Species and Varieties of *Hovenia*.

By

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With Plate VII and 18 Text-figures.

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Under the kind guidance of Prof. T. NAKAI, I made a careful study of *Hovenia*. As the result I shall describe here five species and some varieties based mainly on the taxonomical characters which were overlooked until now. The five species are *Hovenia dulcis* THUNB., *H. acerba* LINDLEY, *H. parviflora* sp. nov., *H. tomentella* NAKAI and *H. robusta* sp. nov.. Prior to the description I shall mention the important characteristics of *Hovenia*.

Flower. According to the figures drawn by Y. SHIRASAWA¹⁾ and to the description made by Y. KUDO,²⁾ *H. dulcis* THUNBERG must have both male and hermaphrodite flowers, and the former has five stamens and aborted ovary. Examining many dried specimens and living materials, however, I failed to find any male flowers. In the young flower the style is erect and three stigmas contact together (fig. 1, 2), while in the matured one the free parts of the style divaricate (fig. 3, 4). SHIRASAWA and KUDO might have seen these two stages of the flowers and thought that they are male and hermaphrodite respectively.

H. acerba, *H. robusta* and *H. tomentella* have the styles, divided into three branches from the very base, and different from the lobed styles of *H. dulcis* and *H. parviflora*. I think these two different branchings of styles are the characteristics of good taxonomic value.

Petals of *Hovenia* are deeply involved (fig. 1-4), and by opening them forcibly we find the different forms according to the different species (fig. 5a-9a). The petals of Japanese *Hovenia* (*H. dulcis* and *H. tomentella*) are narrower than those of the Chinese species.

The sepals of *H. dulcis*, *H. acerba* and *H. parviflora* are glabrous (fig. 5b-7b), while those of *H. tomentella* and *H. robusta* are covered by brown hairs (fig. 8b, 9b). The anastomosing nerves are found in *H. acerba* and *H. parviflora* but never in *H. dulcis* (fig. 5b-7b).

1) Y. SHIRASAWA, Iconography of Japanese Forest Trees (Nihon Shinrin Zyumoku Zufu) **2** (1908) t. 47.

2) Y. KUDO, Useful Trees of Japan (Nihon Yûyô Shokubutu Bunruigaku) ed. 2 (1930) 299.

Figs. 1-4. Flower of *Hovenia dulcis* ca. $\times 7$.

1. younger flower. 2. same looking down from above. 3. matured flower.
4. same in longitudinal section.

Figs. 5-9. a. petals. $\times 10$. b. sepals. $\times 10$.

5. *H. dulcis*. 6. *H. acerba*. 7. *H. parviflora*. 8. *H. tomentella*. 9. *H. robusta*.

Fruit and Seed. *H. tomentella* and *H. robusta* are clearly distinguishable from others with their fruit covered by gray hairs. According to Dr. T. MAKINO, the seeds of *H. dulcis* are broader, orbicular and black, while those of *H. tomentella* (his *H. dulcis* var. *tomentella*) are oval and sub-fulvous black. The shapes of seeds in the respective species have but slight difference. The colour of the seeds will grow darker according to the stages of its maturity. The surface of the immatured seeds is sometimes spotted by minute pits.

Inflorescence. In the Genera Plantarum, BENTHAM and HOOKER mentioned as "Inflorescentia cyma dichotoma", but *Hovenia* has cymose-paniculate inflorescence, viz. it is a panicle in the beginning, then changes to the dichotomous cyme. (fig. 10–12). However this dichotomous cyme is not typical form, because the central flower is a simple protuberance and either very poorly developed or falls down easily. If it becomes a flower, it blooms later or is smaller than the side flowers (fig. 10). The inflorescence of Japanese *Hovenia* has a asymmetrical panicle, solitary or aggregated on the top of branches (fig. 11), while that of Chinese has nearly symmetrical cyme and develops in each axilla of the leaves. (fig. 12).

Leaf. The size and form of the leaves are different in the respective species and varieties (fig. 13–18). The leaves of *H. acerba* are charac-

Figs. 10–12. Inflorescence (diagramm).

10. indicates the pseudo-cyme. 11. *H. dulcis*. 12. *H. acerba*.

