

## SINORADLKOFERA: A NEW GENUS OF SAPINDACEAE

FREDERICK G. MEYER

IN 1900, HEMSLEY published *Koelreuteria minor*, describing it as a small sapindaceous tree from the province of Kwangtung, China. Hemsley noted that "no flowers have yet been received, but it is so very distinct that we do not hesitate to describe the otherwise complete specimens." The description of the 13 foot high tree was based upon a single collection with mature capsules. It may be noted that, lacking flowers, Hemsley's original figure of *K. minor* included the foveolate, strophiolate seeds, which are unlike the smooth, stipitate seeds of *Koelreuteria*. The lack of flowers in all the available specimens caused Radlkofer (1933) and all subsequent authors to place the plant in the genus *Koelreuteria*. How and Ho (1955) cited a specimen with flowers (Hwang, Ho, & Chia 130216) from Lin-Kwei Hsien, Kwangsi, as a flowering specimen of *K. minor*, without recognizing that it was different from *Koelreuteria*. More recently, the plant continues to be listed as *K. minor* in a new flora of the People's Republic of China (Anonymous, 1972).

## RELATIONSHIPS OF THE NEW GENUS

A single specimen (Wang) *Sun Yatsen University* 40934 (A) with flowers at anthesis and in bud, provided the critical material for a detailed comparison of *Sinoradlkofera* with members of the genus *Koelreuteria*. The two genera are compared in TABLE 1.

The new genus is provisionally placed in subfamily Dyssapindaceae (Sapindaceae anomospermae) in the tribe Koelreuterieae (Radlkofer, 1931), near *Koelreuteria*. The strophiolate seeds, sessile disc, pubescent corolla lobes with rudimentary appendages, and geniculate stamens are characters that clearly distinguish the new genus from the previously established genera of the tribe Koelreuterieae.

The pollen of *Sinoradlkofera minor* is closely related to that of *Koelreuteria* (Meyer, 1976). Only the shape of the grains in the two taxa differs: prolate in *S. minor*, and more or less spheroidal in *Koelreuteria*. Although *K. elegans* (Seem.) A. C. Smith has a striate-reticulate ectexine, the two remaining species, *K. bipinnata* Franchet and *K. paniculata* Laxm., have an ectexine with mostly parallel striae, which closely resembles that of *Sinoradlkofera*.

## KEY TO THE GENERA OF KOELREUTERIEAE

- A. Trees with compound leaves with a naked rachis; sepals valvate.
- B. Flowers yellow, asymmetric; disc elevated on a short androgynophore; seeds stipitate, the surface smooth. China, Taiwan, Fiji. . . *Koelreuteria*.



TABLE 1

Sinoradlkofera	Koelreuteria
Leaflets 2.9–4.7 cm. long.	Leaflets 4.8–14.1 cm. long.
Main lateral branches of the inflorescence 5-branched.	Main lateral branches of the inflorescence 4-branched.
Flowers subregular, white.	Flowers asymmetrical, yellow.
Disc sessile, androgynophore absent.	Disc elevated on a short androgynophore.
Petals puberulent.	Petals glabrous.
Limb of petal straight, appendages absent or forming a narrow marginal flap.	Limb of petal reflexed, appendages well developed.
Stamens geniculate in bud.	Stamens straight in bud.
Pollen prolate.	Pollen more or less spheroidal.
Capsules obovoid, retuse.	Capsules tapering toward the apex, or rotund to suborbicular.
Seeds strophiolate, ca. 4 mm. in diameter, the surface usually foveolate, without a waxlike coating.	Seeds stipitate (funiculus persistent), 5–7 mm. in diameter, the surface smooth, often with a whitish, waxlike coating.

- B. Flowers white, subregular; disc sessile; seeds strophiolate, the surface usually foveolate. Southern China. . . . . *Sinoradlkofera*.
- A. Shrubs with simple leaves, or leaves compound, rachis winged; sepals imbricate.
- C. Thorny shrubs with simple leaves; capsule membranous, loculicidal, regularly dehiscent. Afghanistan and Pakistan. . . . . *Stocksia*.
- C. Unarmed shrubs with pinnate leaves and a winged rachis; capsule leathery-membranous, finally irregularly dehiscent. South Africa and Madagascar. . . . . *Erythrophysa*.

