
New Species and Combinations in *Millettia* Wight & Arnott and *Pongamiopsis* R. Viguier (Leguminosae–Papilionoideae–Millettieae) from Madagascar

Jean-Noël Labat

Muséum national d'Histoire naturelle, Laboratoire de Phanérogamie, UMS 826 CNRS-MNHN, 16 rue Buffon 75005 Paris, France

David J. Du Puy

Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AB, England

ABSTRACT. Morphological characters support the description of five new species of *Millettia*, *M. capuronii* Du Puy & Labat, *M. hitsika* Du Puy & Labat, *M. nathaliae* Du Puy & Labat, *M. orientalis* Du Puy & Labat, and *M. taolanaroensis* Du Puy & Labat, and one new species of *Pongamiopsis*, *P. viguieri* Du Puy & Labat, from Madagascar. The genus *Neodunnia* R. Viguier is considered to be a synonym of *Millettia*, and two new combinations, *M. aurea* (R. Viguier) Du Puy & Labat and *M. richardiana* (Baillon) Du Puy & Labat, are made.

RÉSUMÉ. L'étude des caractères morphologiques permet la description de cinq nouvelles espèces de *Millettia*: *M. capuronii* Du Puy & Labat, *M. hitsika* Du Puy & Labat, *M. nathaliae* Du Puy & Labat, *M. orientalis* Du Puy & Labat, et *M. taolanaroensis* Du Puy & Labat, et une nouvelle espèce de *Pongamiopsis*, *P. viguieri* Du Puy & Labat, de Madagascar. Le genre *Neodunnia* R. Viguier est considéré comme étant un synonyme de *Millettia* et deux nouvelles combinaisons, *M. aurea* (R. Viguier) Du Puy & Labat and *M. richardiana* (Baillon) Du Puy & Labat, sont faites.

Prior to completion of an account of the subfamily Papilionoideae in Madagascar, six new species are described and illustrated and two new combinations are made in the closely related genera *Millettia* and *Pongamiopsis*.

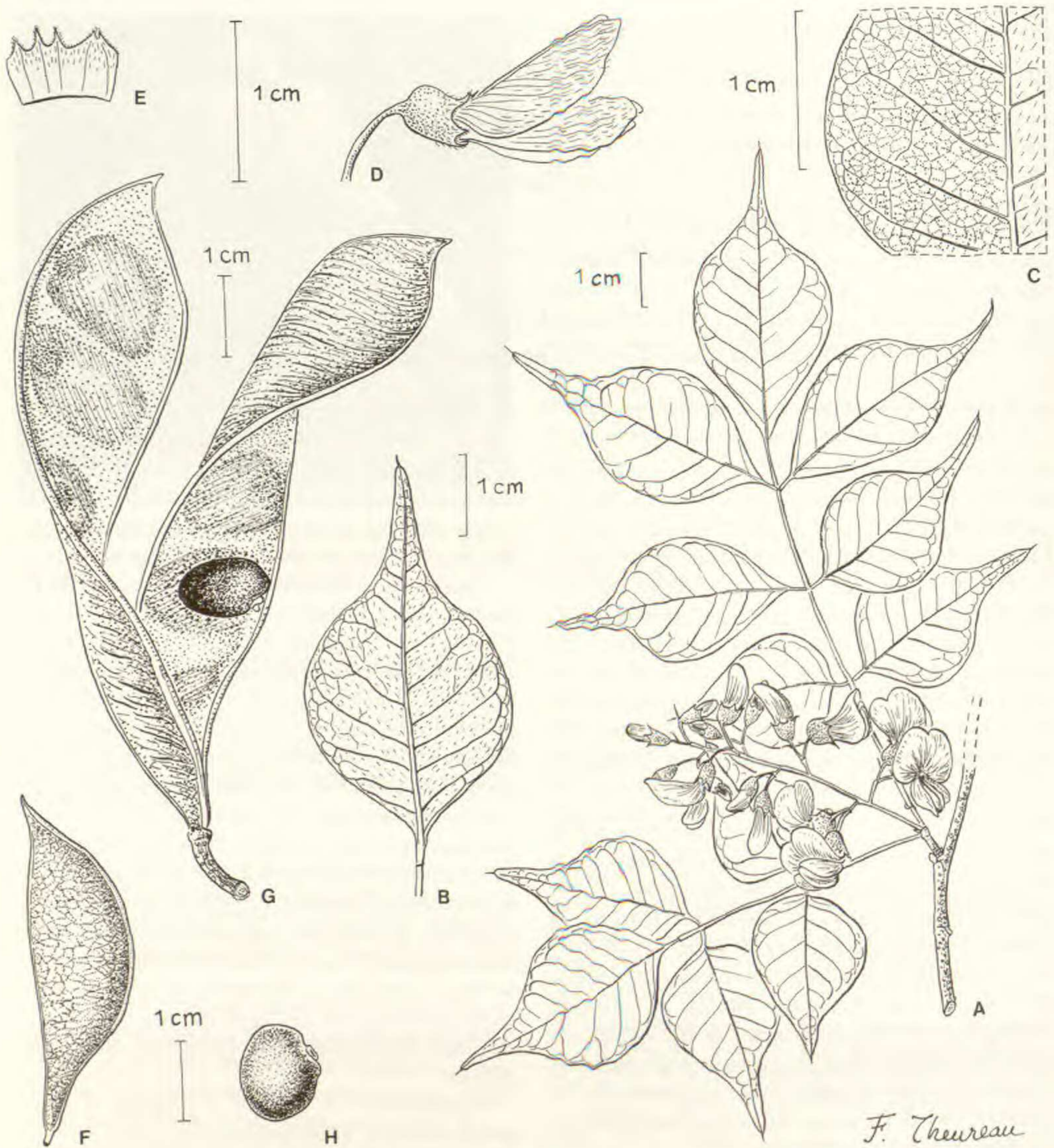
Millettia Wight & Arnott, with about 100 species, is one of the largest genera of the tribe Millettieae. The genus is mainly paleotropical, occurring in Asia and Africa, with only about five species in California and Mexico (formerly regarded as a separate genus *Hesperothamnus* T. S. Brandege, see Geesink, 1984: 102–106). Prior to the present publication, only one variable species, *M. lenneoides* Vatke, a small tree, shrub, or liane was recognized

in Madagascar: a total of eight species, all endemic, are now known to occur on the island. They are widely distributed throughout lowland Madagascar, but do not occur on the Central Plateaux.

Hutchinson (1964) considered *Neodunnia* R. Viguier to be a synonym of *Millettia*, but it was regarded as a separate genus by Geesink (1981, 1984) on the basis of its solitary flowers produced from the bud scales or lowest nodes of new, emerging shoots. In fact, in *M. (Neodunnia) richardiana*, the flowers are produced in a cluster of 2–4 on a very short peduncle, the inflorescence being a reduced pseudoraceme. The second species, *M. (Neodunnia) aurea*, has a similar inflorescence but with the axis somewhat elongated and the flowers in two or three distant clusters: this species and the newly described *M. nathaliae* are intermediate with the main group of species with multi-flowered pseudoracemes. These species are otherwise very similar to other, more typical, *Millettia* species in Madagascar, and *Neodunnia* is not considered here to be distinct.

