August 6, 1948

To the Committee on Graduate Study:

I am submitting to you a thesis written by Ching-Yung Cheng entitled "Studies in the Families, Magnoliaceae, Illiciaceae and Schisandraceae of Szech'uan, China". I recommend that it be accepted for ten quarter-hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Botany.

Aaron J. Sharp
Major Professor

We have read this thesis
and recommend its acceptance:

Arthur Meyer

J. K. Underwood

Accepted for the Committee

R. A. Waters
Dean of the Graduate School

STUDIES IN THE FAMILIES, MAGNOLIACEAE, ILLICIACEAE AND SCHISANDRACEAE OF SZECH'UAN, CHINA

A THESIS

Submitted to
The Committee on Graduate Study
of
The University of Tennessee
in
Partial Fulfillment of the Requirements
for the degree of
Master of Science

---

by

Ching-Yung Cheng

August 1948

ACKNOWLEDGEMENTS

The author takes this opportunity to extend her sincere thanks to Professor A. J. Sharp at the Botany Department, University of Tennessee, under whose supervision this work has been done, and to Dr. E. H. Walker at the U. S. National Herbarium, Smithsonian Institution, for his valuable direction and advice especially in regard to the botanical literature of Asia. She is also under the obligation to Mr. E. P. Killip, head curator of the U. S. National Herbarium for granting the facility of the Herbarium. For specimens on loan from Arnold Arboretum of Harvard University, Botanic Museum of University Oslo, Norway, Fan Memorial Institute of Biology, China, and Herbarium of Szech'uan University, China, the author is also indebted to the authorities in those institutions.

TABLE OF CONTENTS

STUDIES IN THE FAMILIES, MAGNOLIACEAE, ILLICIACEAE AND SCHISANDRACEAE OF SZECH'UAN, CHINA

INTRODUCTION

1. Object of this study

Since the family Magnoliaceae was first described by J. H. Jaume St. Hilaire, its limit has been discussed and treated in various ways by different authors. The tendency of the treatments, however, is always to separate the remotely related groups and break this heterogenous family into more homogenous and well defined ones. According to Bentham & Hooker (3), Magnoliaceae includes three subfamilies, namely Magnolieae, Wintereae and Schisandreae. This treatment was followed by most authors until 1926, when Hutchinson (15) broke these into three separate families: Magnoliaceae, Winteraceae and Schisandraceae. Recently, A. C. Smith (22) separated Illicium from Winteraceae, and suggested a fourth family, Illiciaceae.

This work following the current systematic treatment, is the studies in Magnoliaceae, Illiciaceae and Schisandraceae of Szech'uan Province, China, based upon materials available in the U. S. National Herbarium (NH), Arnold Arboretum of Harvard University (AA), Botanic Museum of University Oslo (MO), Herbarium of Fan Memorial Institute of Biology, Peiping, China (FM), and Herbarium of Szech'uan University, China (SU).

There are 32 species, 2 varieties and 2 forms in the 3 families included in this study, of which 1 species and 1 variety are described as new.

2. Geographical background and distribution

Szech'uan is a province in southwest China. It is situated at 101° 6' to 110° 2' Long. E., and 27° 7' to 34° Lat. N. The area of the province is 75,418 square miles (including the former "Western Szech'uan") with a density of population 581 per square mile. The Red Basin lies at the center of the province, and is bordered by mountains in all directions, especially at the northwest and the west. It is a region of mountains and rivers. High mountains from the west and the northwest extend to nearly everywhere in this province. The Upper Yangtze with four large tributaries give the province immense drainage. Altitudes vary from about 500 m. at the Red Basin, up to 4,000 m. at the high mountains in the west. The eastern part and the northern part, being the gates of communication, are famous for their rugged topography with dangerous paths and rivers. The climate in the province is essentially warm temperate, except for the northern and the northwestern parts which are temperate to cold temperate. The humidity is in general high. Annual rainfall varies from 900-1,100 mm. and is distributed either evenly throughout the whole year, or more in June, July and August, than the other months.

Agriculture is highly developed in this province. About 39% of the land is cultivated (4) of which over 90% lies in the Red Basin.

Land utilization is very intensive. Not only level lands but also high mountains are used for growing crops. Cressey (4, P.314) in his Geographic Foundations of China, stated:

> In no other section of China is such extensive use made of the hillsides, indeed, were it not so, cultivation could scarcely be carried on, for level land is largely wanting. Wherever water can be brought by irrigation canals or lifted by various devices, the hills have been laboriously terraced-often up to their summits.....and occasional terraced shelves may be seen on slopes which average 60°.

Owing to the highly developed agriculture, the natural vegetation in most part is destroyed. Virgin forests are found only at the western border where high mountains are unfavorable to agriculture and hence inhabitants few. It is in this part many novelties of botanical subjects have been found.

The former western border and the southwestern corner of this province now belong to the neighboring Sikang Province. Most specimens in the older collections from the so-called western Szech'uan are now actually in eastern Sikang. Plants from these localities are also included in this study.

The limits of the subregions used to indicate more exact distribution are approximately as follows:

Eastern Szech'uan - East to the Ts'u-kiang, south to Ta-hsien and Kai-hsien, north to Ch'ung-king. Important collecting localities are: Wan-hsien, Kai-hsien, Chung-hsien, and Ch'ung-king.

Northeastern Szech'uan - East to the upper Ts'u-kiang, north to Ta-hsien and Kai-hsien. Important localities: Ch'eng-kou-hsien.

Southeastern Szech'uan - East to Ch'ung-king and south to the

Yangtze River. Important localities: Nan-ch'uan-hsien.

Central Szech'uan - The Red Basin. Important localities: Ch'eng-tu.

Southwestern Szech'uan - West to the Minkiang, south to O-mei-hsien. Important localities: O-mei-hsien, O-pien-hsien, Wa-shan, P'ing-shan-hsien and Lei-po-hsien.

Southwestern Szech'uan (now southeastern Sikang) the southeastern corner of Sikang. Important localities: Hsi-ch'ang-hsien (Ning-yuan), Huei-li-hsien, Yen-yuan-hsien, Yen-pien-hsien, and Ta-Liang-shan.

Western Szech'uan - West to the Min-kiang, north to O-mei-hsien, south to Ch'eng-tu. Important localities: Hung-ya-hsien, and Ming-shan-hsien.

Western Szech'uan - (now eastern Sikang) - West to the Szech'uan border and east to Kanting (Ta-chien-lu). Important localities: Pao-hsing-hsien (Mupin), Tien-chuan-hsien, Ya-an-hsien (Ya-cheu), and Kang-ting.

Northwestern Szech'uan - West to the Upper Min-kiang, north to Cheng-tu. Important localities: Kuan-hsien, Wen-Ch'uan-hsien, Li-fan-hsien, Sung-pan-hsien, and Chiu-ting-shan.

North Szech'uan - East to the Upper Min-kiang, west to the Ts'u-kiang, and north to Ch'eng-tu. Important localities: P'ing-wu-hsien, Pei-ch'uan-hsien.

The distribution of these three families overlaps throughout the whole Province, being found at all altitudes from sea level to 4,000 m. The great concentration seems at the southern part, especially the

southwest. Only one evergreen magnolia, M. Delavayi, is present, and this is confined to the southwestern corner at Huei-li-hsien. The genus Kadsura occurs only in the southern part.

The localities, mentioned above and given under each species, may be found on a map of Szech'uan (figure 1). Older names, cited in earlier collections, are given in parentheses.

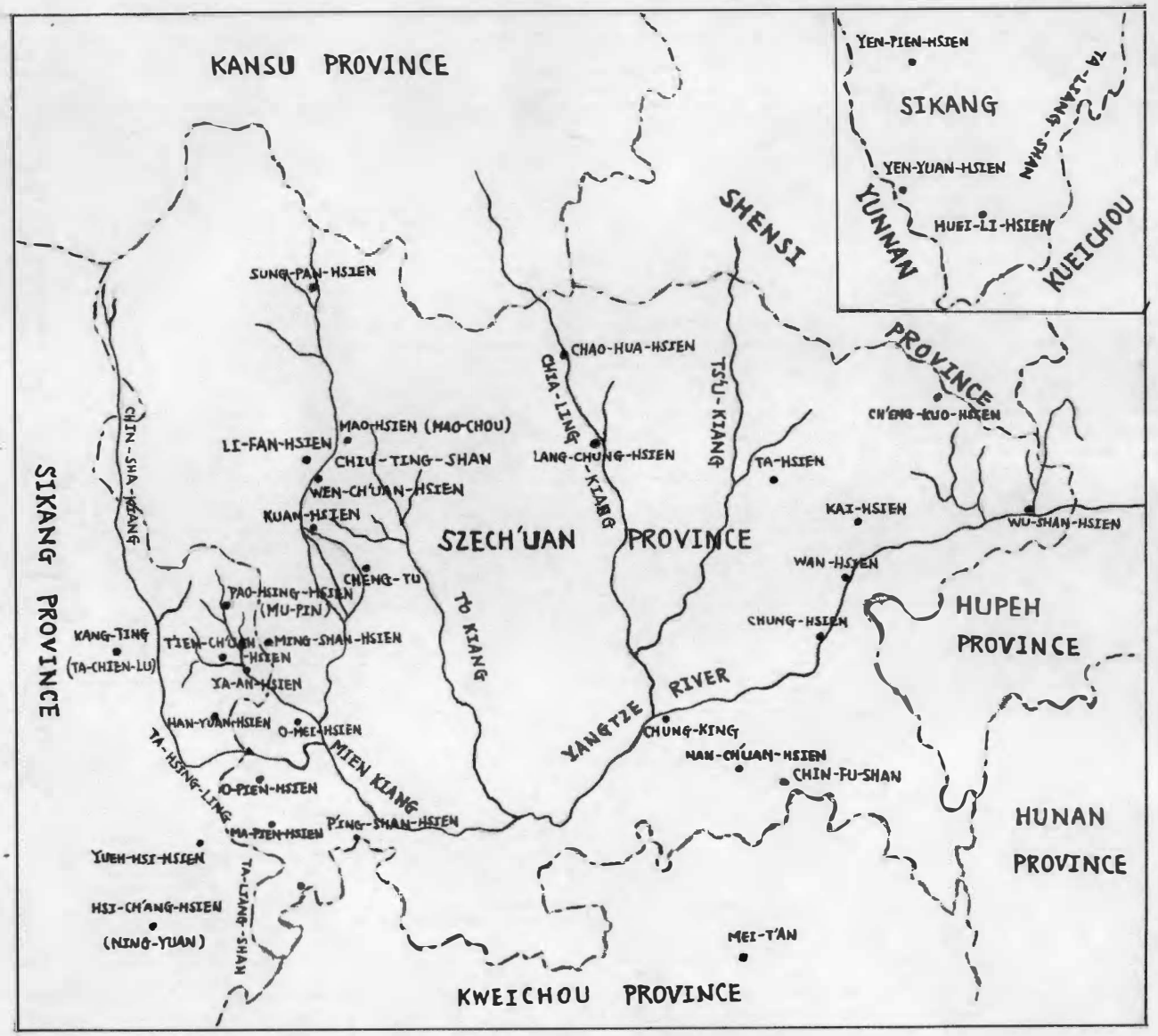

Figure 1. Map of Szech'uan

Key to the Families

A. Erect trees and shrubs; flowers perfect, very rarely unisexual (Kmeria), torus long, floral parts numerous and spirally arranged; mature carpels follicles or samaras.

B. Stipules present, large and characteristically pubescent; flowers often large and showy, fragrant, carpels numerous, over 20; mature ones arranged on an elongated torus, variously shaped..... Family Magnoliaceae

BB. Stipule absent; flowers often small, not over 2 cm. across, carpels few, 8-15, rarely up to 20; mature ones arranged radiately (star-like) on the short, non-elongated torus..... Family Illiciaceae

AA. Scandent shrubs; flowers unisexual, torus short, floral parts reduced in number; mature carpels not dehiscent, berry-like on elongated or very short torus.... Family Schisandraceae

FAMILY MAGNOLIACEAE

Erect trees or shrubs, often aromatic; leaves alternate or subalternate, simple, entire, rarely lobed; stipules large, distinct or fused, mostly with characteristic pubescence, adnate to or free from the petiole; flowers terminal or axillary, perfect and radiate, floral parts spirally arranged, perianth lobes differentiated or non-differentiated, 6–18, rarely more, torus elongated and fleshy, stamens attached at the lower portion of the torus, numerous, filaments usually short and stout, fleshy, gynoecium various-shaped, with numerous carpels compactly set on the terminal portion of the torus, ovary 1-celled, ovules 2-many, styles and stigmas usually not well marked off; fruits composed of variously-arranged and dehiscent follicles, rarely samaras; seeds two to several, anatropous.

Ten genera in two tribes, of which 5 occur in Szech'uan.

Key to the Genera

A. Leaves unlobed; mature carpels dehiscent..... Tribe Magnolieae

B. Flowers perfect, terminal or axillary; mature carpels dehiscent completely along the dorsal suture or both sutures.

C. Flowers terminal, often large and showy, gynoecium sessile or rarely shortly stalked; mature carpels more or less compactly arranged.

D. Ovules 2..... Genus Magnolia

DD. Ovules 4 or more..... Genus Manglietia

CC. Flowers axillary, gynoecium conspicuously stalked; mature carpels loosely arranged..... Genus Michelia

BB. Flowers unisexual; mature carpels completely dehiscent along the ventral suture, and dehiscent to the middle along the dorsal suture..... Genus Kmeria

AA. Leaves characteristically lobed; mature carpels indehiscent and samara-like..... Tribe Liriodendreae

Only one genus..... Genus Liriodendron

Tribe Magnolieae

Trees and shrubs; leaves evergreen or deciduous, never lobed; mature carpels dehiscent follicles. Four genera in Szech'uan.

Genus Magnolia L.

Trees or shrubs; leaves alternate, simple, entire, stipules one or two, adnate to petiole, variously textured; flowers terminal, solitary, large, showy and fragrant, floral parts spirally arranged, perianth lobes 6-18, differentiated or not differentiated, often brightly colored, stamens numerous, compactly attached on the lower portion of the torus, gynoecium variously shaped, carpels numerous, ovary 2-ovuled, style inconspicuously marked off; fruits variously shaped, mature carpels more or less compactly arranged on the elongated torus; seeds 2, or only one developed, red, suspended for a time from the carpels by a thin white thread. Nine species with 2 forms in Szech'uan.

Key to the Species

A. Leaves evergreen, ovate or elliptic-ovate, thick coriaceous; fruits oblong-ovoid, carpels not beaked..... 1. M. Delavayi Fr.

AA. Leaves deciduous, variously shaped and textured; fruits various

B. Flowers appearing with or after leaves; fruits often stout, mature carpels congested, nearly all developed

C. Leaves large, often over 22 cm. long, obovate or oblong-obovate

D. Fruit oblong, mature carpels woody, thick and strong, shortly beaked..... 2. M. officinalis R. & W.

DD. Fruit long cylindrical, spike-like, mature carpels coriaceous, thin and comparatively delicate, not beaked..... ..... 3. M. spicata n. sp.