Figs. 13–18. Leaves. $\times 0.5$. 13. *H. robusta*. 14. *H. dulcis* var. *latifolia*.
15 *H. tomentella*. 16. *H. acerba*. 17. *H. dulcis* var. *glabra*. 18. *H. parviflora*.

terised by its more gradually acuminate apex, as SCHNEIDER indicated. (fig. 16). The back of the leaves of *H. tomentella* is clad by rusty hairs. The serration of the leaves differs by species; viz. the leaves serrated in *H. dulcis*, crenate-serrated in *H. tomentella* and *H. robusta*, minutely crenate-serrated or minutely serrated in *H. acerba* and *H. parviflora*.

Key to the species and varieties.

1. Fructus glaber. Folia serrata vel minute serrulata vel minute crenato-serrulata. Sepala glabra. Petala minora 2–2.5 mm longa 2.
1. Fructus dense brunneo-tomentellus. Folia obtuse serrata vel crenato-serrata. Sepala dense brunneo-tomentella. Petala obovata vel orbiculato-obovata margine ca. 3–3.3 mm longa. Styli 3 a basi liberi 6.
2. Flores medioeres ca. 9 mm lati. Calycis lobi 2.2–2.6 mm longi 3.
2. Flores parvi, ca. 6 mm lati. Calycis lobi 1.5–2 mm longi. Folia minute serrulata vel minute crenato-serrulata. Inflorescentiae cymoso-paniculatae symmetricae. Petala orbiculato-obovata. Styli apice tantum trifidus *H. parviflora* (3).
3. Folia serrata apice breve acuminate. Inflorescentiae cymoso-paniculatae asymmetricae, saepius terminales rarius axillares sed in apice ramorum confertae. Petala late oblonga. Styli apice tantum trifidus *H. dulcis* (1) 4.
3. Folia serrulata vel crenato-serrulata apice gradatim acuminate. Inflorescentiae

- cymoso-paniculatae symmetricae terminales et axillares. Petala transverse orbiculato-elliptica. Styli 3 fere a basi liberi *H. acerba* (2).
4. Planta florifera est arbuscula vel frutex elatus, usque ad 3–5 m alta truncis diametro usque ad 20 cm latis (habitat in Korea) *H. dulcis* var. *koreana* (1c).
4. Planta florifera est arbor usque ad 15–20 m alta, truncis diametro usque ad 60–80 cm latis 5.
5. Folia ovalia vel late ovalia, ca. 8–15 cm longa 5–8 cm lata. *H. dulcis* var. *glabra* (1a).
5. Folia elliptico-ovalia vel cordata, semper magna ca. 11–14 cm longa 8.5–11 cm lata. *H. dulcis* var. *latifolia* (1b).
6. Folia vulgo 8–15 cm longa. Petala apice rotundata basi breve unguiculata *H. tomentella* (4).
6. Folia vulgo magna 15–20 cm longa. Petala apice emarginata basi anguste unguiculata. Cymae fructiferae bene et late incrassatae *H. robusta* (5).

1) **Hovenia dulcis** THUNBERG, Nov. Gen. **1** (1781) 8, Fl. Jap. (1784) 101; LAMARCK, Encycl. Méth. **3** (1789) 138, Pl. de Bot. L'Encycl. **1** (1823) t. 131; WILLDENOW, Sp. Pl. **1** pars 2 (1797) 1141; DE CANDOLLE, Prodr. **2** (1825) 40; SIEBOLD et ZUCCARINI, Fl. Jap. (1826) 135, t. 73–74; MIQUEL, Prol. Fl. Jap. (1866–67) 220; MAXIMOWICZ, Rham. in Mém. Acad. Pétersb. ser. 7, **10** (1866) 20; FRANCHET et SAVATIER, Enum. Pl. Jap. **1** (1875) 82; WEBER-BAUER in Engler, Pfl.-fam. **3**, Abt. 5 (1896) 412, t. 1896; SHIRASAWA, Nihon Sinrin Zyumoku-Zufu **2** (1908) t. 47, text **2** (1910) 112; MATSUMURA, Index **2** pars 2 (1912) 338; SCHNEIDER, Ill. Handb. Laubholzk. **2** (1912) 291, fig. 200; NAKAI, Fl. Sylv. Koreana, **9** (1920) 17, t. 4; Y. KUDO, Nihon Yûyô Syokubutu Bunruigaku ed. 2 (1930) 299.

