesia* is the name *Frazer River* strain or type (Wood 1955, Anderson 1961). This designation is particularly unfortunate because the stream flows through the range of both coastal and interior Douglas-fir.

Some European workers, however, have begun to question the validity of segregating a variety *caesia*. Results of Dutch (Veen 1951) and Belgian (Galoux 1956) provenance studies have raised serious doubts about the existence in interior British Columbia of a taxonomically distinguishable "grey" Douglas-fir characterized by morphological features, growth, and fungal resistance more or less intermediate between those of the coastal and the blue Rocky Mountain varieties. Galoux (1956) suggested that sharp variations in local climate, caused by the topography of interior British Columbia, permit the presence of both coastal and interior forms in this region. Earlier, Duchaufour (1941) and Pourtet (1949), after extensive travels through interior British Columbia, advanced the same thesis.

The Coastal Variety, *Pseudotsuga menziesii* var. *menziesii*

According to Little (1952), use of the name *Abies mucronata* var. *palustris* Rafinesque (1832, p. 120) to describe a swamp form with spreading branches was the earliest varietal epithet published for the coastal form of common Douglas-fir. A second varietal epithet, *Abies douglasii* var. *taxifolia* (Lamb.) Loudon (1838, p. 2319), applied to plants grown from seeds collected by Thomas Drummond in the Northwest, probably referred to the Pacific Coast variety. *Pinus douglasii brevibracteata* Antoine (1840, table 33) is a variety with smaller cones and shorter bracts and reaches only half the height of the typical coastal form. Although Fitschen (1930) noted this variety as occurring in Oregon and the Real del Monte, Mexico, at elevations between 2,600 and 3,000 meters, this statement about range is certainly in error. Gausson (1966) considers *brevibracteata* as possibly an interior form. Schwerin (1907) named the Pacific Coast variety *Pseudotsuga douglasii viridis* Schwerin. That varietal epithet was retained by Ascherson and Graebner (1913) and by Franco (1950).

Little (1953) correctly followed the ICBN⁴ by applying the epithet *menziesii* to coastal Douglas-fir in his *Check List of Native and Naturalized Trees of the United States*. Little's name has been generally accepted in North American usage (Fowells 1965), although some European foresters continue referring to coastal Douglas-fir as *Pseudotsuga menziesii* var. *viridis* (Schwerin) Franco. Gausson (1966) ranked the coastal variety as a species but used the incorrect name *Pseudotsuga douglasii* (Lindley) Carrière. This name is as infrequently employed as *Pseudotsuga vancouverensis*, the name given the coastal variety by Flous (1934a).

⁴The International Code of Botanical Nomenclature (1978) specifies that the variety that includes the type specimen of the species must bear the same epithet as the species, without citation of author.

The Interior Variety, *Pseudotsuga menziesii* var. *glauca*

The inland type of common Douglas-fir has been described as species, subspecies, variety, form, and cultivated variety under a host of names. Apparently, *glauca* is the oldest varietal epithet for the inland variety; it was published by Jäger and Beissner (1884) for a cultivated variation with blue-green foliage. Nuttall (1842-49) knew this form because he described and illustrated the cone bracts of *Abies douglasii* as reflexed and included Rocky Mountain localities in the distribution. He used the English name Douglas's spruce fir. Beginning with Fremont in 1844, explorers of the American West collected the Rocky Mountain form but did not recognize it as distinct. The historical sequence of botanical names for the inland variety is cited mainly from Little (1952, 1953):

Tsuga lindleyana Roehl ex Otto, Hamburg. Gärt. Blumenzeit. 14:403 (1857). (Roehl 1857)

Pseudotsuga lindleyana (Roehl ex Otto) Carrière, Rev. Hort. (Paris) 40:152 (1868). (Carrière 1868)

Abies lindleyana (Roehl) A. Murray in Ravenscroft, Pinetum Brit. v. 2 (pt. 32-34), sig. 29:4, figs. 23, 26-29 (1869), "subsp." of *Abies douglasii* Lindley, not seen; seen in 1884 ed. (Murray 1884)

Tsuga douglasii var. *glauca* Beissner in Jäger & Beissner, Ziergeh. Gärt. Park. ed. 2:446 (1884). (Jäger & Beissner 1884)

Pseudotsuga douglasii var. *glauca* Mayr, Wald. Nordamer. 307, pl. 6 (1890). (Mayr 1890)

