Lonicera brachypoda De Candolle, Prodr. IV. 333 (1830).
Caprifolium flexuosum hort. apud Steudel, Nom. Bot. II. 278 (1841).
Lonicera brachypoda var. *β. repens* Hort. Bogor. apud Siebold in Jaarb. Nederl. Maatsch. Anmoed. Tuinb. 1845, 73, t. 7.
Lonicera confusa Miquel in Ann. Mus. Bot. Lugd.-Bat. II. 270 (1866); Prol. Fl. Jap. 158 (1866).—Not De Candolle.
Lonicera diversifolia Carrière in Rev. Hort. 1866, 99.
Lonicera Japonica Chinensis Baker in Ref. Bot. IV. t. 224 (1871), in part.—Not *L. chinensis* Wats.
Lonicera brachypoda repens Lavallé, Arb. Segrez. 140 (1877), name only.
Caprifolium japonicum subverticillare Kuntze, Gen. Pl. I. 273 (1891).
Lonicera japonica var. *flexuosa* Nicholson, Hand-list Arb. Kew. II. 17 (1896).—Rehder in Ann. Rep. Missouri Bot. Gard. XIV, 161 (Syn. Lonicera) (1903).

As "repens" is the oldest varietal name of this Honeysuckle, the new combination proposed here becomes necessary.

× **Lonicera Sargentii** (*L. hirsuta* × *prolifera*), nom. nov.

Lonicera hirsuta × *Sullivantii* Sargent in Gard. & For. IX. 344, f. 46 (1896).—Rehder in Ann. Rep. Missouri Bot. Gard. XIV. 211 (Syn. Lonicera) (1903).

As this hybrid is still in cultivation and was well figured and described, a binomial may be given to it for convenient reference. It is clearly intermediate between the parents cited above; from *L. hirsuta* Eat. it differs in the less pubescent scarcely or not ciliate leaves, glandless inflorescence, slightly or scarcely pubescent corolla and from *L. prolifera* Rehd. (*L. Sullivantii* Gray) it can be distinguished by the more densely pubescent under side of the leaves and the slightly pilose and darker colored corolla.

THE TAXADS AND CONIFERS OF YUNNAN.

ERNEST H. WILSON

DURING the years 1922–23, Mr. J. F. Rock collecting in Yunnan under the auspices of the National Geographic Society, Washington, D. C., made a large collection of the Taxads and Conifers he met with. A set of these was presented to the herbarium of the Arnold Arboretum. Naming this collection has afforded an opportunity to identify other material in this herbarium collected in Yunnan and enables me to present a review of the TAXACEAE and PINACEAE of the whole province.

Yunnan is interesting as representing the southern limits of distribution of many species of these two families.

TAXACEAE is represented by four genera—Taxus, Podocarpus, Torreya and Cephalotaxus—with eight species of which three belong each to Cephalotaxus and Podocarpus. One species of Cephalotaxus (*Cephalotaxus Mannii* Hook. f.) was first found in Manipur, northern Assam, the other two are widespread in China. One Podocarpus is Indo-Malayan, the other two are doubtful plants of which I have seen no material. The Torreya is found from Hupeh westward whilst the Taxus is widespread in China and grows also in Formosa and the Philippines.

In PINACEAE with fifteen genera Yunnan is richer than any other part of China. To these genera belong 33 species. Of these *Keteleeria Evelyniana* Mast. is doubtfully distinct; *Cryptomeria japonica* D. Don is cultivated only and *Thuja orientalis* L. may be an escape from cultivation and naturalized only. One other (*Fokienia Kawaii* Hayata) is described from the forests of the Tonkin-Yunnan border. *Abies Forrestii* Rogers is endemic and, strange to say, this is probably the only Conifer so far known confined to Yunnan. The most remarkable feature of all is the occurrence in extreme western Yunnan and in Formosa of *Taiwania cryptomerioides* Hayata, *Libocedrus macrolepis* Benth. & Hook. and *Pseudotsuga Wilsoniana* Hayata which are not known to grow elsewhere.

The subfamily ABIETEAE is represented by seven genera in eighteen species of which one (*Keteleeria Evelyniana* Mast.) is doubtful. Of the four species of Pinus two (*Pinus Armandi* Franch. and *P. tabulaeformis* Carr.) are widespread in China and the former grows also in Formosa and on the Japanese islands of Tanega-shima and Yaku-shima. Another (*P. yunnanensis* Franch.) ranges north into the warm valleys of western Szechuan. The fourth (*P. insularis* Endl.), a tropical Indo-Malayan species, finds its northern limits in Yunnan. The tropical *P. Merkusii* Jungh. grows in the bordering regions of upper Burmah and Siam and will probably be found in Yunnan. I have seen no Yunnan specimens of *P. Massoniana* Lamb., the common low-level Pine of China, but feel certain it must grow in that province. Of the two Pseudotsugas, *Pseudotsuga sinensis* Dode has its western limits of distribution in northeastern Yunnan, whilst *P. Wilsoniana* Hayata grows in Formosa and extreme northwest Yunnan. The Larch finds its southern limits in Yunnan as do the two Tsugas. The four species of Picea are also found in Szechuan and belong two to the section Omorica and two to that of Casicta. Curiously enough no Eupicea has yet been found in Yunnan. Two (*Abies Delavayi* Franch. and *A. Beissneriana* Rehd. & Wils.) of the three Abies are common in western Szechuan whilst the third (*A. Forrestii* Rogers) as before stated is endemic.

Of the three genera belonging to the subfamily TAXODIEAE, Cunninghamia is abundant and widespread in the warmer parts of China, Taiwania is confined to Formosa and extreme northwest Yunnan and Cryptomeria is cultivated there as elsewhere outside of Japan proper.

The subfamily CUPRESSEAE is represented by five genera in nine species. Of these *Thuja orientalis* L. may be indigenous or merely naturalized. *Libocedrus macrolepis* Benth. & Hook. grows also in Formosa, but not elsewhere. One Cupressus (*Cupressus Duclouxiana* Hickel) is confined to Yunnan and the warm valleys of western Szechuan, the other (*C. funebris* Endl. is widespread in China. Of the five species of Juniperus two (*Juniperus Wallichiana* Hook. f. and *J. recurva* Buch.-Ham.) are Himalayan and have their western limits in Yunnan. Another (*J. formosana* Hayata) is widespread in China and is found also in Formosa and so too is *J.*

squamata Buch.-Ham. which extends westward to the Sikkim Himalayas. The fifth (*J. chinensis* L.) though widespread throughout China and northeastern Asia generally is doubtfully indigenous in Yunnan.

TAXACEAE

Cephalotaxus Sieb. & Zucc.

Cephalotaxus Fortunei Hooker in Bot. Mag. LXXVI. t. 4499 (1850).—Parlatore in De Candolle, Prodr. XVI. pt. II. 503 (1868).—Franchet in Nouv. Arch. Mus. Paris, sér, 2, VII. 102 (Pl. David. I. 292) (1884);—in Jour. de Bot. XIII. 265 (1899).—Kanitz in Szechenyi, Keletazs. Utján. Tudom. Ered. II. 848 (Pl. Enum. 63) (1891); in Wiss. Ergeb. Reise Szechenyi, II. 738 (1898).—Beissner in Nuov. Giorn. Bot. Ital. n. ser. IV. 186 (1897); in Bull. Soc. Bot. Ital. 1901, 358.—Pritzel in Bot. Jahrb. XXIX. 213 (1900).—Masters in Jour. Linn. Soc. XXVI. 545 (1902); XXXVII. 413 (1906); in Jour. Bot. XLI. 269 (1903).—Pilger in Engler, Pflanzenr. IV.—5, 103 (Taxac.) (1903).—Diels in Wiss. Ergeb. Exped. Filchner China Tibet, X. 247 (1908).—Dunn & Tutcher in Kew Bull. Misc. Inform. add. ser. X. 256 (Fl. Kwangtung & Hongkong) (1912).—Patschke in Bot. Jahrb. XLVIII. 629 (1913).—Rehder & Wilson in Sargent. Pl. Wilson. II. 5 (1914).—Chun, Chinese Economic Trees, 45 (1922).—Rehder in Bailey, Cult. Evergreens, 183 (1923).—Dallimore & Jackson, Handb. Conif. 23, fig. 3 (1923).

Cephalotaxus filiformis Knight & Perry ex Gordon, Pinetum, 46 (1858), as a synonym.

Cephalotaxus drupacea K. Koch, Dendr. II. pt. II. 104 (1873).—Not Siebold & Zuccarini.

Cephalotaxus Griffithii Beissner in Bull. Soc. Bot. Ital. 1901, 358.—Masters in Jour. Bot. XLI. 269 (1903); in Jour. Linn. Soc. XXXVII. 414 (1906).—Not Hooker f.

Cephalotaxus Mannii Masters in Jour. Linn. Soc. XXVI. 545 (1902).—Not Hooker f.

YUNNAN: Between Tengyueh and Likiangfu, via Shweshanting, Kantingai, Feilungkiao-Yunlung, Lanping, Chienchuan, and Likiang, *J. F. Rock*, no. 8150, March, 1923; mountains south of Likiang, Sungkwe Hochin Range, *J. F. Rock*, no. 8298, in 1923; Litiping Range, Mekong-Yangtze divide, east of Weihsi, *J. F. Rock*, nos. 8691, 9397, 10370, 11572, 11575, in 1923; Siaomio-tsin near Pe-yen-tsin, *Siméon Ten*, no. 315, September, 1916; Hoa-Kiao-pin near Pe-yen-tsin, *Siméon Ten*, no. 161, June, 1916; Kou-ty near Pe-yen-tsin, *Siméon Ten*, no. 460, in 1917; Mengtze, mountains to the north, alt. 2300 m., *A. Henry*, no. 9100.

SZECHUAN: Yen-yuan Hsien, alt. 2900 m., *C. Schneider*, no. 3573, May, 1914; between Kalapa and Liuku, alt. 3000–3300 m., *C. Schneider*, no. 1290, May, 1914.

DISTRIBUTION: China, south of the Yellow River at moderate altitudes, from the east coast to the extreme west.

Cephalotaxus Mannii Hooker f. in Hooker's Icon. Pl. XVI. t. 1523 (1886); Fl. Brit. Ind. v. 647 (1888).

YUNNAN: without locality, *G. Forrest*, no. 7798.

DISTRIBUTION: Assam, Khasia mountains eastward to the mountains of southwestern Yunnan.

Forrest's specimen consists of leafy shoots which have subfalcate leaves and agree well with co-type specimens of Hooker's species in this herbarium.

Cephalotaxus drupacea Siebold & Zuccarini in Abh. Akad. Münch. IV. pt. III. 232 (Fl. Jap. Fam. Nat. II. 108) (1846).—Hemsley in Bot. Mag. CXXXV. t. 8235 (1909).—Rehder & Wilson in Sargent, Pl. Wilson. II. 3 (1914), where full synonymy and references are given.

DISTRIBUTION: Japan, south Korea and east China as far west as the province of Hupeh.

I have seen no specimens of typical *C. drupacea* S. & Z. from the province of Yunnan.

Cephalotaxus drupacea var. **sinensis** Rehder & Wilson in Sargent, Pl. Wilson. II. 3 (1914).—Rehder in Jour. Arnold Arb. IV. 118 (1923) where full synonymy and references are given.

YUNNAN: without locality, *G. Forrest*, no. 11683.

DISTRIBUTION: mountains of central and western China from the province of Honan westward.

Forrest's specimen bears young unopened male flowers and is rather fragmentary. This is the only material I have seen of this variety from the province of Yunnan.

Torreya Arn.

Torreya Fargesii Franchet in Jour. de Bot. XIII. 264 (1899).—Pritzel in Bot. Jahrb. XXIX. 214 (1900).—Pilger in Engler, Pflanzenr. IV.–5, 108 (Taxac. (1903).—Pampanini in Nuov. Giorn. Bot. Ital. n. ser. XVII. 231 (1910).—Patschke in Bot. Jahrb. XLVIII. 630 (1913).

Torreya grandis Rehder & Wilson in Sargent. Pl. Wilson. II. 7 (1914). Not Fortune.

Tumion fargesii Skeels in Proc. Biol. Soc. Wash. XXXVIII. 88 (1925).

YUNNAN: Between Tengyueh and Likiangfu, via Shweshanting, Kantingai, Feilungkiao-Yunlung, Lanping, Chienchuan, and Likiang, *J. F. Rock*, no. 8144, March, 1923; Litiping Range, Mekong-Yangtsze divide east of Weihsi, *J. F. Rock*, nos. 8692, 9396, 10374, in 1923; same locality, Lienfu, alt. 2400 m., *H. Handel-Mazzetti*, no. 7848, August, 1915; valley of the Salween River, alt. 2500–2700 m., *H. Handel-Mazzetti*, no. 8302, September, 1915.

DISTRIBUTION: western China, mountains of Hupeh, Szechuan and Yunnan.

This species is characterized by its gray, yellowish green bark on shoots

two years old and upwards and by its deeply ruminate endosperm. The east China *T. grandis* Fortune has similar bark but the endosperm is scarcely if at all ruminate. When working up the TAXACEAE for Sargent's Plantae Wilsonianae, my colleague, A. Rehder, and I had seen no ripe fruits of Fortune's species and, moreover, overlooked the illustration in Gardeners' Chronicle, 1858, 588, fig. and confused the two species. With ripe fruits available the differences are perfectly obvious.

Taxus L.

Taxus chinensis Rehder in Jour. Arnold Arb. I. 51 (1919); IV. 119 (1923); in Bailey, Cult. Evergreens, 187 (1923).—Dallimore & Jackson, Handb. Conif. 71 (1923).—Silva Tarouca & Schneider, Uns. Freiland-Nadelhölz. 34, fig. (1923).

