

**A REVISION OF CALLERYA ENDL.
(INCLUDING PADBRUGGEA AND WHITFORDIODENDRON)
(PAPILIONACEAE: MILLETTIEAE)**

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SUMMARY

The genera *Padbruggea* Miq., *Whitfordiodendron* Elmer, and *Millettia* sections 'Eurybotryae' and 'Austromillettia' were united under *Callerya* Endl. by Geesink (1984). This article presents the necessary new combinations for *Callerya* sensu Geesink. An outline of the taxonomic history of the genus is given together with some notes on the taxonomic and phylogenetic position. The genus is separated from the remaining bulk of *Millettia* on account of its thick paniculate inflorescences and diadelphous stamens. A majority also shares conspicuous bracts and bracteoles and a more or less bilaterally symmetric calyx. A key to the nineteen species recognized and full descriptions of the species are provided in the taxonomic part.

INTRODUCTION

The concept of the genus *Callerya* Endl. as revised here is tightly interwoven with the complex of genera in the tribe Millettieae. Geesink (1984) touched in his *Scala Millettiearum* on the problems of the tribal and generic delimitations within this group. He came to the conclusion that a useful subdivision of the three 'central' genera of the tribe, viz. *Derris*, *Millettia* and *Lonchocarpus* was only possible if the then distinguished groups were raised to a generic level (Geesink, 1984: 35-39). He based this subdivision on different inflorescence types.

One of the genera thus separated from *Millettia* is *Callerya*. With the proposed rearrangement of the subgroups on account of their inflorescence, a study was made on whether the paniculate species then present in *Millettia* could be shifted to other paniculate genera around *Millettia*, viz. *Padbruggea* or *Whitfordiodendron*. As the study proved, this was impossible without losing the distinction between these genera, and this resulted in the merging of *Padbruggea*, *Whitfordiodendron* and the paniculate sections of *Millettia*, 'Eurybotryae' and 'Austromillettia', into the genus *Callerya* (Geesink, 1984: 82).

In this article the taxonomic history and the delimitating characters of *Callerya* are treated in more detail than by Geesink, followed by notes on species of dubious position and on the variable complex species *C. cinerea* from China. A formal treatment of the taxonomy of *Callerya* is given in which the species of *Padbruggea* and *Whitfordiodendron* and the two *Millettia* sections are transferred to *Callerya*.

Table 1. Diagrammatic representation of the most important events in the taxonomic history of *Callerya* Endl.

Date	Author	Event
1843	Vogel	<i>Marquartia tomentosa</i> described, nomen illegit., non <i>Marquartia</i> Hassk. = <i>Pandanus</i> .
1843	Endlicher	<i>Marquartia</i> Vogel redescribed as <i>Callerya</i> , without the combination for the species. The species is synonymous to <i>Millettia nitida</i> Benth. (1842).
1855	Miquel	<i>Padbruggea dasyphylla</i> described.
1910	Elmer	<i>Whitfordia scandens</i> described, nomen illegit., non <i>Whitfordia</i> Murrill = <i>Fungi</i> .
1910	Elmer	<i>Whitfordia</i> Elmer corrected to <i>Whitfordiodendron</i> , without the combination for the species.
1911	Dunn	<i>Adinobotrys</i> Dunn described (incl. <i>M. atropurpurea</i> , <i>M. eriantha</i> , <i>M. nieuwenhuisii</i> and two new species).
1911	Dunn	<i>Padbruggea</i> Miq. revived (incl. <i>M. maingayi</i> and <i>M. oocarpa</i>).
1912a	Dunn	<i>Adinobotrys</i> Dunn = <i>Whitfordiodendron</i> Elmer.
1928	Craib	<i>Whitfordiodendron</i> = <i>Padbruggea</i> .
	Various authors	<i>Whitfordiodendron</i> and <i>Padbruggea</i> in and out of the synonymy of <i>Millettia</i> ; problematic: <i>M. cinerea</i> and <i>M. atropurpurea</i> .
1984	Geesink	<i>Callerya</i> Endl. reinstated, including <i>Padbruggea</i> , <i>Whitfordiodendron</i> , and all paniculate species of <i>Millettia</i>
1994	This article	combinations of <i>Padbruggea</i> , <i>Whitfordiodendron</i> and the paniculate species of <i>Millettia</i> in <i>Callerya</i> .

As yet, a cladistic analysis is not worthwhile as the monophyly of *Callerya* as here described is questionable. The characters used for delimitating *Callerya*, thick panicles, diadelphous stamens, conspicuous bracts and bracteoles, and calyx aestivation, occur commonly throughout the Millettieae. Without a unique character setting the group apart from other Millettieae, paraphyly, or worse, polyphyly, cannot be excluded. Therefore, any cladistic analysis of *Callerya* should be preceded by a cladistic analysis of the Millettieae.¹

TAXONOMIC HISTORY OF CALLERYA

The taxonomic history of the genus *Callerya* is a history of illegitimate names that were corrected without giving new combinations for the species involved, and a history of a constant switching of the species between the various genera. A diagrammatic representation of the events outlined below is given in Table 1.

In 1843 Vogel described a shrubby paniculate vine from Hong Kong as *Marquartia tomentosa*, not knowing that the generic name had already been used (non *Marquartia* Hassk., 1842 = *Pandanus*). Endlicher (1843), noticing the homonym,

¹) In a recent molecular study on chloroplast DNA, two species of *Callerya*, *C. atropurpurea* and *C. reticulata*, were both found, in common with some species of *Wisteria*, to lack the inverted repeat, a character present in other members of the Millettieae (Liston, in press).

redescribed the genus under the name *Callerya*, without the new combination for the species. Vogel's species would later turn out to be synonymous to *Millettia nitida* Benth., and *Callerya* disappeared as a synonym of *Millettia*.

In 1855 Miquel described a large paniculate liana from Java as *Padbruggea dasyphylla*. It was allied to *Millettia*, but differed in having a stalked ovary.

Another large paniculate liana allied to *Millettia*, and from the Philippines, was described by Elmer (1910) as *Whitfordia scandens*. However, the genus *Whitfordia* had already been described as a fungus. Elmer himself corrected in the same issue the name to *Whitfordiodendron*, but omitted the new combination.

Closely resembling Elmer's climber are two other paniculate climbers, the Malayan *Millettia eriantha* and the Bornean *M. nieuwenhuisii*. These species were transferred by Dunn (1911), who was unaware of Elmer's *Whitfordiodendron*, to a new genus, *Adinobotrys*. He added two new climbing species and the common Malayan tree *Millettia atropurpurea*. Later Dunn (1912a) recognized the priority of *Whitfordiodendron* (but did not make the new combinations).

