

## A REVISION OF DISTYLIUM AND SYCOPSIS (HAMAMELIDACEAE)<sup>1</sup>

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*With four text-figures*

THIS revision has been undertaken because of the difficulty encountered in determining herbarium material and in integrating the scattered references to *Distylium* and *Sycopsis*. Judging from the number of references to unpublished names, especially in recent literature, there seems to be considerable work which is unpublished because of the war or suspended because of the confusion encountered in these genera. Although this revision clarifies much of our understanding of the genera, it must be considered as somewhat tentative, because several species are still represented by very inadequate collections and because several important specimens have not been available for study, being deposited in places of safety due to the war. Furthermore, no specimens could be borrowed from Europe, where most of the actual types are deposited.

The author has had the privilege of examining material from the following herbaria: Arnold Arboretum of Harvard University (A), Chicago Museum of Natural History, formerly Field Museum of Natural History (F), Gray Herbarium of Harvard University (G), University of Michigan Herbarium (Mi), Missouri Botanical Garden (Mo), New York Botanical Garden (Y), and United States National Museum (W).

In addition the writer wishes to acknowledge the great benefits of three projects undertaken in recent years aimed to assist botanical work such as this. The first is the insertion of botanical literature in herbaria along with the specimens, a project fostered and developed largely by Dr. E. D. Merrill, now Director of the Arnold Arboretum of Harvard University. By means of literature clipped or typed and attached to herbarium sheets or covers, many references were thus made immediately available. In some cases important published items were found which would not have been located by the usual means. This clipped literature was made available by loan along with the specimens.

Another project of major importance was the interpretation of H. Léveillé's woody plants by Prof. Alfred Rehder of the Arnold Arboretum, based on his study of Léveillé's collections in Edinburgh and the photographs and fragments which have been deposited at the Arnold Arboretum,<sup>2</sup> the results published from 1929 to 1931 in the Journal of the Arnold Arboretum. Without Professor Rehder's work our lists of "species insufficiently

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<sup>2</sup>For index to published results of these studies see Jour. Arnold Arb. 18: 278-321. 1937.



known" in taxonomic treatments would be embarrassingly long. There remains, however, much yet to be done in interpreting L  veill  's herbaceous species.

A third project was the photographing by Mr. R. C. Ching — under grant from the Rockefeller Foundation to the Fan Memorial Institute of Biology, Peking — of types and other important specimens in European herbaria. Only a partial set of these photographs is to be found in American herbaria, mostly at the New York Botanical Garden. The many references in this treatment to photographs of types in the Kew herbarium attest the value of this project. With the probable loss of much basic herbarium material in European institutions, the value of this work will become even greater.

Besides these three there are various other basic undertakings which might be mentioned as contributing greatly to this and other taxonomic interpretations of the eastern Asiatic flora. Research on Asiatic botany seems to be declining in Europe but increasing in America. It would wane here too if our great collections, all too poorly housed in these days of danger, should be injured, as is not impossible.

The genera *Distylium* Sieb. & Zucc. (occurring in Java, India, E. Asia, and Central America), *Sycopsis* Oliver (occurring in India and China), and *Sinowilsonia* Hemsl. (in Hook. Ic. Pl. 29: *pl.* 2817. 1907, occurring in China) constitute the tribe Distylieae Hallier f. of the subfamily Hamamelidoideae Reinsch., according to H. Harms (in Engler & Prantl, Nat. Pfl. ed. 2. 18a: 331–335. 1930). This tribe was characterized by H. Hallier as follows:

Leaves leathery, entire or toothed, evergreen with small lanceolate stipules, spicular cells, two-layered palisade tissue and small solitary crystals; inflorescences glomerate or racemose, axillary, solitary, peduncled; bracts small; flowers monoecious or andromonoecious, apetalous, the stamens with oblong anthers gradually narrowed downward into a short filament and upward into a point, dehiscing by two simple lateral longitudinal clefts. (Translated from the German in Beih. Bot. Centralbl. 14: 255. 1903.)

*Sinowilsonia* differs from this characterization in having thinner closely toothed and probably deciduous leaves and terminal inflorescences. Its flowers resemble closely in structure those of *Sycopsis* but have a longer receptacle tube and apparently a semi-inferior ovary. Although *Sinowilsonia* has no petals, it may better be placed with *Corylopsis* and *Fortunaria* in the tribe Corylopsideae, as A. Rehder has implied (in Sarg. Pl. Wils. 1: 428. 1913) and as H. K. Airy-Shaw has stated (in Curtis's Bot. Mag. 160: *pl.* 9501. 1937). The most recently described genus of Hamamelidaceae, *Matudaea* Lundell (in Lloydia 3: 209. 1940), from Mexico, conforms with Hallier's characterization of the Distylieae in most respects. It is near *Distylium* and was described as having only perfect flowers, these with 20 to 24 stamens. Its trinerved leaf bases are very distinctive.

The genus *Distylium* was first described in 1835 from Japan and remained an Old World genus distributed westward to India and south to



Java until 1933, when Radlkofer's description of the first New World species, *D. guatemalense*, from Central America, was published. In the present paper is described a second New World species, *D. hondurensis* Standl. This interesting distribution on both sides of the Pacific Ocean is paralleled in various other genera, especially of Celastraceae, as has been discussed by T. Loesener (in Bot. Jahrb. 24: 197-201. 1897). The genus has been introduced into cultivation and thrives in warm temperate and subtropical climates in both Europe and the United States, the type species, *D. racemosum*, being rather frequently mentioned in the literature on cultivated woody plants. It flowers in the early spring, its numerous red anthers adding color to the landscape.

In several, if not all, of the species of *Distylium* there is a marked tendency toward variability in both vegetative and reproductive parts, reaching in some species almost to polymorphism. This variability has led to the proposing of a number of new species which have been reduced to synonymy as more material has been found to link extreme forms. It furthermore makes the describing of new species based on only a few specimens a very unsatisfactory proceeding. The great variability in the flowers on the same plant has already been discussed by W. B. Hemsley (in Hook. Ic. Pl. 29: pl. 2835. 1907).

A review of some of the principal characters used in describing and differentiating species may lead to a better understanding of specific limits. The species of both *Distylium* and *Sycopsis* are either trees or shrubs. *Distylium racemosum* in cultivation seems always to be a shrub, but in its natural habitat it is almost always a tree. *Distylium buxifolium* (in the literature as *D. chinense*) is apparently always a shrub, but some species of these genera seem to be either large shrubs or small trees. The indument consists of lepidote scales, usually fimbriate, or of stellate hairs, the latter obviously derived from the former. Their character and presence or absence is fairly definite and is of some value in differentiating species. Leaf size, shape, and serration are very variable and difficult to use in most cases, but the lack of diagnostic characters in the flowering and fruiting parts makes it necessary to use these variable leaf characters in keys. The marginal teeth, when present, are always rather remote and confined to the upper half of the leaf. They may or may not, however, be present in the same species. Leaf venation likewise is fairly uniform, being always pinnate with about 6 lateral nerves, curved-anastomosing fairly far from the margins, except in serrate leaves, where the nerves usually end in the teeth. There is considerable variation among species in the prominence of the lateral nerves on the under sides of the leaves.

The variations in the floral parts between one species and another are so little or so inconsistently variable that they are of scant use in differentiating species. The inflorescences at anthesis are usually short, but lengthen as the fruits mature, as do also the pedicels. It is often difficult to determine whether flowers are unisexual or bisexual, because there may be found stamens and pistils of all degrees of development even in the same inflo-



rescence. Fruit characters are likewise unreliable for species differentiation, at least in our present state of knowledge, because the scarcity of material representing some species prevents our knowing the range of variation.

The genus *Sycopsis* was first described in 1860 from Assam, India, and is so far as now known confined to the Old World, ranging across China, through the Philippines, and south to New Guinea. It differs principally from *Distylium* in the elongated receptacle, which forms a tube completely covering the ovary and growing with the developing ovary or splitting irregularly and forming a cup around the base of the fruit. In its indument and leaf form and venation it closely resembles *Distylium*, except in the characteristic densely setose-pilose ovaries and fruits. The species of *Sycopsis* are much more distinct from one another than are those of *Distylium* and there is more consistent variation in the inflorescences, so much so in fact that the characteristics of these parts can be satisfactorily used in keys.

Both *Distylium* and *Sycopsis* are frequent hosts for gall-forming insects. Galls, often very large, appear on the leaf blades or petioles, and sometimes the inflorescences seem to be transformed. One often finds small tufts of hairs surrounding small domatia in the axils of the lateral nerves and midribs on the lower surface of the leaves.

#### KEY TO GENERA

- Ovary exposed, lepidote or stellate-pubescent, never densely setose-pilose; sepals and stamens hypogynous on margin of unexpanded receptacle; stamens 6 or less.....  
 .....*Distylium*.  
 Ovary free, enclosed in an expanded globose to urceolate receptacle tube, densely setose-pilose; sepals and stamens perigynous on upper edge of receptacle surrounding the style bases; stamens 10 or less.....*Sycopsis*.

#### DISTYLIUM

*Distylium* Sieb. & Zucc. Fl. Japon. 1: 178. *pl.* 94. 1835. — Based on the single species *D. racemosum* Sieb. & Zucc. from Japan.