Pongamiopsis R. Viguier is a genus of three species endemic to Madagascar (including the new species *P. viguieri*, described here). It is closely allied to *Millettia*, differing in its very swollen, ellipsoid pods, which do not taper toward the base, and its seeds, which are spherical or reniform, not flat and discoid as in *Millettia* species. The seeds also lack the rim aril extended into a short flap on one side, which is characteristic of *Millettia* in Madagascar.

***Millettia capuronii* Du Puy & Labat, sp. nov.**
TYPE: NE Madagascar. [Near Sambava], S de la basse Bemarivo, versant oriental de l'Ambatobiribiry, 100–330 m, 9 Avr. 1967 (fl), Service Forestier de Madagascar 27670-SF, R. Capuron (holotype, P; isotypes, K, L, MO, P, TEF). Figure 1.



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Figure 1. *Millettia capuronii* Du Puy & Labat. —A. Habit. —B, C. Leaflet undersurface. —D. Flower. —E. Calyx. —F. Young pod. —G. Pod. —H. Seed. (A–F drawn from *Service Forestier de Madagascar SF 27670*, and G and H from *Service Forestier de Madagascar SF 10027*.)

Species apice foliolorum contracto, foliis et leguminibus glabris, et inflorescentiis cum axibus secundariis brevibus et gracilibus pares apicales florum gerentibus distincta.

A deciduous tree 4–8 m tall, flowering on young, developing shoots; [DBH not known]; twigs glabrous with raised lenticels and small, spherical dormant buds. Leaves with 5–11 opposite leaflets; rachis glabrous; stipels absent. Leaflets ovate, 25–55 × 15–40 mm, obtuse to rounded basally, the apex acuminate and tapering into a short to long drip tip,

finally obtuse and mucronate, entirely glabrous, paler beneath. Pseudoracemes delicate, ca. 4–6 cm long, from the leaf axils near the base of new growths, the flowers toward the base of the inflorescence paired on short, slender secondary axes up to 6 mm long; pedicels with a pair of minute, filiform bracteoles near the middle which are caducous before the flower opens. Flowers ca. 12–15 mm long, violet. Calyx 3–4 mm long, subglabrous with a minutely ciliate margin, with 5 short, broadly triangular teeth,

the upper pair smallest and close together. Standard limb ca. 10×10 mm, cuneate basally, finely and sparsely appressed pubescent behind. Wings as long as the keel. Staminal sheath ca. 9 mm long. Pods obovate to oblong-obovate, flat, $65-80 \times 15-20$ mm, tapering toward the base, the apex rounded and beaked, glabrous, splitting into 2 twisted, woody valves, with 1-4 seeds. Seeds oblong-discoid, ca. 10×10 mm, chestnut brown, the aril extended into a short flap on one side.

Millettia capuronii is recognizable by its tapering leaflet apices, its glabrous leaves and pods, and its distinctive inflorescences with short, slender secondary axes bearing apical pairs of flowers.

Distribution. Eastern Madagascar, collected infrequently but in widespread localities along the eastern coastal region including Fort Dauphin (Taolañaro), Farafangana, and Sambava.

Habitat. Lowland evergreen forest near the coast, at low altitudes.

Flowering time. Only recorded in April.

Vernacular name. Sikidihazo.

This species is dedicated to René Capuron, collector of the type specimen, in recognition of his outstanding contributions to the knowledge of the forest flora of Madagascar.

Paratypes. MADAGASCAR. Prov. de Toliara, Préfecture Taolañaro (Fort Dauphin), forêt à 5 km de Ste. Luce, au N de Maliaforaky, $24^{\circ}46'S$, $47^{\circ}09'E$, 0-10 m, 28 Avr. 1989 (st), *Rabevohitra*, Dumetz & Gereau 1946 (MO, P, TAN); Prov. de Toliara, Préfecture de Fort Dauphin, forêt ombrophile de Manatantely, 50-250 m, 9 Nov. 1990 (jfr), *Rabevohitra* 2426 (MO, P, TAN); Dct. de Farafangana, Andafia, 20 Avr. 1953 (fr), *Service Forestier de Madagascar 10027-SF* (P, TEF).

Millettia hitsika Du Puy & Labat, sp. nov. TYPE:

E Madagascar. Forêt d'Analalava, Fenoarivo, 4 km W de Foulpointe, 20-50 m, 3 Déc. 1958 (fl), *Service Forestier de Madagascar 20154-SF*, R. Capuron (holotype, P; isotypes, K, L, MO, P, TEF). Figure 2.

Species habitu tenui et delicato et foliolis cum apice acuto, supra glabris et subtus appresso-pubescentibus distincta; a *M. orientalis* differt foliis, foliolis, inflorescentibus et floribus magnopere parvioribus.

A deciduous tree or shrub to 10 m tall, flowering on new, developing shoots soon after they emerge from the buds; DBH 18 cm (one record only); twigs brownish pubescent when young, glabrescent with rounded dormant buds when mature. Leaves with 9-13 opposite leaflets; rachis pubescent when young; stipels absent. Immature leaflets narrowly elliptic, [mature leaflets not known], acute and mucronate

apically, glabrous except for the midvein above, densely covered in short, appressed hairs beneath. Flowers in delicate pseudoracemes 4-9.5 cm long from the lowest nodes and leaf axils on very young shoots with developing leaves, the flowers solitary or paired on very short side spurs up to 1.5 mm long; pedicels with a pair of very small, filiform bracteoles up to 3 mm long which are caducous before the flower opens. Flowers 10-12 mm long, [pink or violet]. Calyx 2.5-4 mm long, brownish pubescent, with 5 short, broadly triangular teeth, the upper pair smallest and close together. Standard limb ca. 10×10 mm, thinly pubescent behind. Wings as long as the keel. Staminal sheath 8-9 mm long. [Pods and seeds not known.]

Millettia hitsika is characterized by its fine, delicate habit and by its narrow (immature) leaflets with acute apices, which are glabrous above and appressed-pubescent beneath. It is only known in flower with immature foliage, in which it somewhat resembles *Pongamiopsis pervilleana* (Baillon) R. Viguier. It is easily distinguished from *M. orientalis*, the only other *Millettia* species that occurs in the humid, eastern forests, a much more robust species with much larger leaves, leaflets, inflorescences, and flowers.

Distribution. Eastern Madagascar, on the coastal plain, from Ambila-Lemaitso to Foulpointe.

Habitat. In evergreen forest on sand, at up to ca. 50 m altitude.

Flowering time. October-March.

Local uses. The wood is used in construction.