Taxus baccata Franchet in Nouv. Arch. Mus. Paris, sér. 2, VII. 103 (Pl. David. I. 293) (1884).—Pritzel in Bot. Jahrb. XXIX. 214 (1900).—Masters in Jour. Linn. Soc. XXVI. 546 (1902); in Jour. Bot. XLI. 269 (1903); in Jour. Linn. Soc. XXXVII. 414 (1906).—Not Linnaeus.

Taxus baccata, subsp. 2. *cuspidata* var. b. *chinensis* Pilger in Engler, Pflanzenr. IV.–5, 112 (Taxac.) (1903).—Patschke in Bot. Jahrb. XLVIII. 630 (1913).—Henry in Elwes & Henry, Trees Gr. Brit. & Irel. I. 108 (1906).

Taxus cuspidata var. *chinensis* Rehder & Wilson in Sargent, Pl. Wilson. II. 8 (1914).

Taxus baccata, subsp. 1. *Wallichiana* var. b. *chinensis* Pilger in Bot. Jahrb. liv. 43 (1916).

Taxus cuspidata Chun, Chin. Econ. Trees, 43, fig. 13 (1922).—Not Siebold & Zuccarini.

YUNNAN: Shweli River drainage basin to summit of Shweli-Salween watershed east of Tengyueh, *J. F. Rock*, no. 7587, November, 1922; Litiping Range, Mekong-Yangtsze divide, east of Weihsi, *J. F. Rock*, no. 11573, in 1923; near Talifu, alt. 3200 m., *H. Handel-Mazzetti*, no. 6408, May, 1915; between Sungyueh and Tengchuan, alt. 3000–3200 m., *C. Schneider*, no. 2918, Sept., 1914; without locality, *G. Forrest*, nos. 9642, 11789 and 12087.

DISTRIBUTION: China, widely spread; also on the mountains of Formosa, Luzon in the Philippine Islands and those of Manipur.

The western limits of the range of this species are not known but very possibly they will prove to be on the Sikkim Himalayas. Dr. Handle-Mazzetti's specimen has been named by him *T. Wallichiana* Zucc., but that species would appear to be confined to the northwestern Himalayas. The several specimens I have seen from Luzon in the Philippines and from Manipur in northern Assam are identical in every way with material from Hupeh and Szechuan. The Chinese Yew with its longer leaves of a cheery green color and very numerous slender branchlets is under cultivation very distinct from either the Japanese or European species.

Podocarpus L'Herit.

Podocarpus neriifolius D. Don in Lambert, Descr. Pinus, II. 21 (1824), in part; ed. minor, 142 (1832).—Hooker in Bot. Mag. XXXVIII. t. 4655 (1852).—Masters in Jour. Linn. Soc. XXVI. 548 (1902); LXXVII. 414 (1906).

—Pilger in Engler, Pflanzenr. IV.–5, 80 (Taxaceae) (1903).—Patschke in Bot. Jahrb. XLVIII. 629 (1913).—Rehder & Wilson in Sargent Pl. Wilson. II. 9 (1914).—Hayata in Tokyo Bot. Mag. XXXI. 119 (1917).

Podocarpus macrophylla Wallich, Tent. Fl. Nepal, 56, t. 43 (1824), excluding synonyms; Cat. No. 6052a (1830).—Franchet in Jour. de Bot. XIII. 265 (1899).—Pritzel in Bot. Jahrb. XXIX. 213 (1900).—Masters in Jour. Linn. Soc. XXVI. 548 (1902).—Patschke in Bot. Jahrb. XLVIII. 629 (1913), in part.—Pilger in Bot. Jahrb. LIV. 38 (1916).—Not D. Don.

Podocarpus macrophylla var. *acuminatissima* Pritzel in Bot. Jahrb. XXIX. 213 (1900).

YUNNAN: Szemao, Yulo forest, alt. 1300 m., *A. Henry*, no. 12919.

DISTRIBUTION: India and Burmah eastward through Malaya.

Henry's specimen, which is the only one we have seen from Yunnan, consists of a leafy shoot only. It may not belong to this species, although it agrees well with a specimen so-named collected in Perak by L. Wray, Jr. (No. 2922), and received from Herb. Singapore. Hayata records it as collected by Professor Kawai on the Tonkin border. My own knowledge of this tree in China is based on specimens cultivated in the grounds of several temples on and around Mt. Omei in western Szechuan.

Podocarpus Forrestii Craib & W. W. Smith in Notes Bot. Gard. Edinburgh, XII. 219 (1920).—Dallimore & Jackson, Handb. Conif. 46 (1923.)

Podocarpus macrophyllus Diels in Notes Bot. Gard. Edinburgh, VII. 258 (Pl. Chin. Forrest.) (1912).—Not D. Don.

DISTRIBUTION: Yunnan, the Tali Range.

I have seen no material of this species.

Podocarpus Mairei Lemée & Léveillé in Le Monde des Pl. 1914, 20.

DISTRIBUTION: Yunnan.

This is an obscure plant which is unknown to me except by the author's brief description and which may not belong to the genus. Possibly it is referrable to *Keteleeria Davidiana* Beissn.

PINACEAE

Subfam. ABIETEAE Spach

Pinus L.

Pinus tabulaeformis Carrière, Traité Conif. ed. 2, 510 (1867).

YUNNAN: Yunnanfu district, *C. Schneider*, nos. 116, 119, 141 February, 1914.

DISTRIBUTION: China, wide-spread, being found at sea-level in the colder parts and on mountains above 1000 m. throughout the warmer provinces; also in southern Mongolia and in Manchuria as far east as the watershed of the Yalu River.

The above are the only specimens of the common mountain Hard Pine of China which I have seen from Yunnan province; however, in all probability it is quite common on the mountains of the more northern parts.

My colleague, A. Rehder, discusses the name of this Pine and its priority on page 22 of this number of the Journal of the Arnold Arboretum.

Pinus yunnanensis Franchet in Jour. de Bot. XIII. 253 (1899).—Masters in Jour. Linn. Soc. XXVI. 553 (1902); XXXVII. 415 (1906).—Shaw in Sargent, Pl. Wilson. I. 2 (1911).—Patschke in Bot. Jahrb. XLVIII. 657 (1912).

Pinus sinensis var. *yunnanensis* Shaw in Sargent, Pl. Wilson. II. 17 (1914); Genus Pinus, 60, t. 23, fig. 202–203 (1914).—Rehder in Bailey, Cult. Evergreens, 320 (1923).—Dallimore & Jackson, Handb. Conif. 451 (1923).

YUNNAN: between Kambalti and Tengyueh, via Kuyung, *J. F. Rock*, no. 7545, November, 1922; between Tengyueh and Lungling, *J. F. Rock*, no. 7098, Oct.-November, 1922; between Tengyueh and Likiangfu, via Shweshanting, Kantingai, Feilungkiao-Yunlung, Lanping, Chienchuan, and Likiang, *J. F. Rock*, no. 8037, March, 1923; eastern slopes of Likiang Snow Range, Yangtsze watershed, *J. F. Rock*, no. 11699, (1923–24); north of Yunnanfu, *C. Schneider*, no. 276, March, 1914.

SZECHUAN: between Tungan-chou and Chang-kuan-chung, *C. Schneider*, no. 530. March, 1914; between Hui-li-chuo and Pai-kuo-wan, *C. Schneider*, no. 689, March, 1914; between Techang and Hang-lien-po, *C. Schneider*, no. 806, April, 1914.

DISTRIBUTION: western Yunnan northward to Washan in western Szechuan.

Shaw regards this Pine as a variety of the widely distributed *P. sinensis* Lambert, now known as *Pinus tabulaeformis* Carr., but with its red peeling bark, its very long (20–30 cm.) slender leaves most usually in fascicles of three, and its cocoa-brown cone with but slightly developed apophysis, it is really very distinct. I never had any difficulty in distinguishing it in the field. It is a low-level Pine in the river valleys of southwest Szechuan and west of the limits of the Red Basin. It extends southward into western Yunnan. It is a tree of medium size usually with long, drooping, slender leaves in fascicles of three on all the main shoots and relatively large, long-persistent cones. On the upper part of the trunk and main branches the bark is usually red and exfoliates in thin sheets. On the lower part of the trunk the bark is persistent and deeply fissured into irregular, oblong masses. The branches are rather short and the habit usually pyramidal, though old trees are frequently flat-headed. The wood is moderately close-grained and is used for fuel and also for general construction purposes.

Pinus insularis Endlicher, Syn. Conif. 157 (1847).—Clinton-Baker, Ill. Conif. III. 37, t. (1913).—Shaw, Genus Pinus, 60, t. 23, figs. 208–210 (1914).

Pinus Kesiya Royle apud Loudon, Gard. Mag. n. s. VI. 8 (1840), nomen seminudum.

Pinus taeda Blanco, Fl. Filip. 767 (1837).—Not Linnaeus.

Pinus khasiana Griffith, Notul. Pl. Asiat. IV. 18 (1854); Icon. Pl. Asiat. t. 367–368 (1854).

Pinus Kasya Royle apud Parlatore in De Candolle, Prodr. XVI. pt. 2, 390 (1868).—Brandis, Forest Fl. Brit. Ind. 508 (1874).—Kurz, For. Fl. Brit. Burmah II. 499 (1877).—Gamble, Man. Ind. Timbers, 397 (1881).—Hooker f., Fl. Brit. Ind. VI. 652 (1888).

Pinus Khasya Brandis, Ind. Trees, 690 (1906).—Clinton-Baker Ill. Conif. III. 38, t. (1913).—Dallimore & Jackson, Handb. Conif. 400 (1923).

YUNNAN: between Kingtung Chai and Muang Hing, alt. 1500 m., *J. F. Rock*, no. 2694, March, 1922; watershed of the Black River between Man Lien and Hsinfu, *J. F. Rock*, no. 2941, March, 1922; between Chehu and Noan-Ma-Kai, *J. F. Rock*, no. 2965, March, 1922; valley of the Salween River, alt. 2200–2000 m., *H. Handel-Mazzetti*, no. 8401, Sept., 1915.

UPPER BURMAH, KENG TUNG TERRITORY: between Pang-Sop-Lao and Ban-Yang-Kha, alt. 1000 m., *J. F. Rock*, no. 2147, January, 1922; Ban Saa, alt. 1000 m., *J. F. Rock*, no. 2261, Jan.-Feb., 1922; on ridges above Ta Ping, between Meh Lui river and Muang Mah, alt. 800–1200 m., *J. F. Rock*, no. 2297, Feb., 1922.

DISTRIBUTION: Philippines, Upper Burmah, Assam and southwestern Yunnan.

Rock remarks that this Pine is the most common tree in extreme southwestern Yunnan and that around Szemao the hillsides are covered with it to the exclusion of nearly every other tree. Dr. Handel-Mazzetti's specimen is from about the northern limits of the range of the species.

Pinus Merkusii Junghuhn & De Vriese in De Vriese, Pl. Nov. Ind. Bat. Or. 5, t. 2 (1845).—Endlicher, Syn. Conif. 176 (1847).—Miquel, Fl. Neder. Ind. II. 1069 (Fl. Ind. Bat.) (1856).—De Boer, Conif. Archip. Ind. 5 (1866).—Parlatore in De Candolle, Prodr. XVI. pt. II. 389 (1868).—Kurz, For. Fl. Brit. Burmah, II. 499 (1877).—Gamble, Man. Ind. Timbers, 398 (1881).—Hook. f., Fl. Brit. Ind. V. 652 (1888).—Brandis, Ind. Trees, 691 (1906).—Clinton-Baker, Ill. Conif. III, 41, t. (1913).—Shaw, Genus Pinus, 58, t. 23, figs. 198–200 (1914).—Dallimore & Jackson, Handb. Conif. 415 (1923).

Pinus sylvestris Loureiro, Fl. Cochinch. II. 579 (1790).—Not Linnaeus.

Pinus sumatrana Junghuhn in Bot. Zeit. 1846, 699.

Pinus Finlaysoniana Wallich apud Blume, Rumphia, III. 210 (1847).

Pinus Latteri Mason in Jour. Asiat. Soc. I. 74 (1849).—Kurz in Flora, 1872, 264.

UPPER BURMAH, KENG TUNG TERRITORY: between Pang Sop Lao and Ban Yang Kha, valley of the Meh Len, alt. 800–1100 m., *J. F. Rock*, no. 2155, Jan., 1922.

SIAM, CHIENGMAI PROV.: between Meh Soi and Hue San, alt. 480–525 m., *J. F. Rock*, no. 1836, January, 1922.

This species has not yet been reported wild in China proper, but since it grows in the Upper Shan States adjacent to southwestern Yunnan it will probably be found in that province. In this herbarium there is a specimen of this Pine collected in Hainan by F. A. McClure (No. 9805) from a planted tree.

Pinus Massoniana Lambert, Descr. Pinus, I. 17, t. 12 (1803); ed. 2, I. 16, t. 8 (1828); ed. minor, 20, t. 8 (1832).—Shaw in Sargent, Pl. Wilson. I. 1, (1922); II. 14 (1914), where full references and an account of this species will be found.

DISTRIBUTION: China, widely spread throughout the warmer parts from sea-level up to 1800 m.; also in Formosa but doubtfully indigenous there.

There is no material from Yunnan of this species in this herbarium neither have I actual knowledge of its growing there, but there is little doubt that it does.