Flowers unisexual and monoecious or andromonoecious in separate or the same axillary, erect, spicate or racemose, rarely branched inflorescences, bracteate, the bracts scarcely distinguishable from sepals. Sepals 0–6, small, bractlike, variable, below the ovary. Petals none. Staminate flowers in short spikes or glomerules, the pistils wanting or more or less developed, the stamens 1–6, the filaments rather slender, of varying lengths, the anthers ellipsoid, dehiscing by widely spreading longitudinal slits, the connective more or less protruding, apiculate. Pistillate or perfect flowers with superior, usually lepidote or stellate-hairy, bicarpellary ovary, each carpel 1-celled, 1-ovuled, the styles free, elongate, diverging, slender, more or less hairy, the stigmas apiculate. Fruits ovoid or subglobose, woody, stellate-lepidote or pilose capsules, splitting into 2 or 4 apiculate valves, the first rupture being through the style bases and perpendicular to the common partition between the two cells, the second between the styles and parallel to the partition, the elongate seeds thus escaping, the carpellary walls separating into two layers, the inner (endocarp) horny or woody, thicker than the outer. Leaves simple, alternate, coriaceous, evergreen,



ovate to lanceolate, entire or with a few teeth above the middle, pinninerved, the lateral nerves always curved-anastomosing.

Spring-flowering evergreen trees or shrubs, usually in woods or forests or along stream banks (*D. buxifolium* especially), in subtropical and warm temperate eastern and southeastern Asia (Japan to Assam and southern China, also Java) and Central America (Guatemala and Honduras).

Because of the great variability, especially in the floral parts, and the lack of material representing several species, the details of flowers and fruits in the following specific descriptions should be accepted with caution.

#### KEY TO NEW WORLD SPECIES

- Leaves glabrous beneath, not peltate.....1. *D. guatemalense*.  
Leaves distinctly stellate-pubescent beneath, peltate.....2. *D. hondurensis*.

#### KEY TO OLD WORLD SPECIES<sup>3</sup>

Leaf blades 5 cm. long or less; Formosa, Bonin Islands, China.

Leaves rather broadly elliptic-ovate, very rarely toothed; trees or shrubs; Formosa or Bonin Islands.

Apex of leaf obtuse to rounded; small trees; Formosa.....3. *D. gracile*.

Apex of leaves usually rounded; shrubs; Bonin Islands.....4. *D. lepidotum*.

Leaves lanceolate or oblanceolate to elliptic-ovate or obovate, frequently with a few teeth; shrubs; China.....5. *D. buxifolium*.

Leaf blades usually over 5 cm. long, or, if smaller, from Java only.

Leaves glabrous beneath, even when young.

Lateral nerves not raised beneath.....6. *D. racemosum*.

Lateral nerves fine but distinctly raised beneath.

Margins of leaves entire or toothed; China.....7. *D. myricoides*.

Margins of leaves entire; India.....8. *D. indicum*.

Leaves pubescent beneath.<sup>4</sup>

Leaf blades over 10 cm. long and 4 cm. wide.

Young branchlets minutely puberulent; Java.....9. *D. stellare*.

Young branchlets densely pubescent, not minutely so; China....10. *D. Tsiangii*.

Leaf blades under 10 cm. long.

Leaf tips long-acuminate.

Leaves entire.....11. *D. pingpienense*.

Leaves serrate.....11a. *D. pingpienense* var. *serratum*.

Leaf tips short-acuminate, acute, obtuse, or rounded.

Young branchlets minutely puberulent; Java.....9. *D. stellare*.

Young branchlets densely pubescent, not minutely so; China..12. *D. Chungii*.

1. *Distylium guatemalense* Radlk. ex Harms in Notizbl. Bot. Gart. Berlin 11: 716. 1933. — Type, *H. von Tuerckheim II. 1613*, from Guatemala, in the Munich herbarium.<sup>5</sup>

A tree with grayish bark, the branchlets slender, minutely puberulent when young, glabrescent. Leaves petiolate, the petioles 1 to 1.5 cm. long,

<sup>3</sup>This key is based wholly on vegetative characters and must be used with considerable caution. Floral and fruiting characters are entirely unreliable and even vegetative characters are very variable. For other keys see Guillaumin in Bull. Soc. Bot. France 61: 34. 1914; Harms (after Guillaumin) in Engler & Prantl, Nat. Pfl. ed. 2. 18a: 331–332. 1930; and C. P'ei in Contr. Biol. Lab. Sci. Soc. China Bot. Ser. 10: 122. 1936.

<sup>4</sup>The original description of *D. indicum* says the leaves are "more or less stellately pubescent" beneath, but available specimens and the only other description known (*D. Brandis*, Indian Trees. 301. 1906) indicate that they are glabrous.

<sup>5</sup>H. Harms published after Radlkofer's death the latter's incomplete description based on his Munich specimens, completing the description from the Berlin specimens.



stellate-puberulent, the lower part thicker than the upper, the blade ovate or elliptic- or oblong-ovate, acute or acuminate at apex, obtuse or broadly acute and asymmetric at base, 8 to 13 cm. long, 4 to 6.5 cm. wide, entire or somewhat wavy-margined, glabrous except on the prominent midrib beneath and near base above, the lateral nerves about 5 pairs, raised beneath, curved-anastomosing but not prominently so, connected by raised scalariform tertiary nerves. Flowers andromonoecious or perfect (so far as known), in dense pubescent spikes or racemes about 2 cm. long, the pedicels minute or wanting, the bracts few, small, lanceolate to ovate, caducous. Stamens 5 or 6, the anthers 1 to 1.5 mm. long, with a tuft of hairs at apex, the filaments glabrous, variable in length. Fruit unknown.

GUATEMALA: Alta Verapaz: *H. von Tuerckheim II. 1613* (A, W — originally in the John Donnell Smith herbarium), in a thicket of indigenous species in a pasture near the entrance to the city of Coban, in flower Jan. 1907.

This is the first described New World member of this genus. It appears to be much restricted in distribution. An additional collection (sterile) is reported by H. Harms from a forest on the Chiu River, Sept. 1912.

2. *Distylium hondurens* Standl. apud Walker, sp. nov.

Arbor 6–9-metralis, ramulis gracilibus plus minusve flexuosis dense stellato-tomentosis, tomento ochraceo vel brunnescente; folia petiolata subchartacea, petiolo ca. 1.5 cm. longo stellato-tomentoso vel glabrato; lamina ovata vel oblongo-ovata 6.5–11 cm. longa 3–5.5 cm. lata, breviter vel longiuscule acuminata, basi vulgo plus minusve obliqua obtusa vel anguste rotundata et breviter (2–3 mm. supra basin) peltata, supra viridis primo sparse stellato-puberula, cito glabrata, subtus ubique dense stellato-tomentosa tactu mollis, costa elevata, nervis lateralibus utroque latere ca. 7 leviter arcuatis marginem attingentibus, non distincte anastomosantibus, marginibus fere integris vel remote obscure denticulatis, supra medio interdum undulato-denticulatis; flores ignoti; capsula (tantum in statu aperto visa) ca. 13 mm. longa 4-valvata stellato-tomentosa lignosa. [Description by P. C. Standley]

DISTRIBUTION: Known only from Honduras.

HONDURAS: Comayagua: In a wet ravine near El Achote, in mountains above the plains of Siguatepeque, 1350 m. alt., *T. G. Yuncker, R. F. Dawson and H. R. Youse 6377* (F — TYPE), Aug. 1936; Tegucigalpa: In a pine and oak forest near the river, Montaña de la Flor, 960 m. alt., *Christine & Wolfgang von Hagen 1193* (F), Dec. 1937; local name Matón.

The second collection cited is sterile and was taken from what was probably a luxuriant branch. The leaf blades are as much as 18 cm. long and 11.5 cm. wide. This was first reported from Honduras as *D. guatemalense* Radlk. (Field Mus. Publ. Bot. 17: 364. 1938).

3. *Distylium gracile* Nakai in Jour. Arnold Arb. 5: 77. 1924. — Type, *E. H. Wilson 11107*, from Formosa, at the Arnold Arboretum.

“A small tree 10 m. high, trunk 60 cm. diam.” (according to E. H. Wilson, collector), the branchlets slender, grayish brown, stellate-pubescent when young, glabrescent. Leaves with stellate-pubescent petioles 2 to 4 mm. long, the blade broadly elliptic-ovate to obovate, obtuse to broadly acuminate with callose tip, obtuse to acute at base, 2 to 3 cm. long, 0.7 to 2 cm. wide, entire or rarely with 1 or 2 teeth on each side above the middle,



glabrous, the lateral nerves 3 or 4 pairs, inconspicuous, only slightly raised. Flowers unknown. Capsules globose to ovoid, 1 cm. long, light brown, closely stellate-pubescent, 1 or 2 in racemose inflorescences up to 1 cm. long.

FORMOSA: Prov. Karenko: Cliff near Seisui, E. H. Wilson 11107 (A, W).

This is a very distinct species, recognized by its small, broadly ovate leaves.

4. *Distylium lepidotum* Nakai in Bot. Mag. Tokyo 32: 220. 1918, 44: 23. 1930. — Types collected by H. Hattori on Anishima and Chickishima, Bonin Islands, probably in the Tokyo herbarium. Not seen.