CC. Leaves not large, often under 20 cm. long, variously shaped

E. Leaves narrowly oblong or narrowly elliptic-oblong, more than twice as long as broad

F. Leaves densely pubescent underneath; eastern Sikang..... ..... 4. M. Wilsonii R. & W.

FF. Leaves very sparingly, minutely pubescent, and more or less glaucous beneath.... 4a. M.W.f. taliensis (W.W.Sm.) Rehd.

FFF. Leaves glabrous, glaucous or subglaucous beneath; south-western Szech'uan.. 4b. M.W.f. Nicholsoniana (R.&W.) Rehd.

EE. Leaves broad-elliptic, elliptic-oblong to subrobicular, less than twice as long as broad... 5. M. sinensis (R.& W.) Stapf

BB. Flowers appearing before leaves; fruit usually slender, mature carpels loosely arranged, carpels partially developed

G. Perianth lobes not differentiated into sepals and petals

H. Leaves coriaceous, broadly obovate to obovate, rounded or obtuse at apex, pubescent or glabrous

I. Leaves thick-coriaceous, obovate, acute at apex, glabrous beneath..... 6. M. Dawsoniana R. & W.

II. Leaves coriaceous or subcoriaceous, broadly obovate, rarely narrowly obovate, sometimes emarginate at apex, often pubescent beneath..... 7. M. Sargentiana R. & W.

HH. Leaves thin, subchartaceous, narrowly obovate, acute-acuminate at apex, very sparingly pubescent or glabrescent to glabrous..... 8. M. Sprengeri Pampan.

GG. Perianth lobes differentiated into sepals and petals

J. Leaves elliptic-oblong or elliptic, stipular scar extending nearly the whole length of the petiole..... ..... 9. M. Biondii Pampan.

JJ. Leaves obovate-oblong or narrowly obovate, stipular scar never more than half the length of the petiole..... ..... 10. M. liliflora Desrouss.

1. Magnolia Delavayi Franchet in Pl. Delavay. 1:33, t. 9, 10. 1889.

Tree, young branchlets of the current year greenish-brown or greenish-purple, densely and very shortly yellowish-pubescent sometimes becoming less pubescent later, those more than one year old, brownish or purplish, glabrous; leaves evergreen, alternate, thick coriaceous, green and lustrous above, pale and more or less yellowish shortly pubescent beneath, ovate or elliptic-ovate, usually 15-20 cm. long, (12-22 cm.), 6-14 cm. broad, rounded rarely broadly acute at apex, rounded or broadly cuneate at base, margin entire, somewhat wavy, bordered by a peripheral continuous circular vein, midrib plane and narrowly central-grooved above, very prominent beneath, pubescent at first, essentially so near the base and along both sides later, petiole long and stout, 4-5.5 cm. long, 2.5-3.5 mm. in diameter, pubescent or glabrescent at length, stipular-scar extending throughout the whole

length; flowers (material from Yunnan) white or creamy-white, fragrant, 10-12 cm. across, perianth lobes about 9, not differentiated, sub-equal, linear-oblong, or spathulate, 6-8 cm. long, 3-4 cm. broad, stamens, numerous 11-13 mm. long., filaments very short, about 1 mm. long, anthers introrse, linear, about 1 cm. long, connective narrow, with a mucron about 1 mm. long, gynoecium ovoid, 3.5-4 cm. long, 2.5-3.5 cm. in diameter, acute at apex, carpels numerous, rusty-brown, distinctly dorsal-grooved, compressed, 15-18 mm. long, style about 5 mm. long; fruits oblong-ovoid, 10-11 cm. long, 5-6 cm. in diameter, carpels all fertile, not beaked; seeds 2, sometimes only one developed, oblong-obovoid, 3 sided, 7-9 mm. long, 5-6 mm. broad, yellowish.

Southwestern Szech'uan (E. Sikang): Huei-li-hsien, T. T. Yu 1429 (AA), September 1923.

This is the only known evergreen species in this Province. It is readily recognized by its large, ovate, thick, coriaceous leaves and oblong-ovoid, not beaked fruits.

2. Magnolia officinalis Rehder & Wilson in Sargent, Pl. Wilson. 1:391. 1913.

Tree or shrub, 4-5 meters high; young branchlets of the current year yellowish and tomentose at first, then glabrous or glarescent, those more than one year old, yellowish or yellowish-gray, glabrous; floral buds subovoid or ellipsoid, yellowish-gray pubescent; leaves alternate, often clustered at the distal end of branchlets, subchartaceous

or subcoriaceous, green above, glaucous or subglaucous beneath, grayish-tomentose or sparingly tomentose at length, long-obovate or obovate-oblong, 20–45 cm. long, 12–24 cm. broad, margin entire, often wavy, rounded or with short rostrum at apex, narrowed and cuneate at base, midrib plane above, elevated beneath, secondary veins 18–22 at each side, petiole pubescent when young, then glabrous, stipular scar large and conspicuous, often extending over 2/3 of the petiole; flowers white, fragrant, appearing with leaf, 12–18 cm. across, peduncle thick and short, 2–3 cm. long, yellowish and densely pubescent, perianth lobes usually 12, sometimes 9, not differentiated, stamens numerous, 15 mm. long, filaments 5 mm. long, anthers extrorse, gynoecium oblong-ovoid, about 3.5 cm. long, ovary centrally grooved, style reddish, 5–8 mm. long; fruits oblong-ovoid, 10–12 cm. long, 4.5–6 cm. in diameter, carpels all mature, smoky-brown, rhombic-oblong, about 2 cm. long, 1–1.5 cm. broad, beak 2–3 mm. long, slightly recurved; seeds only one developed, rarely two, reddish, obovoid, about 12 mm. long, 10 mm. in diameter.

Northwestern Szech'uan: Kuan-hsien, Mt. Tsing-ch'eng, small tree, 5 m., flowers white, fragrant, W. P. Fang 13498(SU), May 8, 1939.

Southwestern Szech'uan: O-mei-hsien, Mt. Omei, W. P. Fang 18394 and 16629(SU), 1941–1942.

This plant is cultivated as both an ornamental subject and drug plant in Szech'uan Province at altitudes below 1000 meters.

3. Magnolia spicata sp. nov.

Magnolia hypoleuca sensus Diels in Bot. Jahrb. 29:311. 1900.

Tree, about 7 meters high; branchlets bright yellow or yellowish-gray; leaves pseudo-verticillate, coriaceous, green, glabrous above, glaucous and finally, yellowish-gray sericeous beneath, long-obovate or obovate-oblong, 3-37 cm. long, 21-17 cm. broad, rounded and very short rostrate at apex, narrowed to cuneate at base, midrib plane or grooved above, very prominent beneath, secondary veins 22-25 at each side, showing at both sides, petiole stout, 2-3 cm. long, yellowish-brown, stipular scar usually extending up to 1/3 of the petiole, glabrous; flowers not known; fruits long-cylindrical, curved, about 15 cm. long, 2.5 cm. in diameter, carpels crowded, nearly all developed, suborbicular, 10-14 mm. long, 10-12 mm. broad, beaks very short and stout, under 1 mm. long, or beakless, thin-coriaceous, blackish-purplish, often warted; seed 1, rarely 2 well developed.

Southeastern Szech'uan: Nan-ch'uan-hsien, "Baum 20', 3" circ., Hochnah Houho-po, med (Rinde) - substitut für Ju Kui," Bock & v. Rosthorn 1127 (NH), October 6, 1891.

(Hupeh: Without precise locality, A. Henry 4886, (Type, NH), 1885-1888.)

This new species has the foliage identical with that of Magnolia officinalis R. & W. and M. obovata Thunberg, and these three are evidently closely related species. Since no flowering material is available, it is difficult to tell the exact relation of M. spicata to

either species. It is, however, easily distinguished from both by its curved, long, slender, cylindrical fruit with carpels not at all, or inconspicuously, beaked. The fruiting specimen from Hupeh, Henry 4886, was identified as Magnolia hypoleuca S. & Z., a synonym of M. obovata Thunberg, by Diels in his "Flora von Central China". The Japanese plant, though reported by many previous authors as occurring in China, seems not to be in China at all. It has been much confused with M. officinalis before Rehder & Wilson described the latter species, and also confused occasionally with the present new species, whose fruit differs strikingly from the shorter and much stouter, cylindrical fruit of M. obovata with its long and curved-beaked carpels. It is stated in Rosthorn's field notes that this species also has medical value and is substituted for Ju-kui, which is probably the local name for the bark of a species of Cinnamomum. The colloquial name, Hou-po-shu, given by Rosthorn, which is the name of M. officinalis, seems to be applied by the nearby inhabitants to this new species because the foliage is identical, just as wu-wei-tze is applied to nearly all the species of Chinese Schisandra.

Rehder and Wilson in the treatment of their species, M. officinalis, included Diels' M. hypoleuca S. & Z. as a synonym. Evidently they did not see Henry's 4886, and did not notice the difference between the fruit of this specimen and that of M. officinalis.

4. Magnolia Wilsonii (F. & G.) Rehder in Sargent, Pl. Wilson. 1:395-396. 1913.

Magnolia parviflora var. Wilsonii Finet & Gagnepain in Bull. Soc. Bot. France 52: Mem. 4:39. 1905.

Shrub or small tree, 3-8 meters high; young branchlets of the current year rufous to buff-pubescent, those of the last year purple and, sparingly pubescent or glabrescent, with short hairs, those more than one year old grayish, yellowish-grayish or purplish-grayish and glabrous; buds fusiform, rufous-villous; leaves deciduous, subchartaceous, olive-green (dry) and glabrous above, pale and densely yellow-villous beneath, ovate-oblong or elliptic-oblong, 6-11 cm. long, 4-6 cm. broad, margin entire, tapering into an acuminate apex, cordate, subcordate, or rotund at base, midrib plane above, elevated and rufous-villous beneath, petiole 2-3 cm. long, with long and conspicuous stipular scars, rounded and densely villous beneath, flat and glabrous as far as the stipular scars above; flowers appearing with leaves, white, cup-shaped, fragrant and showy, 10-12 cm. across, peduncle 2-2.5 cm. long, about 2 mm. in diameter, perianth lobes 9, all petaloid, the outermost three often narrowly oblong or elliptic, 4-6 cm. long, 2-3 cm. broad, the inner ones obovate to elliptic-obovate, 5-6 cm. long, 3-4.5 cm. broad, rounded at apex, stamens numerous, about 60-70, filaments very short, not over 1.5 mm. in length, reddish, anthers linear, introrse, 8-11 mm. long, yellowish, opening by longitudinal slits, connective narrow, reddish, gynoecium extruded, cylindric, or elliptic-oblong, about 2 cm. long, reddish, carpels numerous, about 15 mm. long, ovary oblong-ovoid, about 10 mm. long, 2-3 mm. in diameter, styles 2-3 mm. long, subulate or recurved; fruits small, cylindric-

oblong, about 5 cm. long and 2 cm. in diameter, deep purple, not all carpels developed, mature carpels congested, elliptic-ovoid, 8-15 mm. long, 4-7 mm. in diameter, beaked at apex, beaks 2-3 mm. long; seeds 1-2, brownish or reddish-brown, obovoid or oblique when 2, about 6 mm. long and 3-4 mm. in diameter, shorter when 2.

Western Szech'uan (E. Sikang): South-east of Tachien-lu (Kang-ting), woods and thickets, alt. 2000-2800 m., Wilson 1374 (AA, NH), June and October 1908; between Hai-T'ang and P'ing-yi-p'u, alt. 1900 m., H. Smith 1953 (AA) May 1929.

Magnolia Wilsonii and M. sinensis at western Szech'uan are both closely related to the Himalayan species, M. globosa Hook. f. & Thoms. The species divergence lies essentially in the pubescence, shape and size of the leaves. Both Magnolia globosa and M. sinensis have large oblong or ovate-oblong leaves. The former differs from the latter by its densely ferruginous pubescence on the lower surface in contrast to the grayish-yellow and less dense pubescence of the latter. M. Wilsonii differs from both of the other species by its small, narrowly-oblong leaves.

Magnolia Wilsonii forms a species complex at the junction of Szech'uan, Yunnan and Sikang. The typical form is found in eastern Sikang only, with its densely-pubescent leaves. In northwestern Yunnan, this species becomes less pubescent on the leaves, but the sparse pubescence on the lower surface is constant, and sometimes it is pubescent along the midrib on the upper surface, a character never found in either the Sikang specimens or the Szech'uan specimens. In Szech'uan,

this species exhibits a quite glabrous form in which the leaves are pubescent only along the nerves on the lower surface.

J. E. Dandy in 1928 (9) reduced M. Nicholsoniana R. & W. from southwestern Szech'uan to a synonym of M. Wilsonii on account of the intermediate form of pubescence found in the specimens from Yunnan. These specimens are apparently similar to those upon which W. W. Smith described his M. taliensis. Rehder in 1939 (17) suggested a form name, Nicholsoniana, for the less pubescent and glaucous leaved plants from Yunnan and Szech'uan. Again in 1940 (19), he used the name, f. taliensis, and put f. Nicholsoniana as a synonym in his Manual without an explanation. To clarify this complex, the present author suggests retaining both the names given by Rehder: f. Nicholsoniana for the Szech'uan plant, and f. taliensis for the Yunnan plant.

Key to the Forms of Magnolia Wilsonii

A. Leaves densely pubescent on the lower surface, leaf-base subcordate or rounded; E. Sikang..... Typical species

AA. Leaves only minutely and sparingly pubescent or glabrous except for the lower surface of the nerves, usually glaucous, leaf-base often broad cuneate or subrotund

B. Leaves glaucous, glabrous except for the pubescence on the lower surface of nerves; southwestern Szech'uan..... f. Nicholsoniana

BB. Leaves green, glabrous on the upper surface (except sparingly pubescent along the midrib), with minute, sparing pubescence at back, especially dense along the midrib and nerves; northwestern Yunnan..... f. taliensis

4a. Magnolia Wilsonii f. Nicholsoniana (Rehder & Wilson) Rehder in Arn. Arb. 20: 91-92. 1939.

Magnolia Nicholsoniana Rehder & Wilson in Sargent, Pl. Wilson. 1: 394. 1913. (Wilson 838 type, NH).

Shrub or small tree, 4-6 meters high; young branchlets of the current year grayish or brownish, angulate or terete, rufous-pubescent at first, then very sparingly pubescent, those more than one year old grayish or brownish, glabrescent or glabrous, terete or subangulate; buds elongated, yellowish or rufous-pubescent; leaves chartaceous, alternate or pseudo-paired, green, glabrous above, pale, glaucous beneath, elliptic-oblong, obovate-oblong or oblong, 7-12 cm. long, 3-5 cm. broad, acute or abruptly acute-acuminate at apex, subrotund or broad-cuneate at base, margin entire, midrib plane and narrowly grooved above, elevated and rufous-pilose beneath, secondary veins about 9 on each side, visible on both surfaces, petiole long and slender, those in the mature leaves often about 4 cm. long, 1-1.5 mm. in diameter, rufous-pilose except at the stipular scar, or finally glabrescent; flowers cup-shaped, about 8 cm. across, white and fragrant, peduncle slender, about 3 cm. long, 2.5 mm. in diameter, rufous-pubescent, perianth lobes 12, not differentiated, subobovate, rounded at apex, attenuate at base, the outer ones about 4-5 cm. long, 3 cm. broad, the inner ones smaller, about 3-4 cm. long, 1.8-2 cm. broad, all slightly glaucous, stamens numerous, 10-12 mm. long, filaments reddish, about 1.5 mm. long, anthers yellowish, 8-10 mm. long, linear, introrse, connective inconspicuous, rounded at apex, gynoecium oblong-ellipsoid,

extruded, about 18 mm. long, carpels numerous, glaucous, about 10 mm. long including style, style about 3 mm. long, slightly curved, reddish; fruits not seen.