Sinoradlkofera F. G. Meyer, gen. nov.

Inflorescentia paniculata; flores polygami, surregulares, albi; sepala valvata, adpresse puberulenta; petala versus basem disci sessilis inserta (androgynophorum nullum), unguiculata, ungue brevissime, limbo elliptico usque obovato, recto, puberulento, appendicibus carentibus vel rudimentalibus; stamina in alabastro geniculata, sub anthesi recta; antherae antrorsae, versatiles, glabrae; polline prolato; ovaria triloculares; capsulae retusae; seminae strophiolatae, saepe foveolatae.

SPECIES TYPICA: *Sinoradlkofera minor* (Hemsley) F. G. Meyer.

The name of the new genus, *Sinoradlkofera* (the prefix Sino = Chinese, the name *Radlkofera* having been preempted earlier for an African genus), is dedicated to Ludwig Adolph Timotheus Radlkofer (1829–1927), whose





FIGURE 1. *Sinoradlkofera minor*: a, habit of the plant,  $\times \frac{1}{4}$ , from (Wang) Sun Yatsen University 41208; b, staminate flower,  $\times 3$ ; c, geniculate stamen,  $\times 5$ ; d, inflated retuse capsule showing persistent calyx,  $\times \frac{3}{4}$ ; e, staminate flower (petals missing), showing calyx, disc, pistil, and stamens at anthesis,  $\times 3$ ; f, pistillate flower (petals missing), showing aborted stamens,  $\times 4$ ; g, petal,  $\times 8$  (b-g from (Wang) Sun Yatsen University 40934); h, capsule with exposed seed,  $\times \frac{3}{4}$  (after Hooker's Ic. Pl. XXVII: pl. 2642; i, strophiolate seed,  $\times 3$  (Tsang 28000)).