A shrub 1.5 to 3 m. high or a tree to 10 m. with a trunk diameter of "3–4 feet" (according to E. H. Wilson's notes), the branchlets grayish, densely lepidote when young, glabrescent. Leaves with glabrous or lepidote petiole about 5 mm. long, the blade rather broadly elliptic-ovate, usually rounded or sometimes very broadly obtuse at apex, obtuse at base, 2 to 4 cm. long, 1.5 to 2.5 cm. wide, entire, glabrous, "rather glaucous" (according to E. H. Wilson), green above, greenish beneath (when dry), the midrib prominent beneath, the lateral nerves about 4 pairs, obscure, not raised beneath. Flowers in short stellate-lepidote spikes or racemes up to 2 cm. long, the bracts ovate, lepidote, the sepals lanceolate, glabrous or lepidote. Stamens apparently only up to 4 in number, the anthers large, apiculate,

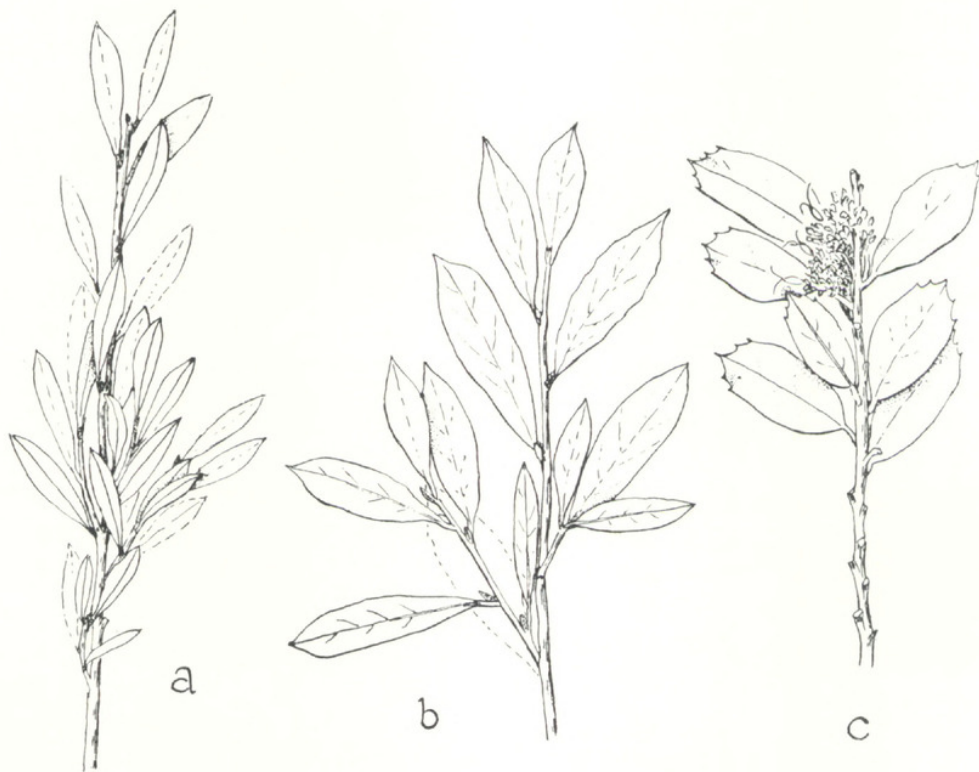


FIG. 1. *Distylium buxifolium*, showing leaf variations,  $\times \frac{1}{2}$ : a. drawn from Dunn (Herb. Hongkong 2681) (A), from Fukien, isotype of *D. strictum* Hemsl.; b. drawn from E. H. Wilson 2961 (W), from Hupeh; c. drawn from Henry 3314 (W), from Hupeh.



the filaments variable in length. Capsules solitary or few, elliptic-ovoid, about 1.5 cm. long, densely lepidote when young.

BONIN ISLANDS: Chickishima: *E. H. Wilson* 8241 (A, W), 8347 (A, Mo, W); Anishima: *E. H. Wilson*, May 3, 1917; no precise locality: *C. Wright* 174 (U. S. North Pacific Exploring Expedition under commanders Ringgold and Rodgers, 1853) (G, W).

Although this species was first described in 1918, based on Japanese specimens, it was first collected in 1853 by the American botanist Charles Wright. In the distribution of the duplicates of this Wright collection confusion of labels resulted in some being referred to the Liu Chiu Islands. This confusion has been clarified by reference to Asa Gray's unpublished manuscript at the Gray Herbarium. Each of the Wright collections at the U. S. National Herbarium, the Gray Herbarium, and the Kew Herbarium has been designated by separate workers as the type of a new species, but none of these "herbarium names" have been published, so far as can now be ascertained.

5. *Distylium buxifolium* (Hance) Merr. in *Sunyatsenia* 3: 251. 1937. — Based on *Myrsine buxifolia* Hance. FIG. 1.  
*Myrsine buxifolia* Hance in *Ann. Sci. Nat. IV. Bot.* 15: 225. 1861. — Type, *C. F. M. DeGrijs* (Herb. Hance 6687), from Fukien, in the British Museum herbarium (see Merrill in *Sunyatsenia* 3: 251. 1937). A rubbing has been examined.  
*Distylium racemosum* var. *chinense* Franch. ex Hemsl. in *Jour. Linn. Soc. Bot.* 23: 290. 1887. — Based on a Delavay collection probably in the Paris herbarium.<sup>6</sup>  
*Distylium chinense* (Franch.) Diels in *Bot. Jahrb.* 29: 290. 1900. — Based on *D. racemosum* var. *chinense* Franch.  
*Rapanea buxifolia* (Hance) Mez in *Pflanzenr.* 9 (IV. 236): 362. 1902. — Based on *Myrsine buxifolia* Hance.  
*Distylium chinense* Hemsl. in *Hook. Ic. Pl.* 29: pl. 2835. 1907. — Based on *D. racemosum* var. *chinense* Franch., although designated as "n. sp."  
*Distylium strictum* Hemsl. in *Hook. Ic. Pl.* 29: sub pl. 2835 (p. 3). 1907. — Type, *S. T. Dunn* (Herb. Hongkong 2681), from Fukien, in the Kew herbarium. Duplicate examined.  
*Distylium Dunnianum* H. Lév. in *Repert. Sp. Nov.* 11: 67. 1912. — Type, *Cavalerie* 3551, from Kweichow, in the Lévillé herbarium in Edinburgh. Duplicate examined.  
*Myrica Seguii* H. Lév. in *op. cit.* 12: 537. 1913. — Type, *J. Cavalerie* 3929, from Kweichow, in the Lévillé herbarium in Edinburgh. Duplicate examined.  
*Myrica rapaneoides* H. Lév. in *Bull. Acad. Int. Géogr. Bot.* 24: 146. 1914. — Type, *J. Cavalerie* 3929, from Kweichow, in the Lévillé herbarium in Edinburgh. Duplicate examined.

A densely branching shrub up to 2 m. high, the branchlets grayish brown, stellate-puberulent when young, glabrescent. Leaves with short, puberu-

<sup>6</sup>In the original publication the authority is given as "Franchet in litt." and the description is enclosed in quotation marks. The specimens cited are *A. Henry*, from Ichang, Hupeh, and *Delavay*, "rocks on the banks of the Blue river at Kouimen," Szechwan, both in the Kew herbarium. Collector's numbers were not cited, but a photograph by R. C. Ching distributed from the Fan Memorial Institute of Biology to the New York Botanical Garden of the Kew specimens shows them to be *Henry* 1300 (received at Kew in 1886) and *Delavay* 2290, collected March 20, 1882. As Franchet's description was in all probability based on the Delavay specimen in Paris, where his collections were being studied, *Delavay* 2290 in the Paris herbarium is presumably the type. Both the Henry and Delavay specimens have the toothed form of leaf.



lent petiole about 2 mm. long, the blade very variable in shape, from oblong or elliptic-lanceolate to ovate or obovate, acute to subrounded and sometimes acuminate with callose tip, acute at base, 2.5 to 5 cm. long, entire or with 1 to 3 callose teeth on each side above the middle (the shape then usually somewhat obovate), generally glabrous but sometimes stellate-puberulent beneath especially on the prominent midrib, the lateral nerves 4 or 5 pairs, not conspicuous, the veinlets sometimes distinctly reticulate. Flowers appearing conspicuously red, in subglobose to spicate stellate-pubescent inflorescences up to 2 cm. long in fruit, the bracts and sepals alike, ovate, glabrous or pubescent, about 3 mm. long. Stamens up to 6, often unequal, the anthers large, red, apiculate, the filaments variable, up to 3 mm. long. Capsules 1-8 in each inflorescence, ovoid, about 7 mm. long (reported up to 1.5 cm. long by Hemsley), more or less stellate-puberulent.

DISTRIBUTION: China. Occurs in sandy or rocky places along river banks which are subject to being flooded.

CHINA: Hupeh: Ichang, *Henry* 3314 (A, G, W, Y), 4280 (A, W), *Wilson* (Arnold Arb. Exp.) 3537 (A, W); no precise locality, *Henry* 3826 (A, G), 7805 (G), *Wilson* (Veitch Exp.) 115, *Wilson* (Arnold Arb. Exp.) 2691; Kweichow: Lofou, *J. Cavalerie* 3551 (A); no precise locality, *J. Cavalerie* 3929 (A); Gan Chouen, *J. Cavalerie* 4236 (A); Djiangdi, *Handel-Mazzetti* 10272 (A); Dyun (or Tyun), *Handel-Mazzetti* 10692 (A); Gudschou, *Handel-Mazzetti* 10810 (A); Tehkiang, Tsaoti, *Steward*, *Chiao & Cheo* 898 (A); Lungli, *Y. Tsiang* 8404 (Y); Chekiang: Sui Chang Hsien, *H. H. Hu* 493 (A); Tsingtien, *Y. L. Keng* 123 (A); no precise locality, *Barchet* 170 (W), *S. Chen* 3230 (A), 3431 (A); Fukien: No precise locality, *S. T. Dunn* (Herb. Hongkong 2680, 2681) (A).