[*Sicku*, vulgo *Ken* et *Kenpokonas* KAEMPFER, Amoen. exot. (1712) 808 cum icone.].

? [*Hovenia dulcis* THUNB., f. *oblongifolia* ROSANOV, l.c. (1930) 137 with Russian descrip.].

1, a) **Hovenia dulcis** THUNBERG var. **glabra**¹⁾ MAKINO in Tokyo Bot. Mag. **28** (1914) 155. [Pl. VII, 1].

Folia ovalia vel late ovalia ca. 8–15 cm. longa 5–8 cm. lata, apice breve acuminata, basi truncata vel leviter cordata, acute serrata, juniora utrinque dense pilosa adulta glabriuscula infra ad venas saepius pilosiuscula, pilis decoloribus, petiolis 2–4 cm. longis (fig. 17). Inflorescentiae terminales rarius axillares sed apice ramorum 2–4 confertae, pseudo-paniculatae vel cymoso-paniculatae asymmetricae (fig. 11), pedunculis pedicellisque glabris. Discus pilosella. Calycis lobi 2.2–2.6 mm. longi 1.5–1.7 mm. lati, non reticulato-nervati glabri (fig. 5b). Petala oblonga basi unguiculato-attenuata, 2.2–2.5 mm. longa 1.3 mm. lata (fig. 5a). Filamenta 1.6–2 mm. longa. Cymae fructiferae pedicellis exceptis bene incrassatae. Fructus facie glaber,

1) This name was proposed by Dr. T. MAKINO to distinguish the typical *Hovenia dulcis* from *T. tomentella* (*H. dulcis* var. *tomentella*).

seminibus nigris orbicularibus.

Nom. Jap. *Kenpo-nasi*.

Specim. exam. *Japonia*. *Honsyû*: Prov. Rikuzen, Tukidatemati (G. KOIDZUMI, July 13 1914); Prov. Musasi, Tokyo (legitor? June 21 1879; S. MATSUDA, Aug. 30 1891; T. MAKINO, 1894); Prov. Sagami, Yokohama Kawasima (K. HISAUCHI, June 9 1915), Zimmuzi (M. HONDA, May 1928), Kitakamakura (Y. KIMURA, June 30 1939); Prov. Sinano, Tokugô-tôge (T. NAKAI, July 11 1927); Prov. Izu, Yawatano (H. HIDA, 1934). Isl. Tusima (T. NAKAI, July 28 1921).

North China: Prov. Shantung, Pai Ying Tung, Lao Shan (Y. CHIAO, no. 2890, Aug. 12 1930 *B*¹⁾), Chi Pan Shih, Lao Shan (Y. CHIAO, no. 2758 July 13 1930 *B*) Lao Shan (F. N. MEYER, no. 280 Aug. 1907 *B*); Prov. Shensi (S. Huo) (F. N. MEYER, no. 1730, Sept. 4 1914); Prov. N. Kiangsi (HERS, no. 3 Apr. 25 1919, no. 1054, 1919); Prov. Hopeh, Peking mountains (E. BRETSCHNEIDER no. 149 *B*).

1, b) ***Hovenia dulcis* THUNBERG var. *latifolia* NAKAI var. nov.**

Folia late elliptico-ovalia vel cordata, 11–14 cm. longa 8.5–11 cm. lata, apice breve acuminata basi truncata vel leviter cordata margine acute serrata, adulta ad venas pilosella, petiolis 3–5 cm. longis.

Nom. Jap. *Hiroha-kenponasi*.

Specim. exam. *Japonia*. North *Honsyû*: Prov. Ugo, Yuzawamati (Y. SATAKE, Aug. 22 1928—Type in Herb. of Tokyo Imp. Univ., Aug. 20 1938); Prov. Uzen, Yamadera (Y. YUKI, Oct. 1930); Prov. Mutu in insella Bentenzima, Asamusi (Y. OGAWA).

Similar to var. *glabra*, distinguished however from it by the shape and size of the leaves.

1, c) ***Hovenia dulcis* THUNBERG var. *koreana* NAKAI var. nov.**

Arbuscula vel frutex elatus, usque ad 3–5 m. alta, truncis diametro usque ad 20 cm. latis. Cetera ut var. *glabra*.

Nom. Jap. *Tyôsen-kenponasi*.