Pseudotsuga taxifolia var. *suberosa* Lemmon, Erythea 1:48 (1893). (Lemmon 1893)

Pseudotsuga taxifolia var. *glauca* (Beissner) Sudworth, U.S. Dep. of Agric. For. Bull. 14:48 (1897). (Sudworth 1897)

Pseudotsuga glauca (Mayr) Mitt. Dtsch. Dendrol. Ges. [1901]:57 (1901). (Mayr 1901)

Pseudotsuga douglasii var. *caesia* Schwerin, Mitt. Dtsch. Dendrol. Ges. 16:257 (1907). (Schwerin 1907)

Pseudotsuga taxifolia B *caesia* (Schwerin) Ascherson & Graebner, Syn. Mitteleur. Fl. ed. 2, 1:287 (1913). (Ascherson & Graebner 1913)

Pseudotsuga taxifolia subsp. *glauca* (Mayr) Schwerin, Mitt. Dtsch. Dendrol. Ges. 33:91 (1923). (Schwerin 1923)

Pseudotsuga glauca var. *caesia* (Schwerin) Fitschen in Beissner, Handb. Nadelh. ed. 3, 93 (1930). (Fitschen 1930)

- Pseudotsuga guinieri* Flous, Bull. Soc. d'Hist. Nat. Toulouse 66:211, pl. (1934). (Flous 1934a)
- Pseudotsuga macrolepis* Flous, Bull. Soc. d'Hist. Nat. Toulouse 66:219, pl. (1934). (Flous 1934a)
- Pseudotsuga flahaulti* Flous, Bull. Soc. d'Hist. Nat. Toulouse 66:332, pl. (1934). (Flous 1934a)
- Pseudotsuga globulosa* Flous, Bull. Soc. d'Hist. Nat. Toulouse 66:334, pl. (1934). (Flous 1934a)
- Pseudotsuga guinieri* var. *mediostrobis* Flous, Bull. Soc. d'Hist. Nat. Toulouse 66:342, pl. (1934). (Flous 1934a)
- Pseudotsuga guinieri* var. *parvistrobis* Flous, Bull. Soc. d'Hist. Nat. Toulouse 66:342 (1934). (Flous 1934a)
- Pseudotsuga merrillii* Flous, Bull. Soc. d'Hist. Nat. Toulouse 66:366, pl. (1934). (Flous 1934a)
- Pseudotsuga rehderi* Flous, Bull. Soc. d'Hist. Nat. Toulouse 66:388, pl. (1934). (Flous 1934a)
- Pseudotsuga caesia* (Schwerin) Flous, Bull. Soc. d'Hist. Nat. Toulouse 71:74, pl. (1937). (Flous 1937)
- Pseudotsuga menziesii* var. *caesia* (Schwerin) Franco, Bol. Soc. Broteriana (Coimbra), Sér. 2, 24:77 (1950). (Franco 1950)
- Pseudotsuga menziesii* var. *glauca* (Mayr) Franco, Bol. Soc. Broteriana (Coimbra), Sér. 2, 24:77 (1950). (Franco 1950)

The interior form, regardless of its status as variety, subspecies, or species, is probably even more heterogenous in its genetic makeup than the coastal form, as evidenced by its enormous latitudinal range. Galoux (1956) emphasized that the interior form at its southern end extends into plant communities foreign to its usual associates. He considered it possible that future research may reveal distinct forms of interior Douglas-fir. *Pseudotsuga flahaulti*, *P. guinieri*, *P. macrolepis*, and *P. rehderi*, species proposed by Flous (1934a), constitute an effort to discern such forms in the southern portions of the range of the interior form. As Galoux (1956) pointed out, however, Flous' basis for separating these forms was insufficient.

Horticultural Variants

Horticulturists have propagated many ornamental forms of common Douglas-fir. Early lists of such forms were published by Beissner (1887, 1891) and Sudworth (1898). Among subsequent and enlarged compilations of horticultural forms are those of Schwerin (1922), Fitschen (1930), Rehder (1949), Krüssmann (1955), and Dallimore and Jackson (1966).

The following list of cultivars is taken from Krüssmann (1960) and from Den Ouden and Boom (1965), whose work provides the most recent and most exhaustive treatment of horticultural variants of Douglas-fir. In accordance with the International Code of Botanical Nomenclature (1978) and the International Code of Botanical Nomenclature for Cultivated Plants (1980), cultivars are treated separately from naturally occurring variants. A set of single quotation marks encloses the capitalized cultivar name, which is placed after the species name.⁵ Authors for cultivar names are not cited. In the following compilation, the species name *Pseudotsuga menziesii* is entered as P.m.