In the same article Dunn (1911) revived the genus *Padbruggea* and noted the differences between this genus and *Adinobotrys* (= *Whitfordiodendron*). *Padbruggea* has lax panicles, cuneate shaped petals, stipellae, and nectar guides. *Whitfordiodendron* has crowded panicles, rounded petals, and lacks stipellae and nectar guides. Both were separated from the bulk of *Millettia* on account of their large woody pods and large inflorescences.

Craib (1928) argued that *Padbruggea* and *Whitfordiodendron* (*Adinobotrys*) were congeneric. He based his arguments on the intermediate position of *Adinobotrys filipes* Dunn (now *Afgekia filipes* Geesink). This species resembles in habit mostly *Padbruggea dasyphylla*, but has the generic characters of *Adinobotrys*.

Since then, many authors subsequently continued to reduce and separate *Padbruggea* and *Whitfordiodendron* to or from *Millettia*. The said differences, viz. shape and size of the pod and the inflorescence, are for some too small to establish separate genera. A close resemblance remains to some species in *Millettia*, especially to *Millettia cinerea* (cf. Corner, 1939). This climbing species is, as the other species of *Millettia* section '*Eurybotryae*', also characterized by thick pods and paniculate inflorescences.

When Geesink started to rearrange the subgroups of *Millettia* on account of their inflorescences into clearer circumscribed genera, a study was carried out during a student course (Thijssse, unpubl.) to determine whether any of the paniculate species within *Millettia* could be transferred to the two existing paniculate genera, *Padbruggea* or *Whitfordiodendron*. The paniculate species of *Millettia*, arranged by Dunn (1912b) in the sections '*Eurybotryae*' and '*Austromillettia*' were analysed for the only two useful diagnostic characters stated by Dunn (1911), viz. the absence or presence of stipellae and nectar guides. This resulted in the blurring of the distinction of *Padbruggea* and *Whitfordiodendron* (Table 2).

As a consequence, *Padbruggea* and *Whitfordiodendron* were united with inclusion of *Millettia* sections '*Eurybotryae*' and '*Austromillettia*'. As *Millettia nitida* belonged to the section '*Eurybotryae*' the genus name *Callerya* was reinstated. Geesink (1984) redescribed the whole group and separated it from *Millettia* on account of the true paniculate inflorescences and the diadelphous stamens.

Table 2. A survey of the presence or absence of stipellae and nectar guides in *Padbruggea*, *Whitfordiodendron*, and some species of the *Millettia* sections 'Eurybotryae' and 'Austromillettia'.

	stipellae	nectar guides		stipellae	nectar guides
<i>Padbruggea</i>	+	+	<i>M(illettia) fordii</i>	+	—
<i>Whitfordiodendron</i>	—	—	<i>M. pilipes</i>	—	—
<i>Millettia australis</i>	+	+	<i>M. reticulata</i>	+	—
<i>M. cinerea</i>	+	+	<i>M. speciosa</i>	+	—
<i>M. eurybotrya</i>	+	+			

The present formal treatment of *Callerya* sensu Geesink seems for the time being the best solution. Only after a phylogenetic analysis of the Millettieae the continuous confusion about the taxonomic position of the paniculate species around *Millettia* may come to a rest. *Callerya* Endl. can be easily distinguished on account of the large paniculate inflorescences; its recognition helps to stabilize, at least partly, the delimitation of *Millettia* s. s.

DELIMITATION OF CALLERYA

Generic delimitation

The genus *Callerya* as presently circumscribed consists of 19 species. They all share a similar shape of the calyx. It is more or less bilaterally symmetric, with short upper teeth and a long lower tooth enclosing the young corolla in bud. This character is most markedly present in the species around *C. cinerea*. *Callerya* differs further from *Millettia* s. s. and other related genera on account of the paniculate inflorescence and the diadelphous staminal tube.

Further characters are shared by a majority of the species of *Callerya*. Conspicuous bracts and bracteoles are present in all except *C. kityana*. The paniculate inflorescence is often correlated with thick inflorescence axes and with a so-called leafy panicle, a combination of a terminal panicle or raceme with axillary racemes. Sometimes the panicle consists of axillary racemes only.

It is probable that the typical thick terminal panicle of *Callerya* is secondary (Geesink, 1984: 9). Primary panicles can turn into racemes by shortening of their side axes. When in a racemous species with terminal and axillary racemes the uppermost leaves are lost, a secondary panicle evolves.

Though uniting *Callerya* on the basis of having secondary panicles could indicate monophyly, it is practically not workable because secondary panicles are not distinguishable from primary ones. Thus *Callerya* is only the phenetically distinct agglomeration of those paniculate species within the tribe Millettieae that have no further distinguishing characters. The other paniculate (and sometimes also diadelphous) genera are distinct from *Callerya* because they do have distinguishing generic characters, as e.g. the peculiar lomentating endocarp of *Endosamara* (former *Millettia* section 'Bracteatae') or the elongated funicle of *Afgekia*.

One group of genera is easily confused with *Callerya*, viz. the paniculate species allied to *Derris*. The most confusing is *Aganope*, that represents the paniculate species of *Derris*, and is just as difficult to distinguish from *Callerya* as *Derris* is from *Millettia*.

Excluded species and species of dubious position

When using the above characters to define *Callerya*, one species which Dunn included in his section *Eurybotryae*, has to be excluded. *Millettia (Wisteria) japonica* (A. Gray) Sieb. & Zucc. has only thin axillary racemes and a monadelphous staminal tube. Though quite close in general habit to *C. reticulata*, it lacks the facies of a 'true' *Callerya*. Other species which may sometimes show axillary racemes only are still included; e.g. *C. fordii* has quite thick inflorescence axes with sometimes terminal racemes and thus leafy panicles and diadelphous stamens.

I have not seen all paniculate *Millettia*-species. Many have been described, especially from China. Wei (1985a, b) described 35 *Millettia* species from China, of which 19 were paniculate (or racemose?). For two out of these 19 species the status remains doubtful, viz. *M. unijuga* Gagnep. and *M. bonatiana* Pamp.