Vernacular name. Hitsika.

The species name is derived from the vernacular name for this species.

Paratypes. MADAGASCAR. Ambila Lemaitso, 13 Mar. 1951 (fl), *Service Forestier de Madagascar 3260-SF* (K, P, TEF); Ambila Lemaitso, 15 Jan. 1953 (fl), *Service Forestier de Madagascar 7257-SF* (P, TEF); Dct. de Brickaville, Ambila Lemaitso, sous parcelle F2K, 20 Fév. 1958 (fl), *Service Forestier de Madagascar 19002-SF* (P, TEF).

Millettia nathaliae Du Puy & Labat, sp. nov.

TYPE: N Madagascar. Track to Irodo along the northern ridge above the Irodo River, ca. 5 km E of Route Nationale 6 to Antsiranana (Diégo-Suarez), the nearest village Andranomena, Sarainana River, $12^{\circ}37'S$, $49^{\circ}26'E$, ca. 235 m, 26 Nov. 1992 (fl, fr), D. J. Du Puy, G. Lewis & B. Schrire M564 (holotype, K; isotypes, P, MO, TAN). Figure 3.



Figure 2. *Millettia hitsika* Du Puy & Labat. —A. Habit. —B. Leaflet upper surface. —C. Leaflet lower surface. —D. Flower. —E. Calyx. (A–E drawn from *Service Forestier de Madagascar SF 20154*.)

Species *M. richardiana* affinis, inflorescentia elongata cum fasciculis pluribus florum, floribus minoribus, pedicellis multo brevioribus, et leguminibus glabris.

A shrub or small tree ca. 3–15 m tall, flowering on new shoots as they emerge from the buds and whilst the leaves are still very immature, DBH up to 40 cm; bark smooth with shallow vertical fissures, dark gray; young shoots densely golden pubescent; mature twigs glabrous, gray, with pale lenticels and large spherical dormant buds. Leaves with (13–)15–25 opposite leaflets; rachis slightly pubescent; stipels absent. Leaflets narrowly oblong-elliptic, 13–37 × 6–11 mm, with a long apical mucro (up to ca. 2 mm long), subcoriaceous and with decurved margins, densely golden pubescent when young, becoming glabrous when mature except for the midvein beneath. Pseudoracemes 1–3.5(–5.5) cm long, from the axils of very immature leaves, golden-velvety pubescent when still in flower, the axis often angular,

the flowers in 1–3 clusters, often paired, but the bottom group may have 2–4 flowers; pedicels short, 2–4 mm long, with a pair of linear bracteoles ca. 3 mm long, which are caducous as the flowers open. Flowers 8–10 mm long, bright fuchsia pink fading to pale mauve, the standard pale green at the base. Calyx 4.5–5 mm long, pale pubescent with occasional brown hairs, purple, with 3 narrowly triangular lower teeth with slender, tapering tips, as long as or shorter than the calyx cup, and with 2 small, very closely spaced upper teeth. Standard limb ca. 6–8 × 8–10 mm, shallowly notched at the apex, white pubescent behind. Wings longer than the keel, both slightly pubescent on the outer surfaces. Staminal sheath ca. 7 mm long. Pod obovate to oblong, flat, 40–70 × 16–18 mm, tapering toward the base, rounded and with a decurved beak apically, glabrous, splitting into two woody valves with 1–3 seeds. Seeds disc-shaped, 8–9 × 8–9 mm, finely

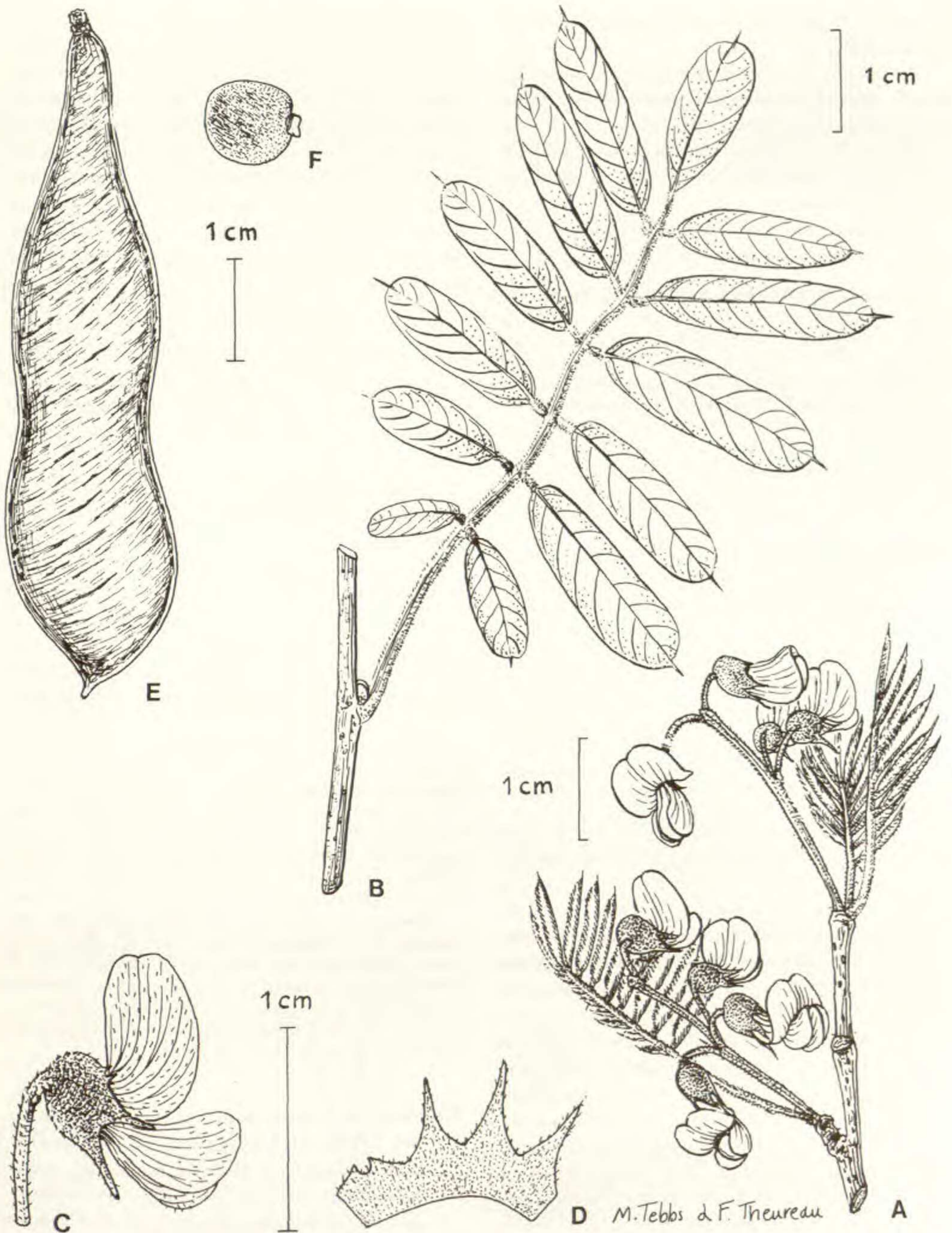


Figure 3. *Millettia nathaliae* Du Puy & Labat. —A. Flowering stem. —B. Leaf. —C. Flower. —D. Calyx. —E. Pod. —F. Seed. (A-F drawn from *Du Puy, Lewis & Schrire M564.*)

mottled dark brown, the aril extended into a short flap on one side.