Specim. exam. *Korea*. Prov. Zennan. Moppo (T. NAKAI, June, 15 1921), Hakuyôzan (T. NAKAI, no. 11797, June 4 1928; S. TATE, Oct. 17, 18 1922), Tintô (T. NAKAI, no. 9894, June 25 1921); Prov. Keinan, Mirokusan, Tôei (T. NAKAI, no. 11798, May 12 1928), in silvis Sindenri insulae Nankaitô (T. NAKAI, no. 11801–11802, May 16 1928), in silvis Tiseppo insulae Kyosaitô (T. NAKAI, no. 11799–11800, May 5 1928); Prov. Keihoku. in insula Uturyôtô (T. ISHIDOYA, no. 90, May 29 1916; T. NAKAI, no. 4177, May 31 1917, no. 4176 July 1 1917); Prov. Tyûnan. in monte Keiryûzan (T. NAKAI, no. 8068, July 10 1919); Prov. Tyûhoku. Zokurisan circa Myohô (T. NAKAI, Aug. 14 1934—Type in Herb. of Tokyo Imp. Univ.); Prov. Keiki. Kôryô (T. MORI, no. 165, July 7 1912; T. ISIDOYA, no. 2712, July 1917); Prov. Kôkai, in silvis insulae Daiseitô (T. NAKAI, no. 13126, 26 July 1932), in insula Kakureito (T. NAKAI, no. 13124, July 25 1929), in silvis peninsulae Tyôzansen (T. NAKAI, no. 13125, July 28 1932).

According to Prof. T. NAKAI, the Korean *Hovenia* never grows large, and blooms and fruits early in the small tree while the Japanese *Hovenia*

1) *B* indicates the specimens belonging to the herbarium of the Royal Botanic Gardens, Kew. To Sir ARTHUR W. HILL, the director of Kew Gardens, I am indebted to his generosity in loaning me the specimens of *Hovenia* kept in the Kew Herbarium.

grows large and tall before it begins to flower. The flowers of the Korean variety may have some differences from the Japanese *Hovenia* but I had not yet an opportunity of examining them.

2) ***Hovenia acerba*** LINDLEY in Bot. Reg. **6** (1820) t. 501; DE CANDOLLE, Prodr. **2** (1825) 40; SCHNEIDER, Ill. Handb. Laubholz. **2** (1912) 291. [Pl. VII, 2].

Hovenia dulcis THUNBERG sensu LINDLEY in Bot. Reg. **7** (1821) in appendice et Bot. Mag. **50** (1823) t. 2360; D. DON, Prodr. Fl. Nepal. (1825) 189; WALLICH in ROXBURGH, Fl. Ind. **1** (1832) 630; HOOKER f., Fl. Brit. Ind. **1** (1875) 640; REHDER & WILSON in Journ. Arn. Arb. **8** (1927) 167; HU & CHUN, Icon. Pl. Sin. **1** (1927) 37, t. 37; HANDEL-MAZZETTI, Symb. Sinic. **7** (1933) 677; REHDER in Journ. Arn. Arb. **15** (1934) 17.

Hovenia inaequalis DE CANDOLLE, l.c. (1825) 40.

Zizyphus Esquirolii LÉVEILLÉ in FEDDE, Rep. Sp. Nov. **10** (1911) 148 pro syn. *H. dulcis* teste REHDER, l.c. (1934) 17.

[*Hovenia dulcis* THUNB. var. *montana* ROSANOV in Bull. of Appl. Bot. (Moscow, 1930) 136 with Russian descrip.].

[*Hovenia dulcis* THUNB. f. *platifolia* ROSANOV, l.c. (1830) 136 with Russian descrip.].

Folia ovalia, late ovalia vel elliptico-cordata, rarius oblonga, ca. 12–15 cm. longa 8–10 cm. lata, apice saepius gradatim acuminata basi truncata vel obtusa vel subcordata, minute serrata potius crassa, adulta infra fusco-pilosella vel glabella, petiolis 3–4 cm. longis. Inflorescentiae axillares cymae dichotomae symmetricae, pedunculis pedicellisque fusco-pubescentibus. Discus facie pilosella. Calycis lobi 2.3–2.5 mm. longi, 1.8 mm. lati, glabri reticulato-nervati. Petala orbicularia et basi attenuata 2–2.3 mm. longa 2 mm. lata. Filamenta 2 mm. longa. Fructus glaber, seminibus elliptico-orbicularibus, nigro-castaneis (semper?).