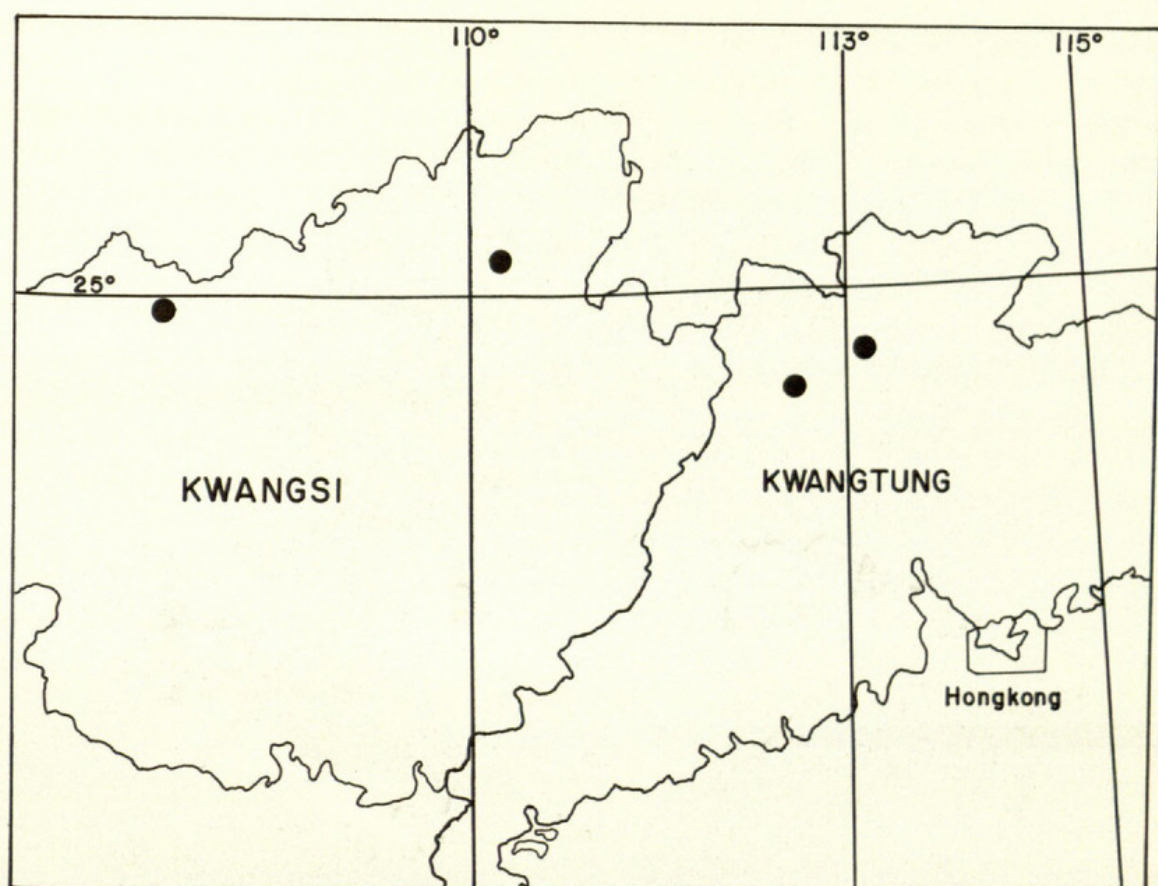


FIGURE 2. Distribution map of *Sinoradlkofera minor* in the People's Republic of China. According to How and Ho (1955), the distribution extends to the adjacent provinces of Hunan and Kweichow.

monumental world monograph of Sapindaceae (1931–1934) still remains the standard reference on this large and important family of flowering plants.

*Sinoradlkofera minor* (Hemsley) F. G. Meyer, comb. nov.

FIGURES 1, 2,<sup>1</sup> 3, 4.

*Koelreuteria minor* Hemsley, in Hooker, Ic. Pl. XXVII: pl. 2642. 1900; M. Smith in Forbes & Hemsley, Jour. Linn. Soc. Bot. 36: 487. 1904; Dunn & Tutcher, Kew Bull. Add. Ser. 10: 66. 1912; Chung, Mem. Sci. Soc. China 1(1): 152. 1924; Radlkofer in Engler, Pflanzenr. IV. 165: 1332. 1933; Chun, Sunyatsenia 4: 239. 1940; How & Ho, Acta Phytotax. Sinica 3: 404. 1955; Anon., Icon. Cormophytorum Sinicorum 2: 724. 1972. HOLOTYPE: China. Prov. Kwangtung, Lienchow River, 25 Aug. 1887, Ford 291 (K!); isotypes (HK, K!).

Deciduous tree, to 20 m. tall; d.b.h. to 40 cm.; twigs and young branches smooth, dark brown, puberulent; lenticels superficial, roundish to lenticular, pale brown; pith white to brownish; axillary buds densely sericeous. Leaves alternate, once pinnate, 8–14 cm. long, 3–8 cm. wide;

<sup>1</sup>The localities pinpointed on the dot map are in accordance with the *Mainland China, Gazetteer No. 22*, ed. 2, vols. 1 & 2. Prepared by the Geographic Names Division, Army Map Service, Washington, D. C. 1968.