Millettia nathaliae is closely related to *M. richardiana* but is distinguished by its elongated in-

florescence with several clusters of flowers, its smaller flowers, its much shorter pedicels, and its glabrous pods. It also closely resembles *Pongamiopsis amygdalina* (Baillon) R. Viguier when in flower and before

the leaflets develop, but its much smaller flowers are characteristic.

Distribution. Northern Madagascar, Ankarana Massif, around Diégo-Suarez and Sahafary forest north of the Irodo River.

Habitat. In deciduous woodland and shrubland, especially on limestone, but also on sand, at ca. 200–250 m altitude.

Flowering time. Only recorded in November.

This species is dedicated to Nathalie Labat.

Paratypes. MADAGASCAR. Ankarana Massif, SE margin, about 25 km NE of Ambilobe, near the village of Ambilomagadro, 13°01'S, 49°07'E, 200 m, 17 Nov. 1992 (fl), *Du Puy, Lewis & Schrire M559* (K, MO, P, TAN); Forêt d'Andranomavo, Canton d'Anamakia, District de Diégo-Suarez, 24 Juin 1951 (fr), *Service Forestier de Madagascar 3596-SF* (K, P, TEF); Bassin de la Saharaina, forêt de Sahafary, 27 Nov. 1958 (fl), *Service Forestier de Madagascar 20112-SF, Capuron* (K, MO, P, TEF).

Millettia orientalis Du Puy & Labat, sp. nov.

TYPE: E Madagascar. Baie d'Antongil, Nosy Mangabe, 5 km from Maroansetra, 15°33'S 49°46'E, 0–330 m, 9 Jan. 1989 (fl), *G. Schatz & J. Miller 2495* (holotype, MO; isotypes, K, P, TAN). Figure 4.

Species habitu robusto ramulis crassis et gemmis magnis, foliis longis (ca. 25–30 cm), foliolis numerosis (11–21) grandibus et inflorescentiis longis (9–20 cm) densis floribus numerosis grandibus (15–20 mm longis) distincta.

A large, deciduous tree ca. 15–30 m tall, flowering on new, developing shoots; [DBH not known]; young shoots densely velvety-pubescent, becoming glabrous and gray, the older twigs thick and blunt-ended with large, subspherical dormant buds. Stipules very large and conspicuous on emerging shoots, obovate, ca. 20–25 × 8–10 mm, soon caducous. Leaves large, ca. 25–30 cm long, with (11–)15–21 opposite or subopposite, subequal leaflets; rachis velvety-pubescent when young; stipels absent. Leaflets very large, oblong-elliptic to obovate, usually narrow, 60–110 × 20–35 mm, acuminate apically, obtuse to rounded basally, glabrous above, densely velvety beneath especially while young. Flowers in robust pseudoracemes 9–20 cm long from the axils of developing leaves near the base of new shoots, the flowers often paired and the lower ones on short secondary axes up to 5 mm long; pedicels with 2 slender, soon caducous bracteoles ca. 4 mm long. Flowers 15–20 mm long, pink fading to pale lavender or mauve, the standard green at the base, sweetly fragrant. Calyx 4–7 mm long, densely pubescent, purplish, with 3 broadly triangular lower

teeth, the upper pair short and much reduced. Standard limb 11–15 × 12–14 mm, pubescent behind. Wings as long as the keel, finely pubescent outside. Staminal sheath 14–17 mm long, the free portion of the filaments rather long. Pods narrowly oblong to obovate, flat, ca. 70–150 × 20–30 mm, slightly thickened along both margins, velvety pubescent, splitting into 2 twisted, woody valves with 2–6 seeds. Seeds oblong to discoid, flat, 13–16 × 8–11 mm, chestnut brown, the aril extended into a short flap on one side.

Millettia orientalis is the only *Millettia* that forms a canopy tree in the humid eastern forests. It is characterized by its robust habit with thick twigs and large buds, its long leaves with many large leaflets, and its long, dense inflorescences with numerous large flowers.

Distribution. Known from around the Bay of Antongil and in the region of Taolainaro (Fort Dauphin).

Habitat. In lowland humid evergreen forest, up to ca. 300 m altitude.

Flowering time. October–January.

Vernacular name. Fanamoakondro.

The specific epithet indicates the provenance of this species, in the eastern forests of Madagascar.

Paratypes. MADAGASCAR. Prov. of Toliara, Fort Dauphin [Taolainaro] Region, NW of town near road to Andohahela Reserve, along trail W of road, 24°46'S, 46°53'E, 100–200 m, 11 Nov. 1989 (fl), *McPherson 14456* (K, MO, P, TAN); Emafotra, Mahatalaky, Fort Dauphin, 27 Mai 1954 (fr), *Service Forestier de Madagascar 10084-SF* (K, MO, P, TEF); Beandri, Mahatalaky, Fort Dauphin, 23 Oct. 1954 (st), *Service Forestier de Madagascar 11139-SF* (P, TEF); Amboangy, Mahatalaky, Fort Dauphin, 20 Oct. 1955 (fl), *Service Forestier de Madagascar 14861-SF* (K, MO, P, TEF); E Madagascar, environs de la Baie d'Antongil, massif de Farankaraina, entre Navana et Andranofotsy, 0–150 m, 16 Sep. 1957 (fr), *Service Forestier de Madagascar 18307-SF, Capuron* (K, P, TEF).

Millettia taolanaroensis Du Puy & Labat, sp. nov.

TYPE: SE Madagascar. SW de Fort Dauphin [Taolainaro], Baie de Ranofotsy, colline près d'Italy, 10 Jan. 1963 (fl), *Service Forestier de Madagascar 22367-SF, R. Capuron* (holotype, P; isotypes, K, MO, P, TEF, WAG). Figure 5.

Species foliolis subglabris nitidis obtusis ad rotundatis subtus cinerascentibus, pubescentia aperta pilis nitidis cupreis brevibus praesertim in rachidi, petiolulis, axe inflorescentiae, pedicellis et calycibus, et leguminibus glabris secus marginem superiorem incrassatis distincta.