Millettia unijuga is according to Wei (1985a) paniculate, and according to Gagnepain (1913) monadelphous. But often the staminal tube in an immature flower can be monadelphous and turn diadelphous in a mature flower. Thus, *M. unijuga* could have both panicles and a diadelphous staminal tube, since Gagnepain may have described immature flowers. In this case *M. unijuga* should be included in *Callerya*, but such a move will require close scrutiny of the specimens. Gagnepain (1913) described it as having stipellae and glabrous flowers, and Wei (1985b: 282) recorded it to have a hairy pod. These characters are also found in *C. speciosa* and *C. fordii*. The characteristic three leaflets place it closer to *C. fordii*. I have seen only three specimens of *C. fordii*, but if it ever has three leaflets, then *M. unijuga* might be conspecific with *C. fordii*. Data on flower size and hairiness of the calyx are needed to be certain. Without the availability of more material, I refrain from making a new combination for *M. unijuga* Gagnep.

The second dubious species is *M. bonatiana*. It was placed by Dunn (1912b) in his section '*Podocarpae*'. This species seems to be diadelphous (Dunn, 1912b) and to have panicles or racemes (Wei, 1985a). But whether it is a *Callerya* or not is impossible for me to decide without having seen the collection.

The Callerya cinerea-complex

A further nine of these 19 paniculate *Millettia* species given by Wei (1985a), occur in the range of the very variable Chinese *C. cinerea* species-complex. In the herbaria numerous collections have accumulated of this scrambling shrub that occurs commonly in China. All specimens are characterized by mostly five leaflets (occasionally 7 or 3), white to red flowers with a more or less densely grey-golden indumentum on the outside of the standard, and wing petals that are distinctly shorter than the keel petals. For these collections various authors have used different arguments to separate species (Table 3).

Dunn (1912b) distinguished six species based on differences of indumentum and thickness of the inflorescence axes, flower colour, and inflation of the pod. The Himalayan *M. cinerea* had small white flowers and inflated, convex, greyish tomentose

Table 3. Survey of some authors and species they have named within the *Callerya cinerea* complex. For a discussion of the specific characters used by each author, see text.

Author	Distinguished species
Dunn (1912):	<i>Millettia cinerea</i> , <i>M. dorwardii</i> , <i>M. dielsiana</i> , <i>M. oosperma</i> , <i>M. sericosoma</i> , <i>M. nitida</i> .
Gagnepain (1913):	added <i>M. cochinchinensis</i> and <i>M. obovata</i> .
Léveillé (1914):	added numerous other species, e.g. <i>M. gentiliana</i> , <i>M. blinii</i> , <i>M. fragrantissima</i> , <i>M. bodinieri</i> , <i>M. cavaleriei</i> .
Various Chinese authors:	reduced to <i>M. dielsiana</i> most species described by Léveillé, only <i>M. gentiliana</i> survived. New species added, e.g. <i>M. sphaerosperma</i> , <i>M. longipedunculata</i> .
Present article:	all reduced to three species: <i>Callerya cinerea</i> , <i>C. cochinchinensis</i> , <i>C. nitida</i> .

Pods. The Burmese *M. dorwardii* was recognizable by its larger flowers and flattish, thick, golden hairy pod. The two true Chinese species *M. dielsiana* and *M. oosperma* were distinguished by thin but long flowers and flat greyish tomentose pods and thick, large, densely golden hairy flowers and strongly inflated golden hairy pods, respectively. The fifth species, *M. sericosoma*, was only known from one flowering specimen, that possessed a character set between *M. dorwardii* and *M. oosperma*. The last, *M. nitida*, was an endemic species of Hong Kong with large flowers and true flat pods. *Millettia dielsiana* was noted to be very variable in size and hairiness of the leaflets and the flowers (Dunn, 1912b: 161).

Later authors described for China more climbing species. Gagnepain (1913) described *M. cochinchinensis* and *M. obovata*, differing in the texture of the leaflets. Léveillé (1914) added in his Flora of Kweichow a complete list of species, e.g. *M. gentiliana*, *M. blinii*, *M. fragrantissima*, *M. bodinieri*, *M. cavaleriei*. The species show characters intermediate to those described above. They were separated on very slight differences in flower, pod size and colour.

Chinese authors have lately undertaken the revision of Chinese *Millettia* (e.g. Wei, 1985b). While many of Léveillé's species were reduced to *M. dielsiana*, other new species were described, e.g. *M. sphaerosperma* and *M. longipedunculata*. The characters on which these species were separated shifted from flower or pod size and colour to variation in number and size of leaflets.

In my view a division based on such characters is artificial. In case a species is characterized by the presence of five leaflets, the occurrence of three or seven leaflets can hardly be used as the only character to distinguish separate species. And the taxonomic value of differences in size, thickness and indumentum of leaflets and inflorescences is doubtful as they can represent adaptive variation. Furthermore, the flower size is unreliable; especially opening flowers can grow out considerably in a short time. The amount of inflation of a pod also is unreliable. Flat pods can be either young, or artificially flattened by the pressing and drying of the specimen for herbarium conservation. And finally, to separate species, colour cannot be checked in dried brownish herbarium specimens.

Certainly, some groups can be distinguished. *Millettia dielsiana* has narrow and thin leaflets, long pedicelled narrow flowers, a subglabrous calyx that colours darker on drying, and flat pods. But this group is not clearly distinguished because many intermediate specimens exist. Undisputable characters for separating species in this complex have not been found.

Without any reliable distinguishing character, all species are best united into one variable species, *C. cinerea*. Figure 1 shows the range of inflorescence thickness and pod inflation in this *C. cinerea*-complex.

Only two Chinese species within this group can be kept apart: *C. nitida* and *C. cochinchinensis*.

Callerya nitida, formerly thought to be endemic to Hong Kong, has now been found regularly in southern China. It is distinguished from *C. cinerea* by its large flowers with typical narrowly obovate curling bracteoles and truly flat, velvety, *Millettia*-pods (Fig. 2).

Callerya cochinchinensis (incl. *M. tsui* Metcalf) is a rare species from Tonkin and South China with mostly three glabrous leaflets that lack stipellae, a ciliate style, and less ovules than either *C. cinerea* or *C. nitida*.

The four other Chinese *Callerya* species are distinct from this group because of the glabrous standard and pod.