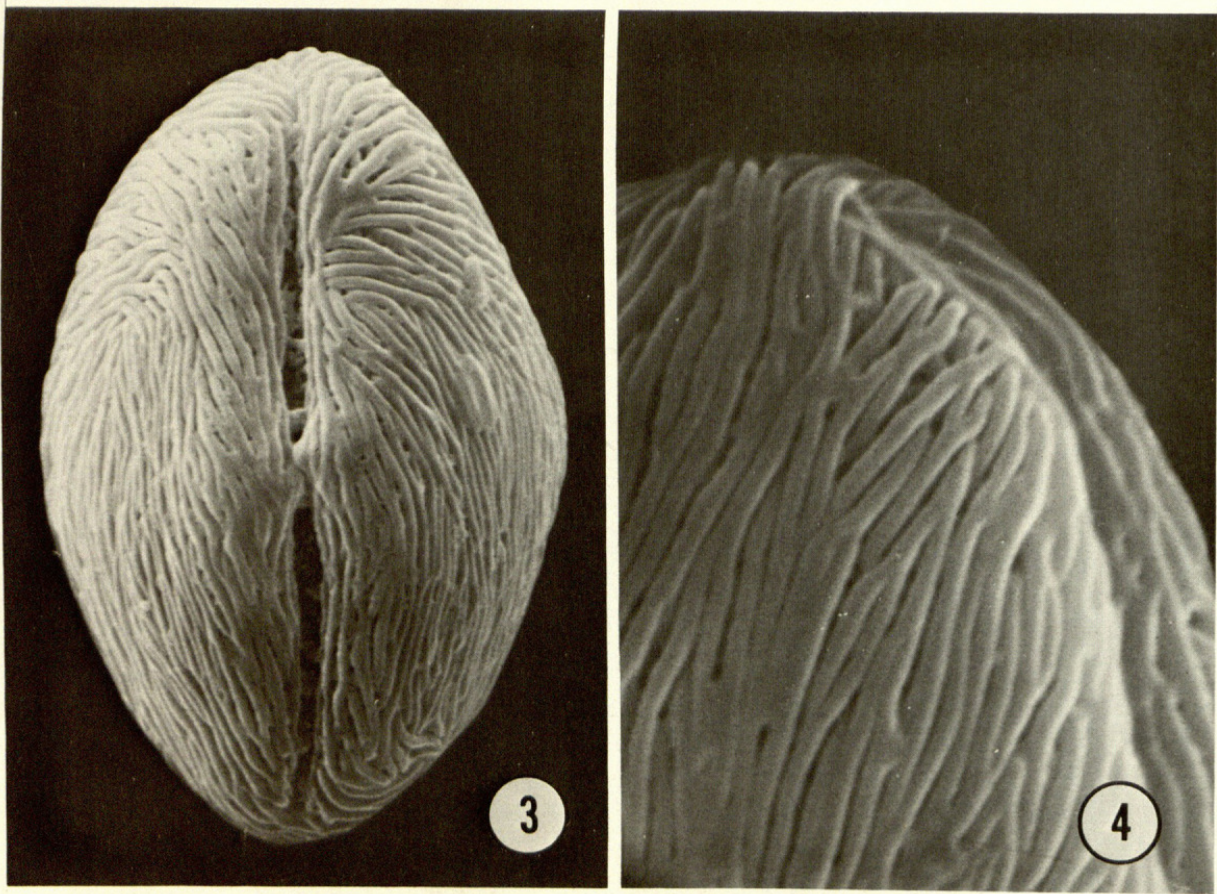
petiole somewhat pulvinate at the base, the rachis densely puberulent; leaflets 10–17, alternate or rarely opposite, the blade elliptic, oblique on the posterior side, 2.9–4.7 cm. long, 1.2–1.4 cm. wide, shallowly crenate-seriate, with forward pointing teeth, thick membranous, lustrous above, lighter beneath, glabrous except for occasional tufts of hair in the marginal sinuses and with short straight hairs on the midvein above and below, rarely with minute reddish glands on the midvein above, the petiolule very short and densely puberulent. Inflorescence terminal, paniculate, pyramidal, much-branched, 12–19 cm. long, 10–15 cm. wide, the branches very slender, uniformly puberulent; flowers polygamous, small, subregular, the bracteoles caducous, the pedicels 2.5–3 mm. long; calyx lobes 5, valvate, persistent, 1.5–2.5 mm. long, ca. 1 mm. wide, 2 long (2.5 mm.) and 3 short (1.5 mm.), oblong to obovate, obtuse at the apex, uniformly densely appressed-puberulent on the outer face, less so on the inner face, often densely fringed with hairs on the margin; disc sessile, tumid; corolla inserted on the outer side of the disc, the petals unguiculate, elliptic to obovate, white, 2.8–3.0 mm. long, obtuse at the tip, the limb straight, puberulent, narrowed to the short claw at the base, appendages absent or forming a narrow marginal flap near the base; stamens 8, inserted on the disc at the base of the ovary, the filaments geniculate in bud, becoming straight at anthesis, ca. 4 mm. long, very short and abortive in the carpellate flowers, the anthers antrorse, versatile, smooth; ovary densely sericeous while young, 3-locular; placentation parietal, the ovules 6, 2 in each locule, more or less median, anatropous, 3 descending and the raphe dorsal, 3 ascending and the raphe ventral; stigmas 3. Capsules inflated, 3-locular, loculicidal, triangular in cross section, obovoid, 1.7–2 cm. long and 1.7–2 cm. wide, the valves winglike, papyraceous, roseate while young, rotund to suborbicular, retuse at the apex, glabrous or often minutely puberulent on the dorsal suture, with reticulate venation outside, lustrous within, the style persistent, ca. 0.7 mm. long; seeds 3, ca. 4 mm. in diameter, nearly spherical, hard, black, shiny, reddish scurfy on the hilum, strophiolate, usually foveolate, exalbuminous, the embryo spirally convolute.