This species is usually referred to as *D. chinense* Franch. The fairly abundant material assembled for this study shows that the range of variation is very great in this species. Hemsley described *D. chinense* and *D. strictum* at the same time, selecting *Wilson* (Veitch Expedition) 115, a partly toothed wide-leaved specimen, as typical of the former, and *Dunn* 2681, an entire and unusually narrow-leaved form as compared with other material from Fukien, as representative of the latter. By study of intermediates these now appear to represent one species, the oldest name, however, unfortunately not being that in common use. The great variability in flowers has been pointed out by H. K. Airy-Shaw (in Curtis's Bot. Mag. 160: *pl.* 9501. 1937). The variation in leaf shape is very striking. This is apparently the most common species in China.

6. *Distylium racemosum* Sieb. & Zucc. Fl. Japon. 1: 179. *pl.* 94. 1835. — Originally described, without mention of specimens, from Kiushiu, Japan.

Usually a large tree, up to 25 m. high, the branchlets densely stellate-lepidote when young, glabrescent. Leaves with glabrous or lepidote petiole 3 to 8 mm. long, the blade elliptic-ovate or rarely slightly obovate, generally obtuse or sometimes acute or often broadly obtuse to subrounded at apex, acute or obtuse at base, 5 to 7 cm. long, 2 to 3 cm. wide, rarely up to 8.5 cm. long and 4 cm. wide, entire (for possible exception see discussion), glabrous, the midrib prominent beneath, the lateral nerves about 6 pairs, obscure on both surfaces. Flowers appearing red, in usually densely stellate-lepidote spikes or racemes up to 4 cm. long in fruit, the bracts ovate or oblong, stellate-pubescent or lepidote, about 4 mm. long, the sepals variable, lanceolate or ovate, about 3 mm. long, stellate-lepidote. Stamens up to 6,



the anthers bright crimson, up to 4 mm. long, apiculate, the filaments variable, up to 3 mm. long, rather slender. Capsules ovoid with apiculate valves, about 1 cm. long, brown to tan-colored, densely stellate-lepidote or puberulent.

DISTRIBUTION: Eastern Asia. In forests, often on mountains.

KOREA: Saishu To (Quelpaert Isl.): *U. Faurie* 549, 550, 1612, 1613 (A) (all 1906 or 1907), *E. J. Taquet* 819, 820, 821, 4252, 4253, 4254, 4255 (A) (Jan.-July 1910), *E. H. Wilson* 9515 (A, W). JAPAN: Tsushima Strait: *U. Faurie* 4831 (A); Kyushu: Nagasaki, *C. J. Maximowicz*, Iter secunda, 1863 (G, W, Y), *R. Oldham* 466 (G, Y); Higashi-kirishima, *E. H. Wilson* 6222 (A); Satsuma, *H. Mayr*, Feb. 28, 1886 (A); no precise locality, *E. H. Wilson* 6039 (A, Mo, W); Honshu: Cultivated at Yokohama: *E. H. Wilson* 6414 (A); no precise locality: *Buerger* (ex Herb. Lugd.-Bat.) (G). LIU KIU ISLANDS: Okinawa-shima: Kunigami-ken, *R. Kanehira* 3283, 3326 (Y); near Nago, *E. H. Wilson* 8070 (A, W); Amami Oshima: *R. Kanehira* 3406 (Y). FORMOSA: South Cape, *A. Henry* 980 (A). CHINA: Chekiang: *C. Y. Chiao* (Herb. Univ. Nanking 14642) (A, W); Kwangtung: Hongkong, *C. Ford* (G, Y), *C. Wilford* (G, Y), *C. Wright* 183 (U. S. North Pacific Exploring Expedition under commanders Ringgold and Rodgers) (G, W).

This is the most widely cultivated species of *Distylium* or *Sycopsis*. In cultivation it appears usually to be a shrub, but in its native habitat it is described as a tree. Cultivated plants seem to bear larger leaves and inflorescences. The most comprehensive treatment of this species is that by H. K. Airy-Shaw in Curtis's Bot. Mag. 160: pl. 9501. 1937. Two variants, apparently only horticultural forms, have been recognized, var. *variegatum*, attributed by H. Harms to Siebold,<sup>7</sup> and var. *pendulum* Makino, in Jour. Jap. Bot. 6: 4. 1929, based on a collection by Makino in 1928. The leaves of all the Hongkong specimens are green above and distinctly brown beneath, a character which appears also in *D. indicum* and occasionally elsewhere but which can not now be interpreted. R. Kanehira's collections from the Liu Kiu Islands, nos. 3283 with mature fruit, 3326 with immature fruit, and 3406 sterile, all in the New York Botanical Garden, have been designated as representing a new species, but the name seems not to have been published. These specimens vary considerably in leaf size and shape, especially no. 3283 with distinctly smaller leaves, but all readily conform to the characters of *D. racemosum* as here given. Some of the leaves of no. 3406 have a few remote teeth above the middle, a character common in *D. buxifolium* of China, but not found elsewhere in *D. racemosum*. Recognition of a new species on the basis of these variations does not seem justifiable.

7. *Distylium myricoides* Hemsl. in Hook. Ic. Pl. 29: sub pl. 2835 (p. 2). 1907. — Type, *S. T. Dunn* (Herb. Hongkong 2684), in the Kew herbarium. Duplicate examined.

A large shrub 3 m. high to a large tree up to 20 m. high with a trunk diameter of 45 cm., the branchlets grayish or brownish, somewhat lepidote when very young. Leaves with lepidote petiole 5 to 10 mm. long, the blade elliptic-ovate to obovate, acute and sometimes acuminate at apex, acute at base, 5 to 10 cm. long, 2 to 4 cm. wide, entire or with 1 to 3 obscure or definitely callose serrate teeth near the acuminate tip (the blades then

<sup>7</sup>Mitt. Deutsch. Dendr. Ges. 44: 5. 1932. The only other reference found is a description in W. J. Bean, Trees & Shrubs Brit. Isl. 1: 501. 1914.



generally obovate), glabrous, rather shining green above, paler beneath (when fresh), the midrib impressed above, prominent beneath, the lateral nerves about 5 pairs, rather fine but raised beneath. Flowers in short lepidote spikes or racemes up to 2 cm. long in fruit, the bracts and sepals variable, about 3 mm. long, caducous. Stamens few, the anthers rather large, apiculate. Capsules solitary or few in a raceme, elliptic-ovoid, 1 cm. long, gray to grayish green, not ferruginous, densely stellate-lepidote to puberulent.

DISTRIBUTION: Eastern and southeastern China. In dense or open woods or in thickets along streams, in ravines, or on slopes.

CHINA: A n h w e i: Hwangshan, *R. C. Ching* 3026 (A); Tien Chu Shan, Chien Shan Hsien, *C. S. Fan & Y. Y. Li* 128 (A); K i a n g s i: Lushan, *H. H. Chung & S. C. Sun* 634 (A, Y); C h e k i a n g: South of Ping Yung, *R. C. Ching* 2081 (A, W, Y); Tai Pai Shan, *Y. L. Keng* 1147 (A); western Chekiang, *R. C. Ching* 3293 (A, Y—photo); F u k i e n: Buong Kang, Yenping, *H. H. Chung* 3328 (A); Kushan, *H. H. Chung* 8503 (A); no precise locality, *H. H. Chung* 7855 (A); *S. T. Dunn* (Herb. Hongkong 2684) (A); K w a n g t u n g: Fan Shui Shan, Wung Yuen Dist., *S. K. Lau* 2568; Yang Kue Ho, Yao Shan, Lochang Dist., *C. L. Tso* 20869 (A, Y).

This species resembles most closely *D. buxifolium*, from which it may be distinguished by its larger leaves.

8. *Distylium indicum* Benth. ex C. B. Clarke in Hook. f. *Fl. Brit. Ind.* 2: 427. 1878. — Type, *Griffith* 3377, from Khasi Hills, Assam, India, in the Kew herbarium. Duplicate examined.

A small tree, the branchlets ferruginous-stellate-pubescent when young, glabrescent. Leaves with margined petiole less than 1 cm. long, the blade obovate or elliptic, rounded or gradually or abruptly acuminate at apex, cuneate at base, 7 to 10 cm. long, entire, glabrous or pubescent (see footnote 4, in key to species, above), green above, distinctly brown beneath when dry, the lateral nerves about 6 pairs, rather prominently raised beneath, the lower pair subbasal or more acutely diverging than the others. Flowers in spikes or racemes up to 6 cm. long (from descriptions), the bracts and sepals caducous, the remainder unknown. Mature fruit unknown, the immature fruit about 1.3 cm. long, densely stellate-pubescent.

INDIA: A s s a m: Khasi Hills, *Griffith* 3377 (G).

So far as known, the only specimen cited in any treatment of this species is *Griffith* 3377.<sup>8</sup> The original description makes no mention of the habit, but the most recent treatment describes it as a small tree. The above description is based in part on these earlier publications. The species is apparently rare. Airy-Shaw (in Curtis's *Bot. Mag.* 160: *pl.* 9501. 1937) has suggested that *D. indicum* Benth. and *D. myricoides* Hemsl. from China may be the same, but in view of the scarcity of material from India, it seems inadvisable to combine them at this time. Comparison of available material shows the Indian species to have somewhat larger leaves with the lateral nerves more prominent beneath. The brown lower leaf surfaces of *D. indicum* resemble those in the Hongkong specimens of *D. racemosum*.

<sup>8</sup>D. Brandis, *Indian Trees*. 301. 1906, and U. N. and P. C. Kanjilal and A. Das, *Flora of Assam* 2: 236. 1938, are the only known references, besides the original description. In the *Flora of Assam* this specimen is erroneously referred to as 3397. A photograph at the New York Botanical Garden of the type at Kew has been examined.