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- Callerya* Endl., Gen., Suppl. 3 (1843) 104. — *Marquartia* Vogel, Nov. Act. Acad. Caes. Leop.-Carol. Nat. Cur. 19, Suppl. 1 (1843) 35, nom. illeg. (non *Marquartia* Hasskarl, 1842 = *Pandanus*); Geesink, Leiden Bot. Series 8 (1984) 82–84. — Type species: *C. nitida* (Benth.) Geesink [*Millettia nitida* Benth., Lond. J. Bot. 1 (1842) 484].
- Padbruggea* Miq., Fl. Ind. Bat. 1 (1855) 150; Dunn, Kew Bull. (1911) 194; Ridley, Fl. Mal. Pen. 1 (1922) 587; Craib, Fl. Siam. Enum. 1 (1928) 396; Backer & Bakh. f., Fl. Java 1 (1964) 615; Polhill in Polhill & Raven, Adv. Leg. Syst. 1 (1981) 259; Allen & Allen, Leg. Nod. (1981) 487. — Type species: *P. dasyphylla* Miq.
- Whitfordiodendron* Elmer, Leafl. Philipp. Bot. 2 (1910) 743; Dunn, Kew Bull. (1912) 363; Merr., Pap. Mich. Acad. Sc. Arts Lett. 19 (1934) 159; Polhill in Polhill & Raven, Adv. Leg. Syst. 1 (1981) 260; Allen & Allen, Leg. Nod. (1981) 694. — *Whitfordia* Elmer, Leafl. Philipp. Bot. 2 (1910) 689, nom. illeg. (non Murrill, 1908 = *Fungi*). — Type species: *W. scandens* Elmer.
- Adinobotrys* Dunn, Kew Bull. (1911) 194; Harms in Engl., Nachtr. Nat. Pflanzenfam. 4 (1915) 137; Ridley, Fl. Mal. Pen. 1 (1922) 586. — Lectotype species [Geesink, Leiden Bot. Ser. 8 (1984) 83]: *A. atropurpureus* (Wall.) Dunn [*Millettia atropurpurea* (Wall.) Benth.; *Pongamia atropurpurea* Wall., Pl. As. Rar. 1 (1928) 70, t. 78].

Lianas to scandent shrubs (*C. atropurpurea* and *C. vasta* are trees). Stipules narrowly triangular or linear, mostly caducous, glabrous. Leaves alternate, imparipinnate. Rachis glabrous to sparsely hairy. Stipellae narrowly triangular or linear, persistent or caducous, glabrous to sparsely hairy. Leaflets opposite, 3–19, symmetric (slightly asymmetric in *A. atropurpurea* and *A. vasta*), (narrowly) ovate to (narrowly) elliptic to (narrowly) obovate, some specimens linear elliptic (in *C. cinerea*, *C. reticulata*), (sparsely) hairy on both sides, more beneath, or sparsely hairy beneath, or only nervation hairy, or glabrous on both sides; base obtuse to rounded (cordate in *C. kityana*); margin entire (slightly undulate in *C. pilipes*); apex acuminate to cuspidate (rounded in *C. dasyphylla*). Midrib raised or flat or sunken above, raised beneath. Secondary nerves raised or flat or sunken above, raised beneath, 4–10 pairs, curving towards the margin, not forming marginal arches or forming (variably distinct) arches near the margin or at 2/3 to 3/4 of lamina. Venation laxly or densely reticulate, or scalariform-reticulate, prominent to flat above, prominent beneath. Inflorescence an axillary or terminal raceme, sometimes in combination with axillary racemes forming terminal or axillary leafy panicles, or a terminal, axillary, or raminascent panicle (caulinascent in *C. nieuwenhuisii*), axes very thick to rather slender, lateral branches only few near the base of the main axis or many from base to apex, sericeous, glabrescent. Bracts to the inflorescence rachis (narrowly) triangular, narrowly ovate, or linear, caducous, hairy. Bracts to the flowers linear, (narrowly) triangular, (narrowly) ovate, (narrowly) obovate, some broadly obovate, shorter or distinctly longer than the corresponding flower buds, often caducous, hairy (ciliate in *C. strobilifera*). Bracteoles on the upper half or near the top of the pedicel, or attached at a variable distance on the calyx base, (narrowly) ovate, (narrowly) elliptic, (narrowly) obovate, or linear, hairy, persistent or caducous (absent in *C. kityana*). Flowers 10–30 mm long, shiny golden sericeous to glabrous, recorded white to red (yellow in *C. strobilifera*), wings, keel, stamens, and pistil often darker in colour than standard, pedicelled, pedicel hairy. Calyx more or less oblique, sericeous to sparsely hairy to glabrous outside, sericeous to sparsely hairy inside only on teeth; teeth obtuse to acute, sometimes almost subtruncate, the uppermost one bifid, the lower teeth the

longest, forming a cover for the corolla in bud. Standard elliptic to suborbicular, reflexed, outside sericeous, sparsely hairy, or glabrous, basal callosities absent or present as two short ones or as one long one at the apex of the claw, auricles absent or present, sometimes reflexed upwards and forming nectar guides, often recorded to have a white, green, or yellow spot or bar-like nectar mark. Wing (narrowly) obovate, blades mostly free, some connate at apex, upper auricle distinct, lower auricle distinct, small, or absent, sometimes (slightly) rugose at base, lateral furrow absent or present, outside hairy at apex, or ciliate at lower margin, or glabrous. Keel (narrowly) obovate, as long as or shorter than the wing blades (longer in some *C. kityana*), blades connate at apex, upper auricle small to distinct, outside completely hairy, or only near margin, or glabrous. *Stamens* 10, diadelphous, basal fenestrae absent, curving upwards at apex, the vexillary stamen free, the other nine forming a sheath, alternately long and short, growing longer on the lower side, glabrous; anthers basifixed, glabrous. Disc mostly distinct, shorter on the vexillary side, sometimes slightly lobed, variable within species. Ovary sericeous to glabrous, stipe sometimes present, style straight, curved upwards, ciliate or glabrous, ovules 2–14. *Pods* inflated or not, convex around the seeds, or flat, some beaked, some stiped, sometimes margins thickened, velvety to tomentose, glabrescent, or glabrous, woody, deeply grooved, (slightly) rugose, ruminant (*C. nieuwenhuisii*), or smooth. *Seeds* lenticular, ellipsoid, orbicular, or elliptic.

Distribution – Nineteen species ranging from Darjeeling, Himalaya to Central and South China and Hong Kong, Taiwan, and Thailand; in Malesia: Malay Peninsula, Sumatra, West Java, Borneo and the Philippines. Three species in Australia: Queensland and New South Wales, one of which is also found in New Guinea (Fig. 1a–f).