- P.m. 'Albospica.' Needles first white, later turning bright green. Raised by Ch. van Geert in Antwerp, Belgium.
- P.m. 'Anguina.' Branches of snake-like appearance. Found at Endsleigh, Devon, England.
- P.m. 'Appressa.' Branches nearly horizontal; leaves light glaucous.
- P.m. 'Argentea.' Leaves almost silvery white. Raised by M. Koser & Son, Boskoop, the Netherlands, about 1875.
- P.m. 'Argentea Compacta.' Dwarf form with silvery gray leaves. First observed in 1891 by W. Hans of Herrnhut, Germany, among seedlings grown from Colorado seed.
- P.m. 'Argentea Pendula.' Form with pendulous branches and silvery gray leaves. Raised by Weisse of Kamenz, Germany.
- P.m. 'Astley.' Dwarf form with crimson pink buds. Propagated from a witches'-broom found on a tree in the arboretum of R. Trotter at Leith Vale, Surrey, England.
- P.m. 'Aurea.' New leaves light yellow, later turning whitish. Found in 1862 by A. Seneclauze, nurseryman at Bourg-Argental, France.
- P.m. 'Blue Wonder.' Pyramidal shape, leaves bluish. Raised from seed in 1910 and distributed in 1958 by P. Lombarts, nurseryman, Zundert, the Netherlands.
- P.m. 'Brevifolia.' Very slow-growing with bluish-white needles.
- P.m. 'Caesia Erecta.' Form with erect branches and gray-green leaves.
- P.m. 'Candida.' Leaves silvery white on current year's shoots. A sport discovered in a shelterbelt at Waterford, Ireland.
- P.m. 'Cedroides.' Habit like *Cedrus libani*. In 1920, Schwerin speculated that it may have originated as a result of severe drought (Den Ouden and Boom 1965).
- P.m. 'Cheesemanii.' Umbrella-shaped dwarf form. Named after Cheeseman, foreman of the old Lock King Nursery, Surrey, England.

⁵Cultivars may also be recognized by the symbol "cv." preceding the cultivar names.

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- P.m. 'Compacta.' Conical, compact form with dark green leaves.
- P.m. 'Compacta Glauca.' Conical, densely branched form with bluish green leaves. Originated in the nursery of Ansorge, Hamburg-Flottbeck, Germany.
- P.m. 'Compacta Viridis.' Conical, compact tree. Leaves light green, forming rosettes at the tip of branchlets. Buds colored reddish. Raised by Hellemann at Moorende near Bremen, Germany.
- P.m. 'Crispa.' Leaves falcate and curly, light blue. Raised by Count Schwerin, Wendisch-Wilmersdorf, Germany.
- P.m. 'Densa.' Slow-growing shrub with short needles. Found prior to 1930 in the Pinetum of Highland Park, Rochester, New York.
- P.m. 'Denudata.' A cultivar similar in appearance to *Picea abies* 'Virgata.'
- P.m. 'Dumosa.' Dwarf form resembling a witches'-broom. Raised by A. Leroy, Angers, France.
- P.m. 'Elegans.' Ascending form with bluish-white needles.
- P.m. 'Elongata.' Branches exceptionally long. Originated in the park of Count Schwerin, Wendisch-Wilmersdorf, Germany.
- P.m. 'Faberi.' Leaves golden yellow. Originated in the nursery of H. H. Faber, Dundee, Illinois.
- P.m. 'Fastigiata.' Habit pyramidal.
- P.m. 'Fletcheri.' Dwarf form, annual shoots barely 3 cm long. In 1906 two dwarfed seedlings of the inland variety of Douglas-fir were raised in the Lock King Nursery, Weybridge, Surrey, England. Both were propagated and sold as *Pseudotsuga douglasii* 'Fletcheri.' Hornibrook considered all of them to be seedlings of *Pseudotsuga glauca* and named the green form *P. glauca* 'Fletcheri' and the glaucous form *P. glauca* 'Nana.'
- P.m. 'Fretsii.' Habit pyramidal, leaves dark green on upper side, bluish-white on lower side. Raised by C. Frets & Son, Boskoop, the Netherlands.
- P.m. 'Glauc Pendula.' Branches pendulous, needles blue-green. Raised by Simon-Louis Bros., Metz, France, from seed imported from Colorado.
- P.m. 'Globosa.' Dwarf form.
- P.m. 'Leotophylla.' Low, slow-growing shrub. Found at Blansford, Abbey leix, Ireland.
- P.m. 'Lombarts.' Pyramidal form with stiff, bluish-green leaves. Raised by P. Lombarts, Zundert, the Netherlands.