Nom. Jap. *Sina-kenponasi*.

Specim. exam. *South China*. Prov. Yunnan: San-kia, Alt. 2500 m. (E. E. MAIRE, no. 51, Jul. 1928 B) On the western flank of the Shweli Salwin divide Alt. 7000 ft. (G. FORREST, no. 8966, Aug. 1912 B), (G. FORREST, no. 13449 B) S. of Red River from Manmei (A. HENRY, no. 9465 B), Mengting plaine (W. HANCOCK, no. 554 B); Prov. Kweichow; Pichieh (Y. TSIANG, no. 8979, Sept. 19 1930 B); Prov. W. Hupeh (E. H. WILSON, no. 1191 B & no. 2429 B); Prov. Szechuan, Omei-sien (W. P. FANG, no. 3843, July 4 B); Prov. Chekiang, Hungchow (W. C. CHENG, no. 129, Aug. 26 1929); side of temple Tien Mu Shan (legitor? Aug. 21 1924 B); Prov. Shensi (F. N. MEYER, no. 1730, Sept. 4 1914 B); Prov. Kiangsu, Haichow (legitor? no. 2294 B) Mow Hsien, Mowchow (W. P. FANG, no. 5531, 26 Sept. 1928); (C. L. Tso, no. 1195, Summer 1926 B); Nanking (J. L. SAMBLE, no. 27, Apr. 1920).

LINDLEY proposed *H. acerba* as a new species based on a specimen cultivated in the greenhouse of LAMBERT, which was raised from the seeds

collected in India and sent by WALLICH to LAMBERT. His description in the Botanical Register says "folia integerrima, fructus ruber è pedunculis incrassatis, *Hovenia dulcis* multities minor, saepe acerbo". But soon this description was corrected by himself in the appendix of the same book, saying "Mr. LINDLEY, as well as our artist has overlooked the serration of the leaves, and that in reality these are serrated and not entire", and it regards *Hovenia acerba* as the synonym of *H. dulcis*. Later, CURTIS figured it as *H. dulcis* in the Botanical Magazine. A. P. DE CANDOLLE in his Prodrômus quoted *H. acerba* and published another new species *H. inaequalis*, describing as "foliis basi inaequalis trinervis". *H. inaequalis* is based also on the material of Nepal and DE CANDOLLE distinguished this new species from *H. acerba*, as the latter has entire leaves by the LINDLEY's first description. D. DON in his Prodrômus Flora Nepalensis and WALLICH in ROXBURGH's Flora Indica, regarded *H. dulcis* as the native of Nepal, but WALLICH quoted the observation of Buchanan, who says "a tree originally brought from China and some country subject to it". I presume that *H. acerba* is a Chinese plant, although many scholars failed to recognize it as such. With Russian description Mr. ROSANOV described a new variety, from Yunnan, and NN Himalaya, but it seems to be the very same *H. acerba*. Perhaps *H. dulcis* forma platifolia is also *H. acerba*, if judged from his description. Mr. ROSANOV seems to have mixed the specimen of *H. dulcis* with it, because he cited the habitats as Yunnan, Kansu meridional and Yokohama. The brief description of *Zizyphus Esquirolii* LÉVEILLÉ has no scientific value.

3) ***Hovenia parviflora* NAKAI et Y. KIMURA, sp. nov.** [Pl. VII, 3].

Folia ovalia vel latè ovalia ca. 8–10 cm. longa 4–6 cm. lata, apice breve acuminata basi truncata vel rotundata minute serrata adulta glabra, petiolis 2 cm. longis. Inflorescentiae terminales et axillares in apice ejusque rami ca. 5, non conferta, cymae dichotomae symmetricae, pedunculis pedicellisque fusco-pubescentibus. Discus facie fere glaber. Calycis lobi minores, 1.5–2 mm. longi 1.2 mm. lati glabri, reticulato-nervati. Petala orbiculato-obovata basi unguiculato-attenuata minora, 2 mm. longa 1.7 mm. lata. Filamenta 1.8 mm. longa. Fructus ignotus.

Nom. Jap. *Kobana-kenponasi*.

Specim. exam. *South China*. Prov. Kwangtung, Loh Kong Tung, Chuk Ko Uen (F. A. McCURE, May 22 1925—Type in Herb. of Tokyo Imp. Univ.).