Southwestern Szech'uan: Wa-shan, thickets, alt. 2300-2800 m., Wilson 838 (Type of M. Nicholsoniana, NH), June and September 1908.

The only available material from this province is Wi son's 838, the type of Magnolia Nicholsoniana Rehder & Wilson, which has leaves with subrotund or cuneate base, glabrous above, glaucous and pubescent only on nerves below. The complexity of this species and its forms are discussed under Magnolia Wilsonii and its form, taliensis.

4b. Magnolia Wilsonii f. taliensis (W. W. Sm.) Rehder in Man. Cult. Trees & Shrubs, ed. 2:249. 1940.

Magnolia taliensis W. W. Smith in Not. Bot. Gard. Edinb. 8:341. 1915.

Magnolia liliflora var. taliensis Pampanini in Bull. Soc.

Shrub or scandent shrub (according to Rock); young branchlets of the current year purple, angulate or slightly so, rufous pubescent at first, then sparingly pubescent or glabrescent, those more than one year old purple or blackish-purple, angulate or subterete; buds as in f. Nicholsoniana; leaves narrowly elliptic or elliptic-lanceolate or sometimes elliptic-oblong, chartaceous, green and glabrous except sparingly pubescent or glabrescent above, glaucous, minutely pubescent especially along the nerves beneath, 9-12 cm. long, 3-4 rarely to 5 cm. broad, acute or acute-acuminate or obtuse with abrupt mucron at apex, rotund or broad cuneate at base, margin entire, midrib slightly elevated and sparingly pubescent above, prominent and often densely pubescent or glabrescent later; flowers white, fragrant, about 12 cm. in diameter, perianth lobes 9, stamens and gynoecium same as those of f. Nicholsoniana; fruits not seen.

Northwestern Yunnan: "circ Pe-yen-tsin, Kouty, 5 m.; floribus albis," P. S. Ten 564(AA, NH), May 7, 1918; between Chienchuan plain and the Mekong drainage basin to Lachi-ming, climbing shrub, flowers large, white, fragrant, alt. 9000 ft., J. F. Rock 8620 (AA, NH), May 1923; same locality, Lanping (Lan-p'ing-hsien), shrub, flowers white, 6400 - 7800 ft., J. F. Rock 8639 (AA, NH), June 1923.

This species is out of Szech'uan.

The type specimen, G. Forrest's 7182, of Magnolia taliensis W. W. Smith, is not available to me. The original description of this species agrees, however, with Rock's and Ten's collection from northwestern Yunnan near Ta-li. The pubescent midrib and dorsal leaf surface suggest that this is an intermediate form between the typical Wilsonii which has leaves more densely pubescent dorsally, and f. Nicholsoniana which has glaucous and glabrous leaves except for the pubescent nerves. The pubescent midrib on the upper surface of the leaves is quite characteristic of this form.

Rehder first used this name (taliensis) for the form in his Manual (19) and reduced f. Nicholsoniana which he had suggested (17) just a year preceding the Manual to the status of a synonym. Therefore he evidently implied that the two forms, Nicholsoniana and taliensis, are the same thing. If this is the case, the legal name for the form should be Nicholsoniana which is the name first applied to the Szech'uan plant in 1913, while taliensis was applied to the Tali plant in 1915. Since the Yunnan plant is considered here as distinct from the Szech'uan plant, the two names used by Rehder are considered both valid and representing two distinct forms of M. Wilsonii as was stated on page 18.

5. Magnolia sinensis (Rehder & Wilson) Stapf in Curt. Bot. Mag. 149: sub. t. 9004. 1924.

Magnolia globosa var. sinensis Rehder et Wilson in Sargent, Pl. Wilson. 1: 393. 1913. (Wilson 1422 type, NH.)

Shrub 2.5-5 m. high; young branchlets of the current year slender, greenish-yellow or greenish-gray, covered with short yellowish pubescence at first, then glabrescent or glabrous, subterete or angulate, those more than one year old grayish-purple or grayish-

yellow, glabrous, subterete; buds elongated, pubescent; leaves subchartaceous, green above, pale and minutely yellowish-pubescent beneath, densely yellowish-pubescent when young, alternate, elliptic-ovate, elliptic-oblong or narrowly elliptic, the largest up to 20 cm. long, and 15 cm. broad, the smallest only 4-5 cm. long and 4 cm. broad, the average ones 8-10 cm. long, 4-7 cm. broad, obtusish-acute at apex, rounded, rarely broad cuneate at base, margin entire, midrib plane or slightly elevated above, elevated and densely yellowish-pilose beneath, secondary nerves 7-12 at each side, yellowish-pubescent underneath, petiole 2.5-4 cm. long in larger, matured leaves, 1-1.5 cm. long in smaller, young leaves, densely covered by buff hairs, stipular scar glabrous; flowers white, fragrant, 12-14 cm. across, perianth lobes about 9, broad-obovate or subcordate, 5-7 cm. long, 3-5 cm. broad, rounded or subcordate at apex, attenuate and narrowed very much at base, when dry slightly glaucous inside, stamens numerous, 13-15 mm. long, 1.5-2 mm. broad, filaments purplish, 1.5 mm. long, anthers yellow, linear, 12-14 mm. long, truncate at apex, connective inconspicuous, often forming a very small point at the top, gynoecium long-extruded, obovate-oblong, 2-2.5 cm. long just after anthesis, carpels about 30, ovary glaucous, style reddish, 2-4 mm. long, incurved; fruits not seen.

Northwestern Szech'uan: West and near Wen-ch'uan-hsien, woodlands and thickets, alt. 2000-2600 m., Wilson 1422 (NH), June and September 1908.

This species is closely related to Magnolia globosa Hook f. & Thoms., and differs from it in the elliptic leaves of varying widths and its scant, yellowish pubescence. This species is always a shrub.

The distribution is limited to northwestern Szech'uan.

6. Magnolia Dawsoniana Rehder & Wilson in Sargent, Pl. Wilson. 1: 397. 1913.

Tree up to 12 meters high; young branchlets of the current year greenish-yellow, glabrous, those more than one year old purplish-brown, glabrous; buds elliptic-ovoid, very sparingly yellowish-pubescent; leaves alternate, subcoriaceous, green above, light green or glaucescent beneath, glabrous at both sides, obovate, 9-12 cm. long, 4.5-7 cm. broad, margin entire, obtuse to acute or sub-acuminate at apex, cuneate or broadly cuneate at base, midrib plane above, prominent beneath, secondary veins 8-10 at each side, veinlets very reticulate, petiole 1.5-2 cm. long, glabrous; flowers not known; fruits cylindrical, only a few carpels maturing, making fruit very slender in appearance, mature carpels nearly rounded, 12-15 mm. long, blackish-purple, minutely warted, with scattered lenticels, acute and not beaked at the apex; often only one seed maturing per carpel, seeds reddish-brown, triangular-rotund; peduncle very short and stout, greenish-brown, glabrous.

Western Szech'uan (E. Sikang): Near Ta-chien-lu (Kang-ting) to the southeast, alt. 2000-2300 m. Wilson 1241 (Type NH), October 1908.

7. Magnolia Sargentiana Rehder & Wilson in Sargent, Pl. Wilson. 1: 398-399. 1913.

Magnolia conspicua var. emarginata Finet et Gagnepain in Mem. Soc. Bot. France 4: 38. 1906.

Magnolia Sargentiana var. robusta Rehder & Wilson in Sargent, Pl. Wilson. 1:399. 1913. (Wilson 923a, type, NH)

Magnolia denudata var. emarginata Pampanini in Bull. R. Soc. Tosc. Ort. ser. 3, 20:200. 1915.

Tree, 10-25 meters high; young branchlets of the current year greenish or yellowish, pubescent at first, then glabrous, those more than one year old yellowish-brownish, glabrous; leaf-buds long-ellipsoid, very scantily pubescent or sometimes with rather dense, yellowish pubescence, floral buds ovoid, often densely, rarely sparingly yellowish-pubescent; leaves alternate, subcoriaceous, green, glabrous above, pale and densely or rarely sparingly yellowish-or whitish-pubescent beneath, broadly obovate or narrowly obovate-oblong, usually 10-15 cm. long, 6-8 cm. at the broadest part, rounded, shallowly emarginate or shortly acuminate at apex, broad-cuneate or narrowed from the middle part of the leaf into a cuneate base, midrib plane above, prominent beneath, secondary veins 8-10 on each side, tertiary nerves reticulate, petiole about 2 cm. long, sometimes up to 4 cm., glabrous; flowers precocious, reddish, up to 20 cm. across, peduncle short and stout, 1-2 cm. long, 8-10 mm. in diameter, yellowish-pilose, perianth lobes 12 or 13, stamens numerous, 16 mm. long, filaments 4 mm. long, connective mucronate, gynoecium cylindric, pointed at apex; fruits cylindric, often somewhat curved or twisted, 10-14 cm. long, 2.5-3 cm. broad; carpels

crowded, but only a few maturing, mature carpels subrotund, thick coriaceous, blackish-purple, yellowish-warted, 1-1.5 cm. long, about 1 cm. broad, beak very faint and inconspicuous; often only one seed developing, red, triangular and flat, 1 cm. long, 1-1.5 cm. broad.

Southwestern Szech'uan: Tsai-erh-ti, 30 miles west of Wa-shan, thickets, alt. 1800 m., Wilson 914 (type, NH), September 17, 1908; Wa-shan, moist woods alt. 1600-2000 m., very rare, Wilson 923 (NH), September 1908; same locality, woodlands and open country, alt. 2300 m., tree 12 m. tall, 1.3 m. in girth, Wilson 923a (type of M. S. var. robusta, NH), September 1908; O-pien-hsien, Sha-p'ing, C. L. Sun 923, (SU), August 5, 1939; O-mei-hsien, Mount Omei, Yen-wang-p'eh, tree, flower red, C. L. Sun 251(SU), May 14, 1939.

This tree is fairly common in the extreme southwestern part of Szech'uan, but rather rare eastward from Wa-shan and O-pein-hsien.

8. Magnolia Sprengeri Pampanini in Nouv. Giron. Bot. Ital. 22: 295. 1915.

Magnolia denudata var. purpurascens Rehd. & Wils. in Sargent, Pl. Wilson. 1: 401-402, in part of the Chinese plant. 1913.

Magnolia diva Stapf et Dandy in Milliais, Magnolias, 51, 120. 1927.

Magnolia Sprengeri diva Stapf in Bot. Mag. 152. t. 9116. 1927.

Tree about 10 meters high; young branchlets of the current year purplish-gray or yellowish-brown, with short, yellowish pubescence at first, then glabrous, or glabrescent, those more than one year old

grayish-purple or grayish-brown, glabrous; terminal buds elliptic-ovoid, yellowish-pubescent, axillary buds subovoid and long-pointed at apex, with short, yellow pubescence or glabrous; leaves alternate or subalternate at the apex of branchlets, subchartaceous or subcoriaceous, green above, usually glabrous, sometimes sparingly pubescent, along nerves, light green or pale beneath, sparingly pubescent or with spreading hairs along nerves, especially the midrib, obovate or narrowly elongated obovate, 10-13 cm. long, 4.5-7 cm. broad at the widest part, acute to acuminate or rounded with abrupt rostrum at apex, tapering and cuneate at base, midrib slightly elevated above, prominent beneath, petiole long and slender, 2-2.5 cm. long, 1-1.5 mm. in diameter, stipular scar basal, subdeltoid; flowers pinkish, sometimes paler inside, saucer-shaped, fragrant, peduncle very short and stout, densely yellowish pubescent, perianth lobes 12, stamens numerous, gynoecium long, cylindrical, style deciduous; fruit cylindrical when young (mature material not seen).

Southeastern Szech'uan: Nan-ch'uan, "Hsiao-ya, Baum 30 fuss. 2' circ. Waldhang", Bock et v. Rosthorn 248(MO), August 4, 1891.

Szech'uan: Without precise locality and date, A. Henry 5651 (NH), 1885-1888.

This Magnolia is very near M. denudata Desrouss. which differs in having broadly campanulate flowers with 9 perianth lobes, and constantly heavier pubescence on branchlets and leaves.

It is known in this province only from the eastern part. Rosthorn's 248 was cited as Magnolia conspicua Salisb. by Diels in his

"Die Flora von Central China". The specimen is sterile and has glabrous branchlets with obovate leaves glabrous throughout except along the mid-rib and main nerves at the back and seems to be M. Sprengeri.

9. Magnolia liliflora Desrousseaux in Lamarck, Encycl. Meth. Bot. 3: 675. 1791.

Small tree or shrub, 2-12 m. high; young branchlets of the current year purple or purplish-brown, glabrous or sparingly pubescent when young, those more than one year old purplish-gray, glabrous; terminal buds ovoid, shortly grayish pubescent or covered with yellowish, shaggy hairs, axillary buds cylindrical, usually with short pubescence; leaves alternate, subchartaceous, on the upper surface green and glabrous, rarely sparingly pubescent along nerves, on the lower surface light green, sparingly short-pubescent or glabrous, obovate, 10-15 cm. long, 6-8 cm. broad; flowers precocious, purplish-pink to purplish outside, white, more or less tinted pink inside, fragrant, broadly campanulate or cup-shaped, 10-16 cm. across, peduncle 1-1.5 cm. long, 8-10 mm. in diameter, with yellowish-gray pubescence, perianth lobes 12-15, rarely 9-18, differentiated into sepals and petals, sepals 3, much smaller than petals, herbaceous, lanceolate or triangular-lanceolate, 1-2 cm. long, 5-10 mm. broad, petals spathulate or narrowly ovate-oblong, subequal, 7-10 cm. long, 3-6 cm. broad, pink-purple outside, white inside, often tinted with pinkish shade, obtuse or obtuse-acute at apex, narrowed into a broad stalk or subround at

base, stamens numerous, about 10 mm. long, filaments stout, about 2 mm. long, 1 mm. broad, purplish, anthers yellow, 7-8 mm. long, cells lateral-introrse, linear, connective reddish, about the same breadth with the anther-cells, mucronate at apex, mucron about 1 mm. long, gynoecium cylindrical, about 2 cm. long at anthesis, extruded well beyond the androecium, carpels numerous, ovary linear-ellipsoid, style long and slender, about 2 mm.; rarely green and glabrescent, fruits cylindrical, 4-5 cm. long, 2 cm. in diameter.

Southwestern Szech'uan: O-mei-hsien, Mt. Omei, Tsing-yin-ko, alt. 900 m., cultivated shrub, W. P. Fang 15929(SU), March 27, 1941; same locality, alt. 900 m., shrub, 2 m., leaves, petioles and peduncles more or less pubescent, flowers rosy-purple, W. P. Fang 18294(SU), April 1, 1942.