- P.m. 'Lombartsii Pendula.' Pyramidal form with pendulous branches. Leaves light green. Raised from seed in 1910 and distributed in 1926 by P. Lombarts, Zundert, the Netherlands.
- P.m. 'Moerheimi.' Ascending form, leaves sickle-shaped with a bluish bloom. Raised in 1912 by B. Ruys, Royal Nurseries Moerheim, Dedemsvaart, the Netherlands.
- P.m. 'Monstrosa.' Low, profusely spreading bush. Originated in 1866 in Angers, France.
- P.m. 'Nana.' For origin, see under 'Fletcheri.'
- P.m. 'Nidiformis.' Almost round, low-growing bush in habit similar to *Picea abies* 'Nidiformis.' Suitable for rock garden planting. Originated in Eisenberg Nurseries, Eisenberg, Czechoslovakia.
- P.m. 'Oudemansii.' Pyramidal form, leaves shiny green on upper side, and bluish-green beneath. Discovered in the Schovenhorst Pinetum, Putten, the Netherlands.
- P.m. 'Pendula.' Weeping Douglas-fir. Found by Sisson in valleys and on slopes of Mt. Shasta, California.
- P.m. 'Pumila.' Dwarf form with green leaves. Raised by A. Waterer, Knap Hill, Woking, England.
- P.m. 'Pygmaea.' Smallest of all the dwarf forms.
- P.m. 'Pyramidalis.' Pyramidal form with glaucous leaves. Raised by H. A. Hesse, Weener on Ems, Germany.
- P.m. 'Pyramidata.' Conical, slow-growing form with short, bright green leaves.
- P.m. 'Slavinii.' Semi-dwarf, broad at base and distinctly narrowed toward top. Found in 1914 among seedlings at Cobb's Hill Reservoir, Rochester, New York.
- P.m. 'Stairii.' New leaves yellowish-white, turning green in fall. Originated at Castle Kennedy, Wigtownshire, seat of the Earl of Stair.
- P.m. 'Standishiana.' Leaves large, dark glossy green, silvery underneath. Found by Standish in his nursery at Bagshot, England, among seedlings raised from seed gathered in England.
- P.m. 'Stricta.' Conical, rather compact form. Raised in 1862 by A. Seneclauze, nurseryman at Bourg-Argental, France.
- P.m. 'Suringarii.' Tree with needles bent downward in semi-circle. Found in the park of the Sanatorium Oranje Nassau near Wageningen, the Netherlands. The tree was destroyed by the bombing of Wageningen in September 1944.

- P.m. 'Taranto.' Pendulous form in the park of the Villa Taranto, Pallanza, in northern Italy.
- P.m. 'Tempelhof Compact.' Densely branched dwarf form. Found in the weeds near Putten, the Netherlands, by van Hasselt and propagated by L. Konijn & Co., Tempelhof Nurseries, Reeuwijk, the Netherlands.
- P.m. 'Variegata.' Foliage variegated, appearing as if frostbitten.
- P.m. 'Viminalis.' Snake Douglas-fir. Found by Count Schwerin in Charlottenlund Forest near Copenhagen, Denmark.
- P.m. 'Yzeuriana.' Pyramidal form with conspicuously two-ranked leaves.

BIGCONE DOUGLAS-FIR, *Pseudotsuga macrocarpa*

The second North American species of Douglas-fir, *Pseudotsuga macrocarpa* (Vasey) Mayr, was first collected in 1850 by C. C. Parry. However, his specimen from the mountains east of San Diego, California, was identified by Torrey (1859) as *Abies douglasii* Lindley. Subsequently, Sargent (1898) ascribed the discovery of bigcone Douglas-fir to the Colorado Expedition of Lieutenant J. C. Ives. J. S. Newberry, a member of that expedition, collected the species in the mountains near San Felipe, California, November 16-17, 1857. For a while, the tree was considered to be a variety of common Douglas-fir but was soon recognized as a separate species. The nomenclatural history of the species is cited below:

- Abies douglasii* var. *macrocarpa* Torrey in Ives, Rep. Colo. River, pt. 4:28 (1861); nomen nudum. (Torrey 1861)
- Abies macrocarpa* Vasey, Gard. Monthly and Hort. 18:21 (Jan. 1876). (Vasey 1876)
- Tsuga macrocarpa* Torrey ex Lemmon, Pacif. Rural Press 17:75 (1879). (Lemmon 1879)
- Pseudotsuga douglasii* var. *macrocarpa* (Vasey) Engelmann in S. Watson, Bot. Calif. 2:120 (1880). (Engelmann 1880)
- Pseudotsuga macrocarpa* (Vasey) Mayr, Wald. Nordamer. 278, pls. 6, 8, 9 (1890). (Mayr 1890)
- Pseudotsuga californica* Flous, Bull. Soc. d'Hist. Nat. Toulouse 66:330, pl. (1934). (Flous 1934a)
- Pseudotsuga macrocarpa* var. *californica* (Flous) Gausson, Trav. Lab. For. Toulouse, Tome 2, vol. 1:552 (1966). (Gausson 1966)

The species name or specific epithet is derived from two Greek words meaning *large-fruited* and refers to the very large cones. Common names listed by Sudworth (1898), Jepson (1910), and Little (1953) include bigcone Douglas-fir, bigcone Douglas-spruce, spruce, hemlock, and desert fir.

The Asian Douglas-firs

The Asian representatives of the genus *Pseudotsuga* are relatively rare and grow in terrain not easily accessible. They were discovered a century later than common Douglas-fir. The taxonomic status of these Asian Douglas-firs is not entirely settled. Hence, agreement is lacking as to the exact number of Asian species of the genus.

Pseudotsuga japonica

Homi Shirasawa found the Japanese Douglas-fir in July 1893 about 10 miles from the coast at 2,000 feet elevation between Owashi, Kii Province, and Yoshino, Yamato Province, in a stand of deciduous and evergreen hardwoods. Shirasawa (1895, p. 86) called the tree *Tsuga japonica* Shirasawa. Tubeuf (1895, 1898) repeatedly discussed Shirasawa's find and suggested that it might be a Douglas-fir rather than a *Tsuga*. Beissner was less hesitant and on the basis of Shirasawa's illustrations made the combination *Pseudotsuga japonica* (Shirasawa) Beissner (1896, p. 62 [not seen]; 1909, p. 199). Mayr (1906, p. 406) reported that the tracheids of *Pseudotsuga japonica* displayed spiral thickening and concluded that the tree was definitely a Douglas-fir. Japanese names for the species are *Toga-Sawara* and *Goyo-Toga* (Ohwi 1965, p. 112).

Pseudotsuga wilsoniana

The Japanese botanist Bunzo Hayata discovered the Formosan Douglas-fir, (fig. 2), also known as Taiwan yellow fir, in October 1906 on Mt. Morrison, Taiwan. He first described the tree as Japanese Douglas-fir (*Pseudotsuga*

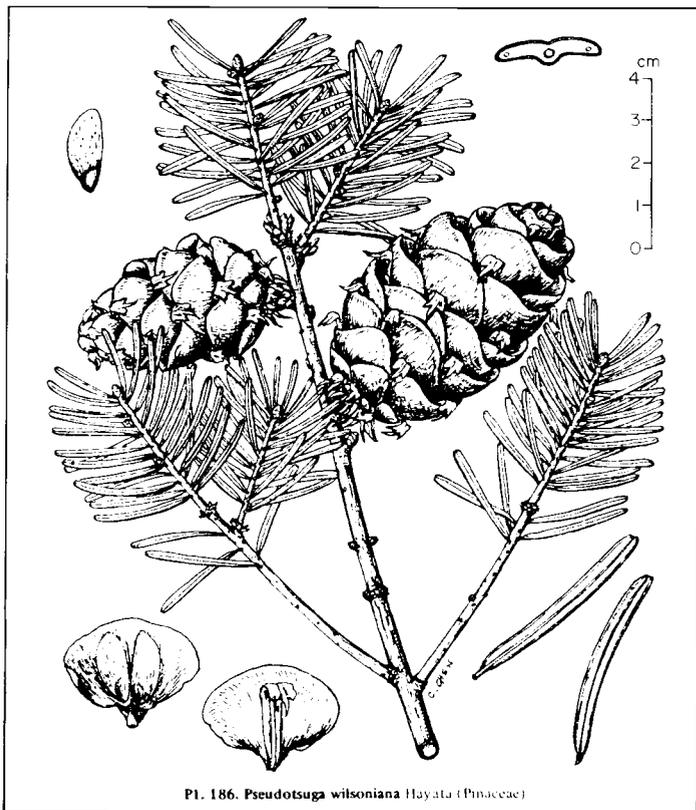


FIGURE 2.