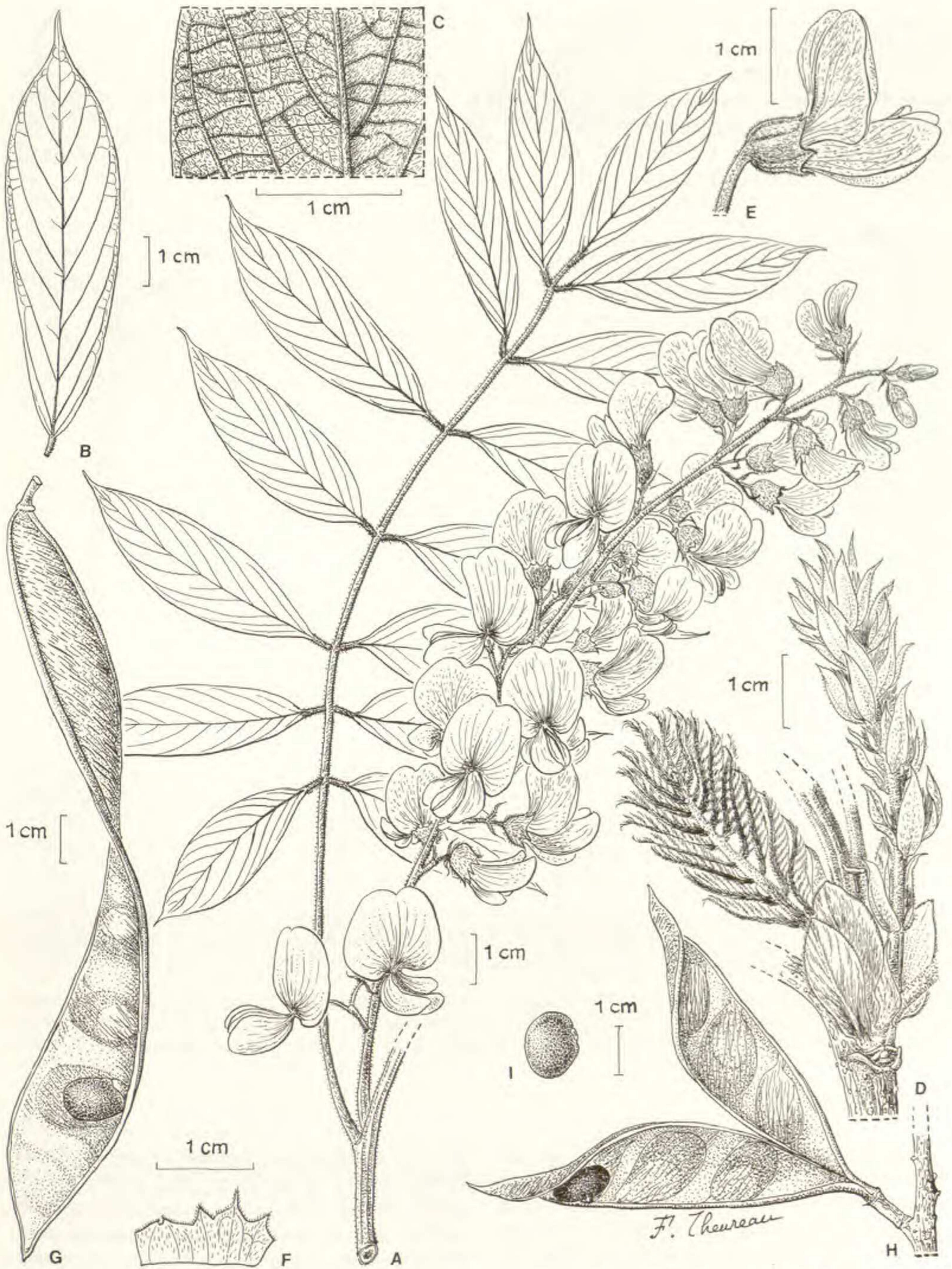


Figure 4. *Millettia orientalis* Du Puy & Labat. —A. Habit. —B. Leaflet. —C. Leaflet undersurface. —D. Young stem with stipules, leaf and inflorescence. —E. Flower. —F. Calyx. —G, H. Pod. —I. Seed. (A, E, and F drawn from Schatz & Miller 2495; B and C from Service Forestier de Madagascar SF 18307; D from Service Forestier de Madagascar SF 11139; G-I from Service Forestier de Madagascar SF 10084.)