9. *Distylium stellare* O. Kuntze, Rev. Gen. Pl. 1: 233. 1891. — Originally described from Java without mention of specimens, but the type identified through subsequent treatments<sup>9</sup> as *O. Kuntze 5751*, in the New York Botanical Garden. Examined.

A tall tree up to 13 m. high, the branchlets grayish to brownish, lenticellate, stellate-pubescent when young, glabrescent. Leaves with stellate-pubescent petiole up to 1 cm. long, the blade ovate to elliptic- or oblong-ovate, sometimes slightly obovate, obtuse or acute and more or less acuminate at apex, acute to obtuse at base, 4 to 8 cm. long, 2.5 to 4 cm. wide (3 to 17 cm. long, 1.5 to 6.5 cm. wide, according to J. J. Smith), entire,<sup>10</sup> glabrous and shining above, stellate-lepidote or puberulent beneath when young, glabrescent, the midrib slightly impressed above, raised beneath, the lateral nerves 5 or 6 pairs, raised beneath. Flowers in spikes, the staminate inflorescences 0.4 to 0.5 cm. long, the pistillate 0.8 to 1.9 cm. long (according to J. J. Smith), the fruiting up to 2 cm. long, bearing 1 to 4 fruits, the bracts ovate-oblong, about 3 mm. long, the sepals lanceolate, about 2 mm. long, stellate-pubescent. Stamens 3 to 5 (according to J. J. Smith), the anthers cordate-ovate, obtuse, about 2 mm. long, the filaments rather long. Capsules apparently sessile, ovoid to subglobose, 1 to 1.5 cm. long, little split parallel to wall between cells of ovary, the valves apiculate, the surface densely rather dark stellate-pubescent.

DISTRIBUTION: Java, alt. 1000 to about 2500 m., Sumatra? (see Backer in Brittonia 3: 79. 1938), and Malay Peninsula.

JAVA: Preanger, *Koorders 1807*  $\beta$  (A); *C. G. G. J. van Steenis 12231* (A); Preanger, Mt. Patoeha, *C. G. G. J. van Steenis* (Herb. Hort. Bot. Bog. 6984) (A); Besoeki, *C. G. G. J. van Steenis 10817* (A); Kedoe, *Koorders 27640*  $\beta$  (A); Dienggebirge, *Kuntze 5751* (Y); Wonosobo, C. Java, *Netherlands Indies Forest Service* (Herb. Hort. Bot. Bog. 2555) (A); Bandoeng, Tjipadaroeöem, W. Java, *Netherlands Indies Forest Service* (Herb. Hort. Bot. Bog. 3977) (A). MALAY PENINSULA: Pahang: Cameron's Highlands, about 1600 m. alt., *M. R. Henderson* (Singapore Field no. 23567) (A).

10. *Distylium Tsiangii* Chun in herb., ex Walker, sp. nov. FIG. 2.

Arbor 7 m. alta, ramulis junioribus valde stellato-pubescentibus glabrescentibus. Foliorum petiolus dense stellato-pubescent 1–1.5 cm. longus; lamina elliptico- vel oblongo-lanceolata ad ovata, apice acuta vel acuminate, basi late acuta, 11–15 cm. longa, 4–5 cm. lata, integra vel apicem versus paucidentata, supra nitida viridis, subtus pallidior ("deep lustrous green above, light green below" — ex Y. Tsiang) et valde stellato-pubescent, praesertim in costa et nervis lateralibus, his circa 7-jugis, supra impressis subtus valde elevatis, capillis aliquis fere atris, nervulis elevato-reticulatis. Flores ignoti. Inflorescentiae fructiferae racemosae valde pubescentes ad 3 cm. longae, capsulis ovoideis circa 1.2 cm. longis, valde stellato-pubescentibus, cinereis ("light gray" — ex Y. Tsiang). [Description by Walker]

CHINA: Kweichow: Waichai, Tuhshan, near the Kwangsi border, in a densely wooded ravine, *Y. Tsiang 6692*, Aug. 25, 1930 (A — TYPE, W, Y).

<sup>9</sup>An important subsequent description is by J. J. Smith in Meded. Dept. Landb. [Nederl.-India] 18: 81. 1914 (S. H. Koorders & T. Valetton, Bijdr. Boomsorten Java 13: 80. 1914). Further references occur in or may be found through the following: Versl. Med. Akad. (Amsterdam) 18<sup>1</sup>: 359–361. 1909; H. Hallier in Meded. Rijks Herb. Leiden 37: 15. 1918; C. A. Backer in Brittonia 3: 79. 1938.

<sup>10</sup>J. J. Smith describes the leaves on young trees as laxly dentate, and O. Kuntze says "ad apicem versus repando paucidentata."



Y. Tsiang's nos. 7019 and 6692 were distributed as "*Distylium Tsiangii* Chun sp. nov." In 1932 W. C. Cheng (in Contr. Biol. Lab. Sci. Soc. China 8: 142) referred the first of these numbers to *D. Chungii* (Metc.) Cheng, when transferring that species from *Sycopsis*, and mentioned in his notes that Prof. Chun had named it "*D. Tsiangii*" but that the name had not been published. As I have found no subsequent publication of this species, but believe that it may have appeared in print and not become available in this country because of the war, it seems advisable to use Chun's name.



FIG. 2. *Distylium Tsiangii*, drawn from the type,  $\times \frac{1}{2}$ .

Using this name will thus minimize the adjustment, if it should subsequently appear that this name has already been published. It would be preferable to choose as the type the same collection selected by Chun, no. 7019, of which a duplicate is at the New York Botanical Garden. However, that specimen is in safe storage for the duration of the war and only *Tsiang* 6692 is available for study.

11. *Distylium pingpienense* (Hu) Walker, comb. nov. FIG. 3, a.

*Sycopsis pingpienensis* Hu in Bull. Fan Mem. Inst. Biol. Bot. 10: 149. 1940.—Type, H. T. Tsai 62201, from Yunnan, at the Fan Memorial Institute of Biology, Peking. Duplicate examined.



A shrub 3 m. high, the branchlets very slender, stellate-pubescent when young, glabrescent. Leaves with densely stellate-pubescent or hirsute petiole about 8 mm. long, the blades ovate to elliptic-ovate or lanceolate, long-acuminate at apex, obtuse to subrounded and more or less asymmetric at base, entire, glabrous and shining above, glabrous or stellate-pubescent beneath especially on the prominently raised midrib and the 5 to 8 raised lateral nerves, these inconspicuous and slightly impressed above. Flowers unknown. Fruiting inflorescences racemose, up to 2 cm. long, the capsules immature, ovoid, densely pubescent with yellowish-brown stellate hairs.

CHINA: Yunnan: Pingpien Hsien, *H. T. Tsai* 62201 (A).

11a. *Distylium pingpienense* var. *serratum* Walker, var. nov. FIG. 3, b.

E forma typica foliis serratis, dentibus utrinque 1-4 tenuiter apiculatis supra medio nonnihil remotis, nervis lateralibus curvato-anastomosantibus vel in dentibus terminantibus, capsulis atro-fuscis differt.

CHINA: Hupeh: Patung Hsien, *Ho-ch'eng Chow* 706 (A — TYPE, Y).

This variety is proposed in order to focus attention on the distinctive serration with apiculate teeth, in the hope that collectors will obtain more material by which the true value of this character may be determined. In

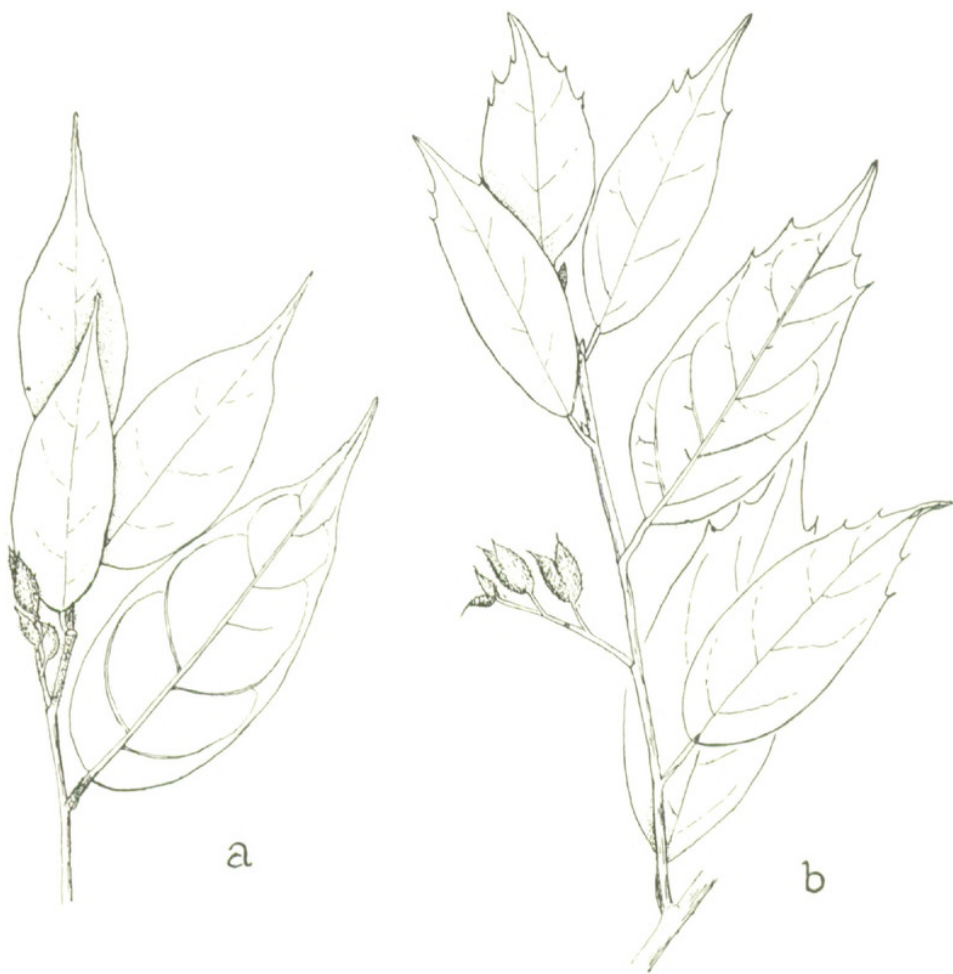


FIG. 3. *Distylium pingpienense*,  $\times \frac{1}{2}$ : a. drawn from an isotype of the species (A); b. var. *serratum*, drawn from the type.



related species of which abundant material is available, leaf serration is merely a variation without recognizable taxonomic significance. The great distance between the type localities of the species and its variety should also be considered. The difference in pubescence of fruits may prove to be inconstant.