**POLLEN.** Grains single, prolate, 23–26  $\mu\text{m}$ .  $P \times 14\text{--}15 \mu\text{m}$ . E, 3-colporate, the exine ca. 1.5  $\mu\text{m}$ . thick (measured at the poles), the ectexine striate, the striae mostly parallel.<sup>2</sup>

**DISTRIBUTION.** Hill slopes, mixed woods, and thickets in upland areas of Kwangtung and Kwangsi, China. According to a recent publication,

<sup>2</sup> Pollen samples were removed from herbarium specimens, acetolyzed according to the method outlined in Erdtman (1966), and mounted in glycerin jelly. All slides are deposited at the Pollen Laboratory, Department of Botany, Smithsonian Institution. Due to a paucity of material, measurements are based on only 10 grains and should, therefore, be treated with reserve. Material for the scanning electron microscope was acetolyzed and mounted in a mixture of alcohol-water. After evaporation, the grains were vacuum-coated with gold, examined, and photographed with a Cambridge Stereoscan MK II A microscope. The data on pollen morphology were contributed by Joan Nowicke, Palynologist, Smithsonian Institution, Washington, D. C.





FIGURES 3, 4. Scanning electron micrographs of pollen grains of *Sinoradlkofera minor* from (Wang) *Sun Yat-sen University* 40934: 3, equatorial view,  $\times 4850$ ; 4, enlargement of ectexine,  $\times 10,000$ .



*Iconographia Cormophytorum Sinicorum* (1972), the distribution of the new genus extends to the adjacent provinces of Hunan and Kweichow, where it grows at an altitude of 400 meters. Flowering May and June; fruiting to November.

SPECIMENS EXAMINED. **China.** KWANGSI: Ching-Si Hsien, Piao-Lin village, 24 Aug. 1935, (Ko) *Sun Yatsen University* 55599 (A); Lung-mu-an and vicinity, Hai-yang-p'ing (Tai-hü P. O.), Kwei-lin District [25.17N, 110.17E], 7 July 1937, *Tsang* 27766 (A, NA, US), 8 July 1937, *Tsang* 27780 (A, NA, US); Lung-mu-an and vicinity, Hai-yang Shan, Kwei-lin District [25.17N, 110.17E], 8–12 July 1937, *Tsang* 27817 (A, NA, UC, US); San-min village and vicinity, P'an-ku-shan and Ch'ao-t'ien-shan, Kwei-lin District [25.17N, 110.17E], 5–23 Aug. 1937, *Tsang* 28000 (A, NA, UC, US); Nam Tanyuen (probably Nan Tan Hsien) [24.59N, 107.32E], 28 June 1937, (Wang) *Sun Yatsen University* 40934 (A); without locality, (Wang) *Sun Yatsen University* 41208 (A). KWANGTUNG: Yu-yuen Hsien, Tai Chiao [24.46N, 113.16E], 19 Nov. 1934, *Ko* 54793 (PE); Lienchow River [ca. 24.30N, 112.30E], Aug. 1887, *Ford* 291 (HK, K, NA, photo).

*Sinoradlkofera minor* is not, as Hemsley thought, a miniature tree only 13 feet tall. Specimens have been collected from plants up to 20 meters in height ((Wang) *Sun Yatsen University* 40934). At present, little is known about the ecology and total distribution of the new genus.

#### ACKNOWLEDGMENTS

My thanks are extended to the herbarium curators for supplying the materials that made this study possible. Dr. Joan Nowicke, palynologist, of the Smithsonian Institution, Washington, D. C., contributed the scanning electron microscope evaluation of the pollen. The Latin diagnosis was prepared by Elaine Mathers.

I am most grateful to my wife, Lillian, for the drawing, which includes the first published details of the flowers of the new genus.

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SUPERVISORY BOTANIST, NATIONAL ARBORETUM  
 U. S. DEPARTMENT OF AGRICULTURE  
 AGRICULTURAL RESEARCH SERVICE, NORTHEASTERN REGION  
 WASHINGTON, D. C. 20002





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