KEY TO THE SPECIES

- 1a. Stipellae absent or caducous 2
- b. Stipellae persistent 10
- 2a. Tree; petals glabrous; pod glabrous 3
- b. Scandent shrub or large liana; standard sparsely hairy to densely sericeous; pod velvety 4
- 3a. Bracts to the flowers 1.5–2 mm long; flowers 17–20 mm; pod inflated, elliptic to obovate; seeds lenticular, 31–38 by 33–36 mm, 20–26 mm thick. — Burma to Sumatra² **1. *C. atropurpurea***
- b. Bracts to the flowers 3–4 mm long; flowers 14–15 mm; pod flat, narrowly elliptic to narrowly obovate; seeds orbicular, 15–20 by 25–30 mm, 3–5 mm thick. — Borneo **19. *C. vasta***
- 4a. Venation densely or laxly reticulate; bracteoles situated on the pedicel; only standard hairy; ovules 3–5 5
- b. Venation reticulate-scalariform; bracteoles attached to the calyx; standard hairy and wing and/or keel at least ciliate; ovules 2 7

2) One specimen seen from Borneo (Wanariset).

- 5a. Leaflets 7–15; pedicel 10–20 mm long; bracts to the flowers ovate, 4–15 mm long; flowers 9–12 mm long; wing blades approximately equal to keel blades; pod not convex between seeds. — Australia 6
- b. Leaflets 3–5; pedicel 4–8 mm long; bracts to the flowers triangular, c. 1 mm long; flowers 18–21 mm long; wing blades distinctly shorter than keel blades; pod convex around one or two seeds. — Indo-China, China
- 4. *C. cochinchinensis***
- 6a. Leaflets margin entire, yellowish white when dry, scarios, sparsely hairy on both sides, glabrescent; bracts to the flowers 4–5 mm long; pedicel 10–18 mm long **10. *C. megasperma***
- b. Leaflets margin slightly undulate, not deviating in colour, not scarios, glabrous; bracts to the flowers 12–15 mm long; pedicel 8–10 mm long **13. *C. pilipes***
- 7a. Leaflets mostly 5, sometimes 7, shiny, leathery; apex acuminate; panicles terminal, axillary or raminascent 8
- b. Leaflets 3–13, not shiny, papery; apex cuspidate; panicles caulinascent, near base of stem **11. *C. nieuwenhuisii***
- 8a. Inflorescence axes dull brown/yellow sericeous; bracts to the flowers obovate or ovate, bracteoles narrowly elliptic or narrowly obovate; flowers 11–15 mm long; wing and keel ciliate or only hairy near margin 9
- b. Inflorescence axes with golden yellow/red hairy indumentum; bracts to the flowers and bracteoles broadly ovate; flowers (13–)20–23 mm long; wing sericeous near apex, keel completely sericeous. — Pod velvety, rugose
- 6. *C. eriantha***
- 9a. Pedicels 0.5–2 mm long; bracteoles narrowly elliptic, attached to calyx base. — Philippines **15. *C. scandens***
- b. Pedicels 1–2 mm long; bracteoles narrowly obovate, attached halfway to calyx. — Sumatra **18. *C. sumatrana***
- 10a. Secondary nerves forming distinct marginal arches at 2/3 to 3/4 of lamina 11
- b. Secondary nerves not forming marginal arches or forming (variably) distinct marginal arches near the margin 13
- 11a. Leaflets 3–8 cm long, base rounded to obtuse; bracts to flowers narrowly triangular, 3–7 mm long, shorter than flower buds; bracteoles present; petals glabrous, wings approximately as long as the keel; ovary sericeous; pod velvety as far as known 12
- b. Leaflets 7.5–16.5 cm long, base cordate; bracts to flowers linear, 6–8 mm long, distinctly longer than flower buds; bracteoles absent; standard red/orange shiny hairy, wings longer than the keel; ovary glabrous; pod glabrous **9. *C. kityana***
- 12a. Leaflets 5–7; pedicel 4–6 mm long; calyx sparsely short hairy outside; (pod unknown) **8. *C. fordii***
- b. Leaflets 7–17; pedicel 7–11 mm long; calyx sericeous outside; pod narrowly elliptic, flat **16. *C. speciosa***
- 13a. Inflorescence a terminal, axillary or raminascent (leafy) panicle with lateral branches present from base to apex of main axis; bracts to the flowers 1–9 mm long, leaving the young flower buds at least partly visible; pods inflated or convex around seeds, if flat, then less than 14 cm long, velvety or glabrous 14

- b. Inflorescence an axillary raceme or axillary panicle with only a few lateral branches near the base of main axis; bracts to the flowers 15–18 mm long, completely covering the young flower buds and giving the young inflorescence thereby a cone-like appearance; pod flat, 19–29 cm long, very sparsely short stiff hairy **17. *C. strobilifera***
- 14a. Standard glabrous; ovary glabrous; pod glabrous 15
- b. Standard at least partly densely or sparsely hairy outside; ovary sericeous; pod velvety, glabrescent, sometimes only still hairy along sutures and seemingly glabrous, but then pod with striate-lineate sculpture 16
- 15a. Calyx and calyx teeth hairy outside; wing and keel acute; pod flattish, convex between seeds; seeds c. 28 by 20 mm **7. *C. eurybotrya***
- b. Calyx very sparsely hairy to glabrous outside, teeth ciliate; wing and keel obtuse; pod flat, not to indistinctly convex between seeds; seeds 7–9 by 7–9 mm **14. *C. reticulata***
- 16a. Leaflets 7–17; standard sparsely hairy outside, at least in middle; wings approximately as long as the keel 17
- b. Leaflets 5, seldom 3 or 7; standard sericeous outside; wings distinctly shorter than the keel 19
- 17a. Leaflets sparsely light or dark long-hairy, glabrescent; apex cuneate to cuspidate. Inflorescence a terminal or axillary panicle or leafy panicle; bracts to the flowers (narrowly) ovate, 4–5 mm long; ovules 5–9; pod narrowly elliptic, sparsely velvety, glabrescent, shallowly longitudinally grooved or not; seeds less than 30 by 20 mm. — Australia and New Guinea 18
- b. Leaflets densely brownish tomentose, glabrescent; apex rounded to obtuse. Inflorescence an axillary or raminascent panicle, never a leafy panicle; bracts to the flowers obovate, 5–9 mm long; ovules 2; pod elliptic, densely tomentose, deeply irregularly grooved in middle when young; seeds ellipsoid, 45–65 by 30–40 mm. — Thailand to Java **5. *C. dasyphylla***
- 18a. Leaflets and inflorescence sparsely covered with dark hairs; margins not deviating in colour, not scarious; pedicels 6–8 mm long; bracts to the flowers narrowly ovate; ovules 7–9. Pod shallowly striate, glabrescent **2. *C. australis***
- b. Leaflets and inflorescence sparsely covered with white hairs; margins yellowish white when dry, scarious; pedicels 10–18 mm long; bracts to the flowers ovate; ovules 5. Pod longitudinally grooved, sparsely velvety **10. *C. megasperma***
- 19a. Nervation distinctly prominent below; bracts to the flowers (narrowly) ovate; bracteoles narrowly ovate, 3–4 by c. 1 mm, curling before dropping; pod not inflated or convex between seeds (Fig. 3) **12. *C. nitida***
- b. Nervation not distinctly prominent below or sometimes prominent, but then leaflets thinnish; bracts to the flowers linear to narrowly elliptic; bracteoles linear, 1–6 by 0.3–0.5 mm or ovate, c. 2 by 1.5 mm, not curling before dropping; immature pod convex between seeds, mature pods inflated and convex (Fig. 2) **3. *C. cinerea***

