

Notes on Gymnosperms I. Taxonomic Treatments of Some Chinese Conifers

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ABSTRACT. A new species, *Taxus fuana* Nan Li & R. R. Mill, and two new varieties, *Abies ferreana* Bordères & Gaussen var. *longibracteata* L. K. Fu & Nan Li and *Pinus kwangtungensis* Chun ex Tsiang var. *varifolia* Nan Li & Y. C. Zhong, are described. Thirteen new combinations are proposed in the genera *Abies*, *Keteleeria*, *Larix*, *Picea*, *Pinus*, *Pseudotsuga*, *Tsuga*, *Cephalotaxus*, and *Taxus*.

During the revision of gymnosperms for the *Flora of China*, and as a result of the examination of types and other specimens in some of the major herbaria in Europe and the United States, the following taxonomic novelties are proposed.

Abies ferreana Bordères & Gaussen var. ***longibracteata*** L. K. Fu & Nan Li, var. nov. TYPE: China. NW Yunnan: high mountainous belts, ca. 3950 m, *Zhongdian Expedition 1980* (holotype, PE).

A var. *ferreana* recedit strobilorum bracteis exsertis, non recurvatis, apice attenuatis.

The new taxon is readily distinguished from variety *ferreana* by having distinctly exserted, acuminate bract scales that are lanceolate at the apex and neither reflexed nor recurved. In contrast, variety *ferreana* has usually reflexed or recurved bract scales that are rounded at the apex with an acute cusp.

Abies beshanzuensis M. H. Wu var. ***ziyuanensis*** (L. K. Fu & S. L. Mo) L. K. Fu & Nan Li, comb. et stat. nov. Basionym: *Abies ziyuanensis* L. K. Fu & S. L. Mo, *Acta Phytotax. Sin.* 18: 208. 1980. TYPE: China. Guangxi: Ziyuan Xian, Yinzhu Lao Shan, 1650–1700 m, L. K. Fu & Y. J. Lü 78001 (holotype, PE).

Abies dayuanensis Q. X. Liu, *Bull. Bot. Res.*, Harbin 8(3): 85. 1988. Syn. nov. TYPE: China. Hunan: Ling-Xian

Dayuan, Xopingao, 1450 m, Sep. 1986, Zhang Can-ming 202 (holotype, HUIF).

Abies beshanzuensis var. *ziyuanensis* differs from variety *beshanzuensis* in having green-brown or dark brown, cylindric-ellipsoid seed cones, wider seed scales (ca. 3.3 cm wide) at the middle of the cones, and conical winter buds. In contrast, variety *beshanzuensis* has light brown or yellow-brown seed cones, narrower seed scales (2.5–3 cm wide), and ovoid winter buds. Variety *ziyuanensis* is quite similar in other aspects to variety *beshanzuensis* and was previously treated as a distinct species. It has recently been collected from Jiangxi (Jinggang Shan) and E Hunan (Lin Xian) and, therefore, does not appear to be as geographically isolated as once thought.

Keteleeria fortunei (A. Murray) Carrière var. ***oblonga*** (Cheng & L. K. Fu) L. K. Fu & Nan Li, comb. et stat. nov. Basionym: *Keteleeria oblonga* Cheng & L. K. Fu, *Acta Phytotax. Sin.* 13(4): 82. 1975. TYPE: China. W Guangxi: Tianyang, 380–680 m, Z. Z. Chen 54163 (holotype PE).

Variety *oblonga* differs from variety *fortunei* in having very thin, oblong seed scales and dark leaf scars obviously protruded on branchlets. Variety *fortunei* has thick, oblate, truncate-rounded seed scales, and its leaf scars are not distinctly protruded on branchlets.

Larix gmelinii (Ruprecht) Ruprecht f. ***pendula*** (D. S. Zhang & Y. M. Chen) L. K. Fu & Nan Li, comb. et stat. nov. Basionym: *Larix principis-ruprechtii* Mayr var. *pendula* D. S. Zhang & Y. M. Chen, *J. Beijing Forest. Univ.* 10(2): 113. 1988. TYPE: China. Hebei: Wulin Shan, 1700 m, D. S. Zhang 87206 (holotype, BJFC).

Forma *pendula* is distinguished from forma *prin-*

cipis-ruprechtii in having pendulous long branchlets and leaves to 3.5 cm long. The latter form has branches spreading horizontally but the upper ones ascending, long branchlets not pendulous, and leaves 1.5–3 cm long.