Central Szech'uan: Ch'eng-tu, cultivated in the College, tree 12 m., flowers purplish, commonly cultivated in Ch'eng-tu, W. P. Fang 13256(SU), March 20, 1939.

Northwestern Szech'uan: Kuan-hsien, Mt. Tsing-ch'eng, cultivated, small tree, 2 m., flowers precocious, W. P. Fang 19313 & 19314 (SU), April 5, 1945.

This species through long cultivation varies considerably in pubescence and number of perianth lobes. This can be distinguished from the other precocious, purplish-flowered species, M. Sprengeri Pampan., by its 3 herbaceous sepals, its long-extruded, cylindrical gynoecium and short stamens with a long mucron at apex.

Dandy in 1934 (10) transferred this species to Magnolia

quinquepeta. This species, under the name of Lassonia quinqupeta, was first published in 1770 by Buc'hoz who used a native Chinese drawing as the type. Here I retain the name liliflora for two reasons. First, the description of Lassonia quinquepeta was based on a drawing which was not made scientifically, and hence better not used as the basis of a scientific description. Secondly, the name, Magnolia liliflora, has been favorably used for so long and is so well-known that I think it is better to conserve it.

10. Magnolia Biondii Pampanini in Nuov. Giorn. Bot. Ital., Nouv. ser. 17:275. 1901.

Szech'uan: Farges 1300 - Specimen not seen, cited by J. E. Dandy in Not. Edin. Bot. Gard. 16:131, 1928.

This species is said to be distributed in Shensi, western Honan, Szech'uan, and western Hupeh (9). However, I have seen no specimen from Szech'uan. Farges 1300 is not available to me. As Farges' collection is largely from Ch'eng-kom-hsien at the northeast part of this province, it is reasonable to believe this specimen is also from the same place.

This species is easily recognized by its elliptic leaves narrowed at both ends. According to Dandy (9), Magnolia aulacosperma Rehder & Wilson is a synonym of this species.

Genus Manglietia Bl.

Habit, leaves and flowers similar to those of Magnolia, except for the more numerous stamens and 4 or more ovules in each carpel. One species in Szech'uan.

1. Manglietia szechuanica Hu in Bull. Fam. Mem. Inst. Biol. (Bot.) 10: 114. 1940.

Tree, 10-12 m. high; young branchlets of the current year greenish-brown, white villous, or villous at nodes only, or glabrous at length, those more than one year old brown or deep greenish-brown, glabrous; bud elongate-ovoid, acuminate or acute at apex, white villous at first, later the long hairs falling off, and leaving the short, rusty hairs covering the bud; leaves subcoriaceous, green and glabrous above, pale or light green beneath and white villous especially along the midrib, with short and straight, rusty hairs beneath the long white hairs, obovate-lanceolate or oblong-lanceolate, 13-18 cm. long, 3-5 cm. broad at the middle part, acuminate with an acumen 5-9 mm. long, cuneate at base, margin entire, midrib grooved above, very prominent beneath, secondary veins 9-15 at each side, petiole 15-22 mm. long, 2-3 mm. in diameter, white villous at first, then rusty puberulent, or finally glabrescent; flowers reddish-purplish, with a slightly disagreeable odor, perianth lobes 9, sepals 3, greenish-purplish, oblong-lanceolate, 5 mm. long, 3 mm. broad, petals 6, oblanceolate, 5.5 cm. long, stamens very numerous, about 105, 9-11 mm. long, filaments about 2 mm. long, anthers 7-9 mm. long, linear, connective reddish, narrow, mucronate, gynoecium ellipsoid, about 2 cm. long, 1.5 cm. across just after the anthesis, carpels numerous, appressed linear-oblong, 10-13 mm. long including style, rugulose and with rusty hairs or yellowish-white hairs, style 2-3 mm. long, slender, deciduous, ovules numerous, white, minute, linear, about 1/2-2 mm. long; fruits immature.

Southwestern Szech'uan: Mount Omei, route between Hung-ch'un-p'ing and Chiu-lao-tung, tree, 12 m., flowers pink, W. W. Ma 2388(SU), June 16, 1940; same locality, Ch'u-tien, alt. 2100 m., flowers purplish-red, W. P. Fang 18950(SU), June 6, 1942.

Szech'uan: Without precise locality, T. T. Yu 3122(FM), 1933.

Genus Michelia L.

Trees or shrubs; leaves alternate, simple, entire; flowers perfect, axillary, often very fragrant, floral parts spirally arranged, perianth lobes few to numerous, not differentiated, subequal, often lanceolate, stamens numerous, gynoecium distinctly stalked, carpels many; fruit a loose spike, mature carpels distantly arranged on the elongated torus; seeds usually 2, red and suspended as in Magnolia. Three species in Szech'uan.

Key to the Species

A. Buds usually densely ferruginous or yellowish pubescent; leaves coriaceous, lustrous green, glabrous at both sides; gynoecium glabrous..... 1. M. Martini Dandy

AA. Buds with scant and short pubescence; leaves subchartaceous or subcoriaceous, often more or less pubescent at the back; gynoecium densely pubescent

B. Midrib of the leaf with spreading hairs at the back, leaves more or less pubescent, rarely subglaucous on the lower surface..... 2. M. szechuanica Dandy

BB. Midrib of the leaf without spreading hairs, leaves usually very sparingly and shortly pubescent on the lower surface ..... 3. M. Wilsonii F. et G.

1. Michelia Wilsonii Finet & Gagnepain in Bull. Soc. Fr. 52. Mem. 4:45. t.7A 1906.

Michelia sinensis Hemsley et Wilson in Kew Bull, 1906: 149. 1906. (Wilson 4720 Co type AA).

Tree 8-10 meters high; young branchlets or the current year greenish-brown, glabrous or glabrescent, those more than one year old brown or purplish-brown, glabrous, often rough with dense lenticels and leaf-scars; leaf bud terminal and elongated, covered with short, appressed, ferruginous hairs, flower-buds axillary, elliptic-ovoid, ferruginous-pubescent; leaves alternate, subcoriaceous, green, glabrous above, pale, glaucous and sparingly pubescent beneath, obovate-oblong, very rarely oblanceolate, 8-12 cm. long, 3.5-5.5 cm. broad at the broad part, margin entire, shortly acuminate or acute at apex, broad cuneate or rarely subrotund at base, midrib plane above, prominent below, secondary nerves 8-12 at each side, showing at both sides, veinlets very reticulate; petiole 1-1.8 cm. long, glabrous; flowers yellow or creamy, fragrant, 3-4 cm. across, perianth lobes about 12, the outer ones elliptic to subovate, 2.5-3 cm. long, 12-14 mm. broad, the inner ones the smaller, oblanceolate or lanceolate, 2.2.5 cm. long, 5-10 mm. broad, stamens very numerous, 1-1.8 cm. long, filaments 1-3 mm. long, reddish-brown, anthers yellow, linear, 1-1.2 cm. long, connective narrow, mucronate, gynoecium 2.5-3 mm. long 5 mm. in diameter, cylindrical, gynophore about 5 mm. long, carpels numerous, ovary ellipsoid 1.5-2 mm. long, with grayish lustrous pubescence, style about 2 mm. long, awl-shaped, glabrous, ovules on central placenta at ventral side,

about 10, subglobose; fruits about 12 cm. long, twisted, mature carpels purplish-brown, with conspicuous, yellowish lenticels, oblong cylindric, usually constricted at the middle, 15-25 mm. long, 9-12 mm. in diameter, beak short and recurved; seeds 2, reddish-brown.

Southwestern Szech'uan: O-mei-hsien, Mt. Omei, Wilson 4720 (AA cotype), June 1904; same locality Chiao & Fan 168 (AA) March 1938; same locality, Chang-lao-ping, below slope, tree, flowers purple (?), C. L. Sun 291(SU), May 19, 1939; same locality, Wan-nien-ssu, tree, 12 m., W. P. Fang 15969(SU), March 30, 1941; same locality, Ch'u-tien, in forests, tree 8 m., flower yellow or yellowish, only one tree seen, W. P. Fang 16598(SU), May 12, 1941.

This species in western Szech'uan is closely related to the eastern Szech'uan species, M. szechuanica Dandy, from Kai-hsien.

2. Michelia szechuanica Dandy in Not. Bot. Gard. Edin. 16: 131. 1928.

Tree or small tree, 5-10 sometimes up to 24 m. high, girth up to 2.6 m.; young branchlets of the current year with short greenish-brown or yellowish pubescence at first, then glabrescent and often with minute scale-like glands, those more than one year old glabrous, grayish-brown; buds ovoid or elongated-ovoid, with chestnut-brown pubescence at first, then hairs becoming grayish and sometimes falling off; leaves subchartaceous to subcoriaceous, green and sparingly pubescent beneath, oblanceolate, elliptic-lanceolate rarely lanceolate or variously oblong, 10-17 usually 15 cm. long, 3.5-6.5 usually 4.5 cm.

broad, margin entire, short to long acuminate at apex, rarely subacute, broad-cuneate or cuneate at base, midrib plane and shallowly grooved above, sometimes with spreading hairs inside the groove near the petiole, prominent beneath, often thickly coated with spreading hairs along the lateral sides, secondary veins 8-12 on each side, veinlets very reticulate, petiole .8-1.8 usually 1 cm. long, glabrous or glabrescent, except hairy in the groove on the upper side; flowers incompletely known, perianth lobes 9, in 2 series, carpels numerous, subovoid, covered by dense grayish hairs, style deciduous, torus densely pubescent, peduncle stout, very short, pubescent; fruits unknown.

Southeastern Szech'uan: Nan-chu'an-hsien, Heiwan-ai, "Baum 30', 1' circ. Wald," Bock & v. Rosthorn 1017(MO), September 25, 1891(MO); same locality, Ch'asha-pa, "Baum 13', 1" circ. Hochwald." Bock & v. Rosthorn 1177(MO), October 10, 1891; without precise date, same locality, Bock & v. Rosthorn 2325 and 2457(MO).

Eastern Szech'uan: Kai-hsien, roadside, alt. 1000-1300 m., tree 24 m. tall, girth 2.6 m., one tree only, E. H. Wilson 4598 (cotype, AA, NH), July 1910.

There are still no complete flowering material or mature fruits available. The constant distinguishing character of this species is the dense spreading hairs along the midrib at the under surface of the leaves. The shape of the leaves in the type specimen is oblong-oblanceolate, but Rock & Rosthorn's 2325 from Nan-chu'an has narrow, oblanceolate leaves, and 1017 has broadly elliptic-oblong or obovate-

oblong leaves. The latter specimen was cited by Diels (11) in his "Die Flora von Central China" as Magnolia conspicua Salib., but the axillary floral buds and the spreading hairs along the midrib of the leaves suggests that it is Michelia szechuanica rather than a Magnolia.

3. Michelia Martini (Lev.) Dandy in Ken Bull. Misc. Inform. 7:263. 1927.

Magnolia Martini Leveil. in Bull. Soc. Agri. Sci. Sarth , 59:321. 1904.

Michelia Bodinieri Finet & Gagnepain in Bull. Soc. France 52:53. 1906.

Tree 15-20 m. high; young branchlets of the last year's growth greenish-brown, minutely warted and densely punctate, those more than one year old yellowish-brown or dark brown, densely lenticellate; terminal buds usually leafy, elongated, covered with chestnut-brown, lustrous hairs, flower buds axillary, ovoid or long-ovoid, densely covered by lustrous chestnut-brown hairs, rarely with yellowish pubescence; leaves alternate, coriaceous, lustrous green above, light green beneath, glabrous on both sides, oblanceolate, elliptic-lanceolate, or oblong-lanceolate, rarely narrowly elliptic or narrowly lanceolate, 12-18 cm. long, 3-4.5 cm. broad, margin entire, slightly revolute, acuminate or short acuminate at apex, cuneate and usually oblique at base, petiole 8-18 mm. long; flowers axillary, peduncle very stout, about 5 mm. long, and 5 mm. in diameter, chestnut-brown or grayish-pubescent, perianth lobes 6, rarely 8, 2-Seriate, the outer 3 larger oblong-ovate, 4-4.5 cm. x 2-25 cm., the inner 3 smaller,

oblanceolate, 4 cm. long, 1 - 1.5 cm. broad; stamens numerous, 14-20 mm. long, filaments 2-3 mm. long, purple, anthers linear, 10-15 mm. long, yellow, connective purple, mucronate at apex, gynoecium sub-cylindrical, 1.5-2 cm. long, 4-5 mm. in diameter, acute at apex, gynophore 4-5 mm. long at anthesis, carpels numerous, glabrous, ovary elliptic-ovoid, about 2 mm. long, style 1-1.5 mm. long, deciduous; fruits not seen.

Southwest Szech'uan: O-mei-hsien, Mount Omei, Ta-p'ing, Alt. 1400 m., T. C. Lee 4506(SU), April 21, 1940; same locality, Hua-yen-ting, alt. 1800 m., tree, 20 m., W. P. Fang 15738(SU), Dec. 20, 1940; same locality, Hsi-hsin-sueh, alt. 1600 m., tree, 20 m. high, flowers yellow, fragrant, W. P. Fang 15797(SU), March 5, 1941; same locality, Hung-chun-p'ing, alt. 1200 m., tree, 15-20 m. high, flowers yellowish, W. P. Fang 15926(SU), March 19, 1941; same locality, W. K. Hu 8809, 8813, 8856, 8879, and 9211(SU), November 23, 1946.

Northwest Szech'uan: Kuan-hsien, Mount Tsing-chieng, in forest, tree usually 20-30 meters high, leaves lanceolate or oblanceolate, flowers yellow, exterior of the bud-scales yellow-tomentose, common, W. P. Fang 19331(SU), April 5, 1944.

Genus Kmeria (Pierre) Dandy

Trees; leaves entire, stipules adnate to petiole and leaving conspicuous scars; flowers solitary, terminal, unisexual and monoecious, perianth lobes 6, subsimilar, the inner ones smaller than

the outer ones, stamens numerous, inserted on a short conic torus, filaments short, anthers linear, introrse, connective produced at apex, gynoecium sessile, carpels numerous, ovules 2; fruits subglobose, mature carpels completely dehiscent along the ventral suture and partially so from the apex to the middle of the carpel on the dorsal side, finally bifid at apex. Three species known, only 1 in Szech'uan.

1. Kmeria sp.

A Kmeria was found on Mount Omei in 1940. Professor W. C. Cheng identified it and gave it a manuscript name. Since I do not have more information about it, and the specimen available to me is a very imperfect fragment (AA), it is impossible to give it further treatment here.

Tribe Liriodendreae

Leaves deciduous, 4-6 lobed; stamens long, usually including the gynoecium; fruit consisting of indehiscent, compactly arranged samaras. One genus, doubtfully in Szech'uan.

Genus Liriodendron Linn.