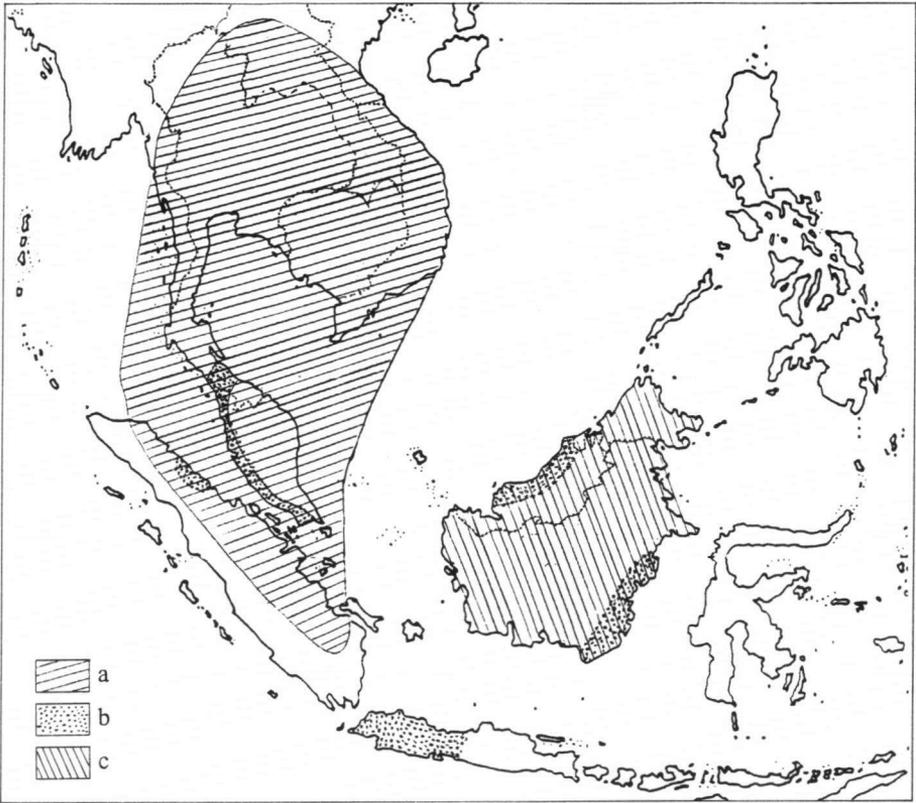


Fig. 1a. Distribution of *Callerya atropurpurea* (a), *C. dasyphylla* (b), and *C. vasta* (c).

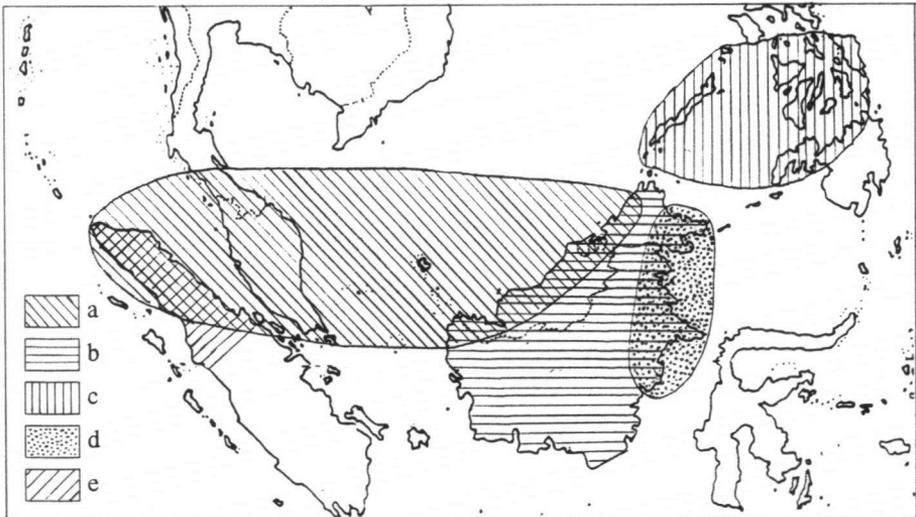


Fig. 1b. Distribution of *Callerya eriantha* (a), *C. nieuwenhuisii* (b), *C. scandens* (c), *C. strobilifera* (d), and *C. sumatrana* (e).