4) ***Hovenia tomentella* (MAKINO) NAKAI stat. nov.**

Hovenia dulcis THUNBERG var. *tomentella* MAKINO in Tokyo Bot. Mag. 28 (1914) 155; Y. KUDO, Nihon Yûyô Syokubutu Bunruigaku ed. 2 (1930) 299.

[*Hovenia tomentella* NAKAI in HONDA, Nomina Pl. Jap. (1939) 209 nom. nud.].

Folia ovalia vel elliptico-ovalia vel cordata, 8–15 cm. longa 5–10 cm. lata, apice acuminata basi truncata vel cordata, obtuse serrata, juniora utrinque dense pilosa, adulta infra pilosa, pilis fuscis, petiolis 2–4 cm. longis. Inflorescentiae terminales vel axilles, in apice ramorum 2–4, confertae pseudo-paniculae (cymae asymmetricae) pedunculis pedicellisque dense fusco-pilosis. Discus facie fusco-tomentella. Calycis lobi majores, 2.6 mm. longi 2 mm. lati. Petala late elliptica unguiculata, 3.3 mm. longa 1.8 mm. lata. Filamenta 3.2 mm. longa. Cymae fructiferae pedicellis exceptis bene incrassatae. Fructus facie dense fusco-tomentella, seminibus nigro-castaneis late ellipticis.

Nom. Jap. *Ke-kenponasi*.

Specim. exam. *Japonia*. Sikoku: Prov. Tosa, Kagasi-gun Makiyama-mura (T. YOSHINAGA, Nov. 1937), Sakawa-mati (T. YOSHINAGA, Nov. 1937), Hinosita-mura (S. HATTORI, Aug. 11 1926), Kuisiyama (H. ASUYAMA, July 27, 1931, *M*¹. no. 41076), Simotui (H. YAMAMOTO, July 28 1927, *M*. no 55411), Yokogurayama (Z. TASHIRO, Sept. 1 1931 *M*. no. 22847); Prov. Iyo, Foot of Isizutisan (J. SUGIMOTO, Aug. 9 1930); Akeharu-mura Meguroyama (H. ITO, Aug. 27 1938); Prov. Awa, Koyadairamura (J. NIKAI, no. 1359, Aug. 11 1904). South Honsyû: Prov. Kii, Hidaka-gun Samukawa-mura (T. NAKAJIMA, Aug. 21 1931), Takigami-mura (K. OTA, Aug. 24 1929), Kôyasan (T. NAKAJIMA, Aug. 1920); Prov. Etizen, Turuga-gun Nakaaihatu-mura (Z. TASHIRO, July 22 1934 *M*. no. 51791).

5) ***Hovenia robusta*** NAKAI et Y. KIMURA, sp. nov. [Pl. VII, 4].

?[*Hovenia pubescens* SWEET, Hort. Brit. ed. 1 (1827) 91 nom. nud.].

Folia late ovalia orbiculato-cordata, 15–20 cm. longa 8–16 cm. lata apice breve acuminata basi truncata vel leviter cordata, obtusa serrata, adulta fere glabra, petiolis 2–4 cm. longis. Inflorescentiae saepius terminales vel axillares et in apice ramorum confertae, pseudo-paniculae (cymae dichotomae asymmetricae), pedunculis pedicellisque fusco-pilosis. Discus facie dense fusco-tomentosus. Calycis lobi 3 mm. longi 2 mm. lati dense fusco-pilosi. Petala orbicularia et longe unguiculata apice emarginata, 3 mm. longa 2 mm. lata. Filamenta 3.3 mm. longa. Cymae fructiferae pedicellis exceptis bene at late incrassatae. Fructus facie fusco-tomentosus, seminibus nigris orbicularibus.

Nom. Jap. *Ô-kenponasi*.

Specim. exam. *China*. S. Anhwei, Chu Hwa Shan Alt. 2000 ft. Tree 65 ft. Seen occasionally here (REN-CHAN CHING, no. 2802, June 28 1925—Fl. Type in Bot. Gard. Kew), Wangshan (W. C. CHENG, no. 3984, Oct. 1933—Fr. Type in Herb. of Tokyo Imp. Univ.).

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1) *M* indicates specimen of the herbarium of the Tokyo Science Museum.