Trees or small trees; bud included in 2 coherent stipules; leaves alternate, deciduous, 3-4-6 lobed, truncate at apex, rounded at base, petioles very long and slender, stipules 2, coherent; flowers solitary, terminal, perianth lobes 9, the outer 3 sepaloid, herbaceous, the inner 6 petaloid, stamens numerous, 2-3 cm. long, filaments long and slender, 5-10 mm. long, anther linear, introrse, connective brownish, mucronate at apex, gynoecium pointed-ovoid or pointed-ellipsoid, carpels numerous, united at base; fruits cylindric-ellipsoid, acute at apex, rounded at base, mature carpels indehiscent, oblanceolate, the upper portion of the ovary becoming thin, woody and dry, forming a wing, seeds basal in position, usually 2, rhombic-ovoid, smooth and yellowish. Two species, 1 doubtfully in Szech'uan.

1. Liriodendron chinense Sargent in Trees & Shrubs, 1: 103, t. 52. 1903.

This tree is fairly common in Kiangsi and Hupeh, and has not been found in Szech'uan during many recent botanical explorations. Diels (11) in 1901 cited a Rosthorn's specimen from Nan-ch'uan of southeastern Szech'uan as L. tulipifera var. sinensis Hemsley. Unfortunately this specimen, Rosthorn's 396, was burned in Berlin during the war. Also Finet and Gagnepain in 1905 (13) identified Farges 702 from Cheng-kuo at eastern Szech'uan as this species. Owing to the peculiar shape and floral as well as fruiting characters, this tree in any stage is not likely to be misidentified. The uncertainty is only in reference to the origin of the tree. Rosthorn's field notes read: "T'an-chia-wan, ein 15 m. hoher Baum von etwa 1 m. Stammumfang." In the fast denuding country, it is hard to tell if a tree of fair size is indigenous or cultivated.

Synonyms, according to Rehder and Wilson (22) are: L. Tulipifera var. ? chinense Hemsley (in Jour. Bot. 13: 225. 1875); L. Tulipifera var. sinensis Diels (in Bot. Jahrb. 29:322. 1900).

FAMILY ILLICIACEAE

Trees or shrubs, aromatic; leaves alternate or subalternate and pseudo-verticillate at the distal end of the young branchlets, often coriaceous and glabrous, pellucid-dotted, simple, entire, exstipulate; flowers perfect, regular, solitary and axillary, sometimes pseudo-verticillate with the leaves; perianth lobes several to many, dimorphic or all alike, torus very short, stamens few to many, at the base of the torus, 1-several-seriate, filaments often short and free, anthers lateral-introrse or introrse, connective narrow, gynoecium short, carpels usually 8-15, rarely less than 5 or up to 21, 1-seriate, erect, ovule solitary, on sub-basal placentation; fruits a star-like body consisting of 5-21 woody follicles radiating star-like from the short torus; seed single, often smooth, glossy-brown, endosperm oily. One genus with four species and 1 variety in Szech'uan.

Genus Illicium Linn.

The characters are the same as those of the family.

Key to the Sections

A. Perianth lobes dimorphic, the inner ones long and narrow, often very numerous, thin and membranaceous..... Sect. Badiana

AA. Perianth lobes (all nearly identical), the inner ones usually nearly as long as broad, carnose or thin.... Sect. Cymbostemon

Section Badiana Spach.

Perianth lobes dimorphic, the outer ones ovate or triangular, shorter, the inner ones numerous, papyrous, lanceolate, often long and narrow, lax at anthesis. Only one species in Szech'uan.

1. Illicium Simonsii Maximowicz in Bull. Acad. Sci. St. Petersb. 32: 480. 1888.

   Illicium Fargesii Finet & Gagnepain in Bull. Soc. Bot. Fr. 52: Mem. 4: 29. pl. 4, A, 1-14. 1905.

   Illicium szechuanensis (sic) Cheng in Ic. Pl. Omeiens. I (1): pl. 6. 1942.

Shrub or small tree, 1-3 meters or more high; young branchlets of the current year olive-brown or brownish, those more than one year old brownish or purplish; buds elongated, ovoid, scales ovate-lanceolate, ciliated; leaves coriaceous or subcoriaceous, light green above, pale green beneath, narrowly oblong-elliptic or ovate-oblong, 5-12 cm. long, 2-4.5 cm. broad, acuminate or shortly acuminate at apex, cuneate at base, midrib grooved above, elevated beneath, secondary veins inconspicuous, petiole usually 8-10, occasionally up to 12 mm. long, about 1.5 mm. in diameter; flowers axillary and forming a pseudo-cluster, creamy yellow, 1.5-2 cm. across, perianth lobes numerous, about 22, the outer ones ovate-oblong or elliptic-oblong, chartaceous, the inner ones the largest, usually narrowly ovate-oblong or lanceolate, obtuse or tapering at the apex, the innermost very narrow and often linear, stamens numerous about 16, 3 mm. long, anthers

twice as long as the filaments, connective mucronate, filaments 1-2 mm. long, carpels 12 or 13; fruits about 3 cm. across, mature carpels, slender-beaked.

Southwest to Szech'uan (S.E. Sikang): "Szech'uan australis, bei Hui-li-chou, 1-3 m., Blüten gelblich, leicht duftend," Camillo Schneider 596(NH), March 25, 1914.

Southwest Szech'uan: O-pien-hsien, Sha-p'ing, C. L. Sun 925(SU), August 5, 1939.

Sections Cymbostemon (Spach.) A. C. Smith

Perianth lobes monomorphic, the inner ones usually ovate or suborbicular, carnose or papyraceous, not lax at anthesis. Three species and 1 variety in Szech'uan.

Key to the Species

A. Carpels usually 8, occasionally 7

B. Leaves small, usually 5-7 cm. (rarely up to 10 cm.) long, 2-3 cm. (rarely up to 4 cm.) broad, petiole short and slender, less than 1 cm. long; stamens few, 6-12, usually 1-seriate, fruits small; carpels very thin and delicate..... ..... 2. I. micranthum Dunn

BB. Leaves larger, usually over 7 cm. in length and 3 cm. in width, petiole longer and stouter; stamens numerous, 2-3-seriate; fruiting carpels thick and robust..... ..... 3. I. Henryi var. multistamineum A. C. Smith

AA. Carpels usually 12-14

B. Leaves subcoriaceous, broader, 3.5-5.5 cm. broad, petiole

longer and stouter, 1.5-2 cm. long, 2 mm. in diameter; fruits 4-5 cm. in diameter..... 4. I. majus H. f. & T.

BB. Leaves thick coriaceous, narrower, usually under 3.5 cm. broad, petiole usually shorter and more slender, under 1 cm. long, fruits 3 cm. in diameter 5. I. majus var. diminutivum n. var.

2. Illicium micranthum Dunn in Hook. Ic. Pl. 28: pl. 2714. 1901.

Shrub or small tree, 1.5-7 meters high; young branchlets of the current year yellowish-brown, those more than one year old grayish-brown, both slender; floral buds ovoid, very small, bud-scales numerous, oblong and ciliated; leaves coriaceous, olive-green above, brownish beneath, elliptic, obovate-elliptic or lanceolate, 5-7 cm. (rarely up to 10 cm.) long, 2-3 cm. (rarely up to 4 cm.) broad, short-acuminate at apex, cuneate to broad-cuneate at base, margin entire, midrib grooved above, elevated beneath, secondary veins 7-9 pairs, immersed, rarely visible, reticulate, petiole short and slender, usually under 1 cm. long; flowers solitary and axillary, sometimes pseudo-verticillate at the distal end, about 5 mm. across, perianth-lobes 15, the outer three small, about 2 mm. long, 2-2.5 mm. broad, triangular-ovate, the inner ones larger, ovate or oblong-ovate, the largest 5 mm. long, 4 mm. broad, the average ones 4 mm. long and 3-3.5 mm. broad, the innermost becoming smaller, ovate or rhombic and often mucronate, 2-3 mm. long and nearly as broad as long, stamens 6 or more, 1-seriate, 2-3 mm. long, filaments oblong, 1-1.5 mm. long, thick, carpels 7-8, flattened ovoid, 2-3 mm. long, shortly beaked; fruit (not at full maturity) about 12 mm. across, carpels 8, about 6 mm. long, 3.5 mm. in diameter; peduncle

about 6 mm. long (apparently longer at full maturity).

Southwest Szech'uan: O-mei-hsien, Mount Omei, Ta-p'ing, shrub, C. L. Sun 546(SU), June 18, 1939; same locality, Hsi-hsin-hsueh, ravine, shrub, 15 cm., flower red, C. L. Sun 2270(SU), May 31, 1940; same locality, tree, 6-7 m., T. C. Lee 2773(SU), July 12, 1940; same locality W. P. Fang 17052(SU), June 23, 1941.

In Szech'uan, this species has been reported from Mount Omei only. The Omei plant in general has the elliptic leaves rather than the elliptic-lanceolate ones of the cotype collections, A. Henry's 12108A and 12224B from Sze-mao, Yunnan. Fang's 17052 has elliptic-lanceolate leaves larger and broader than the typical micranthum; however, the flower is quite characteristic and unmistakable.

3. Illicium Henryi Diels var. multistamineum A. C. Smith in Sargentia 6: 64. 1947.

Probably a shrub; young branchlets of the current year yellowish-green, slightly angulate, those more than one year old yellowish-brown, terete; buds oblong-ovoid, scales deciduous, occasionally one or two persistent; leaves thick, coriaceous, sub-verticillate, narrowly elliptic, narrowly obovate or elliptic-lanceolate, 8-10 cm. long, 3-3.8 cm. broad, rarely 5-7 cm. long, 1-2 cm. broad, acute-acuminate or acute at apex, cuneate at base, midrib plane and grooved above, slightly elevated beneath, petiole 5-10 mm. long; flowers axillary, solitary, 1-1.5 cm. across, peduncle 1.5-1.8 cm. long, perianth lobes

10-12, obovate-oblong, 8-11 mm. long, 5-7 mm. broad, the inner ones often reduced in size and narrower, stamens 16-23, about 2.5 mm. long, filaments 1.5 mm. long, oblong, anthers suborbicular, about 1 mm. long, connective inconspicuous, rounded at apex, gynoecium long, ovoid, carpels 8, about 4 mm. long, ovary ellipsoid or subovoid, style long and slender about 2 or 3 mm. long; fruits not seen.

Northeastern Szech'uan: Ch'eng-kuo-hsien, "District de Tchen-keou-tin," R. P. Farges 208 bis (type, AA).

Southeastern Szech'uan: Nan-ch'una-hsien, Bock & v. Rosthorn 2326(AA). 1891.

Illicium Henryi Diels which has been generally confused with the specimens of Illicium from along the Yangtze River, now seems to be found mainly in Hupeh. The variety above differs from the species by its greater number of stamens, which varies from 16-28 (usually over 20), in 2-3 whorls. The species has only 11-14 stamens usually in 1 whorl. Rosthorn 2326 which was cited by Diels (11) as I. Henryi has very small leaves with nearly completely immersed veins. The carpels are 8 in number, immature, but long-styled like those of the species. Though the number of stamens is not known, geographically it is better to consider this collection as var. multistamineum.

4. Illicium majus Hooker f. & Thomson in Hook. f. Fl. Brit. Ind. 1:40. 1872.

Tree, 3.5 m.-7 meters high, 1/6-1/3 meter in diameter; young

branchlets of the current year yellowish-brown, those more than one year old of a deeper shade; terminal buds long and pointed; leaves subcoriaceous, greenish above, brownish (in the dry condition) beneath, elliptic-oblong or elliptic-lanceolate, 11-18 cm. long, 3.5-5.5 cm. broad, long-acuminate at apex, cuneate to broad-cuneate at base, margin entire and slightly revolute, midrib concave above, prominent beneath, secondary veins reticulate, rather conspicuous, petiole long and rather stout, yellowish, about 3 cm. long, 2-3 mm. in diameter; flowering and fruiting materials not available.

Southeastern Szech'uan: Nan-ch'uan-hsien, "urnah. Huapan-chn p'ing, joulang shu, Baum 21', 1' cicr.," Bock & v. Rosthorn 776(MO), September 5, 1891; same locality, "Jangshui-pa, Chin huang shu, Baum 10', 5" cicr., Wald," Bock & v. Rosthorn 941(MO), September 17, 1891.

The only specimens from Szech'uan I have seen are Rosthorn's two from Nan-ch'uan near the border between Szech'uan and Kweichou. The local names which he gave to the specimens are different. These, however, are probably the same thing as I cannot find any difference between them in the sterile condition.

The large, subcoriaceous and reticulate leaves, and the long, stout petioles suggest that these plants have a closer relationship to Illicium majus than to Illicium Henryi var. multistamineum A. C. Smith. The specimen of Rosthorn, no. 2326, from Nanch'uan, cited as I. Henryi by Diels (11) in his original description of that species, then cited by

A. C. Smith (22) as var. multistamineum, is certainly very different from those listed above.

The foliage also suggests a resemblance to I. Simonsii Maxim., which occurs in western Szech'uan and seems less likely to be found at Nanch'uan. Since no flowering or fruiting material is available, it is difficult to treat these specimens properly. I venture to put them under the name of Illicium majus Hook. f. & Thoms., because (a) the leafy character suggests that species, and (b) the locality of the Nanch'uan plant falls near the range of I. majus which has been reported at Mei-t'an, Kweichou, not more than 200 miles southwest from Nanch'uan. I have not seen the Mei-t'an plant.

Illicium majus by Smith (22), is said to be distributed from Indo-China and Burma to the southern part of China, including Yunnan, Kweichow, Kuangsi, Kuang-tung, Hunan and Szech'uan. As the western Szech'uan plants are apparently very different from the specimens collected from Indo-China, of which I have seen Petelot's 5796, 3758, and 1680 from Chapa, Tokin, it may be easier to treat them as a separate entity, and I suggest a new variety. The northern extension of majus reaches only to the southern border of Szech'uan and the common Illicium in this province is this new variety, diminutivum.

5. Illicium majus H. f. & T. var. diminutivum var. nov.

Tree or shrub, 1.5-10 m. high; young branchlets of the current year brownish or chestnut-brown, those more than one year old grayish-

brown; buds small, ovoid, scales numerous, broadly ovate, minutely ciliated, deciduous; leaves clustered or alternate, thick, coriaceous, green above, pale beneath, elliptic-lanceolate or rarely obovate-lanceolate, 7-14 cm. long, 2.5-4 cm. broad, long or short acuminate at apex, cuneate at base, margin entire slightly revolute, midrib depressed above, prominent beneath, secondary nerves 6-10 at each side, immersed, petioles 1-1.5 cm. long, 1-2 mm. across, concave above; flowers solitary, axillary and pseudo-verticillate at the nodes near the distal end of the branches, peduncle slender, 2-3.5 cm. long at anthesis, flower 1-1.4 cm. in diameter, perianth lobes usually 15-18, rarely 12 or up to 21, not differentiated, the outer ones smaller and triangular-orbicular, 3-5 mm. long, 4-6 mm. broad, ciliated, the middle ones the largest, usually oblong or ovate-oblong, 6-10 mm. long, 5-8 mm. broad, ciliated, the innermost the smallest, sometimes hard to distinguish from the stamen; stamens 21-31, usually in 2 series, 2-3 mm. long, filaments as long as, or longer than the anther, constricted at apex and attenuated at base, anthers ellipsoid, connective obtuse, carpels often 13, sometimes 12 or 14, 3-4 mm. long at anthesis, styles usually short, rarely long and very distinct (Wilson 3085); fruit reddish brown, about 3 cm. in diameter, peduncle slender, about 2 cm. long, 1.5 mm. in diameter, mature carpels 8-12 mm. long, 5-10 mm. broad or perhaps larger (mature fruit not seen), beak rather stout, 2-3 mm. long, recurved; seeds oblong-ovoid, 6-8 mm. long and 3-5 mm. broad, brown and smooth.