12. *Distylium Chungii* (Metc.) Cheng in Contr. Biol. Lab. Sci. Soc. China Bot. Ser. 8: 140. 1932. — Based on *Sycopsis Chungii* Metc.

*Sycopsis Chungii* Metc. in Lingnan Sci. Jour. 10: 414. *pl.* 59. 1931. — Type, *H. H. Chung* 2095, from Pehling Inn, Fukien, in the Amoy University herbarium. Duplicate examined.

A forest tree up to 20 m. high, the branches grayish, densely stellate-pubescent when young, glabrescent. Leaves with densely stellate-pubescent petiole 1 cm. long, the blade elliptic- to oblong-ovate, subrounded to obtuse with acuminate or merely callose apiculate tip, obtuse to rounded at base, 5 to 9 cm. long, 2.5 to 4 cm. wide, entire or with 1 to 3 obscure callose teeth on each side above the middle, shining and glabrous above except on the impressed midrib, stellate-pubescent beneath especially on the prominent midrib, the lateral nerves 5 or 6 pairs, usually impressed above, raised beneath. Flowers unknown but reported to be "red" (according to *H. H. Chung*). Fruiting inflorescences racemose, scarcely 2 cm. long, densely stellate-lepidote or puberulent, the capsules ovoid, about 1.2 cm. long, densely stellate-lepidote or puberulent.

CHINA: Fukien: Pehling, Minhow Hsien, *H. H. Chung* 2095 (A — isotype); Foochow, *H. H. Chung* 8190 (A, Y); Kuliang, *F. P. Metcalf & T. C. Chang* 248 (A), *J. B. Norton* 1568 (W); Hinghwa Hsien, *H. H. Chung* (Herb. Amoy Univ. 1012) (A).

An excellent drawing of this species is given in *H. H. Hu and W. Y. Chun*, *Ik. Pl. Sin.* 3: 43. *pl.* 143. 1933, but with the name "*Sycopsis Chingii* Metc.," which is apparently a typographical error.

#### SPECIES INSUFFICIENTLY KNOWN

1. *Distylium formosanum* Kanehira, *Anat. Char. & Ident. Formos. Woods.* 106. 1921, *Formos. Trees* ed. 2. 253. 1936.

The original description of this species dealt almost entirely with anatomical structures of the wood and cited a wood specimen only. The morphological characters were described in 1936 with reference to the original anatomical description but without mention of herbarium specimens. Thus the wood specimen must stand as the technical type. Kanehira's description of the wood anatomy of this new species from Formosa has been compared with his description of the wood anatomy of *D. racemosum* Sieb. & Zucc. in Japan. Mr. W. N. Watkins of the Section of Wood Technology, U. S. National Museum, has examined a specimen in the Museum's collection of wood samples originally received from Yale University as *D. racemosum* Sieb. & Zucc. and labeled as "authenticated" (without further explanation of the meaning of this term). We are strongly inclined to the belief that *D. racemosum* and *D. formosanum* can not be differentiated on the basis of wood anatomy alone. H. K. Airy-Shaw (in *Curtis's Bot. Mag.* 160: *pl.* 9501. 1937) suspected that Kanehira's 1936 description was inaccurate, because of the comparison of *D. formosanum*, an endemic tree,



with *D. chinense* (Franch.) Diels, a shrub of the mainland, rather than with *D. racemosum* Sieb. & Zucc., a tree occurring in Japan, southern Formosa, and Hongkong. Comparison of Kanehira's description of *D. formosanum* with the characters here given for *D. racemosum* shows significant leaf differences as follows:

*D. formosanum*: Leaves oblong, acuminate, stellate-lepidote, 10 cm. long, the upper part obscurely crenate.

*D. racemosum*: Leaves ovate, obtuse or acute, glabrous, 5 to 8.5 cm. long, entire except one uncertain specimen from the Liu Kiu Islands with smaller leaves.

The original publication states that this is a tree of primary forests at medium altitudes, abundant in Sintiku and Arisan. Until significant material from Formosa has been examined, this species must remain in doubt.

2. *Distylium velutinum* Hu in Bull. Fan. Mem. Inst. Biol. Bot. 10: 148. 1940. — Type, *H. T. Tsai* 62636, from Tsing Pien Hsien, Yunnan, China, collected July 14, 1934; *T. T. Yü* 3659 and 3205 from La Po Hsien, southwestern Szechwan, are also cited.

None of the originally cited specimens and little material of this genus from Yunnan and Szechwan have been available for this study. This shrub, about 3 meters high, seems, according to the original description, to be especially distinct in the stellate-velutinous and stellate-lepidote under surfaces of the leaves, these also bearing coarser black stellate hairs on the veinlets. They are also described as 3-veined at the base and sometimes remotely setose-denticulate along the margins. It is compared with "*D. Chingii* Chun," which differs in having larger leaves, but I am unable to find any publication of this name. Concerning the fruits Hu says: "exocarpium lepidotum, endocarpium superne ad stylum persistentem, dense longe albo-villosum." In no other species of *Distylium* has any indument been noted on the endocarp. It is possible that the enlarged receptacle tube of a species of *Sycopsis* has been mistaken for the exocarp, and that the enclosed fruit, which is always pilose or villose in *Sycopsis*, has been mistaken for the "endocarpium." But until representative material can be examined this species must remain in doubt.

3. *Distylium lanceolatum* Chun ex W. C. Cheng in Contr. Biol. Lab. Sci. Soc. China Bot. Ser. 10: 124. 1936. Based on *R. C. Ching* 5512, from Kwangsi.

In his discussion of *D. strictum* Hemsl. (now *D. buxifolium* (Hance) Merr.), W. C. Cheng inadvertently effected publication of Chun's name, which until then was apparently unpublished. His remarks are as follows: "The closely related species, *D. lanceolatum* Chun (*R. C. Ching* no. 5512 from Kwangsi), which differs from the present species by its lanceolate leaves dull brown on the lower surface when dry, not callose-apiculate at apex, and by its somewhat obovate capsules with light brown stellate hairs, is probably not yet published." Although there is a specimen of *Ching* 5512 in the New York Botanical Garden, distributed under this name and designated as "cotype," it is unfortunately in safe storage for the duration of the war and is not available for this study. The brown lower surface of the leaves is apparently another occurrence of this as yet uninterpreted



character mentioned in the discussion of *D. indicum* Benth. and *D. racemosum* Sieb. & Zucc.

#### EXCLUDED SPECIES

In 1937 H. K. Airy-Shaw mentioned in his treatment of *Distylium racemosum* Sieb. & Zucc. (Curtis's Bot. Mag. 160: *pl.* 9501. 1937) the existence of an unidentified New World species of this genus in the G. B. Hinton collections from Mexico. His associate, N. Y. Sandwith, has kindly reported that the Hinton collections are nos. 3090 (fls.) and 6163 (frts.). Duplicates of these in the U. S. National Herbarium have been compared with the type of *Matudaea trinervia* Lundell, *E. Matuda* S-194 (Mi) and found to be the same. This New World genus has been described as similar to *Distylium* and may be considered as in the Distylieae.

#### SYCOPSIS

*Sycopsis* Oliv. in Trans. Linn. Soc. 23: 83. *pl.* 8. 1860. — Based on the single species *S. Griffithiana* Oliv., from Assam, India.

Flowers unisexual and monoecious or andromonoecious in separate or the same axillary headlike spikes or racemes, these bracteate, the lower bracts in some species broad, imbricate, involucre-like enclosing the unopened flowers, the bracts below individual opened flowers 2 or more, sometimes on sides of urceolate receptacle. Sepals 1 to 5, irregular, small, resembling the bracts, on upper edge of receptacle. Petals none. Staminate flowers in short compact spikes or glomerules, the pistils wanting or very rudimentary, the stamens 7 to 10 on edge of a more or less enlarged globose to urceolate receptacle, the filaments of varying lengths, the anthers basally attached, 2-celled, ellipsoid, dehiscent by widely spreading longitudinal slits, the connective often protruding as a point. Pistillate or perfect flowers with bicarpellary, 2-celled, setose-pilose, free ovary surrounded by the globose to urceolate, lepidote receptacle-tube bearing 1 to 5 sepals and 1 to 10 reduced or mature stamens and closely investing the 2 free, elongate, diverging, slender, glabrous styles, the stigmatic surfaces elongate, papillose on inner sides of styles; ovules solitary in each cell, pendant. Fruits subglobose, woody, 2- or 4-valved, setose-pilose capsules, splitting longitudinally, first perpendicular to the common partition between the two carpels, thus permitting the two seeds to escape, later the 2-pointed apex of each valve more or less splitting, the carpellary walls separating into two layers, the inner (endocarp) ligneous and somewhat thicker than the outer, the 2 seeds ovate-oblong, shining, brown or whitish with impressed whitish hilum. Leaves simple, alternate, coriaceous, evergreen, petiolate, glabrous, lepidote or velutinous, entire or with a few rather remote teeth above the middle, the lateral nerves usually curved anastomosing (except in *S. laurifolia*), the petiole usually lepidote, the stipules small, lanceolate, caducous.