Pinus Armandi Franchet in Nouv. Arch. Mus. Paris, sér. 2, VII. 95, t. 12 (Pl. David. I. 285) (1884); in Jour. de Bot. XIII. 254 (1899).—Beissner in Nuov. Giorn. Bot. Ital. n. ser. IV. 184 (1897).—Masters in Jour. Linn. Soc. XXVI. 549 (1902); XXXVII. 415 (1906).—Clinton-Baker, Ill. Conif. I. 6, t. (1909).—Elwes & Henry, Trees Gr. Brit. & Irel. v. 1043 (1909).—Stapf in Bot. Mag. CXXXVI. t. 8347 (1910).—Mottet in Rev. Hort. 1910, 423, fig. 177–179.—Shaw in Sargent, Pl. Wilson. I. 1 (1911); II. 12 (1914); Gen. Pinus, 30, t. 9, fig. 96–99 (1914).—Bean, Trees, Shrubs Brit. Isles, II. 172, fig. (1914).—Wilson, Conif. Tax. Jap. 20 (1916).—Chun, Chin. Econ. Trees, 11, t. 5 (1922).—Rehder in Bailey, Cult. Evergreens, 305 (1923); in Jour. Arnold Arb. IV. 119 (1923).—Dallimore & Jackson, Handb. Conif. 370 (1923).—Silva Tarouca & Schneider, Uns. Freiland-Nadelhölz, ed. 2, 72, fig. 74, t. 2, fig. o (1923).

Pinus quinquefolia David, Jour. Trois. Voy. Chin. I. 192 (1875), name only.

Pinus koraiensis Beissner in Nuov. Giorn. Bot. Ital. n. ser. IV. 184 (1897).—Masters in Jour. Linn. Soc. XXVI. 550 (1902); XXXVII. 415 (1906); in Gard. Chron. ser. 3, XXXIII. 34, fig. 18, 19 (1903).—Not Siebold & Zuccarini.

Pinus scipioniformis Masters in Bull. Herb. Boiss. VI. 270 (1898).

Pinus mandshurica Masters in Jour. Linn. Soc. XXVI. 551 (1902).—Not Ruprecht, nor Murray.

Pinus Mastersiana Hayata in Gard. Chron. ser. 3, XLIII. 194 (1908).

Pinus Armandi var. *Mastersiana* Hayata in Jour. Coll. Sci. Tokyo, XXV. art. 19, 215, fig. 8 (Fl. Mont. Formos.) (1908).

Pinus levis Lemée & Léveillé in Fedde, Rep. Spec. Nov. VIII. 60 (1910).

Pinus excelsa var. *chinensis* Patschke in Bot. Jahrb. XLVIII. 657 (1912).

YUNNAN: Watershed of the Black River or Papienho, between Mohei and Maokai and beyond Chugai, alt. 2100–2300 m., *J. F. Rock*, nos. 2994, 3019, April, 1922; headwaters of the Red River between Mao-goi and Nan-chien, alt. 2000 m., *J. F. Rock*, no. 3025, April, 1922; drainage basin of Erhhai (Lake of Talifu), Tsangshan Range, alt. 2300–2600 m., *J. F. Rock*, no. 3170, April, 1922; Yangtsze watershed, Likiang plateau, *J. F. Rock*, nos. 3614, 5877, May, 1922; west of Talifu, Mekong watershed, between Youngchang and Tengyueh *J. F. Rock*, no. 6792, Sept.-Oct., 1922; Yunnanfu, *C. Schneider*, nos. 117, 142, February, 1914; Mengtsze, alt. 2300 m., *A. Henry*, no. 10519; district of Mi-le, *A. Henry*, no. 9868; without locality, *E. E. Maire;* without locality, *G. Forrest*, no. 11919.

DISTRIBUTION: China, mountains south of the Yellow River in central,

western and southwestern China; also in Formosa and on the Japanese Islands of Tanega-shima and Yaku-shima.

This is the only 5-needle Pine native of China. In Yunnan it is fairly common. Rock says that around Tali Lake it grows in association with *Pinus yunnanensis* Franch. In 1899 I gathered ripe seeds at 2300 m. altitude near Lu-tung-po where the tree was growing associated with *Magnolia Delavayi* Franch.

Larix Mill.

Larix Potaninii Batalin in Act. Hort. Petrop. XIII. 385 (1893).—Masters in Jour. Linn. Soc. XXVI. 558 (1902); XXXVII. 424 (1906); in Gard. Chron. ser. 3, XXXIX. 178, fig. 68 (1906).—Bean in Kew Bull. Misc. Inform. XXIII. 173, t. (1910).—Patschke in Bot. Jahrb. XLVIII. 651 (1913).—Rehder & Wilson in Sargent, Pl. Wilson. II. 18 (1914).—Chun, Chin. Econ. Trees, 6, fig. 3 (1922).—Rehder in Jour. Arnold Arb. IV. 121 (1923); in Bailey, Cult. Evergreens, 290 (1923).—Dallimore & Jackson, Handb. Conif. 297 (1923).

Larix chinensis Beissner in Mitt. Deutsch. Dendr. Ges. v. 68 (1896); in Nuov. Giorn. Bot. Ital. n. ser. IV. 183, t. 5, fig. 1 (1897).—Pritzel in Bot. Jahrb. XXIX. 216 (1900).—Masters in Jour. Linn. Soc. XXVI. 558 (1902); XXXVII. 424 (1906).—Patschke in Bot. Jahrb. XLVIII. 651 (1913).

Larix thibetica Franchet in Jour. de Bot. XIII. 262 (1899).—Pritzel in Bot. Jahrb. XXIX. 216 (1900).—Masters in Jour. Linn. Soc. XXVI. 558 (1902); XXXVII. 424 (1906).

Larix Griffithii Masters in Jour. Linn. Soc. XXVI. 558 (1902); XXXVII. 424 (1906).—Not Hooker f. & Thomson.

Pinus sinensis Voss in Putlitz & Meyer, Landlexicon, IV. 769 (1913).—Non Lambert.

YUNNAN: Yangtsze watershed, prefectural district of Likiang, eastern slopes of Likiang Snow range, *J. F. Rock*, nos. 3404, 3839, May & October, 1922; same locality, nos. 8193, 11661, in 1923–24; without locality *G. Forrest*, no. 10185.

DISTRIBUTION: mountains of northwestern Yunnan and northward on those of western Szechuan and southern Kansu and eastward to the mountains of Shensi.

The cones of Rock's no. 3404 are from 6 to 7.5 cm. long and are much larger than I have heretofore seen. At first glance the specimen suggests *L. Griffithiana* Hook. f. & Thoms. but it has the polished glabrous shoot, leaves keeled on both surfaces and erect bracts to the cone-scales characteristic of *L. Potaninii* Batal.

Picea A. Dietr.

Sect. CASICTA Mayr.

Picea likiangensis Pritzel in Bot. Jahrb. XXIX. 217 (1900).—Masters in Jour. Linn. Soc. XXVI. 554 (1902); XXXVII. 418 (1906).—Beissner, Handb. Nadelholzk. ed. 2, 249 (1909).—Patschke in Bot. Jahrb. XLVIII. 632, fig. 1, 6 (1913).—Rehder & Wilson in Sargent, Pl. Wilson. II. 31 (1914).—Chun,

Chin. Econ. Trees, 19 (1922).—Rehder in Bailey, Cult. Evergreens, 285 (1923).—Dallimore & Jackson, Handb. Conif. 334, fig. 73 (1923), excluding synonyms.

Abies likiangensis Franchet in Jour. de Bot. XIII. 257 (1899).

Picea Alcockiana Masters in Jour. Linn. Soc. XXXVII. 418 (1906).—Not Carrière.

YUNNAN: High plateau between Talifu and Likiang to the foot of the Likiang Snow Range, *J. F. Rock*, no. 3271, May, 1922; Yangtsze watershed, Prefectural District of Likiang, eastern slopes of Likiang Snow Range, *J. F. Rock*, no. 3542, May-October, 1922; eastern slopes of Likiang Snow Range, Yangtsze watershed, *J. F. Rock*, no. 10888, in 1923–24; Likiang Snow Range, alt. 2500 m., *J. M. Delavay*, no. 1031, July, 1884; Yungning, *C. Schneider*, no. 1612, June, 1914; without locality, *G. Forrest*, nos. 10151, 10295.

SZECHUAN: Between Kalapa and Liuku, alt. 3900 m., *C. Schneider*, no. 1291, May, 1914; Molien, alt. 3000–3600 m., *C. Schneider*, no. 1428, May, 1914; between Oti and Ouentin, alt. 2800 m., *C. Schneider*, no. 1452, June, 1914; between Choso and Woloho, alt. 3000 m., *C. Schneider*, no. 1573, June, 1914.

DISTRIBUTION: Mountains of northwestern Yunnan northward to the neighborhood of Tachien-lu in western Szechuan.

Schneider's specimens are mostly without cones and some may belong to the related *P. montigena* Mast. The Likiang Spruce is evidently a very common tree in the alpine regions of northwestern Yunnan, as it is round Tachien-lu and elsewhere in southwestern Szechuan. It is cultivated in England from seeds that I sent from Tachien-lu in 1904 to Messrs. Veitch (Seed nos. 1836, 1834). There is growing in this Arboretum plants of a Spruce received in 1924 from Messrs. Hillier & Sons of Winchester, England, under the name of "*P. yunnanensis*" which are evidently *P. likiangensis* Pritzel.

Messrs. Dallimore & Jackson (l.c.) would include under this species the *P. likiangensis* var. *rubescens* Rehd. & Wils., *P. Balfouriana* Rehd. & Wils. and would relegate *P. purpurea* Mast. to varietal rank. In the present state of our knowledge such wholesale lumping is likely to make confusion worse confounding.

Picea montigena Masters in Gard. Chron. ser. 3, XXXIX. 146, fig. 56 (1906), excluding cone.—Patschke in Bot. Jahrb. XLVIII. 632 (1913).—Rehder & Wilson in Sargent, Pl. Wilson. II. 33 (1914).—Chun, Chin. Econ. Trees, 18 (1922).—Rehder in Bailey, Cult. Evergreens, 284 (1923).

YUNNAN: Yangtsze watershed, Prefectural district of Likiang, eastern slopes of Likiang Snow Range, *J. F. Rock*, nos. 3403, 4761, 5328, May–October, 1922; between Tengyueh and Likiangfu, via Shweshanting, Kantingai, Feilungkiao-Yunlung, Lanping, Chienchuan and Likiang, *J. F. Rock*, no. 8158, March, 1923; eastern slopes of Likiang Snow Range, Yangtsze watershed, *J. F. Rock*, no. 10890, in 1923–24.

SZECHUAN: between Yenyuan Hsien and Hunka, alt. 2900 m., *C. Schneider*, no. 1486, June, 1914.

DISTRIBUTION: Mountains of northwestern Yunnan northward to those round Tachien-lu in western Szechuan.

Messrs. Dallimore & Jackson (Handb. Conif., 316 [1923]) reduce this species to *P. asperata* Mast., but the latter is an EUPICEA while *P. montigena* Mast. belongs to the section CASICTA.

Sect. OMORICA Mayr.

Picea complanata Masters in Gard. Chron. ser. 3, XXXIX. 146, fig. 57 (1906).—Beissner, Handb. Nadelholzk. ed. 2, 288 (1909).—Bean in Kew Bull. Misc. Inform. 1910, 174.—Patschke in Bot. Jahrb. XLVIII. 632 (1913). —Rehder & Wilson in Sargent, Pl. Wilson. II. 35 (1914).—Rehder in Bailey, Cult. Evergreens, 286 (1923).—Silva Tarouca & Schneider, Uns. Freiland-Nadelhölz. ed. 2, 33, fig. (1923).

Abies brachytyla Franchet in Jour. de Bot. XIII. 258 (1899), as to Delavay's specimen, not *Picea brachytyla* Pritzel.

YUNNAN: Between Tengyueh and Likiangfu, via Shweshanting, Kantingai, Feilungkiao-Yunlung, Lanping, Chienchuan, and Likiang, *J. F. Rock*, no. 8142, March, 1923; Karila and Ponzela, Yangtsze watershed, southeast of Peimashan, *J. F. Rock*, no. 11705, in 1923; watershed of Salween and Irrawadi rivers, Tjiontson-lumba valley, alt. 2950–3050 m., *H. Handel-Mazzetti*, no. 9209, July, 1916; "Ona-pen-Késu sur le Ma-eul-chan, 2500 m.," *J. M. Delavay*, no. 4129, August, 1889.

DISTRIBUTION: Mountains of western Yunnan, northward to those of Wen-ch'uan Hsien in western Szechuan.

An old detached cone, evidently picked from the ground, is associated in this herbarium with Rock's no. 11705. I do not think it belongs there or to the species, but to *Picea likiangensis* Pritzel. Dr. Stapf in Bot. Mag. CXLVIII. sub t. 8969 (1922) unites all the Chinese Spruces of the OMORICA group under *Picea brachytyla* Pritzel; Dallimore & Jackson do the same. I am unable to agree to this drastic lumping together. As I know them in a wild condition these trees present many differences which are, I think, entitled to recognition. As our knowledge increases and the plants become properly known under cultivation it will be possible to critically revise the classification of the species of Picea native of China, but that time is not yet. Whatever disposition is made of the three Omorica Spruces (*P. complanata* Mast., *P. ascendens* Patsche, *P. Sargentiana* Rehd. & Wils.) of Yunnan and western Szechuan I am convinced that that of western Hupeh and eastern Szechuan (*P. brachytyla* Pritzel) will be recognized as a good and perfectly distinct species.

Picea ascendens Patschke in Bot. Jahrb. XLVIII. 632 (1913).—Rehder & Wilson in Sargent, Pl. Wilson. II. 34 (1914).—Rehder in Bailey, Cult. Evergreens, 286 (1923).

YUNNAN: western slope of Likiang Snow Range, Yangtsze watershed, *J. F. Rock*, nos. 4136, 10865, 10889, May-June, 1922 and April, 1923; Litiping Range, Mekong-Yangtsze divide, east of Weihsi, *J. F. Rock*, no. 11574, in 1923; Salween valley, border of Tsarong, Tibet, *J. F. Rock*, no. 11498, in 1923.