Western Szech'uan: Mupin (Pao-hsing-hsien), thickets, alt. 1000-1300 m., bush 1.5-2 m., flowers dark-crimson, Wilson 3085(NH), June 1908; O-mei-hsien, Mount Omei, Hung-chun-ping, alt. 1200 m., small tree, 8 m. high, flowers in bud, W. P. Fang 15930(SU), March 27, 1941; same locality Hua-yen-ting, alt. 2096 m., small tree 8 m. high, flower greenish, W. P. Fang 18762(SU), May 6, 1942; same locality, Tsu-tien, alt. 1800 m., small tree 8 m., high, flower reddish, W. P. Fang 18353(SU), April 8, 1942; without precise locality, W. P. Fang 16311(SU), April 26, 1941; without precise locality and date, C. L. Sun 2694(SU).

This new variety is different from the species by its thick, leathery and smaller leaves which are identical with those of Illicium Henryi Diels of Hupeh Province; by the more completely immersed veins, by the shorter, slender petioles, and by the greater number of stamens (21-31, in contrast to 12-21 in the species). From Illicium Henryi, and its Szech'uan var. multistamineum, it differs by its larger number (12-13) of carpels.

Illicium majus Hook f. & Thoms. and Illicium Henryi Diels are closely related species. The former represents the southern entity and has larger and broader, thin, somewhat reticulate leaves, larger flowers, larger fruits, stouter peduncles, more stamens and more carpels; while the latter represents the northern entity and has smaller, narrower, thick, leathery and obscurely veined leaves, smaller flowers, smaller fruits with fewer (8) carpels, fewer stamens, and slender peduncles. Between these two entities there are intermediate forms. This variety

of western Szech'uan has its constant characteristics both in the leafy and the floral structures.

Wilson's 3085 from Mupin was cited by Rehder and Wilson (21) as Illicium Henryi Diels in Plantar Wilsonianae. In fact, it is identical in appearance with Henryi in every respect except for the number of stamens and carpels. Later it was identified as Illicium majus Hook. f. & Thoms. by A. C. Smith (22) in his monograph of Illiciaceae and Schisandraceae. However, this plant differs from the typical majus as pointed out in the preceding statement, though not so strikingly as the Omei specimens. This species as known from Mount Omei, is in general a tree from 8–10 meters (according to collectors), while the Mupin plant is a shrub not more than 2 meters high. The geographical distribution of both the species and its variety has been previously discussed on page 46.

FAMILY SCHISANDRACEAE G. DON

Scandent shrubs; leaves alternate or subalternate and crowded at the distal end of young branchlets, simple, entire or shallowly and minutely denticulate, exstipulate; flowers unisexual, dioecious, or monoecious, regular, perianth lobes several to many, not differentiated, subequal or unequal, androecium variously shaped, stamens few to many, filaments connate at base or through the whole length into a characteristic column, anthers essentially 4-celled, lateral or lateral-extrorse or lateral-introrse, vertical or divergent, contiguous or widely separated by the connective, connective narrow to very broad, gynoecium on the terminal portion of the short torus, carpels several to many, ovary 2-several ovuled, stigma inconspicuous, sessile or shortly pseudo-styled; fruits globose with short torus or elongated and spike-like, mature carpels berry-like, usually reddish in color; seeds 1-several, with lateral placentation, ventrally attached or pendulous. Two genera, both occurring in Szech'uan, with 12 species and 1 variety. Don in 1831 (12) first raised this group to the family rank, and used the name "Schizandriaceae". The present name was corrected by Smith (22) in 1947.

Key to the Genera

Fruits variously modified, globose; rachis very short..... Genus Kadsura

Fruits long and spike-like; rachis elongated..... Genus Schisandra

Genus Schisandra Michx.

Scandent shrubs, sometimes aromatic; bud-scales several and imbricate; leaves alternate or subalternate, evergreen or decidous, simple, chartaceous, usually shallowly denticulate or entire, exstipulate; flowers dioecious or monoecious, solitary and axillary, always appearing with leaves, floral parts spirally arranged, perianth lobes several to many, androecium variously shaped, stamens few to numerous, essentially free to entirely connate, column variously shaped, filaments free, connate, erect, spreading or reduced, anthers extrorse or lateral, gynoecium variously shaped, at the distal end of the torus, carpels numerous, ovary with 1-2 ovules, rarely 3; fruits spike-like, the torus much elongated after anthesis, mature carpels red, often globose to subglobose, seeds 2, rarely 1 or 3. Nine species and 1 variety in Szech'uan. A different spelling of this Genus name is Schizandra. The present name was proposed for conservation by Rehder (20) in 1944.

Key to the Sections

Stamens numerous (8–60), filaments free or essentially so, anthers distinctly stalked..... Sect. Pliostema

Stamens fewer in number (5-16), filaments connate into a rounded column, anthers sessile on the surface of column..... ..... Sect. Sphaerostema

Section Pliostema A. C. Smith

Androecium with numerous free stamens, the base of filaments often united into a column of various shapes.

Key to the Species

A. Stamens with obvious filaments; leaves usually narrow, obovate or lanceolate; carpels very numerous, 60–110; flowers red

B. Leaves narrowly obovate or obovate; stamens more numerous, 40–60..... 1. S. rubriflora R. & W.

BB. Leaves lanceolate or obovate-lanceolate; stamens less numerous, 20–50..... 2. S. sphaerandra Stapf

AA. Stamens with very short filaments or subsessile; leaves usually broad, width over 1/2 length; flowers yellowish or orange-red; carpels less numerous, about 50, rarely up to 70

C. Branchlets angulate and prominently winged, with larger persistent bud-scales over 5 mm., usually 8–20 mm. long, fruiting peduncles long and slender... 3. S. Henryi Clarke

CC. Branchlets subangulate or terete, not winged, with smaller persistent bud-scales under 5 mm., usually 2–3 mm. long; fruiting peduncles various

D. Leaves more or less pubescent beneath

E. Lower surface of leaves, branchlets and petioles all pubescent; perianth lobes less than 10, usually 5–8, stamens 18–24

F. Hairs simple; perianth lobes 7–8, stamens 19–24, carpels up to 55... 4. S. pubescens Hemsl. & Wils.

FF. Hairs branched, perianth lobes 5–7, stamens 18–20, carpels up to 70..... 5. S. tomentella A. C. Sm.

EE. Lower surface of leaves pubescent only on nerves, branchlets and petioles glabrescent or quite glabrous; perianth lobes 10, stamens about 15..... ..... 4. S. pubescens var. pubinervis A. C. Sm.

DD. Leaves glabrous or glaucous beneath; plant glabrous throughout

G. Leaves glaucous beneath, stamens 18-25, carpels about 50..... 6. S. glaucescens Diels

GG. Leaves greenish beneath; stamens 10-19, carpels less than 50

H. Leaves oblong, obovate or elliptic-oblong or suborbicular, 5-10 cm. long, 3-5 cm. broad, stamens usually 11-19..... 7. S. sphenanthera R. & W.

HH. Leaves elliptic-lanceolate, usually 4-6, rarely up to 7 cm. long, 1.5-3 cm. broad, stamens 10-16..... ..... 8. S. lancifolia A. C. Sm.

1. Schisandra rubriflora Rehder & Wilson in Sargent, Pl. Wils. 1: 412. 1913.

Scandent shrub; young branchlets of the current year brownish or purplish, those more than one year old purplish-gray, lenticels prominent; leaves alternate, often clustered at the distal end of the short young shoot, chartaceous, green above, pale green beneath, obovate or obovate-lanceolate, 7-12 cm. long, 4-8 cm. broad, acuminate or short-acuminate or rarely acute at apex, tapering or cuneate at base, margin denticulate or subentire, teeth 1/2-1 mm. deep, midrib flat above, elevated beneath, petiole 1.5-3.5 cm. long, 1-1.5 mm. in diameter, mostly rusty brown; flowers dioecious, staminate flowers 10-20 mm. across, peduncle 3-4 mm. long, slender, perianth lobes 6 or 7, obovate or oblong-ovate, subequal, 10-15 mm. long, 8-10 mm. broad, the outer ones often thin but the inner ones thicker, androecium subovoid, 7-10 mm. long, 5-6 mm. in diameter, stamens about 50, distinct, the lower ones

longer, the longest up to 6 mm. in length, the shortest at the top only 2 mm. long, filaments dilated, nearly as long as the anther or slightly longer, anthers extrose, elongated, pistillate flowers with perianth same as those of the staminate flowers, gynoecium elliptic-ovoid, about 10 mm. long, 4-5 mm. in diameter at full bloom, carpels very numerous, about 90; fruiting torus long and thick, 8-11 cm. long, matured carpels red or crimson, subglobose or ellipsoid, 8-10 mm. in diameter, seeds usually 2-4, flattened ellipsoidal or reniform, 2-3 mm. long, 2-2.5 mm. in diameter, brownish.

Western Szech'uan: Near Mao-chou, Chiu-ting-shan, thickets, alt. 2100 m., Wilson 921 (in part (NH)), May 22, 1908; Wa-shan, alt. 2000-2500 m., Wilson 921 (in part, (NH)), September 18, 1908.

This species is distributed from the high mountains which border the Chengtu Plain, to the eastern part of Sikang. It is characterized by its obovate or obovate-lanceolate leaves glabrous on both sides, its large, red to dark red flowers and its long and thick fruiting spikes of an attractive red color.

2. Schisandra sphaerandra Stapf. in Curtis's Bot. Mag. 152: sub. tab. 9146. 1938.

Scandent shrub, young branchlets of the current year purplish when dry, those more than one year old purplish-gray; buds elongated-ovoid, acute at the apex, scales imbricate, broad ovate, several

usually persistent at the base of either the peduncles or the current year's shoots; leaves thin, clustered on the very short young shoots, green above, light green and subglaucous beneath, elliptic-lanceolate or obovate-lanceolate, 6-8, rarely 4 cm. long, 2-2.5 cm. at the broadest part, margin entire, sometimes furnished with small mucronate teeth, acuminate or obtusely acute at apex, cuneate at base, midrib plane and narrowly grooved above, elevated beneath, secondary veins usually 5-6 on each side, reticulate, petioles 12-18 mm. long, glaucous or glabrescent; flowers red (according to Rock), staminate flowers 1.5-2 cm. across, on very slender peduncle about 1.5-3 cm. long, perianth lobes about 6, unequal, oblong or ovate-oblong, 10-14 mm. long, 6-9 mm. broad, the smallest 7 mm. long, and 5 mm. broad, androecium sub-obovoid, 6-8 mm. long, 5-6 mm. across, stamens 4-6 seriate, the upper ones connate, the lower ones connate at base and more or less free at the apex, anthers lateral-extrorse, connective conspicuous and somewhat cordate at apex, pistillate flowers same as the staminate ones but with slightly stouter peduncles, gynoecium oblong-ellipsoid, carpels very numerous, stigmas large, decurrent, producing a flattened oblong appendage at the ventral side of ovary, fruiting torus 5-7 cm. long, carpels red, subglobose, 5-8 mm. in diameter, smooth; seeds 1 or 2, sometimes 3, horse shoe-shaped, about 3 mm. long, 2 mm. in diameter, oily, yellowish.

Southwest of Szech'uan (S. E. Sikang): "in Kalapa et Liuku, in dunidtis adripas, frut. scandens, fl. intense rebri, alt. c. 3300 m.," C. Schneider 1276(NH), May 17, 1914; "Muli Kingdom", in forest, alt.

450 m., climber, 9-12 m., flowers red, J. F. Rock 18233(NH), September 1929; Kaushu shan, on trail to Leirong, southwest of Muli, vine, flowers red, fir forest, alt. 12,500 feet, J. F. Rock 24092(NH), May-July 1932.

Western Szech'uan (E. Sikang): "Ta-hsiang-ling, in fruticetis, ca. 2300 m. s m., H. Smith 2031(NH), May 22, 1928.

This species is now mainly in Eastern Sikang which was formerly a part of Szech'uan. No other member of the genus is found at such high altitudes (from 2300 to approximately 4000 m.).

3. Schisandra Henryi Clarke in Gard. Chron. III. 38: 162, f. 55. 1905.

Schisandra elongata var. longissima Dunn in Jour. Linn. Soc. Bot. 38: 354. 1908. (A. Henry 9193A, cotype, NH).

Scandent shrub; young branchlets of the current year greenish-red and glaucous, angulate and usually winged, wing papery, those more than one year old purplish or purplish-brown, often densely yellowish-lenticellate, angulate and sometimes winged, or subterete and narrowly costate; bud-scales oblong or ovate-oblong, mucronate or acute at apex, large, usually about 10 mm. long, 6-8 mm. broad, several persistent at the base of the young shoot; leaves green above, pale and usually glaucous beneath, orbicular-ovate, broad-elliptic or rarely oblong, 5-10 cm. long, usually 4-7 cm. broad, acuminate or shortly acuminate at apex, rounded or broad-cuneate at base, margin entire or remotely denticulate with glandular teeth, midrib slightly elevated and grooved near the base above, elevated beneath, petiole red, slender, 2-3 cm.

long; flowers dioecious, staminate flowers greenish-yellow, perianth lobes usually 7, suborbicular, 5-7 mm. long, 4-6.5 mm. broad, androecium subglobose or globose, 4-6 mm. long and approximately as wide as long, stamens 28-30, 3-seriate, the lower whorls with free filaments as long as 1 mm., the uppermost whorl connate into a peltate top, with wavy or dissected margin and sessile anthers, anthers lateral-introrse, ellipsoid, about 1-1.5 mm. long, pistillate flowers on long peduncle 7-8 cm. long, perianth lobes same as those of the staminate flower, gynoecium oblong-ovoid, 7 mm. long, 5-6 mm. broad, ovary glabrous, style short; fruits on slender peduncle, about 8 cm. long, mature carpels globose, 4-5 mm. in diameter, short stalked, red, seeds 2, yellowish-brown, subhemispherical.

Southwestern Szech'uan: O-mei-hsien, Mount Omei, vine, flowers yellowish-green, C. L. Sun 504(SU), June 14, 1939; same locality, W. P. Fang 16686, 16734, 17017(SU), May-June 1941.

This is the common Schisandra in eastern and western Szech'uan. The winged, angulate branchlets, and the broad, ovate leaves, glaucous on the lower surface and with long, slender, red petioles, are remarkable and distinguish this species readily from any other species in this province.