Larix gmelinii (Ruprecht) Ruprecht f. ***genhensis*** (S. Y. Li & K. T. Adair) L. K. Fu & Nan Li, comb. et stat. nov. Basionym: *Larix gmelinii* var. *genhensis* S. Y. Li & K. T. Adair, Sida 16(1): 183. 1994. TYPE: China. Nei Mongol: Genhe, S. Y. Li 861-643 (holotype, NEFI).

This form is distinguished from typical plants of variety *gmelinii* by its long and pendulous long branchlets.

Larix potaninii Batalin var. ***chinensis*** (Beissner) L. K. Fu & Nan Li, comb. et stat. nov. Basionym: *Larix chinensis* Beissner, Mitt. Deutsch. Dendrol. Ges. 5: 215. 1896. TYPE: China. S Shaanxi: Taibai Shan, 3000 m, Aug. 1893–1984, P. G. Giraldis s.n. (holotype, BONN?).

Variety *chinensis* differs from variety *potaninii* in having pale, grayish, or brownish yellow first-year shoots and seed scales $\pm$ strigose abaxially. Variety *potaninii* has red-brown or purplish brown first-year shoots and seed scales tuberculate and pubescent abaxially. It differs from variety *macrocarpa* in having smaller seed cones $2.5\text{--}5 \times 1.5\text{--}2.8$ cm and seed scales $\pm$ strigose abaxially. In variety *macrocarpa* the seed cones are $5\text{--}7.5 \times 2.5\text{--}3.5$ cm, and the seed scales are tuberculate and pubescent abaxially.

Picea asperata Masters var. ***heterolepis*** (Rehder & Wilson) L. K. Fu & Nan Li, comb. et stat. nov. Basionym: *Picea heterolepis* Rehder & Wilson, in Sargent, Pl. Wilson. 2: 24. 1914. TYPE: China. W Sichuan: Mao-chou [Guan Xian], 1600–2500 m, E. H. Wilson 4064 (holotype, A; isotype, PE).

Variety *heterolepis* is readily distinguished from variety *asperata* in having seed scales 2-lobed apically. In variety *asperata* the seed scales are entire or rarely slightly denticulate.

Only a few sheets of variety *heterolepis* are available. Seeds collected by E. H. Wilson in October 1910 from Guan Xian, Sichuan, have been propagated and cultivated in some arboreta and gardens in Europe and the United States. All their offspring have seed scales that are evidently 2-lobed apically.

Picea meyeri Rehder & Wilson f. ***pyramidalis*** (H. W. Jen & C. G. Bai) L. K. Fu & Nan Li, comb. et stat. nov. Basionym: *Picea meyeri* var. *pyramidalis* H. W. Jen & C. G. Bai, J. Beijing Forest. Univ. 17(1): 95. 1995. TYPE: China. Nei Mongol: Hexigten Qi, 1300 m, X. W. Ren 94001 (holotype, BJFC).

This form is recognized only by its narrowly conical crown and dense branches divergent at $35\text{--}45^\circ$. There are no other characters that distinguish it from typical plants of *Picea meyeri* and, therefore, it does not deserve a rank higher than form.

Pinus fenzeliana Handel-Mazzetti var. ***dabeshanensis*** (Cheng & Law) L. K. Fu & Nan Li, comb. et stat. nov. Basionym: *Pinus dabeshanensis* Cheng & Law, Acta Phytotax. Sin. 13(4): 85. 1975. TYPE: China. SW Anhui: Dabie Shan, 900–1400 m, C. C. Chang 1 (holotype, PE).

Variety *dabeshanensis* differs from variety *fenzeliana* by its shorter needles 5–14 cm long, cylindrical-ellipsoid seed cones ca. 14 cm, and pale brown seeds with a wing less than 2 mm long. In variety *fenzeliana* the needles are 10–28 cm long, the seed cones are ovoid-ellipsoid and 6–9 cm long, and the seeds are chestnut brown and with a wing 2–4(–7) mm long. The differences between the two taxa are primarily quantitative and somewhat continuous in nature, and that justifies their recognition at the varietal rank.

Silba (1990) treated this taxon as a variety of *P. armandi* Franchet. However, variety *dabeshanensis* appears to be more related to *P. fenzeliana*. Both *P. fenzeliana* var. *fenzeliana* and variety *dabeshanensis* have thin, easily breakable seed coats and are restricted in their distribution to the south of the Yangtze River. *Pinus armandi* has thick and hard seed coats and is widely distributed in China.