DISTRIBUTION: Mountains of northwestern Yunnan and northward to the district of Lungan-fu in northwestern Szechuan.

No. 11498 consists of a sterile branch and may belong to another species.

Tsuga Carr.

Tsuga yunnanensis Masters in Jour. Linn. Soc. XXVI. 556 (1902).—Beissner, Handb. Nadelholzk. ed. 2, 83 (1909).—Patschke in Bot. Jahrb. XLVIII. 639 (1913).—Rehder & Wilson in Sargent, Pl. Wilson. II. 63 (1914).—Hayata in Tokyo Bot. Mag. XXXI. 118 (1917).—Chun, Chin. Econ. Trees, 22 (1922).—Rehder in Bailey, Cult. Evergreens, 266 (1923).—Dallimore & Jackson, Handb. Conif. 538, fig. 119 (1923).—Downie in Notes Bot. Gard. Edinburgh, XIV. 16, fig. 194, 1 (1923).

Abies dumosa var. *chinensis* Franchet in Jour. de Bot. XIII. 258 (1899), as to Delavay's specimen.

Abies yunnanensis Franchet in Jour. de Bot. XIII. 258 (1899).—Bois in Jour. Soc. Hort. France, ser. 4, I. 231 (1900).

Tsuga dura Downie in Notes Bot. Gard. Edinburgh, XIV. 16, fig. 194, 2 (1923).

Tsuga leptophylla Handel-Mazzetti, Pl. Nov. Sin. Fortsetz. 25, p. 3 (Anzeig. Akad. Wiss. Wien. no. 10.) (1924).

YUNNAN: Shweli River drainage basin to summit of Shweli-Salween watershed east of Tengyueh, *J. F. Rock*, no. 7643, November, 1922; Mount Lauchunshan, southwest or the Yangtsze bend of Shiku, *J. F. Rock*, no. 11493, in 1923; between Tengyueh and Likiangfu, via Shweshanting, Kantingai, Feilungkiao-Yunlung, Lanping, Chienchuan, and Likiang, *J. F. Rock*, no. 8152, March, 1923; Yangtsze watershed, Prefectural District of Likiang, eastern slopes of Likiang Snow Range, *J. F. Rock*, nos. 3540, 3724, May-October, 1922; same locality, *J. F. Rock*, no. 9049, in 1923–24; Yangtsze watershed, western slopes of Likiang Snow Range, *J. F. Rock*, no. 4608, May 30–June 6, 1922; eastern slopes of the Likiang Snow Range, alt. 3200 m., *C. Schneider*, no. 1979, July, 1914; between Chung-tien and Chitsung, alt. 3200–3575 m., *H. Handel-Mazzetti*, no. 7795, August, 1915 (co-type of *Tsuga leptophylla* Hand.-Mazz.); without locality, *G. Forrest*, no. 9056.

SZECHUAN: Ning-yuan-fu, Lo-tieh shan, alt. 2900–3500 m., *C. Schneider* nos. 914, 4001, April 15, 1914; Lololand, *C. Schneider*, no. 3974, April, 1914.

DISTRIBUTION: high mountains of western Yunnan northward to those of Wen-ch'uan Hsien in western Szechuan.

This species of Hemlock Fir is quite local in distribution as compared with *T. chinensis* Pritzel, being known only from the mountains of the extreme west. There, however, it is plentiful and grows to a large size. The species is well distinguished by its leaves which are entire and rounded

at the apex with a margin usually serrulate and by its sessile cone with dull flexible cone-scales which are inclined to curve outward at the summit.

Tsuga chinensis Pritzel in Bot. Jahrb. XXIX. 217 (1900).—Masters in Jour. Linn. Soc. XXVI. 556 (1902); XXXVII. 421 (1906).—Beissner, Handb. Nadelholzk. ed. 2, 82 (1909).—Patschke in Bot. Jahrb. XLVIII. 639 (1913).—Rehder & Wilson in Sargent, Pl. Wilson. II. 37 (1914).—Bean, Trees, Shrubs Brit. Isles, II. 606 (1914).—Downie in Notes Bot. Gard. Edinburgh, XIV. 18, fig. 194, 5 (1923).—Chun, Chin. Econ. Trees, 22, fig. 7 (1922).—Rehder in Bailey, Cult. Evergreens, 266 (1923).—Silva Tarouca & Schneider, Uns. Freiland-Nadelholz. ed. 2, 36, fig. (1923).—Dallimore & Jackson, Handb. Conif. 533, fig. 117 (1923).

Abies thei-sha David, Jour. Trois. Voy. Chin. I. 343 (1875), name only.

Abies Tsuga Franchet in Nouv. Arch. Mus. Paris, ser. 2, VII. 97 (Pl. David. I. 287) (1884).—Not Siebold & Zuccarini.

Abies dumosa var. *chinensis* Franchet in Jour. de Bot. XIII. 258 (1899), excl. Delavay's specimen.

Abies chinensis Franchet in Jour. de Bot. XIII. 259 (1899).—Bois in Jour. Soc. Hort. France, ser. 4, I. 230 (1900).

Tsuga dumosa var. *chinensis* Pritzel in Bot. Jahrb. XXIX. 217 (1900).

Tsuga Sieboldi Pritzel in Bot. Jahrb. XXIX. 217 (1900).—Masters in Jour. Linn. Soc. XXVI. 556 (1902); XXXVII. 421 (1906); in Jour. Bot. XLI. 270 (1903).—Not Carrière.

Tsuga yunnanensis Masters in Gard. Chron. ser. 3, XXXIX. 236, fig. 93 (1906), in part; XXXVII. 421 (1906).—Bean in Kew Bull. Misc. Inform. 1910, 176.—Not Masters in Jour. Linn. Soc. XXVI. 556 (1902)

Tsuga Brunoniana Masters in Jour. Linn. Soc. XXXVII. 421 (1906).—Downie in Notes Bot. Gard. Edinburgh XIV. 19 (1923).—Not Carrière.

Tsuga diversifolia Masters in Jour. Linn. Soc. XXXVII. 422 (1906), as to Formosan plant.—Not Masters in Jour. Linn. Soc. XVIII. 514 (1881).

Tsuga formosana Hayata in Gard. Chron. ser. 3, XLIII. 194 (1908); Jour. Coll. Sci. Tokyo, XXV. art. 19, 222, fig. 12 (Fl. Mont. Formos.) (1908); in Fedde, Rep. Spec. Nov. VIII. 366 (1910); Act. III. Congr. Internat. Bot. Bruxelles, 1910, II. 76, pl. 28 (1912); Icon. Pl. Formos. V. 206 (1915).—Kanehira, Formos. Trees, 617 (1917).

Tsuga patens Downie in Notes Bot. Gard. Edinburgh, XIV. 16, fig. 194, 6 (1923).

Tsuga Wardii Downie, l. c. 17, fig. 194, 4.

Tsuga calcarea Downie, l. c. 17, fig. 194, 3.

Tsuga Forrestii Downie, l. c. 18, fig. 194, 7.

Tsuga intermedia Handel-Mazzetti, Pl. Nov. Sin. Fortsetz. 25, p. 2 (Anzeig. Akad. Wiss. Wien. no. 10) (1924).

YUNNAN: eastern slopes of Mount Dyinaloko, northern peak of the Likiang Snow Range, *J. F. Rock*, no. 8986, in 1923; eastern slopes of Likiang Snow Range, Yangtsze watershed, *J. F. Rock*, no. 10891, in 1923–24; Tongtchouan, Tche-hai, alt. 2900–2990 m., *E. E. Maire*, June and August, 1916; without locality, *G. Forrest*, no. 10293.

SZECHUAN: Muli or Mili Kingdom, *J. F. Rock*, no. 11707, June, 1922.

CHEKIANG: hillsides, alt. 1330 m., *R. C. Ching*, no. 2400, August, 1924.

DISTRIBUTION: mountains of Formosa, Chekiang, Hupeh and westward through Szechuan and Yunnan.

This is the common Hemlock Fir of China being especially abundant on

the high mountains of Formosa and extreme western Szechuan. It is easily recognized by its emarginate leaves, the longest of which are often obscurely serrulate, and by its polished stipitate cones with stiff woody cone-scales bevelled and inclined to be incurved at the summit.

After a careful study of the mass of material in this herbarium, my field notes and knowledge of this Hemlock in the wild I cannot agree with Miss Downie in her recent attempt to establish a number of species of what she calls the CHINENSIS group. That such a wide spread species should exhibit a certain variation is to be expected but as I view it these variations are both trivial and unimportant. The lengthy and involved synonymy of this plant shows how greatly it has been misunderstood.

Pseudotsuga Carr.

Pseudotsuga Wilsoniana Hayata, Icon. Pl. Formos. v, 204, t. 15 (1915).—Kanehira, Formos. Trees, 614 (1917).

Pseudotsuga japonica Matsumura & Hayata in Jour. Coll. Sci. Tokyo. XXII. 400 (Enum. Pl. Formos.) (1906).—Hayata in Jour. Coll. Sci. Tokyo, XXV. art. 19, 223 (Fl. Mont. Formos.) (1908).—Not Shirasawa.

Pseudotsuga Forrestii Craib in Notes Bot. Gard. Edinburgh, XI. 189, fig. 160 (1919).

YUNNAN: mountains of Lonjre, Mekong-Salween watershed, adjoining southeastern Tibet, *J. F. Rock*, nos. 10260, 11625; sub jugo Doker-la, 28° 25′, alt. 3000–3100 m., *H. Handel-Mazzetti*, no. 8058, September 19, 1915.

DISTRIBUTION: mountains of western Yunnan and of Formosa.

As pointed out in Jour. Arnold Arb. II. 25–41 (1920) the relationship of the mountain flora of the island of Formosa is with western China. This Pseudotsuga forges another link in the chain of which the Taiwania and *Libocedrus macrolepis* Benth. & Hook. f. furnish other notable examples. So far as our meagre knowledge goes this Pseudotsuga is confined to the mountains of Formosa and those of extreme western Yunnan, whereas, the other Chinese species, *P. sinensis* Dode, is distributed sparingly from the coastal provinces to northeastern Yunnan. In herbaria it is not at all easy to distinguish any of the species of Pseudotsuga, the distinctions being both subtle and obscure. Craib in establishing his *P. Forrestii* points out that transverse section of the leaves show that the hypoderm is developed only immediately above and below the midrib and the epidermal cells are oblong. I find this character constant in many sections taken from Formosan and Yunnan specimens. It may be added that the resin-ducts are marginal and sub-epidermal. The endodermis is well-marked consisting of rounded thin-walled, bead-like cells; the margin is blunt in section, rayed idioblasts may or may not be present in the parenchyma; the epidermal cells are much thickened and uniform in character, the lower surface of the leaf is markedly papillose. Craib states that he had not seen *P. Wilsoniana* Hayata; if he had, the identity of his plant and Hayata's would have been apparent to him.

Morphologically *P. Wilsoniana* may be distinguished by its shining chestnut-brown or red-brown, sparsely pubescent, puberulous or glabrescent shoots, by its ciliate bud-scales, by its relatively thick leaves varying from 1.5 to 4.5 cm. in length, with midrib glaucous on the lower surface and the stomatic lines extending virtually to the margin of the leaf. Rarely is any green to be detected on the under surface of the leaf. The cone is erect, peduncled, ellipsoid to ovoid from 4–6 cm. long with a very prominent cuspis to the exserted deflexed bract. The seeds with the wing measure from 1.6–2 cm. in length, the base of the wing is cuneate with the apex rounded or abruptly obtuse.

We are without information as to the general appearance of this tree as it grows in Yunnan. During my travels in Formosa in 1917 and 1918 I saw only one tree of this Pseudotsuga. This was about 80 feet tall with a short trunk 12 feet in girth and three ascending stems so the real habit of the tree was obscured. The branches were relatively thin, horizontally spreading and slightly upturned toward the ends. The crown had no particular shape though it was more or less ovoid and flattened in outline. It was growing among various broad-leaf trees mostly belonging to the families Fagaceae and Lauraceae at an altitude of 4900 ft. in north-central Formosa. I was told of it being fairly common in several districts on that island where, owing to the unfriendly attitude of the savages, it was not possible for me to venture. Nevertheless, from what I could learn it was nowhere plentiful. Its altitudinal range is said to be from 4500 to 7000 ft. The sap and heart woods are clearly differentiated—the former is creamy white to pale yellow tinged with pink, the heart-wood is yellow-brown tinged pink. The annual rings are narrow but distinct; the specific gravity of the wood ranges from 0.57 to 0.72.

Pseudotsuga sinensis Dode in Bull. Soc. Dendr. France, 1912, 58, fig.; in Mitt. Deutsch. Dendr. Ges. XXI. 387 (1912).—Craib in Notes Bot. Gard. Edinburgh, XI. fig. 161 (1919).—Chun, Chin. Econ. Trees, 23 (1922).—Rehder in Bailey, Cult. Evergreens, 265 (1923).

YUNNAN: Tong-tchouan, alt. 2990 m., *E. E. Maire*, June, 1916; Tchou-scen-tsen, alt. 2990 m., *E. E. Maire*, March.

CHEKIANG: northeast of Tai-tuan, alt. 650 m., *R. C. Ching*, no. 2144, July, 1924.

ANHWEI: Wang shan, alt. 1200, *A. N. Steward*, no. 7195. August, 1924.

DISTRIBUTION: mountains of northeastern Yunnan; also of Chekiang and Anhwei provinces.