4. Schisandra pubescens Hemsley & Wilson in Kew Bull. Misc. Inform. 1906:150. 1906.

Scandent shrub; young branchlets of the current year, terete or subangular, densely covered by very short rufous hairs, those more than one year old terete or slightly angular, glabrescent or sparingly pubescent, purplish or grayish-purple; leaves deep green and glabrous above, grayish and covered by simple, curly hairs beneath, elliptic-ovate or suborbicular, usually 8-9 rarely 6 cm. long, 5-7 rarely 4 cm. broad, acuminate or shortly mucronate at apex, subrotund or truncate-rotund at base, margin shallowly denticulate or entire, teeth small and pointed, midrib shallowly grooved above, slightly elevated beneath, secondary veins 5-6 on each side, midrib and sometimes also the secondary veins rufous pubescent, petiole 2-3 cm. long, covered by short, dense, rufous hairs; flowers dioecious, staminate flowers solitary, axillary, yellowish, 12-15 mm. across, peduncle about 4 cm. long, covered by short, curly hairs, perianth lobes 9, yellowish, suborbicular, ciliate, the outer ones smaller, 6 mm. long, 5 mm. broad, the inner ones 8-10 mm. long, 7-8 mm. broad, androecium subovoid, about 4 mm. long, 5 mm. in diameter, anthers lateral-introrse, cells linear, connective oblong, obtuse at apex, filaments connate at base, free portion very short, under 1 mm., pistillate flower not seen; fruits orange-red, 5-6 cm. long, rarely shorter, peduncle 5-7 cm. long, puberulent, mature carpels numerous, puberulent, very short beaked, seeds 2, sometimes 1, yellowish.

Southwestern Szech'uan: O-pien-hsien, alt. 1600 m., T. T. Yu 844(NH), May 23, 1932; same locality, W. C. Cheng 6238(NH), August 1936; O-mei-hsien, Mount Omei, Ta-p'ing, T. C. Lee 2792(SU), July 12,

1940.

4a. Schisandra pubescens Hemsl. & Wils. var. pubinervis (Rehd. & Wils.) A. C. Smith in Sargentia 7: 119. 1947.

Schisandra sphenanthera var. pubinervis Rehder & Wilson in Sargent, Pl. Wilson. 1:415. 1913. (Wilson 2551, type NH)

Scandent shrub, 3-5 m. high; young branchlets of the current year purplish and glabrous, those more than one year old dark purplish, glabrous, lenticels conspicuous, yellowish; bud-scales usually persistent at the base of the present year's shoots; leaves alternate, subchartaceous, green and glabrous above, light green beneath, glabrous except for the midrib and nerves which are covered by rufous or buff, curly hairs, elliptic-ovate or elliptical, rarely oblong or rhombic-elliptical, 5-10 cm. rarely 3.5 cm. long, 4-5 cm. rarely up to 6 cm. broad, acuminate or shortly acuminate or acute at apex, broad-cuneate or rounded at base, margin denticulate, teeth shallow and pointed, midrib plane and slightly concave above, elevated beneath, petiole 2-3 cm. long, glabrescent or glabrous; flowers dioecious, staminate flowers greenish, about 1 cm. across, on slender peduncles about 3-5 cm. long, perianth lobes 9, suborbicular, unequal, 5-8 mm. long, 4-7 mm. broad, yellowish or greenish, stamens 14-15, about 3 mm. long, filaments very short, about 1 mm. long, dilated and connate at base, anthers lateral, cells linear, connective broad, pistillate flowers usually larger than the staminate ones, about 1.5 cm. across, perianth lobes 7, about 10 mm. long, 8-9 mm. broad, gynoecium ovoid, 7-8 mm. long, carpels numerous,

ovary ovoid, style short, deciduous; fruits red, on a peduncle 4-6 cm. long; seeds 1 or 2, subglobose, compressed, reddish-brown, about 3 mm. in diameter.

Southwestern Szech'uan: Near Monkong Ting, thickets, alt. 2,000-2,300 m., Wilson 2551 (type of S. sphenanthera, NH), June 19, 1908; Hung-ya-hsien, thickets, alt. 1300 m., Wilson 897(NH), September 14, 1908; O-mei-hsien, Mount Omei, W. P. Fang 7658(NH), July 16, 1930; same locality, alt. 1500 m., climbing on tree, occasional, W. P. Fang 12823(SU) 1940, same locality, alt. 1850 m., vine, bark blackish-purple, flowers yellowish-green, common, W. W. Ma 2508(SU) June 1940, O-pien-hsien, at roadside, W. C. Cheng 5987 & 6028(SU), July 1936.

This was recognized as a variety of S. sphenanthera R. & W. until recently transferred by A. C. Smith (22) to the present species because of the nature of the pubescence. Its androecium, however, bears 14-15 stamens with filaments connate basally, a characteristic nearer to S. sphenanthera than to S. pubescens.

5. Schisandra tomentella A. C. Smith in Sargentia 7:119-120. 1947.

Scandent shrub; young branchlets of the current year covered with rusty, curly, branched hairs, angulate or subterete, those more than one year old subterete or terete, glabrescent or glabrous, grayish-purple; leaves papery, , green above, scaly and rusty-pubescent beneath, hairs curly, branched, rufous, elliptical, broad-elliptical or elliptic-obovate, 6-8 cm. long, 3.5-6.5 cm. broad, acuminate or long-acuminate

at apex, cuneate at base, margin toothed with callose teeth, midrib depressed or slightly elevated above, plane or slightly elevated beneath, densely covered by short, curly, branching hairs; petiole 2-2.8 cm. long, 1.5 mm. in diameter, pubescent; flowers monoecious, staminate flowers on the same branch with the pistillate flowers, perianth usually 6, subequal, the external three thin, suborbicular or broad-elliptical, 4-7 mm. long, 4-6 mm. broad, the inner three thick and slightly smaller than the outer ones, androecium subglobose 3-5 mm. long, 2-3 mm. in diameter, stamens 18, filaments connate into a thick column, anthers free, laterally introrse, 1.2-2 mm. long, pistillate flowers often larger than the staminate flowers, perianth lobes 6-7, 8-10 mm. long, 8-9 mm. broad, gynoecium subglobose, about 5 mm. long, 5 mm. in diameter, carpels very numerous, about 70, ovary compressed ovoid, very short beaked, beak about 1/2 mm. long, or sessile; fruits unknown.

Southwestern Szech'uan: Ma-pien-hsien, W. P. Fang 408, (cotype, NH) May 23, 1930.

A rather rare species in southwestern Szech'uan.

6. Schisandra glaucescens Diels in Bot. Jahr. 29:323. 1900

Scandent shrub; young branchlets of the current year purplish and glaucous, subterete or angulate, those more than one year old blackish-purple with prominent lenticels, angulate or subterete; bud-scales deciduous, rarely 1 or 2 persistent at the base of young branchlets;

leaves alternate or subalternate, chartaceous, green above, glaucous or subglaucous beneath, elliptic-obovate or elliptical, 5-8 cm. long, 3-5 cm. broad, acute-acuminate or shortly and abruptly acuminate at apex, cuneate at base, margin denticulated with minute teeth, midrib plane above, slightly elevated beneath, secondary veins 3-6 at each side, not well distinguished from the parallel veinlets, petiole 1-2 cm. long, subglaucous or glabrescent; flowers dioecious, solitary and axillary, orange-red according to Wilson, staminate flowers 8-14 mm. across, on a very slender peduncle about 3 cm. long, 1.1.5 mm. in diameter, perianth lobes 6-7, subequal, elliptic-oblong or broad-ovate, slightly glaucous, 8-13 mm. long, 7-10 mm. broad, androecium subovoid, somewhat peltate at the top, about 6 mm. long, 4 mm. across at anthesis, stamens numerous, filaments connate into a column, free only at the extreme upper portion, anthers lateral-introrse, cells very small, under 2 mm. long, connective yellowish, truncate or rounded at apex, pistillate flowers (material from Hupeh) with longer peduncle about 3-5 cm. long at anthesis, perianth lobes similar to those of the staminate flowers, gynoecium subglobose, about 6 mm. long, and as wide as long at anthesis, carpels numerous, stigma sessile, ovary subellipsoid, with projecting appendage at the distal end; fruits scarlet, 5-6 cm. long, about 2 cm. in diameter, slightly curved, mature carpels crowded; fruiting peduncle about 5 cm. long.

Southeastern Szech'uan: Nan-ch'uan-hsien, Chin-fu-shan, Lei-chia-p'ing, "Wu wei-t'eng, creeper 20 ft. long, on stone wall, fruit edible," Bock & v. Rosthorn 131 (photo of type, AA), July 29, 1891; same locality,

in thickets, woody vine, W. P. Fang 855(AA), May 21, 1928.

7. Schisandra sphenanthera Rehder & Wilson in Sargent, Pl. Wilson. 1: 414. 1913.

Scandent shrub, 3-5 m. high; young branchlets of the current year terete or subterete, brownish when dry, those more than one year old terete, purple or purplish-gray when dry, densely lenticellate, very slender; bud-scales small, about 2-3 mm. long and 2-4 mm. broad, persistent at the base of the young shoots; leaves subchartaceous, green above, light green beneath, elliptical or oblong-elliptical, obovate or rarely ovate, or orbicular, 4-8 cm. long, usually 3-4 cm. rarely up to 5-7 cm. broad, short-acuminate or acute at apex, cuneate at base, margin denticulate with small pointed teeth, or entire, midrib shallowly grooved or slightly prominent above, elevated beneath, petiole usually 8-12 mm. rarely up to 15 mm. long, 1/2-1 mm. in diameter; flowers dioecious, staminate flowers 8-12 mm. across, perianth lobes 6-8, broad-ovate or suborbicular, subequal, in the larger flowers usually 6-10 mm. long, 5-10 mm. broad, in the smaller flowers usually 4-7 mm. long, and 4-5 mm. broad, androecium globose, the basal, sterile portion of the column narrowed and stalk-like, stamens about 15, filaments connate, the free portion of the lower stamens not more than 1/3 mm. long, while those of the upper ones completely connate, anthers laterally introrse, long and narrow, connective subcordate, emarginate at the apex, pistillate flowers on longer peduncle 2.5-6 cm. long,

gynoecium subglobose, about 5 mm. in diameter, carpels about 40, up to 50; fruiting torus thick, 7-11 cm. long, mature carpels red, globose, 8-12 mm. in diameter, smooth; seeds usually 2, reniform, reddish-brown, dull, hilar marking conspicuous.

Southwestern Szech'uan: Wa-shan, thickets, alt. 1300-2000 m., Wilson 866 (in part,NH), May and September 1908; near Mao-chou, thickets, alt. 1300-1600 m., Wilson 866 (in part, NH), September 1908; Mupin (Pao-hsing-hsien), thickets, alt. 1600 m., Wilson 869(NH), June 1908; west and near Wen-ch'uan-hsien, alt. 1600 m., Wilson 869a(NH), September 1908; without precise locality, A. Henry 5527A (2 sheets both with staminate flowers NH), 1885-1888.

Henry's 5527A, without precise locality, has larger and broader orbiculate leaves than the western Szech'uan specimens.

8. Schisandra lancifolia (Rehd. & Wils.) A. C. Smith in Sargentia 7:133-135. 1947.

Schisandra sphenanthera var. lancifolia Rehder & Wilson in Sargent, Pl. Wilson. 1:415. 1913. (Wilson 2552, type, NH).

Scandent shrub; young branchlets of the current year angulate sometimes faintly winged or subterete, brownish when dry, those more than one year old subterete or angulate, brownish-purple, internodes long and slender, lenticels prominent; bud-scales broadly triangular-ovate, persistent at the base of the young shoots; leaves alternate or pseudo-verticillate at the short young shoots of the current year,

green above, paler beneath, glabrous on both surfaces, elliptic-lanceolate or elliptical, 3-6 cm. long, 1.5-2 cm. broad, long acuminate or acute at apex, cuneate at base, margin denticulated by small teeth, midrib impressed above, elevated beneath, secondary veins 4-5 on each side, petiole short and slender, 3-5 mm. long, under 1 mm. in diameter; flowers dioecious, staminate flowers small, 3-6 mm. across, on very long and slender peduncles, axillary, clustered at the distal end of the young branchlets of the current year, perianth lobes 7, unequal, broad-orbicular or broad-ovate, 3-5 mm. long, 3-5 mm. broad, subpapery, yellowish, sometimes tinged with a reddish hue, androecium obovoid, 2-3.5 mm. long, 2-3 mm. across, stamens about 10, filaments connate, anthers free, cresent-shaped, laterally introrse, yellow, connectives oblong; fruiting torus 4-5 cm. long, 10-14 mm. in diameter, mature carpels red, rather loosely arranged, subglobose to ellipsoid, 6-8 mm. long, 4-7 mm. in diameter, smooth and glabrous; seeds 1 or 2, rarely 3, sub-ovoid, or oblong-ellipsoid, rusty-brown, dull.

Western Szech'uan (E. Sikang): Mupin (Pao-hsing-hsien), thickets, alt. 1300-1800 m., climber, 2-4 m., flowers orange-yellow, Wilson 2552 (type of S. sphenanthera var. lancifolia, and cotype of S. lancifolia, NH), June 1908; Ta-chien-lu, alt. 1300-1600 m., climber, 2-3 m., fruit scarlet, Wilson 1286 and 1286a. (NH), October 1908.

This species with its small, lanceolate leaves and fewer stamens (about 15) and carpels (about 18) is distinct from S. spenanthera with which this species was identified as a variety by Rehder and Wilson(21).

The specimens available to me are not from Szech'uan due to the recent change of the provincial borders. This species may be expected at the western frontier of Szech'uan, even though no specimens have been seen from there.

Section Sphaerostema (Bl.) Nakai

Stamens in reduced number (5-16), filaments connate into a rounded and angulate head, free anthers sessile in the cavities of the head. Only 1 species in Szech'uan.

9. Schisandra propinqua var. sinensis Oliver in Hooker Ic. Pl. 18: Pl. 1715. 1887.

Schisandra propinqua var. linearis Finet et Gagnepain in Bull. Soc. Bot. Fr. 52: Mem. 4:51. 1905. (A. Henry 1693, 3243, 6219 & Wilson 485, all as cotypes, NH)

Scandent shrub, 2-3 meters high; branchlets slender, those of the current year subterete or angulate, grayish or slightly purplish, and somewhat costate, internodes very long and slender, those more than one year old purple or grayish, subterete or angulate; buds elongated, the terminal ones oblong or elongated, the axillary ones broad-triangular and smaller, scales persistent; leaves subchartaceous, green above, light green beneath, alternate, glabrous on both sides, narrowly lanceolate or ovate-lanceolate, 5-8 cm. long, 1.7-2 cm. broad, gradually tapering and finally forming an acumen at the apex, rounded or

truncately rounded, rarely widely wedge-shaped at base, margin conspicuously or obsoletely denticulate, teeth pointed or callose, midrib slightly elevated and centrally grooved above, prominent beneath, petiole short, 4-10 mm. long, under 1 mm. in diameter; flowers dioecious, staminate flowers (Hupeh material) with peduncle 1/2-2 cm. long at anthesis, perianth lobes 6-9, elliptic-oblong or elliptical, 4-8 mm. long, 2-5 mm. broad, androecium subovoid, 4 or 5 mm. long, stamens 6-9, filaments connate into an angulate head, anthers sessile in the cavities of the head, pistillate flowers with 8-11 perianth lobes, yellowish or yellowish-orange, gynoecium subglobose, 3-5 mm. long, about as wide as long, fruits on short, slender peduncle, torus slender, 3-7 cm. long, mature carpels 10-30, sub-ellipsoid, red: seeds 2, sometimes 1, subreniform.