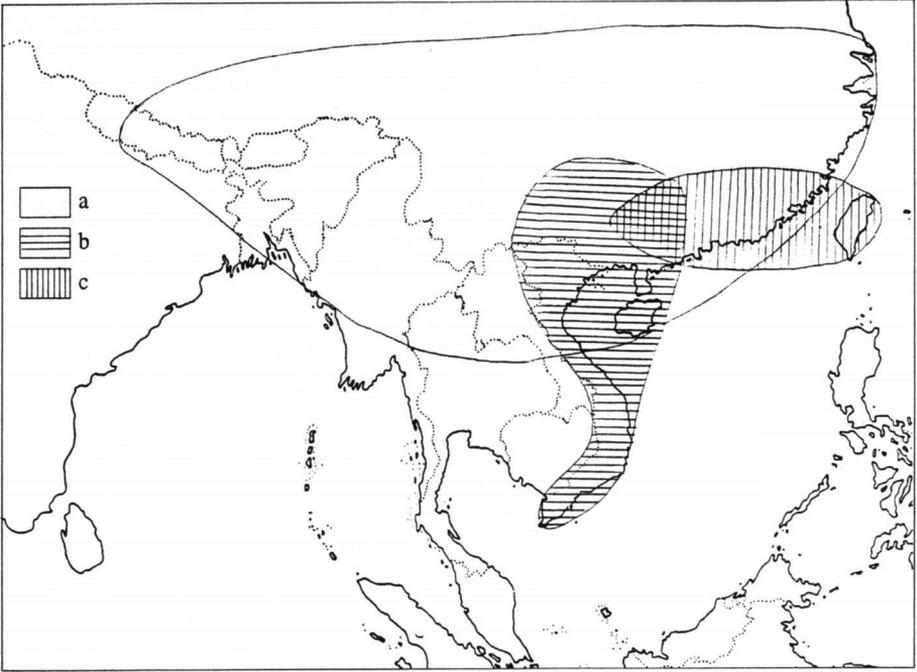


Fig. 1c. Distribution of *Callerya cinerea* (a), *C. cochinchinensis* (b), and *C. nitida* (c).

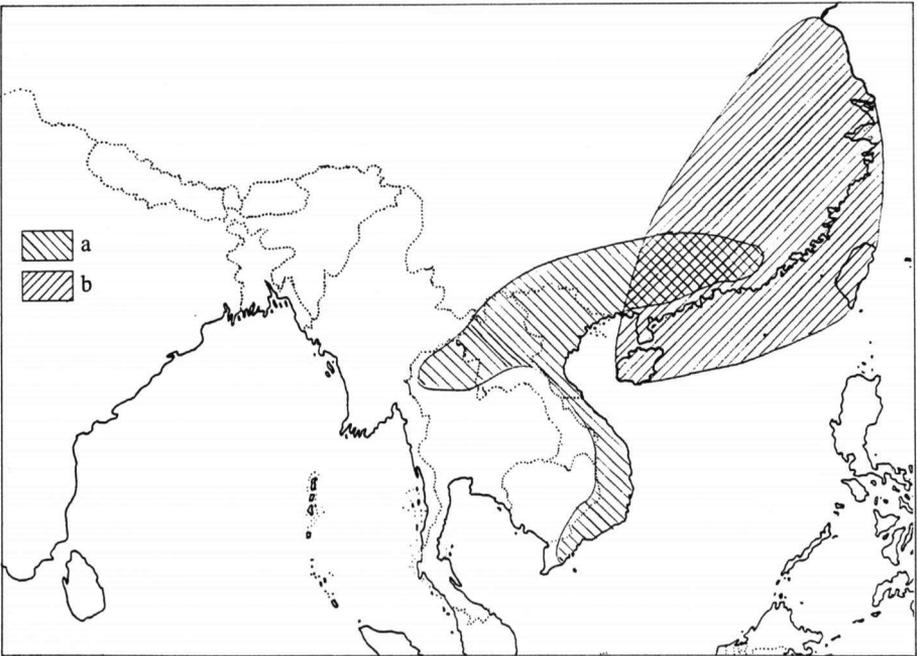


Fig. 1d. Distribution of *Callerya eurybotrya* (a) and *C. reticulata* (b).

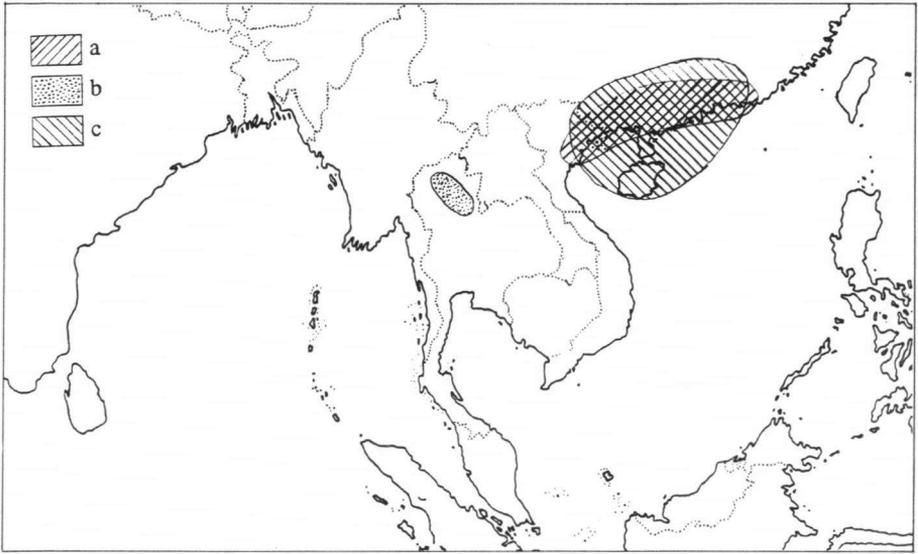


Fig. 1e. Distribution of *Callerya fordii* (a), *C. kytiana* (b), and *C. speciosa* (c).

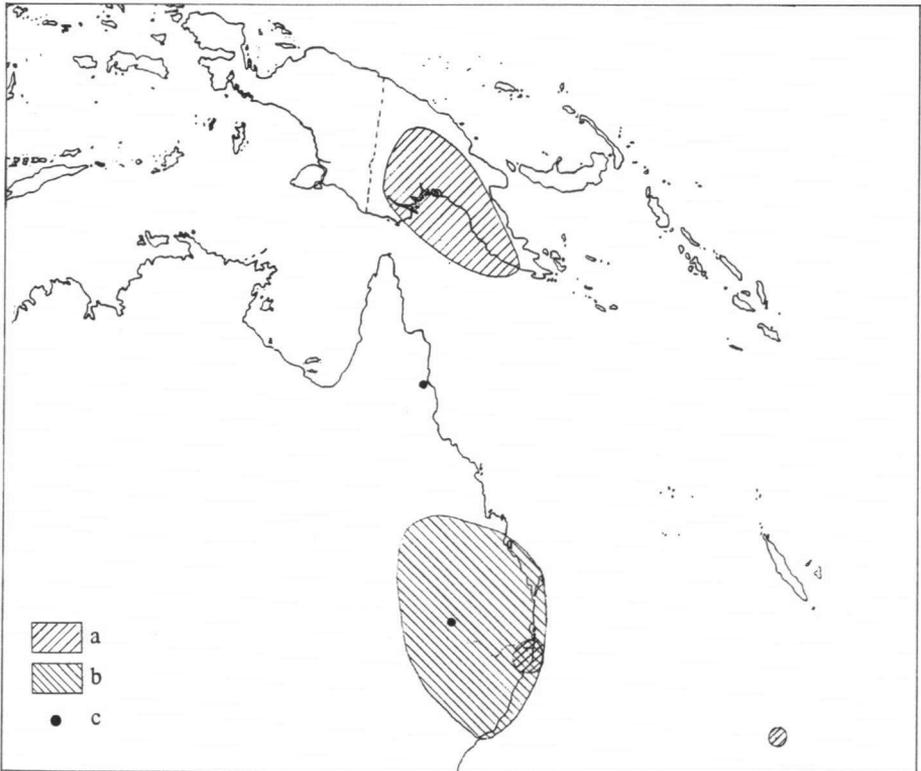


Fig. 1f. Distribution of *Callerya australis* (a), *C. megasperma* (b), and *C. pilipes* (c).