I have no personal knowledge of this Pseudotsuga which is an interesting illustration of the marked difference between the floras of eastern China and of Formosa and extreme western China. The type locality of *P. sinensis* Dode is the district of Tong-tchouan or Tung-ch'uan in northeastern Szechuan. In Chekiang it is said by R. C. Ching to be very common at an altitude of 2000 ft. where it is a tree up to 120 ft. in height with

gray, deeply fissured bark. In Anhwei province Steward notes that he saw only one tree; it was growing in an open place and was 20 m. tall.

In herbaria this Pseudotsuga may be distinguished from the related *P. Wilsoniana* Hayata by its more pubescent shoots, by its much thinner leaves which show a raised green mid-rib and a distinct marginal line of green bordering the stomatic line, and by its seed which is smaller with a proportionately larger wing more obliquely narrowed to the apex. In transverse section the leaf of *P. sinensis* shows a well-marked continuous or virtually continuous hypoderm and the thinness of the leaf as compared with that of *P. Wilsoniana* is most marked. The epidermal cells are nearly as broad as long; the margin is sub-acute in section with sclerotic strengthening tissue present. Rayed idioblasts may or may not be present and the resin-ducts are marginal and subepidermal.

It may be stated here that the Japanese *Pseudotsuga japonica* Shirasawa is at once distinguished from the two Chinese species by its glabrous pale gray shoots, and by other marked differences.

Keteleeria Carr.

Keteleeria Davidiana Beissner, Handb. Nadelholzk. 424, fig. 117 (1891).—Van Tieghem in Bull. Soc. France, XXXVIII. 412 (1891).—Pritzel in Bot. Jahrb. XXIX. 217 (1900).—Masters in Jour. Linn. Soc. XXVI. 554 (1902); XXXVII. 421 (1906); in Gard. Chron. ser. 3, XXXIII. 84, fig. 37, 38 (1903); in Jour. Bot. XLI. 270 (1903).—Mottet in Rev. Hort. 1904, 130, fig. 53.—Clinton-Baker, Illust. Conif. I. 72 t. (1909).—Henry in Elwes & Henry, Trees Great Brit. & Irel. VI. 1475 (1912).—Patschke in Bot. Jahrb. XLVIII. 649 (1913).—Rehder & Wilson in Sargent, Pl. Wilson. II. 39 (1914).—Kanehira, Formos. Trees, 602 (1917).—Chun, Chin. Econ. Trees, 24, fig. 8 (1922).—Rehder in Bailey, Cult. Evergreens, 247, fig. 64 (1923).—Silva Tarouca & Schneider, Uns. Freiland-Nadelhölz. ed. 2, 30, fig. (1923).—Dallimore & Jackson. Handb. Conif. 269, fig. 62 (1923).

Pseudotsuga Davidiana Bertrand apud Carrière in Rev. Hort. 1873, 37, fig. 3, 4, 5.—Bertrand in Ann. Sci. Nat. ser. 5, XX. 86 (1874).

Abies sacra David, Jour. Trois. Voy. Chin. II. 29 (1875), name only.—Franchet in Nouv. Arch. Mus. Paris, sér. 2, VII. 100, t. 14 (Pl. David. I. 290, t. 14) (1884).

Pinus (*Pseudotsuga*) *Davidiana* McNab in Proc. Roy. Irish Acad. ser. 2, II. 702 (1877).

Abies Davidiana Franchet in Nouv. Arch. Mus. Paris, ser. 2, VII. 98, t. 13 (Pl. David. I. 288, t. 13) (1884); in Jour. de Bot. XIII. 260 (1899).—Masters in Gard. Chron. ser. 3, I. 481 (1887).

Keteleeria sacra Beissner, Handb. Nadelholzk. 426 (1891).—Van Tieghem in Bull. Soc. Bot. Francę, XXXVIII. 412 (1891).—Mottet in Rev. Hort. 1904, 130.—Patschke in Bot. Jahrb. XLVIII. 649 (1913).

Keteleeria Delavayi Van Tieghem in Bull. Soc. Bot. France, XXXVIII. 412 (1891), nomen seminudum.

Podocarpus sutchuenensis Franchet in Jour. de Bot. XIII. 265 (1899).—Pritzel in Bot. Jahrb. XXIX. 213 (1900).—Masters in Jour. Linn. Soc. XXVI. 548 (1902); XXXVII. 414 (1906).

Pinus sacra Voss in Mitt. Deutsch. Dendr. Ges. XVI. 94 (1907).

Keteleeria formosana Hayata in Gard. Chron. ser. 3, XLIII. 194 (1908).
Keteleeria Davidiana var. *formosana* Hayata in Jour. Coll. Sci. Tokyo, XXV. art. 19, 221 (Fl. Mont. Formos.) (1908).
Keteleeria Esquirolii Léveillé in Fedde, Rep. Spec. Nov. VIII. 60 (1910).

YUNNAN: Puerhfu, alt. 2150 m., *J. F. Rock*, no. 2888, March, 1922; watershed of the Black River or Papienho, between Mopo and Man-pieh, alt. 1450 m., *J. F. Rock*, nos. 2975, 2922, March-April, 1922; high plateau between Talifu and Likiang, *J. F. Rock*, nos. 3213, 6321, May and August, 1922; mountains south of Likiang, Sungkwe Hochin Range, *J. F. Rock*, nos. 8289, 10892, in 1923; between Tengyueh and Likiangfu, via Shweshanting, Kantingai, Feilungkiao-Yunlung, Lanping, Chienchuan, and Likiang, *J. F. Rock*, no. 8172, March, 1923; region of Tungshan, Yangtsze drainage basin, east of Likiang, *J. F. Rock*, no. 11711, in 1923; between Likiangfu and Yunnanfu, via Youngpei, Hwaping, Magai and Wuting, *J. F. Rock*, no. 11729, March, 1924; Szemao, alt. 1600 m., *A. Henry*, nos. 12734, 12855; Tong-tchouan, Kin-tschong-chan and Tche-hai, alt. 2990 m., *E. E. Maire*, March, April, June, 1916; Yunnanfu, *C. Schneider*, nos. 61, 118, 4031, Feb.-March, 1914; without locality, *G. Forrest*, nos. 10230, 11425.

DISTRIBUTION: mountains of Formosa and in Hupeh, Kweichou, Szechuan and Yunnan.

This Yunnan material presents all the variations mentioned by Rehder & Wilson but there is no mistaking it as belonging to one species only. In many of the specimens the leaves are very glaucous on the lower surface and this character is particularly noticeable on young foliage. The cone-scales are often more or less erose, varying greatly in this character which is especially pronounced in Rock's no. 8289.

This tree is evidently very plentiful throughout Yunnan as it is also in Hupeh and Szechuan; in Formosa on the other hand I found it to be quite rare. *Tsuga Mairei* Lemée & Léveillé (in Monde des Pl. XVI. 20 [1914]) probably belongs here.

Keteleeria Evelyniana Masters in Gard. Chron. ser. 3, XXXIII. 194, fig. 82 (1903).—Beissner in Mitt. Deutsch. Dendr. Ges. XII. 66 (1903).
Pinus Evelyniana A. Voss in Putlitz & Meyer, Landlex. IV. 773 (1913).

YUNNAN: Yuanchiang, alt. 1300 m., *A. Henry*, no. 11815.

DISTRIBUTION: Yunnan, endemic.

In all probability this is nothing more than a condition of the widespread and exceedingly variable *K. Davidiana* Beissn.

Abies Juss.

Abies Beissneriana Rehder & Wilson in Sargent, Pl. Wilson. II. 46 (1914).—Chun, Chin. Econ. Trees, 30 (1922).—Rehder in Bailey, Cult. Evergreens, 254 (1923).—Dallimore & Jackson, Handb. Conif. 87 (1923).

YUNNAN: Yangtsze watershed, prefectural districts of Likiang, eastern slopes of Likiang Snow range, *J. F. Rock*, nos. 3811, 8375, May and October, 1923–24; between Tengyueh and Likiangfu, via Shweshanting, Kantingai,

Feilungkiao-Yunlung, Lanping, Chienchuan, and Likiang, *J. F. Rock*, no. 8141, March, 1923: Mount Kenyichunpo and region of Chemputong, Salween-Irrawadi watershed, *J. F. Rock*, no. 11518, in 1923; without locality *G. Forrest*, no. 10281; between Yungning and Yungpeh, *C. Schneider*, no. 1648, June 23, 1914.

DISTRIBUTION: mountains of northwest Yunnan northward to Muping in western Szechuan.

In Plantae Wilsonianae a full account of this species is given. The specimens cited above call for no special remark. Rock's no. 8375 has male flowers which show that the pollen sacks are yellow. His No. 11518 has leaves up to 7.5 cm. long and is evidently from a young plant. The gray polished character of the shoots and the lustrous green upper surface of the leaves is well-marked. Among the Chinese Abies this species is most closely related to *A. chensiensis* Van Tieghem, a native of northwestern Hupeh and southern Shensi.

As Rehder points out (in Jour. Arnold Arb. I. 54 (1919)) the name *Abies Beissneriana* Rehder & Wilson is not invalidated by the earlier *A. Beissneriana* Mottet which is a non-valid name having been given to a hybrid already provided with a specific name.

Abies Delavayi Franchet in Jour. de Bot. XIII. 255 (1899).—Masters in Jour. Linn. Soc. XXVI. 557 (1902); in Gard. Chron. ser. 3, XXXIX. 212, fig. 82 (1906); in Jour. Linn. Soc. XXXVII. 422 (1906).—Beissner, Handb. Nadelholzk. ed. 2, 194 (1909).—Diels in Notes Bot. Gard. Edinburgh, XXXI. 252 (Pl. Chin. Forrest.) (1912).—Patschke in Bot. Jahrb. XLVIII. 642, fig. 3, (1913).—Rehder & Wilson in Sargent, Pl. Wilson. II. 41 (1914).—Craib in Notes Bot. Gard. Edinburgh, XI. 277, fig. 163 (1919).—Chun, Chin. Econ. Trees, 27, fig. 10 (1923), exclud. synon.—Rehder in Bailey, Cult. Evergreens, 254 (1923).—Dallimore & Jackson, Handb. Conif. 97 (1923).—Silva Tarouca & Schneider, Uns. Freiland-Nadelh. ed. 2, 28, fig. 28 (1923).

Keteleeria Fabri Masters in Jour. Linn. Soc. XXVI. 555 (1902); in Gard. Chron. ser. 3, XXXIII. 194 (1903); in Jour. Linn. Soc. XXXVII. 421 (1906).—Mottet in Rev. Hort. 1904, 130.—Beissner, Handb. Nadelholzk. ed. 2, 203 (1909).—Patschke in Bot. Jahrb. XLVIII. 649 (1913).

Abies Fargesii Masters in Gard. Chron. ser. 3, XXXIX. 213, fig. 83 (1906); in Jour. Linn. Soc. XXXVII. 422 (1906).—Not Franchet.

Pinus Fabri Voss in Putlitz & Meyer, Landlex. IV. 773 (1913).

Abies Faberi Craib in Notes Bot. Gard. Edinburgh, XI. 278, fig. 164 (1919).

YUNNAN: Drainage Basin of Erhhai (Lake of Talifu), Tsangshan Range, *J. F. Rock*, no. 3148, April 13–25, 1922; between Tengyueh and Likiangfu, via Shweshanting, Kantingai, Feilungkiao-Yunlung, Lanping, Chienchuan, and Likiang, *J. F. Rock*, no. 8068, March, 1923; Shweli River drainage basin to summit of Shweli-Salween watershed east of Tengyueh, *J. F. Rock*, no. 7652, November, 1922; eastern slopes of Likiang Snow Range, Yangtsze watershed, *J. F. Rock*, nos. 10886, 10887, in 1923–24; between Hunka and Woloho, alt. 3000–3500 m., *C. Schneider*, no. 1533, June 13, 1914; Yen-yuan

Hsien, alt. 3300–3900 m., *C. Schneider*, nos. 3574, 3563, May, 1914; without locality, *G. Forrest*, no. 11898.

DISTRIBUTION: western Yunnan northward to Wen-ch'uan Hsien in western Szechuan.

The acquisition of ample Yunnan material collected by Rock and Schneider, as well as those of Forrest's in this herbarium, has enabled me to investigate again the leaf anatomy of this species. Mr. Craib (in Notes Bot. Gard. Edinburgh, XI. 278 (1919) separates the Szechuan tree under the name of *A. Faberi* from the typical *A. Delavayi* Franch. found in Yunnan basing his distinctions mainly on the excessive curling back of the leaf margins noticeable on Forrest's material and on Delavay's type specimen as opposed to the slightly recurved almost plane leaves on Szechuan material notably my No. 2089. The differences in the degree of recurving of the leaf-margin pointed out by Mr. Craib are present and indeed obvious on many specimens but I find every intermediate condition, moreover, in my No. 2093 collected in Mupin the leaf-margins on one part of the specimen are folded back almost to the mid-rib, on another part of the same branch the leaf margin is only slightly recurved and here and there the leaves are almost plane. The resin-ducts vary slightly in size but not in position. Contrary to Mr. Craib's statement I find the leaf-margin of the strongly recurved condition more acute in cross-section than when the leaf is plane or with the margin only slightly recurved. The strong recurving of the leaf-margin serves doubtless as protection from loss of moisture by excessive transpiration, but in herbarium specimens this obvious character may be much exaggerated by careless drying, for instance, by allowing the branch to wilt or by not drying it under greater pressure.

This further study confirms the opinion set forth in Plantae Wilsonianae II. 41 (1914). I find no constant characters by which to separate the specimens collected in Szechuan from those collected in Yunnan by Delavay, Forrest, Rock and others.

Abies Forrestii C. C. Rogers in Gard. Chron. ser. 3, LXV. 150 (March 29, 1919).—W. C. Craib in Notes Bot. Gard. Edinburgh, XI. 279 t. 162 (November, 1919).—Rehder in Bailey, Cult. Evergreens, 254 (1923).—Dallimore & Jackson, Handb. Conif. 101 (1923).