Western Szech'uan (E. Sikang): Mupin (Pao-hsing-hsien) rocky places, alt. 1300-1600 m., Wilson 1070 (NH), 1908.

Western Szech'uan: Wa-shan, roadsides, alt. 1300 m., climber 2 m., fruit scarlet, Wilson 1268 (NH), November 1908.

Genus Kadsura Kaempf ex Jussieu

Scandent shrubs; bud-scales several to numerous, imbricated; leaves alternate, entire or shallowly denticulate, glabrous, exstipulate; flowers dioecious or monoecious, axillary on young shoots, sometimes rising below leaf on old branches, floral parts essentially

same to those of Schisandra, fruits globose, head-like, fruiting torus not elongated after anthesis, carpels on very short torus; seeds 2-several, rarely 1. Three species in Szech'uan.

Key to the Sections

A. Androecium with rudimentary ovary-like appendages at the top, stamens spirally arranged, filaments free or essentially so, anthers lateral and subdivergent..... Sect. Cosbaea

AA. Androecium without appendages at top, stamens cyclic, filaments rudimentary, anthers lateral, cells widely separated by the broad connective..... Sect. Eukadsura

Section Cosbaea (Lem.) A. C. Sm.

Androecium with appendages at top, stamens essentially free, spirally arranged, anthers lateral-extrorse, sometimes nearly divergent at the top of stamen. One species in Szech'uan.

1. Kadsura coccinea (Lem.) A. C. Smith in Sargentia. 7:166-171. 1947.

Cosbaea coccinea Lemaire in Illstr. Hort. 2:71. fig. 1855.

Kadsura chinensis Hance ex Benth. Fl. Hongkong.:8. 1861.

Schisandra Hanceana Baill. in Hist. Pl. 1:150. 1868-1869.

Kadsura Cavaleriei H. Level. in Rep. Fedde Sp. Nov. 9:459. 1911.

Scandent shrub; young branchlets of the current year greenish-purple, glabrous, usually with bud-scales persistent at base, those more

than one year old grayish-purple or blackish-purple, subterete, or subangulate; leaves coriaceous or thick coriaceous, alternate, deep green above, yellowish-green or pale beneath, glabrous on both sides, elliptic-ovate or elliptic-oblong, about 12 cm. long, 4-5 cm. broad, acuminate at apex, acumen 5-8 mm. long, broad-cuneate or subrotund at base, margin entire and slightly revolute, midrib immersed above, slightly elevated beneath, secondary veins 6-8 on each side, inconspicuous, tertiary veinlets not shown, petiole .5-2 cm. long, about 2 mm. in diameter; flowers dioecious, staminate flowers solitary or paired in the axils of leaves, reddish or greenish or yellowish, but tinged with red at top, 1-2 cm. across, peduncle about 2 cm. long, with 1 or 2 bud-scales persistent at the base, perianth lobes 10, the outer 2 or 3 triangular-ovate, or broad-triangular, 3-4 mm. long, 4-5 mm. broad, the inner ones large, oblong or obovate-oblong, 10-15 mm. long, 10-12 mm. broad, reddish or greenish-red, ciliated, androecium ovoid, often narrowed at top, 5 mm. long, stamens about 24, filaments distinct, 1-2 mm. long, anthers lateral-extrorse, pistillate flowers on longer peduncle about 3 cm. long, 2 mm. in diameter, perianth lobes same as those of the staminate flowers, gynoecium triangular-ovoid, about 7 mm. long, 5 mm. in diameter, carpels numerous, ovary subovoid, greenish, glabrous, no appendage; fruits not seen.

Southwestern Szech'uan: Wa-shan, roadsides, alt. 1300 m., climber 2 m., fruit scarlet, Wilson 1268b (NH), November 1908; O-mei-hsien, Mount Omei, alt. 1200 m., in woods, vine, flowers purple, T. C. Lee

2018(SU), May 17, 1940; same locality, alt. 1300 m., woody vine, flowers reddish, W. P. Fang 16680(SU), May 20, 1941; same locality, at side of forests, vine with reddish fruits, rare, T. C. Lee 3092 (SU), July 31, 1940; without precise locality, T. H. Tu 80 (SU), in 1935; without precise locality, W. C. Cheng 10449(SU), May 27, 1940.

Kadsura coccinea (Lem.) A. C. Smith is the new name of the well-known species, K. chinensis Hance. The binominal has a quite complex origin. Baillon in 1868(2) identified this species with a previously described plant Cosbaea coccinea Lemaire based on a cultivated plant in the botanical garden at Gand. Cosbaea at that time was already known as a synonym of Kadsura, and because Baillon reduced Kadsura and combined it with Schisandra, he then proposed Schisandra Hanceana for this species. It is evident that coccinea was the first name applied to this species. Smith (22) made the new combination in his monograph.

Section Eukadsura A. C. Sm.

Androecium without appendages at top, stamens arranged cyclically, filaments connate, anthers widely separated by broad connective.

2. Kadsura longepedunculata Finet et Gagnepain in Bull. Soc. Bot. Fr. 52: Mem. 4: 53. pl. 8, B, 8-15. 1905.

Kadsura peltigera Rehder & Wilson in Sargent, Pl. Wilson 1: 410. 1913. (Wilson 1736, type NH).

Scandent shrub; young branchlets of the current year yellowish-brown or greenish-brown, glabrous, those more than one year old grayish-brown or purplish-brown, densely lenticellate, subterete or angulate; leaves subchartaceous rarely subcoriaceous, deep green above, pale beneath, narrowly obovate-oblong, elliptical or elliptic-oblong, 9-12 cm. long, 3-3.5 cm. broad, acuminate at apex, acumen 5-9 mm. long, base cuneate, margin often shallowly or remotely denticulate, rarely entire and slightly revolute, midrib shallowly concave above, elevated or slightly so beneath, petiole slender, 2-3 cm. long; flowers dioecious, staminate flowers yellowish, about 1.5 cm. across, peduncle short, 10-15 mm. long, with 1 or 2 alternate, persistent bractioles, perianth lobes 9 or sometimes more, the outermost ones often very small and bract-like, 3-5 mm. long, 3-4 mm. broad, the inner ones broadly triangular-ovate or oblong, 10-12 mm. long, 8-10 mm. broad, the innermost the smallest, narrowly oblong or narrowly elliptical, 6-9 mm. long, 2-5 mm. broad, androecium subglobose, 8-9 mm. long, about 8 mm. in diameter, stamens arranged cyclically, connate into a globose head, anthers sessile, rarely with inconspicuous filaments under 1 mm. long, lateral-extrorse, cells 2, widely separated by the broad connective, connective subrectangular, about 1 mm. long, 2-2.5 mm. broad, pistillate flowers about 2 cm. in diameter, peduncle 8-20 cm. long, perianth lobes same as those of the staminate flowers except somewhat larger, gynoecium subglobose, rarely ovoid, 9 mm. long, 7 mm. in diameter, carpels numerous,

ovary oblong, angulate, ventral side with 2 pointed, narrow-lamellate appendages near the base, stigma sessile, large and peltate; fruit red, globose, 2.5-3 cm. in diameter, on a peduncle 4-5.5 cm. long, about 2 mm. in diameter, matured carpels angulate-obovoid, 10-14 mm. long, 8-10 mm. in diameter; seeds 3, brownish, reniform and laterally compressed, 5-6 mm. long, 5-7 mm. broad, hilar scar conspicuous, perpendicular to the long axis.

Southwestern Szech'uan: P'ing-shan-hsien, W. P. Fang 6368(NH), October 20, 1929; O-mei-hsien, Mount Omei, alt. 1400 m., shrub 3 m., fruit red, globose, W. P. Fang 18026(SU), November 1941; same locality, alt. 1900 m., woody vine, flowers creamy-yellow, W. P. Fang 16949(SU), June 14, 1941; same locality, W. P. Fang 17039 & 18932 (SU), June 23, 1941, and June 6, 1942.

This species presents a very complicated case in this province, especially on Mount Omei where it occurs together with K. polysperma Yang. The latter species is closely related, as evidenced by identical foliage, to K. heteroclita Craib which has a southern distribution. K. longepedunculata and K. heteroclita are two geographical entities of a single species-complex, and intermediate forms between the two entities are not exceptional on this mountain. Consequently difficulty is encountered in the identification of specimens without fruits. In general, this species differs from K. polysperma by its 2-3 seeded carpels, its narrow, denticulate leaves, and its larger flowers.

3. Kadsura polysperma Yang in Contr. Biol. Lab. Sci. Soc. China 12: 104. fig. 5. 1939.

Kadsura sp. Rehder & Wilson in Sargent, Pl. Wilson. 1:411. 1913. (Wilson 1116, NH).

Scandent shrub; young branchlets of the current year brownish or greenish-brown, subterete or slightly angulate, those more than one year old purplish-brown or brownish, densely lenticellate, lenticels elliptical or fusiform; buds small, ovoid, scales numerous, imbricate, usually several persistent at the base of the young branchlets; leaves alternate, subchartaceous, deep green above, paler beneath, elliptic-oblong, ovate-oblong or narrowly elliptical, 8-10 cm. long, 4-6 cm. broad, acute-acuminate at apex, broad-cuneate or subrotund at base, margin entire or occasionally denticulate by remote and very small teeth, midrib plane above, prominent beneath, secondary nerves very fine and faintly shown, petiole 1.5-2 cm. long, about 1.5 cm. in diameter; flowers dioecious, staminate flowers small, 5-7 mm. across, yellowish, peduncle 8-20 mm. long at anthesis, perianth lobes 12, the outermost bract-like, valvate, broad, triangular 3-4 mm. long, about 4 mm. broad, the inner ones the largest, oblong or oblong-ovate, rarely suborbicular, 4-5 mm. long, 3-4 mm. broad, the innermost slightly reduced, androecium ellipsoid, 3 mm. long, 2-2.5 mm. in diameter, stamens numerous, 7-9-seriate, arranged cyclically connate, anthers sessile or subsessile, lateral-extrorse, cells widely separated by broad connective, connectives rectangular, pistillate flowers not known; fruits subglobose, about 4.5 cm. long, 4 cm. in diameter (apparently not

mature), peduncle stout, about 4 cm. long, 3-3.5 mm. in diameter, carpels elongated-deltoid; seeds 5-7 in each carpel, olive-brown, deltoid or reniform, 5-6 mm. long, 5-7 mm. at the broadest part, hilar scar large and conspicuous.

Southwestern Szech'uan: O-mei-hsien, Mount Omei, Hung-chun-p'ing, alt. 900 m., C. L. Sun 2079(SU), May 16, 1940; same locality, alt. 5500-6000 ft., in thickets, woody vine, on a large tree, W. P. Fang 2683(AA), August 9, 1928.

Western Szech'uan (E. Sikang): Ya-chou-fu (Ya-an-hsien), thickets, alt. 2500 ft., climber 20 ft., fruit crimson, Wilson 1116(AA), October 1908.

This species is identical with K. heteroclita Craib in the characters of its leaves and androecium. It differs from the latter by its 5-7, occasionally up to 11, seeds in each fruiting carpel, by its much smaller staminate flowers, and its much larger fruits. The small size of the flower, however, is questionable for the staminate flowers in Sun's no. 2079 are young. If the small flowers and the large fruits are exceptional or a matter of the stage of development, the only difference remaining between this species and K. heteroclita would be the number of seeds. Whatever the relation of this species to the others, it is certainly an entity in the heteroclita-longepedunculata complex, and only more ample material and more field study can clarify this complicated problem.

The distribution of K. polysperma is limited in western

Szech'uan. On Mount Omei, it often occurs at lower altitudes than *K. longepedunculata*.

BIBLIOGRAPHY

1. Bailey, I. W. and C. G. Nast. "Morphology and relationships of Illicium, Schisandra and Kadsura." Journal of the Arnold Arboretum, 29:77-88, 1948.

2. Baillon, H. "Magnoliacees." Histoire des plantes, 1:133-192, 1868-1869.

3. Bentham, G. and J. D. Hooker. Genera plantarum, 6. Londini, Reeve & Co., 1862-1867.

4. Cressey, G. B. China's geographic foundations, 1st. ed. 3rd. imp. New York: McGraw-Hill Book Co. Inc., 1934.

5. Dandy, J. E. "Key to the Species." in J. G. Millais, Magnolias: 41-53, 1927.

6. _____, "Key to the species of Magnolia." Journal of the Royal horticu tural society, London, 53: 260-264, 1927.

7. _____, "The genera of Magnolieae." Kew Bulletin of miscellaneous information, 1927: 257-264, 1927.

8. _____, "Magnolia sinensis and M. Nicholsoniana." Journal of the Royal horticultural society, London, 53: 115, 1928.

9. _____, "New or noteworthy Chinese Magnolieae." Notes from the Royal botanic garden, Edinburgh, 16: 123-132, pl. 226, 1928.

10. _____, "The identity of Lassonia Buc'hoz." Journal of botany, British and foreign, 72: 101-103, 1934.

11. Diels, L. "Die Flora von Central-China." Botanische Jahrbücher für systematik, Pflanzengeschichte und Pflanzengeographie, 29: 169-659, 1900-1901.

12. Don, G. "Schizandriaceae." A general system of gardening and botany: 101-102, 1831.

13. Finet, A. and F. Gagnepain. "Contributions a la flore de l' asie, orientale." Bulletin de Societe botanique de France, 52: Memoire 4:23-45, 1905.

14. Good, R. D'O. "The past and present Distribution of the Magnoliaceae." Annals of botany, 39:409-430, 1925.

15. Hutchinson, J. Families of Flowering Plants 1. Dicotyledons. London: Macmillan & Co., 1926.

16. King, G. "The Magnoliaceae of British India." Annals of botanic garden, Calcutta, 3:192-223, 1891.

17. Rehder, A. "New species, varieties and combinations from the collection of the Arnold Arboretum." Journal of the Arnold Arboretum, 20:85-101, 1939.

18. _____, "Zur Nomemklatur der Magnolia denudata und M. liliflora Desrouss." Mitteilungen der Deutschen dendrologischen Gesellschaft 41:342-346, 1929.

19. _____, Manual of Cultivated Trees and Shrubs, 2nd ed. Ontario: The Macmillan Co. of Canada, 1940.

20. _____, "Schisandra Michaux nomem genericum conservandum." Journal of the Arnold Arboretum, 25:129-131, 1944.

21. _____, and E. H. Wilson. Sargent, Plantae Wilsonianae. Publication of the Arnold Arboretum, no. 4, 1913.

22. Smith, A. C. "The Families Illiciaceae and Schisandraceae." Sargentia, 7:1-224, 1947.

23. Stapf, O. "Magnolia Sprengeri diva." Curtis's botanical magazine, 152:9116, 1927.

24. _____, "Schisandra rubriflora." Curtis's botanical magazine, 152: tab. 9146, 1928.

25. Wilson, E. H. Plant Hunting, 2. Boston: The Stratford Co., 1927.

APPENDIX