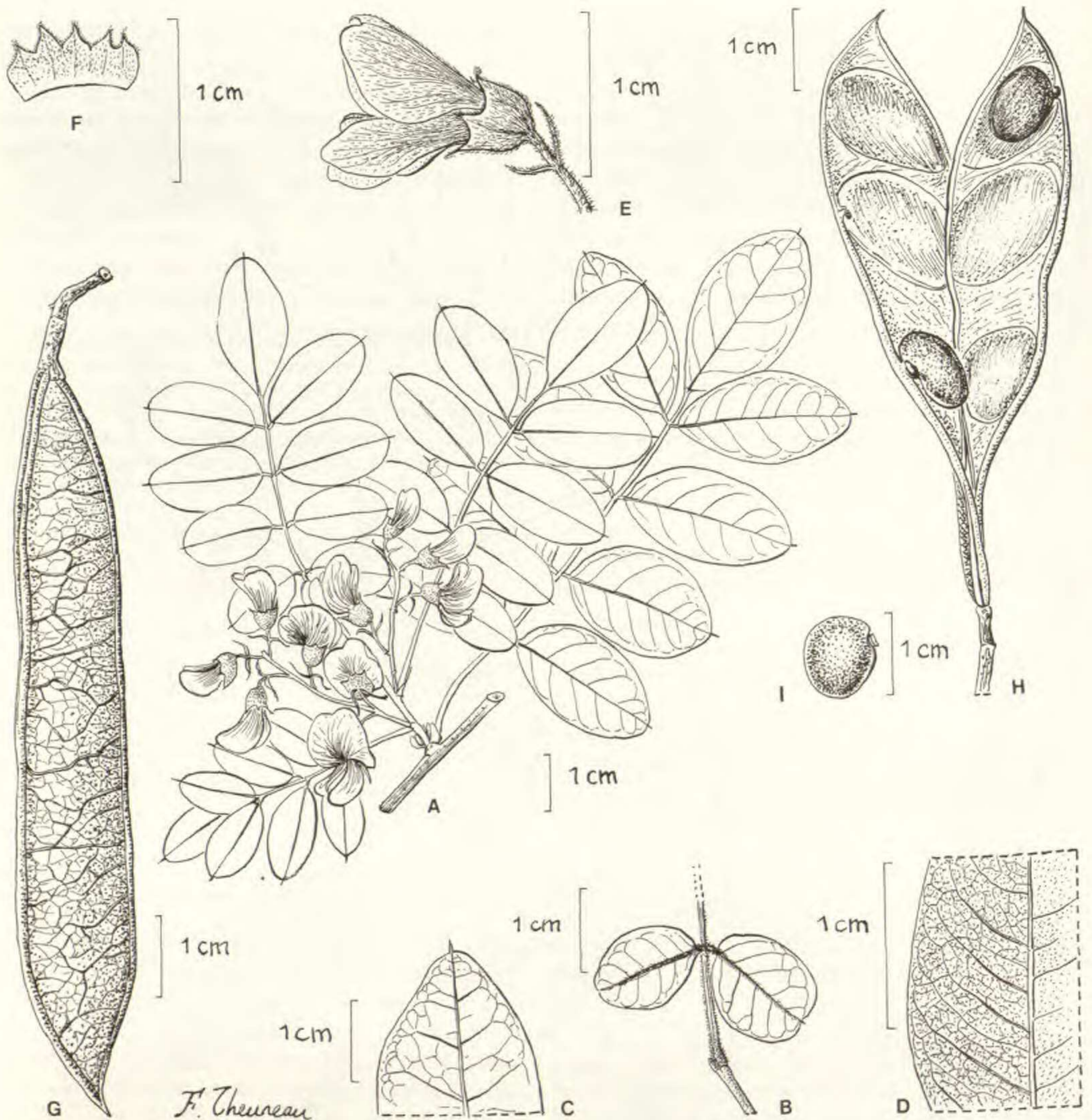


Figure 5. *Millettia taolanaroensis* Du Puy & Labat. —A. Habit. —B. Petiole and first leaflet pair. —C. Leaflet apex. —D. Leaflet undersurface. —E. Flower. —F. Calyx. —G, H. Pod. —I. Seed. (A, C–F drawn from *Service Forestier de Madagascar SF 22367*; B and G from *Phillipson & Milijaona 3526*; H and I from *Service Forestier de Madagascar SF 8503*.)

A deciduous shrub or small tree 4–6 m tall, flowering on young shoots with fully expanded leaves; twigs sparsely pubescent when young, glabrescent, with small dormant buds. Leaves with 7–11 opposite leaflets; rachis thinly coppery-pubescent; stipels absent. Leaflets elliptic, 12–30(–36) × 9–19 mm, rounded basally, obtuse or rounded to notched and mucronulate apically, dark green, glossy and glabrous above, gray-green and almost glabrous with very scattered, short brown hairs beneath. Flowers in delicate pseudoracemes ca. 4–6 cm long from

the axils of leaves near the base of new shoots, the flowers solitary or paired on small knobs; pedicels with 2 slender, soon caducous bracteoles near the middle. Flowers 10–12 mm long, mauve or violet. Calyx 3–4 mm long, densely coppery-pubescent, with 5 short, broadly triangular teeth, the upper pair smallest and close together. Standard limb ca. 9 × 9 mm, cuneate basally, finely pubescent behind. Wings as long as the keel. Staminal sheath ca. 8 mm long. Pods obovate to oblong, flat, (40–)50–90 × (12–)14–19 mm, tapering basally, the apex

rounded and beaked, slightly thickened along the upper margin, glabrous or with very scattered brown hairs, splitting into 2 twisted, woody valves, with 1–5 (usually 1–3) seeds. Seeds oblong-discoïd, 9–10 × 7–8 mm, chestnut brown, the aril extended into a small flap on one side.

Millettia taolanaroensis is recognizable by its subglabrous, glossy, obtuse to rounded leaflets, which are grayish beneath, by its thin pubescence of lustrous, copper-colored short hairs most noticeable on the leaf rachis and petiolules, the inflorescence axis and pedicels and the calyces, and by its glabrous pods thickened along the upper margin. It appears to flower when the leaves are almost full-sized rather than as new growth emerges from the buds.

Distribution. Southeastern Madagascar, only known from around Taolañaro (Fort Dauphin), on the coastal plains to the north and on the lower slopes of the mountains to the west (including Andohahela, parcelle 3).

Habitat. In coastal, evergreen forest on sand, and in transitional, deciduous woodland often near the coast.

Flowering time. Only recorded in January.

Local uses. Used as a fish poison.

Vernacular name. Anakaraka.

The specific epithet indicates the provenance of this species, in the southern region of Madagascar, near the town of Taolañaro.

Paratypes. MADAGASCAR. Maravato près de Fort Dauphin, Avr. 1972 (fr), *Boiteau s.n.* (P); Prov. de Fort Dauphin, Andrahomana, 24 Juin 1926 (fr), *Decary 3993* (P); Baie des Galions (Ranofotsy) au SW de Fort Dauphin, 1–100 m, 18–21 Fév. 1955 (fr), *Humbert & Capuron 29019* (L, MO, P); Falaise cotière NW du Cap Sainte-Marie, vers Lavanono, 1–150 m, 8 Mar. 1955 (fr), *Humbert & Capuron 29323* (K, P); Fort Dauphin region, W of town along highway on southern boundary of Réserve Intégrale no. 11, Andohahela, parcel 3, dry forest W of Col des Ranopiso, 120–140 m, 27 Jan. 1990 (fr), *McPherson & Pigeon 14911* (K, MO, P, TAN); 5 km S of Manambaro, 23 km W of Fort Dauphin, 25°05'S, 46°49'E, 150 m, 30 Mar. 1991 (fr), *Miller & Randrianasolo 6224* (K, MO, P, TAN); Réserve d'Andohahela, parcelle 3, 25°02'S, 46°40'E, 100 m, 17 Feb. 1990 (fr), *Phillipson & Milijaona 3526* (K, MO, P, TAN); Préfecture de Fort Dauphin, Petriky, 25°05'S, 46°51'E, 0–10 m, 16 Oct. 1989 (fr), *Rabevohitra 2018* (K, MO, P, TAN); Mandena, Fort Dauphin, 8 Avr. 1953 (fr), *Service Forestier de Madagascar 8172-SF* (P, TEF); Bords d'un cours d'eau, aux environs de Ranopiso, route Ambovombe–Fort Dauphin, 23 Sep. 1953 (fr), *Service Forestier de Madagascar 8503-SF*, *Capuron* (K, MO, P, TEF); entre km 454 et 455 de la route de Fort Dauphin, 19 Sep. 1954 (fr), *Service Forestier de Madagascar 10911-SF* (P, TEF).

Millettia aurea (R. Viguier) Du Puy & Labat, comb. nov. Basionym: *Neodunnia aurea* R. Viguier, Notul. Syst. (Paris) 14: 73, 1950. TYPE: (based on three collections) W Madagascar. Ambongo, Manongarivo [S of Soalala], Oct. 1903 (fl, jfr), *H. Perrier de la Bâthie 1617* (lectotype, chosen here, P; isolectotypes, K, L, MO, P, TAN).

R. Viguier cited three syntypes in the original description, including *H. Perrier de la Bâthie 4831* and *4879*, in addition to the lectotype selected here.

Millettia aurea may be confused with *M. richardiana*, which differs in its much shorter inflorescences with a single cluster of (larger) flowers, its smaller and less pubescent calyx with shorter teeth, especially the upper pair, which are very short and connate to near the tip, its much less pubescent petals, and its usually smaller leaflets.