Pinus kwangtungensis Chun ex Tsiang var. ***varifolia*** Nan Li & Y. C. Zhong, var. nov. TYPE: China. SW Guangxi: Longing Xian, Tiandeng Xian, summits of limestone mountains, ca. 540 m, Y. C. Zhong 80834 (holotype, PE; isotype, GXF).

A var. *kwangtungensis* recedit foliis variabilis in numero, 2–3(–5) in fasciculo, supra faciebus obsoletis stomatiferis instructis, strobilis minoribus, 3–4 cm longis, 1.5–2 cm latis.

Variety *varifolia* is easily distinguished from variety *kwangtungensis* by having needles 2–3(–5) per bundle, inconspicuous bands of stomata on the

adaxial leaf surface, and seeds cones $3-4 \times 1.5-2$ cm. In contrast, variety *kwangtungensis* has 5 needles per bundle, conspicuous white bands of stomata on the adaxial leaf surface, and seed cones $5-9(-17) \times 3-7$ cm.

Pseudotsuga sinensis* Dode var. *wilsoniana (Hayata) L. K. Fu & Nan Li, comb. et stat. nov. Basionym: *Pseudotsuga wilsoniana* Hayata, Icon. Pl. Formos. 5: 204. 1915. TYPE: China. Taiwan, *U. Mori s.n.* (holotype, TI).

Variety *wilsoniana* is quite similar to variety *sinensis* and differs primarily in having leaves with gray-green instead of white stomatal belts abaxially. It is endemic to Taiwan and, therefore, geographically isolated from variety *sinensis*, which is distributed in S Anhui, N. Fujian, NW and NE Guizhou, W Hubei, NW Hunan, NE Jiangxi, S Shaanxi, Sichuan, Central and NE Yunnan, and SW Zhejiang.

***Tsuga oblongisquamata* (Cheng & L. K. Fu) L. K. Fu & Nan Li, comb. et stat. nov.** Basionym: *Tsuga chinensis* (Franchet) Pritzel var. *oblongisquamata* Cheng & L. K. Fu, Acta Phytotax. Sin. 13(4): 83. 1975. TYPE: China. Hubei: Badong, *H. C. Chow 950* (holotype, PE; isotypes, E, NY).

Tsuga oblongisquamata is related to *T. chinensis*, from which it is distinguished in having slender, longer, cylindric-ovoid or elongated ovoid seed cones, thinner seed scales, and elongated orbicular, glabrous, loosely arranged exposed parts as long as broad. *Tsuga sinensis* has ovoid-globose or obovoid-oblong seed cones and square-orbicular, pentagonal ovate, or oblate and densely arranged seed scales as long as or slightly longer than broad.

A comparison of *Tsuga oblongisquamata* with the American hemlocks reveals that it is quite similar to *T. caroliniana* Engelm (southern Appalachian mountains), especially in their longer and slender seed cones and elongated orbicular, loosely arranged seed scales.

Tsuga chinensis* (Franchet) Pritzel var. *patens (Dowie) L. K. Fu & Nan Li, comb. et stat. nov. Basionym: *Tsuga patens* Downie, Notes Roy. Bot. Gard. Edinburgh 14: 16. 1923. TYPE: China. W Hubei: Changyang Xian, 1800–2200 m, *E. H. Wilson 2096*, p.p. (holotype, A).

Tsuga chinensis var. *patens* is distinguished by its relatively stout branchlets 1.5–2 mm diam., brownish yellow or brown, ovoid-globose seed

cones $2-2.5 \times 1.8-2.2$ cm, thick seed scales, and almost square, smooth, and glossy exposed parts. Variety *chinensis* has slender branchlets ca. 1 mm diam., ovoid seed cones $1.5-2.5 \times 1.2-1.6$ cm, and pentagonal-ovate nearly square not glossy seed scales.

There are seven sheets of *Wilson 2096* in the herbarium of the Arnold Arboretum, and all are from W Hubei. Of these, only three belong to variety *patens*, and two of these are from Changyang Xian and the third is without an exact locality. The other four sheets of *Wilson 2096* belong to variety *chinensis* and were collected from Fang Xian and Xingshan Xian.

Cephalotaxus sinensis* (Rehder & Wilson) Li var. *wilsoniana (Hayata) L. K. Fu & Nan Li, comb. et stat. nov. Basionym: *Cephalotaxus wilsoniana* Hayata, Icon. Pl. Formos. 4: 22. 1914. TYPE: China. Taiwan, Mt. Arisan, *K. Uyematsu 18* (holotype, TI?).