Spring-flowering evergreen trees or shrubs, usually in forests or woods, extending from New Guinea through the higher mountains in the Philippine Islands and central and southern China to Assam, India. At the Arnold Arboretum is a single sterile specimen, *Mrs. H. Greenway* 30, from Langbian Peak, Dalat, Annam, Indo-China, referable to this genus but insufficient for further identification.



## KEY TO SPECIES

Flowers in heads or headlike spikes, in bud enclosed by dark brown imbricate involucre bracts.

Leaves glabrous or stellate-pubescent beneath when young; leaf bases cuneate; blades 4 to 8 cm. long, entire; India.....1. *S. Griffithiana*.

Leaves glabrous or lepidote beneath when young; leaf bases obtuse to rounded; blades 5 to 13 cm. long, entire or toothed above the middle; China...2. *S. sinensis*.

Flowers in spikes or racemes, not glomerate, not enclosed in bud by dark brown involucre bracts.

Leaves closely and densely tomentose beneath; lateral nerves not curved-anastomosing.....3. *S. laurifolia*.

Leaves glabrous beneath; lateral nerves curved-anastomosing.

Blades of leaves ovate.

Apex of leaves acute or acuminate; petiole 1 to 1.5 cm. long.....4. *S. Dunnii*.

Apex of leaves broadly obtuse or rounded; petiole 5 mm. long or less.....

.....5. *S. Tutcheri*.

Blades of leaves narrowly or linear-lanceolate.....6. *S. salicifolia*.

1. *Sycopsis Griffithiana* Oliv. in Trans. Linn. Soc. 23: 83. *pl.* 8. 1860; Brandis, Indian Trees. 301. 1906. Originally described from Khasi Hills, Assam, India, without mention of specimens, the type in all probability being *Griffith* 3375 at Kew (see discussion below).

A branching shrub or small tree, the branchlets minutely puberulent or lepidote when young, glabrescent. Leaves with channeled glabrous or lepidote petiole up to 7 mm. long, the blade elliptic-ovate, generally slender acuminate at apex, cuneate at base, 4 to 8 cm. long, 2 to 3 cm. wide, entire, glabrous (stellate-pubescent when young—according to Clarke), the midrib and about 8 pairs of lateral nerves slightly impressed above, raised beneath, curved-anastomosing. Flowers in subglomerate, stellate-pubescent heads or headlike spikes, bracteate at base, the lower portion of the calyx tube adnate to the ovary, the free portion pubescent within (according to Brandis). Stamens up to “8 (of which number several appear abortive)” (according to Hooker). Capsules globose or ovoid, about 1.5 cm. long, with ruptured lepidote receptacle tube at base.

INDIA: Assam: *Griffith* 3375 (G — isotype).

*Henry* 11464, from Yunnan, has been referred by A. Rehder and E. H. Wilson (in Sarg. Pl. Wils. 1: 431. 1913) to this species, but this collection has not been examined in the course of this study.

In the discussion following the original description Oliver says: “The foregoing description . . . rests upon specimens met with in the course of arrangement of the late William Griffith’s herbarium. These, although very numerous, appear to be all of one gathering, and, unfortunately, are almost all a little too far advanced to enable me to furnish, from a sufficient number of female flowers, complete details of their earlier condition . . . It is not improbable that they may have been obtained by some of the collectors despatched . . . to the Khasia Hills.” Neither the original description nor Hooker’s *Flora of British India* mentions any collector’s number for Griffith’s specimen, but a specimen in the Gray Herbarium bears the data “Herbarium of the late East India Company, no. 3375. East Bengal. Herb. Griffith. Distributed at the Royal Gardens, Kew, 1863–4.” The specimen conforms with the original description and excellent drawing. Its



distribution from Kew in 1863-4, subsequent to the publication in 1860 of this species, suggests its having been numbered, and possibly geographically labeled, subsequent to its study by Oliver. The failure to include the collector's or herbarium number in the Flora of British India 2: 427. 1878 is unfortunate, for it could probably have been easily supplied. As no other collections of this species are mentioned in the literature examined, it may be assumed that the Gray Herbarium specimen of *Griffith* 3375 is an isotype. The type is doubtless at Kew.

2. *Sycopsis sinensis* Oliv. in Hook. Ic. Pl. 20: pl. 1931. 1890, 29: pl. 2834. 1907. — Based on *Henry* 6019, 7574, 7574b, and 7825, from Yunnan, in the Kew herbarium. Duplicates of the first two syntypes have been examined.

*Sycopsis sinensis* var. *integrifolia* Diels in Bot. Jahrb. 29: 381. 1900. — Type, *von Rosthorn* 2261, from Szechwan, in the Berlin herbarium. Photograph and fragment examined.

A tree up to 14 m. high with trunk diameter up to 45 cm., the bark brown or gray, smooth, longitudinally fissured, the branchlets grayish, stellate-lepidote, glabrescent. Leaves with densely stellate-lepidote petioles 1 to 1.5 cm. long, the blades elliptic-ovate to slightly obovate, sometimes lanceolate, acuminate at apex, obtuse to rounded at base, 5 to 13 cm. long, 2.5 to 5 cm. wide, entire or with 1 to 5 callose teeth above the middle, glabrous, more or less lepidote beneath, paler and glaucous beneath when fresh, the lateral nerves about 6 pairs, more or less impressed above, somewhat raised beneath, curved-anastomosing. Flowers in short peduncled subglomerate heads or headlike spikes, enclosed in bud by broad ferruginous, pubescent, imbricate, involucre bracts, in fruit reaching 2 cm. long, the sepals about 3, ovate, about 1 mm. long, hairy on outside. Stamens 10, the anthers red, apiculate, slightly curved, the filaments glabrous, up to 1.5 cm. long in staminate flowers. Capsules globose, about 8 mm. long, with ruptured receptacle tube around base.

DISTRIBUTION: China. In thickets, woods, and deep forests.

CHINA: Szechwan: Ping Shan Hsien, *F. T. Wang* 22815 (A); Kweichow: Yinking, *Y. Tsiang* 7658, 7667, 7685, 7687, 7910 (Y); Hupeh: Chang Yang Hsien, *E. H. Wilson* (Arnold Arb. Exp.) 2586 (A, G, W); Patung Hsien, *Ho-ch'eng Chow* 855 (A, Y); Siu Yueh Sie (Sin Yeh Su?), *W. Y. Chun* (Herb. Univ. Nanking 4068) (A), *W. Y. Chun* 3726 (A); S. Wushan, *E. H. Wilson* (Veitch Exp.) 1825 (A, W, Y); no specific locality, *A. Henry* 6019 (G, W, Y), 7574 (A, G, W, Y), *E. H. Wilson* (Veitch Exp.) 727 (W, Y); Hunan: Hang Shan, *C. S. Fan & Y. Y. Li* 404 (A); southern Anhwei: Western Wu Yuan, *R. C. Ching* 3250 (A); Kiangsi: Woo Kung Shan, An Fu, *H. H. Hu* 702 (A); Kunnan Hsien, Sai Hang Cheung, near Tung Lei village, *S. K. Lau* 4059 (A, W), 4329 (A, W); Hwangdschou-ling, between Dingdschou and Ningdu, Kiangsi-Fukien border, *Handel-Mazzetti* 378 (A); southern Chekiang: King Yuan region, *R. C. Ching* 2387 (A, G, W, Y).

3. *Sycopsis laurifolia* Hemsl. in Hook. Ic. Pl. 29: sub pl. 2836 (p. 2). 1907; K. Y. Tong, Stud. Hamamel. 37. 1926. — Type, *Henry* 11365,<sup>11</sup> from Mengtze, Yunnan, in the Kew herbarium. Duplicate examined. FIG. 4.

A shrub 3 m. high or a tree up to 15 m., the branchlets grayish, abundantly lenticellate, lepidote when young. Leaves with densely puberulent or lepidote petioles 1 to 1.8 cm. long, the blades elliptic-ovate, acute or

<sup>11</sup>The type was cited as 14365, but this is apparently a misprint for 11365, as noted in Sarg. Pl. Wils. 1: 431. 1913, and as seen from a photograph at the New York Botanical Garden of the type at Kew.





FIG. 4. *Sycopsis laurifolia*, drawn from an isotype (A),  $\times \frac{1}{2}$ .

acuminate at apex, acute to obtuse at base, 6 to 10 cm. long, 2.5 to 4.5 cm. wide, entire, glabrous above, much paler and finely and densely velutinous beneath, the lateral nerves 4 or 5 pairs conspicuous beneath, the lower pair sometimes longer and more acutely diverging from the midrib than the others, none prominently anastomosing, connected by rather conspicuous scalariform tertiary nerves. Flowers in spikes or racemes not distinctly subglomerate and enclosed in involucre bracts in bud, reaching 2 cm. long in fruit, the bracts 2 to 4 at base or on receptacle tube, hairy, the sepals 0 to 2, hairy. Stamens up to about 6, about 4 mm. long, the anthers apiculate, the filaments variable in length. Capsule globose, more or less pointed, about 1 cm. long, entirely enclosed in the brownish lepidote receptacle tube (always?).