Millettia aurea is an uncommon species of western Madagascar, with a restricted distribution in the Boina and the Ambongo, south to Maintirano, most frequently recorded from the region of Ankara-fantsika, and from Soalala to Mitsinjo. It occurs in deciduous woodland, on sand, often near the coast but also inland at up to ca. 300 m altitude.

Millettia richardiana (Baillon) Du Puy & Labat, comb. nov. Basionym: *Mundulea richardiana* Baillon, Bull. Soc. Linn. Paris 1: 389–390, 1883, pro parte. TYPE: (based on three collections) N Madagascar. [Diégo-Suarez (Antsiranana)], Baie des Amis (fl), *C. Richard 158* (lectotype, chosen here, P).

Mundulea hysterantha Baker, J. Linn. Soc., Bot. 25: 309, 1890. Syn. nov. TYPE: W Madagascar. Androna (fl, jfr), *R. Baron 5444* (holotype, K; isotype, P).

Millettia baroni Drake in Grandidier, Hist. Phys. Nat. Pol. Madagascar, Plantes, Texte 1: 141, 1903. Syn. nov. TYPE: Madagascar (fr), *R. Baron 4952* (holotype, P; isotypes, K, P).

Neodunnia atrocyanea R. Viguier, Notul. Syst. (Paris) 14: 72, 1950. Syn. nov. TYPE: NW Madagascar. Rivière de Mananjeba, Oct. 1909 (fl), *H. Perrier de la Bâthie 4845* (holotype, P; isotype, P).

Neodunnia edentata R. Viguier, Notul. Syst. (Paris) 14: 73, 1950, pro parte. Syn. nov. TYPE: (based on four collections) NW Madagascar. Majunga, Dec. 1924 (fl), *H. Perrier de la Bâthie 16800* (lectotype, chosen here, P; isolectotypes, K, P, MO).

H. Baillon cited three syntypes in the original description of *Mundulea richardiana*, including *Boivin 2712* and *2713*, in addition to the lectotype selected here. Of the two *Boivin* specimens (both mounted on the same herbarium sheet) only *2712*

corresponds with *M. richardiana*; *Boivin 2713* is *Pongamiopsis amygdalina* (Baillon) R. Viguier.

In the original description of *Neodunnia edentata*, R. Viguier cited four syntypes: *H. Perrier de la Bâthie 1601* is a specimen of *Pongamiopsis pervilleana* (Baillon) R. Viguier; *H. Perrier de la Bâthie 4076, 16800*, and *Louvel 53* are all specimens of *Millettia richardiana*. *H. Perrier de la Bâthie 16800* is composed of two elements: the first was collected in December 1924, in flower, and is selected here as the lectotype; the second was collected in January 1926, in fruit, and is considered here to be a separate specimen.

Millettia richardiana is especially variable in the number of leaflets, the form and pubescence of the leaflets, and the pubescence of the pods. Variants can be constant within certain localities. However, none of these variants seem distinct enough to be recognized as separate taxa.

Millettia richardiana is very widely distributed throughout western Madagascar from Antsiranana (Diégo-Suarez) to Toliara (Tulear) and southwestern Madagascar, including the forest of Zombitsy, the Bemaraha Massif, the Ambongo, the Boina and the Ankarana Massif. It occurs in deciduous woodland, mainly on calcareous or sandy soils, on limestone, sand over limestone or on coastal dunes, at up to ca. 300 m altitude.

Pongamiopsis viguieri Du Puy & Labat, sp. nov.

TYPE: W Madagascar. Tsingy de Bemaraha (Réserve Naturelle no. 9), environs d'Antsalova, 5 km à l'E de Bevitika, 18°38'S, 44°43'E, 150–250 m, 30 Nov. 1992 (fr), *J.-N. Labat, R. Edmond & O. Laivao 2243* (holotype, P; isotypes, K, MO, P, TAN). Figure 6.

A *P. amygdalina* differt inflorescentiis brevibus condensatis, dentibus calycis latioribus, apicibus tenuibus destitutis, vexillo, alis et carina dense pubescentibus, vagina staminea breviori, et leguminibus plerumque elongatioribus seminibus numerosioribus.

A deciduous tree (2–4–)10 m tall, flowering on new shoots as they emerge from the buds and whilst the leaves are still very immature; young shoots densely pubescent, glabrescent; twigs with large leaf scars and large, spherical dormant buds. Leaves becoming very large, with 7–11 opposite leaflets; stipels absent. Leaflets oblong, oblong-elliptic or oblong-obovate, 50–200 × 20–80 mm, with a broad, V-shaped apical notch with a mucro at the base of the notch, silky pubescent at first but becoming glabrous above and pubescent mainly on the veins beneath, the veins strongly raised beneath, the straight, parallel secondary veins extending to the

slightly thickened margin. Racemes produced in the axils of the lowest leaves of developing shoots, short and condensed, the axis ca. 1–3 cm long, with numerous flowers in closely spaced clusters of 2 or 3 on short spurs; pedicels with a pair of small, caducous bracts toward the apex. Flowers 13–15 mm long, white washed with pale lilac, the standard with a pale green basal eye. Calyx 6–8 mm long, densely appressed-hairy, with 3 triangular, acute lower teeth, the upper pair partially connate but with free, widely separated, recurved tips. Standard limb 12–14 × 12–13 mm, densely silky pubescent behind. Wings about as long as the keel, narrow, both appressed-pubescent outside and upcurved apically, the keel shortly beaked. Staminal sheath 12–15 mm long. Style short-hairy, hooked apically. Pod strongly inflated, ellipsoidal to oblong-ellipsoidal, 45–70 × 25–35 × 23–35 mm, obliquely beaked apically, the upper margin broad and thickened, velvety-pubescent, wrinkled, thick and woody, indehiscent or eventually splitting into 2 valves, usually with 3–5 seeds (occasionally some pods with fewer seeds). Seeds subspherical, compressed, ca. 13 mm diam., becoming dark gray, the hilum raised and surrounded by a narrow aril.

Pongamiopsis viguieri is closely related to *P. amygdalina*, with similar leaves, pod type, and growth habit, but differs in its short, condensed inflorescences, its broader calyx teeth lacking the very slender tips, its densely pubescent standard, wings, and keel, its shorter staminal sheath, and its usually more elongated pods with more numerous seeds. It occurs in western rather than northern Madagascar, which is the range of *P. amygdalina*.

Distribution. Western Madagascar, uncommon, mainly from the Bemaraha Massif, but also collected at Amboanio south of Mahajanga (Majunga) and at Andranomavo near Namoroka.

Habitat. In deciduous woodland, always over limestone outcrops or "tsingy," from near sea level to ca. 500 m altitude.

Flowering time. October.

This species is dedicated to René Viguier, in recognition of his extensive research on the Leguminosae of Madagascar.