This variety differs from variety *sinensis* in having slightly falcate, longer (3–4 cm) leaves with a rounded-cuneate base and slightly revolute margin. Variety *sinensis* has straight or occasionally curved, shorter leaves (less than 3 cm long) with a rounded base and non-revolute margin.

***Taxus wallichiana* Zuccarini var. *mairei* (Lemée & H. Léveillé) L. K. Fu & Nan Li, comb. et stat. nov.** Basionym: *Tsuga mairei* Lemée & H. Léveillé, Monde Pl. ser. 2, 16: 20. 1914. TYPE: China. Yunnan: Dongchuan, *E. E. Mair s.n.* (holotype, E).

Taxus wallichiana var. *mairei* differs from variety *wallichiana* and variety *chinensis* (Pilger) Florin in having glossy, falcate leaves $2-3.5$ cm $\times$ $3-4(-5)$ mm with a tapering apex, abaxial middle bands without papillae, and a slightly revolute or flat margin when dry.

The variety is widespread in the plains and mountains (usually below 1000–1200 m) in China (S Anhui, Fujian, S Gansu, N Guangdong, N Guangxi, Guizhou, W Henan, W Hubei, Hunan, S Shaanxi, Sichuan, Taiwan, E Yunnan, and Zhejiang), India, Malaysia, Myanmar, the Philippines, and Sumatra.

***Taxus fuana* Nan Li & R. R. Mill, sp. nov.** TYPE: China. Xizang: Jilong, 3000 m, *Qingzhang Expedition 7032* (holotype, PE).

Species similis *T. wallichianae* Zuccarini, sed foliis dense, irregulariter que distichis, angustatis et rectis, linearibus, (1.2–)2.5–3.7 cm longis, apice acutis, margine

plus minusve revolutis, seminibus oblongo-cylindricis, superno leviter compressis, apice rostellibus differt.

Trees or shrubs. Branchlets green, drying pale brown-yellow, golden or pale brown in the first year, aging pale or red brown. Winter buds ovoid; scales at base of shoots keeled abaxially. Leaves densely arranged in 2 irregular rows, spreading V-shaped, linear, (1.2–)2.5–3.7 cm $\times$ 1.5–2.5 mm, slender, straight, upper parts almost as broad as the lower parts, margin $\pm$ revolute, apex abruptly pointed. Seeds cylindric-oblong, ca. 6.5 $\times$ 4.5–5 mm, somewhat compressed, with slightly obtuse lateral ridges in upper parts, apex obtuse and with a mucro, enclosed for more than $\frac{1}{2}$ length in a cup-shaped, red succulent aril; hilum ellipsoid.

Cheng and Fu (1978: 440) recognized and illustrated two species of *Taxus* from SW China. The plants restricted to SW Xizang were identified as *T. wallichiana* Zuccarini, and the species was said to have slender, straight, linear leaves that are uniform in width, abruptly acute at the apex, and densely arranged in two irregular rows. The second species, which is distributed in SW Sichuan, W Yunnan, and SE Xizang, was recognized as *T. yunnanensis* Cheng & L. K. Fu and was said to have loosely and pectinately arranged, lanceolate or linear-lanceolate, $\pm$ falcate leaves that are tapered at the apex and with lower parts obviously broader than the upper. Critical study of types and authentic material, both in China and Europe, clearly reveals that *T. wallichiana* has falcate, loosely and pectinately arranged leaves, and it is conspecific with the plants recognized by Cheng and Fu (1978) as *T. yunnanensis*. Therefore, *T. yunnanensis* should be reduced to a synonym of *T. wallichiana*, and the

plants recognized by Cheng and Fu (1978) as *T. wallichiana* should be described as a new species, *T. fuana* Nan Li & R. R. Mill. The species is named in honor of Professor Fu Li-kuo for his life's work on the taxonomy of Chinese gymnosperms. *Taxus fuana* is represented by an excellent illustration in Cheng and Fu (1978: 440, p. 100, figs. 1–3).

Paratypes. INDIA. Deoban, Chakrata, Maheshwan s.n. (E); Tirjugi, Narain, N Gashwal, Ram 8894 (E); Punjab, Drummond 26626 (E), Gamble 23507 (K). KASHMIR. Judia, Johnston 3955 (E). NEPAL. Kali, Stainton et al. 734, 4832 (E); S Tukucha, Lete, Stainton et al. 734 (E). PAKISTAN. Punjab, Rodin 5313 (K).

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