CHINA: Yunnan: Mengtze, A. Henry 11365 (A — isotype), 11365 A (A, W, Y); Ping Pien Hsien, H. T. Tsai 62636 (A).

This species is readily recognized by its velutinous lower leaf surfaces and nerves ending at the margin, not curved-anastomosing.

4. *Sycopsis Dunnii* Hemsl. in Hook. Ic. Pl. 29: pl. 2836. 1907. — Type, S. T. Dunn (Herb. Hongkong 2695), from Fukien, in the Kew herbarium (see discussion below). Photograph and rubbing examined.

*Sycopsis philippinensis* Hemsl. in loc. cit. (p. 2). — Type, Loher 4881, from Baguio, Luzon, Philippine Islands, in the Kew herbarium. Duplicate examined.

*Croton curviflorus* Elmer, Leaf. Philip. Bot. 1: 310. 1908. — Type, A. D. E. Elmer 8651, from Baguio, Luzon, Philippine Islands, in the Manila herbarium. Duplicate examined.



A shrub or tree up to 10 m. high,<sup>12</sup> the branchlets grayish or brownish, glabrous or scattered lepidote when young. Leaves petiolate, the petiole 1 to 1.5 cm. long, at least the lower part densely lepidote with large scales, the upper part in most eastern continental specimens more slender and narrowly margined and not lepidote, the blades elliptic-ovate, acute to acuminate at apex, subrounded, obtuse, acute or acuminate and somewhat narrowly decurrent at base, 5 to 10 cm. long, 2 to 5 cm. wide, entire, glabrous or stellate-lepidote on both surfaces when young, the midrib and 6 or 7 pairs of lateral nerves impressed above, raised beneath, curved-anastomosing. Flowers in lepidote, few-flowered short spikes or racemes reaching 2.5 cm. long in fruit, especially short in all staminate inflorescences but not covered with involucre bracts in bud, the bracts at base or on the receptacle tube, ovate, the sepals about 6, oblong-ovate or ovate, about 1.5 mm. long, glabrous or hairy. Stamens up to 10, the anthers about 2 mm. long, apiculate, the pollen brown, the filaments 2 to 5 mm. long, rather slender. Capsules 1 or 2 in each inflorescence, subglobose, about 1 cm. long, with ruptured receptacle tube surrounding about the lower half. Seeds brown or whitish.

DISTRIBUTION: From Yunnan and Fukien in China to the Philippine Islands, Celebes, and New Guinea. Woods, forests and grassy slopes.

CHINA: Southern Yunnan: Banks of Nam Ha, between Muang Hai and Keng Hung, *J. F. Rock* 2466 (A, W); Kwangsi: Hung Hsien, Ta Tze Shan, *A. N. Steward & H. C. Cheo* 827 (A, Y); Yui Hsien, Na Kan-Lin, *A. N. Steward & H. C. Cheo* 165, 170, 199 (A, Y); Shap Man Tai Shan, *W. T. Tsang* 22362 (A); Tong Shan, *W. T. Tsang* 22795 (A); Kwangtung: Kook Kiang Dist., Lung Tau Shan, *S. P. Ko* 50161, 50209 (Y); Hongkong, New Territories, Tai Mo Shan, *W. T. Tsang* 21092 (A, Y); Fukien: Kutien, *H. H. Chung* 4008, 4009 (A); Yenping, *Kuang-han Chou* 8704 (A); no precise locality, *H. H. Chung* 7917 (A), *S. T. Dunn* (Herb. Hongkong 2696, 2697) (A). PHILIPPINE ISLANDS: Luzon: Benguet Subprov., Baguio, alt. 1500 m., *A. D. E. Elmer* 8651, 8688 (A, W), *C. Garcia* (For. Bur. 25506) (G, Mo), *A. Loher* 4881 (W), *J. K. Santos* 13 (A, Mo); Nueva Vizcaya Prov., Caraballo Mtn., *A. Loher* 13628 (A); Zambales Prov., Mt. Marayep, *Ramos & Edaño* (Bur. Sci. 44784) (A); Nueva Ecija Prov., Mt. Umingan, *Ramos & Edaño* (Bur. Sci. 26419) (A, W); Bataan Prov., Lamao Forest Reserve, *Curran* (For. Bur. 6246) (W, Y); Tayabas Prov., Mt. Camatis, *Alcasid & Edaño* (Philip. Nat. Herb. 4988) (A); Rizal Prov., Balabano, *A. Loher* 13081 (A); Mt. Susong-Dalaga, *Ramos & Edaño* (Bur. Sci. 29326) (W); no precise locality, *M. Ramos* 1999 (G, Mo, Y); Laguna Prov., Mt. Banajo, *Curran & Merritt* (For. Bur. 7923) (W); Batangas Prov., *C. Mabesa* (For. Bur. 28053) (A); Mindoro: Paluan, *M. Ramos* (Bur. Sci. 39604) (A, W); Palawan: Mt. Balogbag, 1200 m. alt., *G. Edaño* (Bur. Sci. 77801, For. Bur. 77805) (Y); Dinagat: *Ramos & Convocar* (Bur. Sci. 83922) (Y). CELEBES: "En Ond. Gowa, Lembaja, Beroe," 1600 m. alt., *Netherlands Indies Forest Service* (Herb. Hort. Bot. Bog. BB 20432, BB 20433) (A); "Sum. Atjeh en Ond. Gajo Loeëus Penosan (Gn. Geroepal)," about 2200 m. alt., *Netherlands Indies Forest Service* (Herb. Hort. Bot. Bog. BB 22366) (A); "en Ond. Masamba, Borschaft, Takalaki, Malili," 2200 m. alt., *Netherlands Indies Forest Service* (Herb. Hort. Bot. Bog. BB 23361) (A). BRITISH NEW GUINEA: Central Division, Vanapa Valley, probably at Ononge, *Father Dubuy* (without number) (A).

<sup>12</sup>Hemsley's description of *S. Dunnii* says "arbor 9-10 m. alta," but the specimens here cited, so far as data are available, indicate that this species is a shrub up to 5 m. high. Available duplicates of specimens studied by Hemsley bear no habit, habitat, or descriptive data. Elmer describes it as a "tree-like shrub or erect tree, 10 m. high with rather short numerous branched ascending branchlets."



Careful comparison of Chinese and Philippine specimens shows few differences, these appearing to be of less significance than the variations found within either supposedly distinct species. There are no good male flowers from the Philippines, and the fruiting inflorescences seem to have fewer fruits. The tendency of the leaf bases in most of the Chinese specimens to be cuneate and somewhat narrowly decurrent on the petiole above the lower densely lepidote part of the petiole is only slightly suggested in the Philippine material. Obtuse to subrounded leaf bases are fairly common in the Philippine material but rare in the Chinese material. However, *Rock 2466* has broadly obtuse and rounded leaf bases and larger leaves. Furthermore it is reported by the collector as a "tree 50 ft.," which is considerably larger than is noted for any of the remaining material from China or the Philippines. There are no significant differences in the original descriptions of the Philippine and Chinese species. There seems, therefore, little reason to maintain distinct species for the material from these two areas, or to consider the *Rock* specimen as representing a distinct species.

At the New York Botanical Garden is a photograph of a Kew specimen of this species bearing two labels, *Dunn* (Herb. Hongkong 533) and (same) no. 2695. The specimen on this sheet is large and ample, but so far as can be determined there are no stamens in the flowers. There is a pocket labeled 533. As the original description cites only "533, 2695," and as the 533 part of the Kew specimen is apparently a fragment, *Dunn* (Herb. Hongkong 2695) at Kew should be considered the type. The original citation of this species describes and illustrates the apparently non-functioning stamens from an otherwise pistillate plant. There is another photograph in the New York Botanical Garden of a Kew specimen labeled at the top "Hongkong herb. nos. 2697 = 1340," to which is attached a drawing in pencil bearing a pocket stating it to contain a "stamen taken from specimen, W. B. H. 1907," the drawing labeled "Ic. Pl. 2836. Sycopsis 2696 & 737. Returned to Hongkong." Comparison of this drawing with that of the plate published with the original description reveals strong evidence that it is the original rough draft. Thus the original description and illustration in respect to abortive stamens were based on the Hongkong specimen of 2696, which was not cited with the original description. However, all these specimens seem to represent the same species.

In discussing and citing additional specimens of *S. Dunnii* Hemsl., W. Y. Chun (in *Sunyatsenia* 1: 245. 1934) mentions the aberrant characters of *S. P. Ko 51428* from Kwangtung, and suggests it might prove to be new. It has "small spatulate-obovate leaves abruptly attenuate to a long petiole, and very small capsules." This collection has not been seen.

5. *Sycopsis Tutcheri* Hemsl. in Hook. Ic. Pl. 29: pl. 2834. 1907. — Type, *W. J. Tutchet* (Herb. Hongkong 1340), from Hongkong, in the Kew herbarium. Duplicates examined.

A shrub about 2 m. high in Hongkong, a tree up to 12 m. in Hainan, the branches dense, dark gray, glabrous, scattered lepidote when young. Leaves with densely lepidote petioles up to 5 mm. long, the blade elliptic-ovate or slightly obovate, broadly obtuse to rounded at apex, acute to obtuse at





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