Paratypes. MADAGASCAR. Vallée de la Tsiribihina dans le Bemaraha, 20–350 m, Oct. 1933 (fl, jfr), *Humbert 11480* (K, MO, P); Antsingy de Bemaraha, vers Anbodiriana (E d'Antsalova), NE du pont, 100–150 m, 10 Déc. 1952 (fr), *Leandri, Capuron & Razafindrakoto 2102* (BR, K, L, MO, NY, P, PRE, WAG); Antsingy de Bemaraha, vers Anbodiriana (E d'Antsalova), 100–150 m, 21–27 Jan. & 8–11 Fév. 1960 (fr), *Leandri & Saboureau 3071* (K, L, MO, NY, P, PRE); Ambongo, environs d'Andranomavo, Jan. 1905 (jfr), *Perrier de la*

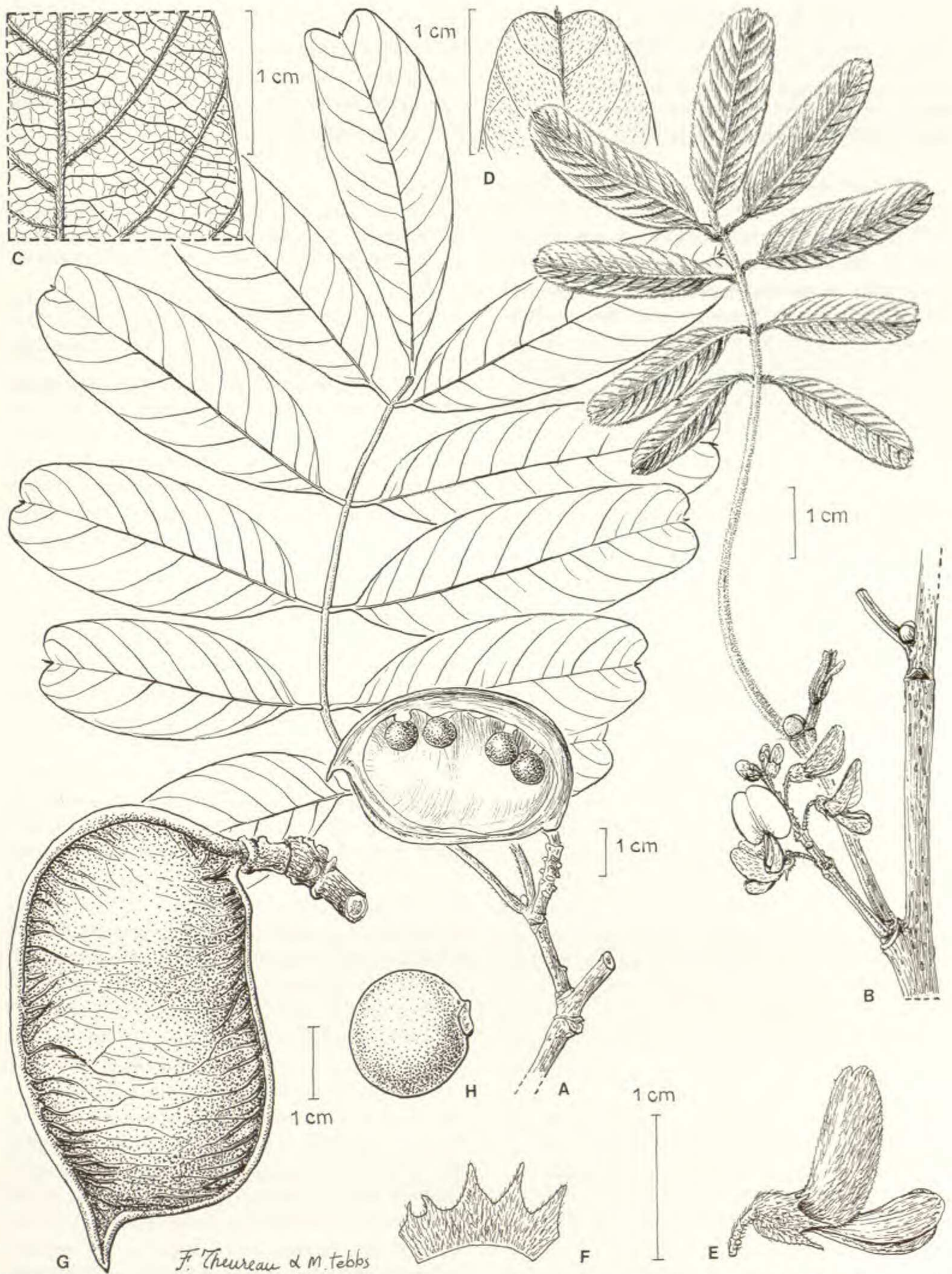


Figure 6. *Pongamiopsis viguieri* Du Puy & Labat. —A. Habit with mature leaf and pod. —B. Habit with young leaf and flowers. —C. Leaflet undersurface. —D. Leaflet apex. —E. Flower. —F. Calyx. —G. Pod. —H. Seed. (A, C, and D drawn from Labat, Edmond & Laivao 2243; B, E, and F drawn from Humbert 11480; G and H from Leandri & Saboureau 3071.)

Bâthie 1801 (P); Rochers calcaires du bord de mer à Amboanio près de Majunga, Fév. 1901 (fr), *Perrier de la Bâthie 1828* (P); Antsingy de Bemaraha, route Antsalova-Tsiandro, aux environs de la clairière d'Ambo-diriana, 10 Déc. 1952 (fr), *Service Forestier de Madagascar 6808-SF*, Capuron (K, L, MO, P, TEF).

Acknowledgments. We thank Françoise Theureau and Margaret Tebbs for the illustrations and R. Hoogland for assistance with the Latin descriptions. D. Du Puy thanks the Royal Society for the opportunity to undertake collaborative research in the Laboratoire de Phanérogamie, Paris, and the Weston Foundation for the support of his continued research in Madagascar and Kew. We thank the Directors and staff of the Laboratoire de Phanérogamie, Paris, the Herbarium, Royal Botanic Gar-

dens, Kew, the Parc de Tzimbazaza, Antananarivo, and the Centre National de la Recherche Ecologique, Antananarivo. We are also grateful to the National Geographic Society for supporting our recent fieldwork in Madagascar.

Literature Cited

- Geesink, R. 1981. Tephrosieae. Pp. 245-260 in R. M. Polhill & P. H. Raven (editors), *Advances in Legume Systematics, Part 1*. Royal Botanic Gardens, Kew.
- . 1984. *Scala Millettiearum*. A survey of the genera of the tribe Millettieae (Legum.-Pap.) with methodological considerations. E. J. Brill/Leiden Univ. Press, Leiden Botanical Series 8.
- Hutchinson, J. 1964. *The Genera of Flowering Plants*. Vol. 1. Oxford Univ. Press, Oxford.