YUNNAN: Yangtsze watershed, prefectural district of Likiang, eastern slopes of Likiang Snow range, *J. F. Rock*, nos. 3792, 10673, May and October, 1922; between Tengyueh and Likiangfu, via Shweshanting, Kantingai, Feilungkiao-Yunlung, Lanping, Chienchuan, and Likiang, *J. F. Rock*, no. 8157, March, 1923; between Chienchuan plain and the Mekong drainage basin to Lachiming, *J. F. Rock*, no. 8611, May, 1923; Lotueshan mountains of Lakako, west of the Yangtsze bend at Shiku, *J. F. Rock*, no. 9543, in 1923; without locality, *G. Forrest*, nos. 10152, 10206, 10225.

DISTRIBUTION: high mountains of northwest Yunnan; not recorded from elsewhere.

This is a well-marked species distinguished by its very resinous winter-buds, by the rufous brown short hispid pubescence on the shoots, by its cylindric violet-purple, medium-sized cone, non-resinous and with short-exserted bracts. It is perhaps most closely related to the Himalayan *A. spectabilis* Spach (*A. Webbiana* Lindl.) which has similar pubescence on the shoots, but is much larger in all its parts, the leaves on adult trees being much longer and the cone twice the size with the bracts not exserted.

On material before me of *Abies Forrestii* the leaves are distinctly petiolate and vary from 1.5 to 3 cm. in length, are emarginate with the margin slightly recurved. In the cross section the leaves show a much thickened continuous hypoderm often in two layers with lateral sub-epidermal resin-canals of medium size and a number of sclerotic cells at the margin which is blunt in cross section. The endodermis is definite and the epidermis on the lower surface is very thick-walled.

The undescribed cone is sessile, violet-purple, non-resinous, cylindric 8.5 cm. high, about 4 cm. broad and the scales are about 1 cm. high, 1.5 to 2 cm. broad, thin and incurving at the summit. The bracts are slightly exserted and have a narrow-lanceolate acuminate cuspis outthrust and more or less recurved. The seed is dark purplish and with the hatchet shape wing is about 1.5 cm. long. This description is drawn from Rock's no. 10673. In young and half grown cones the lanceolate cuspis is bristle-like and more conspicuous. The white stomatic lines on the undersurface of the leaves are very conspicuous. The pollen-sacs are deeply tinged with violet-purple.

This species is usually ascribed to Craib but the description by C. C. Rogers which appeared six months earlier is quite sufficient to identify this distinct and well-marked Fir.

Subfam. Taxodieae Parl.

Cunninghamia R. Br.

Cunninghamia lanceolata Hooker in Bot. Mag. liv. 7. 2743 (1827).—Rehder & Wilson in Sargent, Pl. Wilson. ii. 50 (1914), where full references to synonymy and literature will be found.

Yunnan: Plain of Tche-hai, alt. 2900 m., *E. E. Maire*, April; Mengtsze, mountains to the southeast, alt. 1600 m., *A. Henry*, no. 9148a.

Distribution: China, south of the Yellow River from the extreme east to the west but not ascending above 2500 m.

More generally known as *Cunninghamia sinensis* R. Br., this is the most useful of all Chinese softwood trees, being employed in all branches of carpentry. The above are the only specimens in this herbarium collected in the province of Yunnan but during my visit there in 1899 I noted it as a common tree.

A synonym not recorded by Rehder & Wilson is *Cunninghamia sinensis* var. *prolifera* Lemée & Léveillé in Monde des Pl. 1914, 20. Proliferous cones are frequently found on any Cunninghamia tree .

Taiwania Hayata

Taiwania cryptomerioides Hayata in Jour. Linn. Soc. XXXVII. 330 t. 16 (1906); in Tokyo Bot. Mag. XXI. 21, t. 1. fig. 23 (1907).—Beissner, Handb. Nadelholzk. ed. 2, 484 (1909).—Clinton-Baker, Ill. Conif. III. 75, t. (1913).—Kanehira, Formos. Trees, 615, fig. (1917).—Bean in Gard. Chron. ser. 3, LXVIII. 213, fig. 99 (1920).—Handel-Mazzetti in Zeitschr. Gart. Obstb. 1. Gartenb. I. 25–27 (1920).—Rehder in Bailey, Cult. Evergreens, 237, fig. 58 (1923).—Dallimore & Jackson, Handb. Conif. 496 (1923).—Sorger in Oesterr. Bot. Zeitschr. LXXIV. 81, figs. (1925).

Taiwanites Hayata in Gard. Chron. ser. 3, XXXIX. 165 (1906).

YUNNAN: Watershed of the Salween and Irrawadi Rivers, alt. 2250 to 2800 m., *H. Handel-Mazzetti*, nos. 8915, 9664, June and August, 1916.

DISTRIBUTION: mountains of Formosa and those of extreme northwestern Yunnan.

Dr. Handel-Mazzetti's finding of Taiwania in northwestern Yunnan is one of the most interesting discoveries in recent work on the Chinese flora. He gives the exact locality as near Ninalo west of Chamnutung, which is west of Tsekou on the Salween River. There in side valleys between 2300 and 2800 m. altitude he found giant trees which in habit and bark reminded him of Sequoia. The occurrence of Taiwania, of *Libocedrus macrolepis* Benth. & Hook. and of *Pseudotsuga Wilsoniana* Hayata, in western China and on the mountains of Formosa and at no place in between these widely separated regions is a remarkable fact in plant distribution. Since so little is known about the Taiwania perhaps a few words about it as it grows in Formosa may be welcome.

On Arisan in central Formosa the Taiwania grows scattered through the forests of *Chamaecyparis formosensis* Matsum., *C. obtusa* var. *formosana* Hay., *Trochodendron aralioides* S. & Z., evergreen Oaks, Lauraceae, Symplocos and evergreen shrubs in a narrow belt between 7000 and 8000 ft. altitude. In my opinion it formed in ancient times forests with the Trochodendron but has been defeated in the struggle by the two Chamaecyparis and the present trees are mere survivals. On Matsu-yama, a mountain in the Arisan forest reservation, it is more common than on Arisan itself. On Hsokei-hen, a forest reservation belonging to the Imperial University, Tokyo, it grows in small groups among evergreen Oaks. So far as my own observations go it is everywhere in Formosa a rare tree. Small trees are very uncommon and seedlings extraordinarily rare. The young trees have pendent branches and in the shade of the forests the branches are sparse and the tree unattractive. In the open it is a singularly beautiful and attractive Conifer densely branched, has graceful handsome branchlets and attractive green leaves. Tall trees in the forests are strikingly distinct but singularly like old Cryptomeria trees, and both suggest gigantic Lycopods. In the dense forests the crown is small, domeshape, oval or flattened, the branches few and small and one wonders how so little leafage can support so gigantic a tree. When the top is broken lateral branches

assume an erect position. In more open forests the branches are massive and wide-spreading but the crown is thin. In height the Taiwania overtops all other trees on Arisan and probably attains upwards of 200 ft. The highest I measured was 190 ft. tall and 130 ft. to the first branch. The girth is up to 30 ft.; the trunk is straight and mast-like, buttressed at the base. The bark is grey and thin, smooth and longitudinally fissured. The wood when green is heavier than water, when air dried its specific gravity is 0.46. There is very little sap wood which is pale in color; the heart wood is a rich mahogany brown with a purplish sheen becoming duller with exposure and age. It is strong, easily worked, but is not very durable. The trees are usually solid.

The Taiwania is essentially a light demanding tree and in Formosa favors northerly and northeasterly exposures. It is polygamo-dioecious and fruit is only found on the tops of the oldest trees. Male flowers on some trees are extraordinarily abundant. It sheds its small inner branchlets after the manner of Cryptomeria, Cunninghamia and Sequoia and is a very close relative of the latter.

I was fortunate enough to secure in 1918 three young seedling plants in the forests of Arisan and from the forestry officials at Keitao obtained a small nursery grown plant. All four were safely brought to the Arnold Arboretum. The plant roots easily from cuttings.

During my visits to Formosa I collected a great many seeds of the Taiwania but none of them proved viable. In the late autumn of 1924, through the good services of my friend, R. Kanehira, the Arnold Arboretum received seeds which germinated quickly and we now have a nice stock of young plants. On these seedlings the normal number of cotyledons is two, but occasionally three are present.

Cryptomeria D. Don

Cryptomeria japonica D. Don in Trans. Linn. Soc. XVIII. 167, t. 13, fig. 1 (1841).—Rehder & Wilson in Sargent, Pl. Wilson. II. 52 (1914).—Wilson, Conif. & Taxads Jap. 66, tt. 48–49 (1916), where complete references to the literature and a full account of this tree will be found.

Cupressus japonica Linnaeus f., Suppl. 421 (1781).—Thunberg, Fl. Jap. 265 (1784).

Taxodium japonicum Brongniart in Ann. Sci. Nat. xxx. 183 (1833), excluding var. *heterophylla*.

Cryptomeria Fortunei Otto & Dietrich in Allg. Gartenz. 1853, 234.

Cryptomeria japonica var. *japonica* Henry in Elwes & Henry, Trees Gr. Brit. Irel. I. 129 (1906).

Cryptomeria Kawaii Hayata in Tokyo Bot. Mag. XXXI. 117, figs. (1917).

YUNNAN: Mengtsze, temple grounds, alt. 1950 m., *A. Henry*, nos. 9667, 9667A; without locality, *E. E. Maire*.

DISTRIBUTION: Japan; often cultivated in the warmer parts of China more especially in the grounds surrounding temples and monasteries.

Authentic specimens from trees truly wild in China are unknown and there is no reliable record of any one having seen an indigenous tree any-

where in the Chinese empire. In *Plantae Wilsonianae* I expressed the opinion that it would appear highly improbable that the Cryptomeria had been introduced to the remote sparsely populated regions northwest of the Chengtu plain from Japan or eastern China. In the year 1914 during my travels through Japan I made an exhaustive study of Cryptomeria and this study was continued during the years 1917 and 1918 when again visiting the Orient. It is now my matured opinion that Cryptomeria is purely a Japanese tree and that its occurrence in China is due to it having been brought there from Japan in the first instance by Buddhist priests or proselytes. When in Japan in 1917, Dr. B. Hayata showed me the type specimens of his *C. Kawaii*. To me they did not look different from material I could have gathered from trees in any good sized grove of Cryptomeria in Tokyo or elsewhere in Japan. The armature of the cone scale in Cryptomeria is notoriously variable, and the size of the cone also varies a good deal. Maire's specimen cited above agrees almost exactly with that collected by Professor S. Kawaii. Under cultivation in Japan many distinct varieties of this tree have appeared exhibiting marked variation in habit, foliage and consequently in general appearance. It is, in Japan, the most all round useful softwood timber and in this respect finds an analogue in China in *Cunninghamia lanceolata* Hook. For afforestation purposes Cryptomeria is being planted in enormous quantities on the mountains of Formosa; for like purposes it is being experimented with in many parts of India, Africa and Australia. The only place in which I have seen it flourishing in all these lands was on the rain-soaked outer ranges of the Himalayas in and round Darjeeling.

Subfam. CUPRESSEAE Lindl.

Cupressus L.

Cupressus Duclouxiana Hickel in Camus, Les Cyprès, 91, t. 3, figs. 419–424 (1914).—Dallimore & Jackson, Handb. Conif. 195 (1923).—Stapf in Bot. Mag. CL. t. 9049 (1925).

Cupressus sempervirens Franchet in Jour. de Bot. XIII. 263 (1899).—Not Linnaeus.

Cupressus torulosa Rehder & Wilson in Sargent, Pl. Wilson. II. 54 (1914), excluding all references and synonyms.—Hayata in Tokyo Bot. Mag. XXXI. 118 (1917).—Chun, Chin. Econ. Trees, 38, fig. 12 (1922).—Rehder in Jour. Arnold Arb. IV. 125 (1923).—Not D. Don.

YUNNAN: Yangtsze watershed, Prefectural districts of Likiang, eastern slopes of Likiang Snow Range, *J. F. Rock*, no. 3987, May–October, 1922; west of Talifu, Mekong watershed, en route to Youngchang and Tengyueh, *J. F. Rock*, no. 6802, September–October, 1922; Shweli River drainage basin and environs of Tengyueh, *J. F. Rock*, no. 7921, February, 1923; Lotueshan, mountains of Labako, west of the Yangtsze bend at Shiku, *J. F. Rock*, no. 8440, in 1923; mountains of Londjre, Mekong-Salween watershed, adjoining southeastern Tibet, *J. F. Rock*, no. 11645, in 1923; Yunnanfu, *C. Schneider*, no. 46, February, 1914; Yen-yuan Hsien, Kalapa, alt. 3000

m., *C. Schneider*, no. 3568, May, 1914; between Yungning and Chungtien, alt. 3200 m., *H. Handel-Mazzetti*, no. 7602, August, 1915; without locality, *E. E. Maire;* without locality, *G. Forrest*, no. 8166.

SZECHUAN: valley of the Tung River, alt. 1300–2600 m., *E. H. Wilson*, no. 2106, Veitch Exped. no. 3012, June, July & August, 1908, July, 1904; valley of the Min River, Wa-ssu country, Wen-chuan Hsien, alt. 1600 m., *E. H. Wilson*, no. 798A, November, 1908; near Mao-chou, alt. 1800 m., *E. H. Wilson*, no. 2105, May, 1908.

KANSU: near Chu kun, *F. N. Meyer*, no. 1981, October, 1914.

CULTIVATED: Hort. P. D. Williams, St. Keverne, Cornwall; Hort. Allard, Angers, July, 1922.