From H. L. Li's *Flora of Taiwan*, volume I, Epoch Publishing Co. Ltd., Taiwan, 1975. Used with permission of the publisher.

japonica sensu Matsumura and Hayata, non (Shirasawa) Beissner) (Matsumura and Hayata 1906, p. 400; Hayata 1908, p. 223 and fig. 13). Later, Hayata (1915, p. 204, table 15) distinguished the tree as a separate species, *Pseudotsuga wilsoniana* Hayata, named in honor of the American botanist E. H. Wilson (1876-1930). Flous (1937, p. 156) in her revision of the genus *Pseudotsuga* recognized an additional species of Formosan Douglas-fir, *Pseudotsuga salvadori*. That species was reduced to synonymy by Li (1963, p. 51-53).

Pseudotsuga taitoensis

Kanehira (1936, p. 51; also Li 1950, p. 300) briefly described in Japanese without Latin diagnosis another Douglas-fir from Taiwan, *Pseudotsuga taitoensis*, on the basis of a specimen collected near Taitung (Taito). However, he could not fully differentiate it from *Pseudotsuga wilsoniana* because the material was incomplete. This species was not accepted later by Li (1963, p. 51-53; 1975, p. 526). As it was not validly published, this scientific name must be rejected.

Pseudotsuga sinensis

The Chinese Douglas-fir, *Pseudotsuga sinensis* Dode (1912, p. 58), was supposedly discovered by R. P. Maire on a limestone formation at 2,500 meters elevation in Yunnan Province of southwestern China. According to Chen Yung (1937), a Chinese botanical expedition in 1923 found a large tree of the species in the Yellow Mountains of Anhwei Province and named it yellow fir to commemorate its discovery in the southwestern part of China. Cheng and Fu (1978) list another common name for the tree; its English translation is short-budscales Douglas-fir.

Pseudotsuga forrestii

Craib (1919) distinguished an Asian Douglas-fir on the basis of herbarium specimens collected in 1914 by Forrest in the Mekong Valley at lat. 27°40'N, and originally identified as *Pseudotsuga sinensis*. He named it *Pseudotsuga forrestii* Craib (1919, pls. 160, 161). Craib considered *Pseudotsuga sinensis* and *Pseudotsuga forrestii* as two closely allied species forming a geographically and systematically distinct subgenus. Wilson (1926) disputed Craib's interpretation and considered *Pseudotsuga forrestii* as identical with *Pseudotsuga wilsoniana*. Nevertheless, the wide geographic separation (at least 1,200 miles) between the locales of *P. forrestii* and *P. wilsoniana* seems to indicate that they are two different species. Volume 7 of the *Flora of China* (Cheng and Fu 1978) lists *Pseudotsuga forrestii* as a separate species. Translated into English, common names given in the volume are Mekong yellow fir and long-budscales Douglas-fir.

Pseudotsuga gaussenii

Flous (1937, p. 102) named a new species, *Pseudotsuga gaussenii* Flous, on the basis of herbarium specimens collected in Anhwei Province and previously included under *Pseudotsuga sinensis*. Cheng and Fu (1978, p. 101) followed Flous in recognizing *Pseudotsuga gaussenii* as a separate species. Translated into English, common names for this species are eastern China yellow fir and dogstail tree (Cheng and Fu 1978).

Pseudotsuga brevifolia

Shortleaf yellow fir, *Pseudotsuga brevifolia* Cheng & Fu (1975, p. 83 and pl. 16 [not seen]; 1978, p. 103, 105, pl. 26) is the latest addition to the list of Asian Douglas-firs. The tree is described as being very similar to *Pseudotsuga gaussenii*.

CONCLUSION

Tracing the involved nomenclature of Douglas-fir has been a fascinating, although at times frustrating, task. Most of the credit for being able to piece together the history of the many name changes of Douglas-fir must go to Elbert L. Little, Jr., retired chief dendrologist of the U.S. Forest Service, whose publications on the taxonomy of Douglas-fir were an invaluable source of information. Because of changes adopted by the International Code of Botanical Nomenclature in 1980, however, further changes in the scientific name of Douglas-fir are unlikely.

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