Distribution: western Yunnan northward through western Szechuan to southern Kansu, chiefly in arid warm valleys and often cultivated in temple grounds.

Since 1914 I have had the advantage of seeing many trees of the real *C. torulosa* D. Don cultivated in different parts of the world, and now realize that my colleague and I were in error in referring my Chinese material to the Himalayan Cypress. M. Hickel's Chinese species is very distinct and may easily be recognized by its very slender branchlets and large globose and sub-globose cones usually 2–2.5 cm. in diam.; occasionally they are less than 1 cm. long and broad, but this is very unusual. The Himalayan species has smaller cones, always longer than broad, and gray fibrous fissured bark.

Cupressus funebris Endlicher, Syn. Conif. 58 (1847).—Parlatore in De Candolle, Prodr. XVI. pt. II. 471 (1868).—Debeaux in Act. Soc. Linn. Bordeaux, XXX. 110 (Fl. Shangh. 58) (1875).—Masters in Jour. Linn. Soc. XVIII. 496 (1881); XXVI. 540 (1902); XXXVII. 412 (1906); in Jour. Bot. XLI. 268 (1903).—Kanitz in Szèchenyi, Keletazs. Utján. Tudom. Ered. II. 847 (Pl. Enum. 63) (1891); Wiss. Ergeb. Reise Szèchenyi, II. 738 (1898).—Franchet in Jour. de Bot. XIII. 263 (1899).—Pritzel in Bot. Jahrb. XXIX. 219 (1900).—Pavolini in Nuov. Giorn. Bot. Ital. n. ser. XV. 439 (1908).—Henry in Elwes & Henry, Trees Gr. Brit. & Irel. V. 1162 (1910).—Patschke in Bot. Jahrb. XLVIII. 675, t. 8, fig. 6 (1913).—Hayata in Tokyo Bot. Mag. XXXI. 118 (1917).—Chun, Chin. Econ. Trees, 38 (1922).—Rehder in Bailey, Cult. Evergreens, 211, fig. 34 (1923).—Dallimore & Jackson, Handb. Conif. 197, fig. 38 (1923).

Cupressus pendula Abel in Staunton, Embassy to China, II. 265 (1797), name only.—Not Thunberg, nor L'Héritier.

Cupressus funebris gracilis Carrière, Traité Conif. 162 (1867).

YUNNAN: district of Yunnanfu, *O. Schoch*, no. 425 (1916).

DISTRIBUTION: China, widely distributed from the seacoast to the extreme west being especially abundant in the valley of the Yangtsze River.

This is the only specimen we have seen from Yunnan of this common and wide-spread Chinese tree.

Fokienia Henry and Thomas

Fokienia Kawaii Hayata in Tokyo Bot. Mag. XXXI. 116, fig. (1917).

YUNNAN-TONKIN BORDER, *S. Kawai*, January, 1917 (co-type specimen).

DISTRIBUTION: forests of the Yunnan-Tonkin border.

On the above specimen, which is the only one I have seen, the cones are much smaller than those of *F. Hodginsii* Henry & Thomas.

Thuja L.

Thuja orientalis Linnaeus, Spec. 1002 (1753).—Rehder & Wilson in Sargent, Pl. Wilson. II. 53 (1914) where full citations of literature and synonymy are given.

Thuja orientalis f. *Kawaii* Hayata in Tokyo Bot. Mag. XXXI. 118 (1917).

YUNNAN: Yangtsze watershed, Prefectural district of Likiang, eastern slopes of Likiang Snow Range, *J. F. Rock*, no. 4660, May–October, 1922; mountains of Londjre, Mekong-Salween watershed, adjoining southeastern Tibet, *J. F. Rock*, nos. 9402, 11646, in 1923; Yuanchang, alt. 2000 m., *A. Henry*, no. 13353; valley of the Mekong, alt. 2050–2200 m., *H. Handel-Mazzetti*, nos. 7983, 7970, September, 1915; without locality, *E. E. Maire;* Yunnanfu, *F. Ducloux*, no. 6251, January, 1909.

SZECHUAN: Lung-chu-shan, *C. Schneider*, no. 850, April, 1914.

DISTRIBUTION: China, exact habitat unknown; long cultivated and escaped, in China, Manchuria and Korea, cultivated in Japan.

In this herbarium there is much material of this tree, but whether collected from escaped and naturalized or really spontaneous specimens we do not know. In my own travels through the Orient I never saw a spontaneous example. It has been cultivated by the Chinese from time immemorial and in by-gone days was a feature of the gardens of princes and the tombs of emperors. At the New Year the fragrant branches are used to symbolize long life and happiness; the fruit and leaves were formerly much used in Chinese medicine. The tree is a favorite with both Taouists, Buddhist and Confucian priests which accounts for its wide spread cultivation in China, Korea and Japan. In Peking may be seen some magnificent specimens planted more than six hundred years ago with enormous burled trunks and flattened rounded, wide-spreading crowns of huge branches.

Libocedrus Endl.

Libocedrus macrolepis Bentham & Hooker, Gen. Pl. III. 426 (1880).—Masters in Jour. Linn. Soc. XVIII. 485 (1881); in XXVI. 540 (1899); in Gard. Chron. ser. 3, XXX. 467 (1901).—Kent in Veitch, Man. Conif. 255 (1900).—Henry in Garden, LXII. 183, fig. (1902); in Elwes & Henry, Trees Gr. Brit. Irel. III. 488 (1908).—Hayata in Jour. Coll. Sci. Tokyo, XXV. art. 19, 207, fig. 4 (Pl. Mont. Formos.) (1908).—W. in Gard. Chron. ser. 3, XLIV. 148 (1908).—Beissner, Handb. Nadelholzk. ed. 2, 493 (1909).—Henry and Thomas in Gard. Chron. ser. 3, XLIX. 67, fig. 34 (1911).—Kanehira, Formos.

Trees, 602, fig. (1917).—Chun, Chin. Econ. Trees, 34 (1922).—Rehder in Bailey, Cult. Evergreens, 221 (1923).—Dallimore & Jackson, Handb. Conif. 305 (1923).

Calocedrus macrolepis Kurz in Jour. Bot. XI. 196, t. 133, fig. III. (1873).
Thuja macrolepis Voss in Mitt. Deutsch. Dendr. Ges. XVI. 88 (1907).

YUNNAN: Talang, alt. 1600 m., *A. Henry*, no. 11566; Szemao, alt. 1400 m., *A. Henry*, nos. 11566A, 11566B.

DISTRIBUTION: mountains of northern Formosa and of southwestern Yunnan.

This Libocedrus appears to be a rare tree in Yunnan and confined to rather low altitudes. On my visit to Szemao in 1899 I saw several trees but none of any size. In general appearance they strongly resemble the Chinese Arbovitae (*Thuja orientalis* L.). From one tree on the outskirts of Szemao I obtained good seeds which I sent to Messrs. Veitch with whom they germinated in 1900. None of the collectors in northwest Yunnan have sent back material of this tree and it would appear to be confined to the southwestern part of the province. In Formosa the range of this tree is from the central parts northward, between elevations of from about 150 to 1500 m. but it is nowhere common. Where I saw the tree in 1918 was in mixed evergreen broad-leaf forests beyond Urai in the Taihoku prefecture. There it is extremely rare but some distance to the northwest it is said to be more plentiful, but today the Libocedrus is certainly not a common tree in Formosa. Those I saw were growing on the face of cliffs or on the edge of sharp rock ledges in almost inaccessible places. The largest tree was about 70 ft. tall with a trunk 10 ft. in girth but I saw stumps of felled trees from 16 to 18 ft. in girth. In these forests it is never a striking nor a handsome tree. The crown is broad, more or less flattened but rather sparse, made up of several thick main branches and many thin branches of secondary order. The branches are spreading, horizontal or slightly ascending. The wood is fragrant, with very narrow annual rings and the sap wood merges into the heart wood without any sharply defined color distinction. The sap wood is pale yellowish to brownish, the heart wood is darker in shade. In texture it is close-grained and elastic. It is easily worked and when smoothed by a plane becomes lustrous. It is very durable, especially underground, and is not attacked by Termites. Its specific gravity is 0.62 to 0.69. For cabinet-work, furniture, and interior fittings, Libocedrus wood is the best and most valuable produced in Formosa. The sawdust is used in the manufacture of incense sticks and the bark is valued for roofing purposes. Until about 1908 this most valuable tree was quite common in the forests of the Taihoku prefecture.

Juniperus L.

Sect. OXYCEDRUS Spach.

Juniperus formosana Hayata in Jour. Coll. Sci. Tokyo, XXV. art. 19, 209, t. 38 (Fl. Mont. Formos.) (1908); Icon. Pl. Formos. VII. 39, fig. 25

(1918).—Henry in Elwes & Henry, Trees Great Brit. & Irel. VI. 1415 (1912).—Bean, Trees Shrubs Brit. Isles, I. 672 (1914).—Rehder & Wilson in Sargent, Pl. Wilson. II. 56 (1914).—Kanehira, Formos. Trees, 600, fig. (1917).—Chun, Chin. Econ. Trees, 41 (1922).—Rehder in Jour. Arnold Arb. IV. 126 (1923); in Bailey, Cult. Evergreens, 197 (1923).—Dallimore & Jackson, Handb. Conif. 247 (1923).—Silva Tarouca & Schneider, Uns. Freiland-Nadelhölz. ed. 2, 31, fig. (1923).

Juniperus taxifolia Parlatore in De Candolle, Prodr. XVI. pt. II. 481 (1868), as to Fortune's specimen no. 47.—Pritzel in Bot. Jahrb. XXIX. 219 (1900).—Beissner in Bull. Soc. Bot. Ital. 1901, 360.—Masters in Jour. Linn. Soc. XXVI. 543 (1902); XXXVII. 413 (1906); in Jour. Bot. XLI. 268 (1903).—Matsumura & Hayata in Jour. Coll. Sci. Tokyo, XXII. 403 (Enum. Pl. Formos.) (1906).—Patschke in Bot. Jahrb. XLVIII. 678 (1913), in part.—Not Hooker & Arnott.

Juniperus rigida Beissner in Nuov. Giorn. Bot. Ital. n. ser. IV. 186 (1897).—Franchet in Jour. de Bot. XIII. 264 (1899).—Masters in Jour. Bot. XLI. 268 (1903); in Jour. Linn. Soc. XXXVII. 413 (1906).—Patschke in Bot. Jahrb. XLVIII. 678 (1913), in part.—Not Siebold & Zuccarini.

Juniperus communis Franchet in Jour. de Bot. XIII. 264 (1899).—Not Linnaeus.

Juniperus Mairei Lemée & Léveillé in Monde des Pl. 1914, 20.

YUNNAN: high plateau between Talifu and Likiang to the foot of the Likiang Snow range, *J. F. Rock*, no. 3243, May 6–11, 1922; Yangtsze watershed, Prefectural District of Likiang, eastern slopes of Likiang Snow range, *J. F. Rock*, no. 3630, May–October, 1922; Mountains south of Likiang, Sungkwe Hochin Range, *J. F. Rock*, nos. 8297, 11680, in 1923; eastern slopes of Likiang Snow Range, Yangtsze watershed, *J. F. Rock*, no. 11475, in 1923–24; between Talifu and Likiang, alt. 2000–2600 m., *H. Handel-Mazzetti*, no. 6438, May, 1915; Tcheou-kia-ouan, alt. 2990 m., *E. E. Maire*, April; Suen-oui, alt. 2600 m., *E. E. Maire*, August.

SZECHUAN: between Liuku and Kuapu, alt. 2800 m., *C. Schneider*, no. 1319, May, 1914; Yen-yuan Hsien, Kalapa, alt. 3000 m., *C. Schneider*, no. 1242, May, 1914; between Oti and Ouen-tin, alt. 2800–3200 m., *C. Schneider* no. 1182, June, 1914.

DISTRIBUTION: mountains of Formosa and of China throughout the warmer parts from the eastern sea-board to the extreme west.

In Kansu and some of the extreme northern parts of China the black-fruited *Juniperus rigida* S. & Z. has been recently collected by R. C. Ching (nos. 93, 101), but throughout all the warmer parts *J. formosana* appears to be the only member of the section *Oxycedrus* Spach indigenous there. Messrs. Rehder & Wilson have discussed this species and the material before me adds nothing to what they have written.

Sect. SABINA Spach

Juniperus squamata Buchanan-Hamilton apud Lambert, Descr. Gen. Pinus, II. 17 (1824).—D. Don, Prodr. Fl. Nepal. 55 (1825).—Spach in Ann. Sci. Nat. sér. 2, XVI. 293 (1841).—Endlicher, Syn. Conif. 18 (1847).—Brandis, For. Fl. Brit. Ind. 537 (1874).—Henry in Elwes & Henry, Trees Great Brit. & Irel. VI. 1420 (1912).—Rehder & Wilson in Sargent, Pl.

Wilson. II. 57 (1914).—Rehder in Bailey, Cult. Evergreens, 199 (1923).—Dallimore & Jackson, Handb. Conif. 260 (1923).

Juniperus religiosa Royle, Ill. I. 351 (1839), name only.
Juniperus Lambertiana Wallich mss. ex Endlicher, Syn. Conif. 19 (1847), as a synonym.
Juniperus rigida Wallich mss. ex Endlicher, Syn. Conif. 19 (1847), as a synonym.
Sabina squamata Antoine, Cupress. 66, t. 90 (1857), in part.
Juniperus recurva β. squamata Parlatore in De Candolle, Prodr. XVI, pt. II. 482 (1869).—Hooker f., Fl. Brit. Ind. v. 647 (1888).—Masters in Jour. Linn. Soc. XXVI. 543 (1902); XXVII. 413 (1906); in Jour. Bot. XLI. 268 (1903).—Patschke in Bot. Jahrb. XLVIII. 678 (1913).
Juniperus recurva Franchet in Nouv. Arch. Mus. Paris, sér. 2, VII. 102 (Pl. David. I. 292 (1884); in Jour. de Bot. XIII. 263 (1899).—Beissner in Nouv. Giorn. Bot. Ital. n. ser. IV. 186 (1907).—Pritzel in Bot. Jahrb. XXIX. 219 (1900).—Patschke in Bot. Jahrb. XLVIII. 678 (1913), in part.—Not Buchanan-Hamilton.
Juniperus recurva var. *densa* Hort. Kew, 1880 (in Herb. Arnold Arb.); probably not Carrière.
Juniperus morrisonicola Hayata in Gard. Chron. ser. 3, XLIII. 194 (1908); in Jour. Coll. Sci. Tokyo, XXV. art. 19, 211, fig. 7 (Fl. Mont. Formos.) (1908); XXX. art. 1, 307 (1911); in Jour. Linn. Soc. XXXVIII. 298 (1908).

YUNNAN: Drainage basin of Erhhai (Lake of Talifu), Tsangshan Range, *J. F. Rock*, nos. 3147, 3150, April, 1922; Yangtsze watershed, Prefectural District of Likiang, eastern slopes of Likiang Snow Range, alt. 3000–4600 m., *J. F. Rock*, nos. 3434, 3452, 3453, May–October, 1922; between Lanping and Kau-ho-ten on Yun-lu-shan, alt. 3300 m., *J. F. Rock*, no. 8155, March, 1923; without precise locality, alt. 2900–3200 m., *C. Schneider*, no. 3420, August, 1914.

SZECHUAN: Liuku, alt. 3800–4000 m., *C. Schneider*, no. 1313, May, 1914; Huali, alt. 4200 m., *C. Schneider*, no. 1411, May, 1914; Ta-ching, Ta-yung-pu, alt. 3500 m., *C. Schneider*, no. 4131, May, 1914.

DISTRIBUTION: Mountains of Formosa westward on the higher mountains of China to the central Himalayas.

This variable species is apparently abundant on the higher mountains of Yunnan as it is elsewhere in central and western China.

Juniperus squamata var. **Fargesii** Rehder & Wilson in Sargent, Pl. Wilson. II. 259 (1914).—Rehder in Jour. Arnold Arb. IV. 126 (1923); in Bailey, Cult. Evergreens, 199 (1923).—Dallimore & Jackson, Handb. Conif. 260 (1923).

YUNNAN: Mount Lauchunshan, southwest of Yangtsze bend at Shiku, alt. 3300 m., *J. F. Rock*, nos. 8377, 8378, in 1923; Yunnanfu, *C. Schneider*, no. 57, February, 1914; without locality, *G. Forrest*, no. 8268.

SZECHUAN: Hui-li-chou, alt. 3500 m., *C. Schneider*, no. 565, March, 1914.

DISTRIBUTION: mountains of central and western China.

Juniperus squamata f. **Wilsonii** Rehder in Jour. Arnold Arb. I. 191 (1920); IV. 126 (1923); in Bailey, Cult. Evergreens, 200 (1923).

YUNNAN: between Lanping and Kao-ho-ten, alt. 3300 m., *J. F. Rock*, no. 8154, March 1923; Yangtsze watershed, Prefectural District of Likiang, eastern slopes of Likiang Snow Range, *J. F. Rock*, no. 3568, May–October, 1922; same locality, alt. 2900–3200 m., *C. Schneider*, no. 3305, October, 1914; district of Chung-tien, alt. 3700–3900 m., *H. Handel-Mazzetti*, no. 4643, August, 1914; without locality, *G. Forrest*, no. 10496.

SZECHUAN: Ning-yuan-fu, Lo-tieh-shan, alt. 4200 m., *C. Schneider*, no. 910, April, 1914; between Woloho and Hunka, alt. 3300 m., *C. Schneider*, no. 3896, June, 1914.

DISTRIBUTION: high mountains of Formosa and of western China.

Schneider's nos. 3305 and 3896 have fruits larger than is usual in the species.

Juniperus recurva Buchanan-Hamilton apud D. Don, Prodr. Fl. Nepal. 55 (1825).—Loudon, Arb. & Frut. Brit. IV. 2504, fig. (1838).—Endlicher, Syn. Conif. 18 (1847).—Griffith, Notul. IV. 26 (1854); Icon. Pl. Asiat. IV. tt. 373–374 (1854).—Hooker f., Himal. Jour. II. fig. facing p. 51 (1854); Fl. Brit. India V. 647 (1888), excluding synonym.—Parlatore in De Candolle, Prodr. XVI. pt. II, 481 (1868).—Brandis, Forest Flora Brit. Ind. 536 (1874); Indian Trees, 694 (1906).—Gamble, Ind. Timbers, 412 (1881).—Masters in Gard. Chron. n. s. XIX. 468 fig. 69 (1883).—Kent in Veitch, Man. Conif. 185, figs. 57, 58 (1900).—Clinton-Baker, Ill. Conif. II. 75, t. facing p. 74, fig. 1 (1909).—Elwes & Henry, Trees Gr. Brit. & Irel. VI. 1419, t. 349 (1912).—Bean, Trees Shrubs Brit. Isles, I. 674, t. (1914).—Rehder in Bailey, Cult. Evergreens, 200 (1923).—Dallimore & Jackson, Handb. Conif. 255 (1923).

Sabina recurva Antoine, Cupress. 67, t. 88, fig. e–m, t. 91 (1857).

Juniperus recurva var. *a. typica* Patschke in Bot. Jahrb. XLVIII. 776 (1913).

YUNNAN: between Tengyueh and Likiangfu, via Shweshanting, Kantingai Feilungkiao-Yunlung, Lanping, Cheinchuan and Likiang, alt. 3300 m., *F. J. Rock*, no. 8156, March, 1923; mountains above Tseku and Tsehchung, Mekong-Salween watershed, *J. F. Rock*, no. 8821, in 1923; Mekong valley alpine regions round Yetche, *J. F. Rock*, no. 9066, May, 1923; Salween Valley, border of Tsarong, Tibet, alt. 2600–2900 m., *J. F. Rock*, no. 11495, in 1923; Yangtsze-Mekong watershed, alt. 3600–4050 m., *H. Handel-Mazzetti*, no. 8842, June, 1916.

DISTRIBUTION: Himalayas eastward to the high mountains of northwestern Yunnan.

The fruit of the Yunnan material is rather smaller than that on specimens from Sikkim with which it otherwise agrees. Yunnan is a new station for the range of this species which heretofore has not been authentically known from China. The material referred by Masters (in Jour. Linn. Soc. XXVI. 542 (1902)) to this species belonging to *J. squamata* Buch.-Ham. According to Rock's field notes this Juniper varies from a low shrub to a small tree 15 ft. tall.

Juniperus Wallichiana Hooker f. apud Parlatore in De Candolle, Prodr. XVI. pt. II. 482 (1868).—Brandis, Forest Fl. Brit. Ind. 537 (1874); Indian Trees, 695 (1906).—Gamble, Manual Ind. Timbers, 412 (1881).—Henry in Elwes & Henry, Trees Gr. Brit. & Irel. VI. 1423 (1912).—Clinton-Baker, Ill. Conif. III. 32, t. (1913).—Rehder in Bailey, Cult. Evergreens, 202 (1923).—Dallimore & Jackson, Handb. Conif. 266, fig. 61 (1923).

Juniperus pseudosabina Parlatore in De Candolle, Prodr. XVI. pt. II, 482 (1868), in part.—Hooker f. Fl. Brit. Ind. v. 646 (1888).—Beissner, Handb. Nadelholzk. 106 (1891), in part.—Not Fischer & Meyer.

Juniperus Wallichiana var. *meionocarpa* Handel-Mazzetti, Pl. Nov. Sin. Fortsetz. 26, p. 1 (Anzeig. Akad. Wiss. Wien. 1924, no. 14) (1924).

YUNNAN: Mount Lauchunshan, southwest of the Yangtsze bend at Shiku, *J. F. Rock*, no. 8387, in 1923; Lotueshan, mountains of Labako, west of the Yangtsze bend at Shiku, *J. F. Rock*, no. 9559, in 1923; Mount Peimashan, Mekong-Yangtsze divide between Atuntze and Pungtzera, *J. F. Rock*, nos. 8837, 11353, in 1923; Mountains of Moting, northeast of the Yangtsze-Mekong watershed, *J. F. Rock*, no. 9336, June, 1923.

DISTRIBUTION: Himalayas from Chamba and Almora eastward through Nepal and Sikkim to the mountains of northwestern Yunnan.

Dr. Handel-Mazzetti was the first to record this species from China though he would refer the specimens to a distinct variety based on the upright or ascending fruit, but I do not see how they differ from material collected in Sikkim and on other parts of the Himalayas. According to Rock this is sometimes a tree from 50 to 75 ft. tall with a trunk as much as 4 ft. in diameter. All the specimens before us are in fruit and there are no juvenile leaves. The branches are markedly tetragonal and the arrangement of the leaves on the ultimate branches is, with rare exceptions, opposite and decussate, very occasionally are they ternate. The gland on the back of the leaf is very marked and the apex of the leaf is incurved. The blue-black, ovoid, one-seeded fruit is about 1 cm. long and obtuse at the summit. I think it best to keep this Himalayan Juniper distinct from the Altai and Turkestan plant named *Juniperus pseudosabina* by Fischer & Meyer. There is material in this herbarium from Kansu which I believe belongs to Fischer & Meyer's species. In this the adult branchlets are less quadrate, the leaves on the ultimate branchlets are ternate and not so thick, and the fruit is oval.

To *J. Wallichiana* Hook. f. probably belongs the material collected by E. E. Maire at 3200 m. altitude on the Ta-hai-tse plateau in May, 1912, and by Léveillé (in Monde des Pl., 1914, 20) referred to *J. tamariscifolia* Ait., a species that is not known to grow in China.

Juniperus chinensis Linnaeus, Mant. 127 (1767).—Rehder & Wilson in Sargent, Pl. Wilson. II. 60 (1914) where full references to literature and synonymy will be found to date.—Hayata in Tokyo Bot. Mag. XXXI. 115 (1917).—Chun, Chin. Econ. Trees, 40 (1922).—Rehder in Jour. Arnold Arb. IV. 127 (1923); in Bailey, Cult. Evergreens, 203 (1923).—Dallimore & Jackson, Handb. Conif. 237, fig. 51 (1923).

YUNNAN: high plateau between Talifu and Likiang to the foot of the Likiang Snow Range, *J. F. Rock*, no. 3278, May, 1922; Yunnanfu, cultivated, *C. Schneider*, no. 51, February, 1914; Pan-long-se, alt. 2990 m., *E. E. Maire*.

DISTRIBUTION: northeastern Asia, Japan, Korea, Manchuria and China. Often cultivated in gardens and planted among tombs and in temple grounds.

NOTES.

The Arnold Arboretum expedition to North Central Asia.[1]—From two letters recently received from Mr. Rock, the following extracts are of general interest, describing as they do an almost unknown region and the hardships and difficulties it presents for exploration.

"High plateau of the Kokonor, Oct. 9, 1925

"We have been on the Kokonor plateau for some time and as the Dulanssu (on the map Dulankit) trip proved a very arduous and disappointing one, I decided to give it up and we made our way back to the lake (Kokonor) crossing the sand dunes and thence up a gorge known as the Rako gorge. Looking for trees or even shrubs on the Kokonor is like looking for a needle in a haystack. At Rako, where there are Tibetan and Mongolian encampments (nomads), we found two species of Picea and quite a number of shrubs including Rhododendrons. I was very much surprised to find Rhododendrons so far north. We thence made our way across the Tapanshan, a high range part of the Nanshan, not a tree in sight, but several bushes, including three species of Rhododendrons at 12500 ft. elevation. They grow only on the northeastern slopes of the range where the snow does not melt. Not a single bush could be seen on the southwestern slope which receives the afternoon sun and where there is no snow. This range is the divide between the central Asian plateau and the Yellow River and is a formidable barrier. At Komangssu, called by the Tibetans Serku gombo, and not on any map, we found extensive forests of a single species of Picea, which reaches a height of over 100 ft. with trunk two feet in diameter. A tree 1½ ft. in diameter had 119 rings. The tree resembles much *Picea Meyeri;* there is a slight pubescence on the slender branchlets, the needles are less robust and the cones much smaller. The bark is the same as found on *Picea Meyeri* in the Tebbu country. We collected quite a quantity of seed, which I shall forward from Kanchow in the north later on with a number of seeds of various Berberis, Cotoneaster, Clematis, Lonicera, etc., which formed the underbrush; in this Picea forest only this one species occurs and forms extensive forests. Komangssu is one stage from the Tapanshan. We are again in Tibetan grass country camping. It is bitterly cold, the temperature in my tent has been 27° Fahrenheit, and fire is impossible. No charcoal could be bought, not even in Lanchow, where they burn coal. It has been snowing now for a night and a day, and while I write this the snowflakes are whirling down from a dull sky. Camping under such conditions, with no other fuel than Yak dung, and that now soaked with snow, is very trying indeed. Yak dung is difficult to find now as the plain is covered with snow, all the grass is hidden and the animals are having a hard time; we carry beans for the horses and mules, but grass is an essential. We hope it will clear shortly and so we will be able to proceed, otherwise we would have to go south to Peitating, a forlorn walled village, the last place where cultivation is carried on, to remain until the weather clears. We have one high pass yet to cross ere we reach the main Nanshan, which separates us from Kanchow and of which the Richthofen range is a part. I sent you various seeds from the Kokonor region which I sent to Tankar to be mailed. I hope you will have received them

[1] See Vol. VI. 213