1. *Callerya atropurpurea* (Wall.) Schot, *comb. nov.*

Pongamia atropurpurea Wall., Pl. As. Rar. 1 (1829) 70, t. 78. — *Millettia atropurpurea* (Wall.) Benth., Pl. Jungh. (1852) 249; Miq., Fl. Ind. Bat. 1 (1855) 157; Baker, Fl. Brit. India 2 (1876) 108; Kurz, For. Fl. Burma 1 (1877) 358; Prain, J. As. Soc. Beng. 66, 2 (1897) 89; Gagnep., Fl. Gén. Indo-Chine 2 (1916) 371; Corner, Gard. Bull. Str. Settl. 10 (1939) 270; Wayside Trees 1 (1940) 372; Whitmore, Tree Fl. Malaya 1 (1972) 296. — *Adinobotrys atropurpureus* (Wall.) Dunn, Kew Bull. (1911) 197; Merr., Enum. Born. (1921) 303; Ridley, Fl. Mal. Pen. 1 (1922) 587. — *Whitfordiodendron atropurpureum* (Wall.) Merr., Pap. Mich. Acad. Sc. Arts Lett. 19 (1934) 160. — *Padbruggea atropurpurea* (Wall.) Craib, Kew Bull. (1927) 61; Fl. Siam. Enum. 1 (1928) 396. — Type: *Wallich 5910*, Amherst (K).

Padbruggea pubescens Craib, Kew Bull. (1927) 61; Fl. Siam. Enum. (1928) 397. — *Whitfordiodendron pubescens* (Craib) Burkill, Kew Bull. (1935) 319 [= *Millettia atropurpurea* (Wall.) Benth.]; Corner, Gard. Bull. Str. Settl. 10 (1939) 270. — Type: *Kerr 8457*, Thailand, Ta Uton (K).

Stipules caducous. Leaf rachis 10–22 cm long, c. 1–2 mm in diameter, glabrous; pulvinus 6–10 by 2–4 mm. Stipellae caducous. Petiolules 4–10 mm long, 1.5–2 mm in diameter. *Leaflets* 7–11, (narrowly) ovate to (narrowly) elliptic to (narrowly) obovate, oblique, thick, leathery, shiny, 5–17 by 2.5–6 cm; base rounded to obtuse; apex acuminate; glabrous on both sides. Nervation glabrous on both sides. Midrib raised above. Secondary nerves 5 or 6 pairs, prominent above, not forming marginal arches. Intersecondary nerves distinct. Venation distinct, reticulate. *Inflorescence* a terminal panicle, 11–20 cm long, rachis 2–5 mm in diameter, sparsely hairy. Pedicel 3–4 mm long. Bracts to the inflorescence rachis narrowly triangular, c. 1 mm long, caducous; bracts to the flowers narrowly ovate, 1.5–2 mm long, caducous. Bracteoles at top of the pedicel or slightly beneath, ovate, c. 1 by 0.5 mm, persistent. *Flower* 17–20 mm long. Calyx campanulate, distinctly oblique, cup 4–5 by 6–7 mm, (sparsely) hairy outside, teeth distinctly unequal, obtuse, c. 0.5 mm long, (sparsely) hairy outside and inside. Standard blade elliptic to suborbicular, not auricled, c. 12–14 by 12–11 mm, glabrous, basal callosities and nectar guides absent, claw 1–3.5 mm long. Wings approximately as long as keel, blades attached to keel, obovate, lower auricle distinct, 10–14 by 4–6 mm, glabrous, apex obtuse, claw 1.5–4 mm long. Keel blade obovate, upper auricle distinct, lateral pocket present, 10–13.5 by 4.5–6.5 mm, glabrous, apex obtuse, claw 2–4 mm long. *Staminal tube* 7–12 mm long. Disc small, not lobed. Ovary stiped, 7–11 mm long, sparsely hairy. Style ciliate. Ovules 3–5. *Pod* elliptic to obovate, inflated, 7.5–15 by 4.5–6 cm, glabrous, slightly rough. *Seeds* 1 or 2, lenticular, 31–38 by 33–36 mm, 20–26 mm thick, smooth.

Field notes – Tree 5–25 m high. Girth 25–150 cm. Crown dense, broad, dark green. Bole 13 m, straight, tapering, or fluted, fairly slender, with steep buttresses, 1.5–3 m high, 20 cm thick, 40–60 cm over the ground. Bark smooth, brown to grey to grey-white, very thin, with irregular, minute fissures, flaking and revealing bright green bark beneath. Slash inner bark brown, orange/red, yellow mottled. Slash wood brown to whitish/orange, in horizontal rays. Exudate resinous, sticky, red, slow to appear. Leaves dark glossy green, paler green beneath, upper side shiny. Flowers pink to deep purple red or dark violet, standard with yellow patch at base, stamens white. Fruit green or greenish, tinged dark brown reddish, sticky. Common.

Distribution – Burma (Tenasserim), Thailand, Indo-China (Laos, Annam, Vietnam), Malay Peninsula, Riouw, Sumatra. Cultivated in Bogor and Singapore. Fig. 1a.

Habitat & Ecology – Evergreen forest, or felled, disturbed, or strongly cut-out forest or along road, on (steep) hillsides. Clay or limestone. Altitude < 50–1200 m. Fl. Feb.–Aug.; fr. May–Oct.

Vernacular names – Tulang daing, nyivih bukit (Malaya); ki mo, se (Thai).

Notes – 1. The shape of the pods of Sumatra plants is elliptic, whereas those from the Malay Peninsula and from the mainland are obovate.

2. The specimens recorded from Borneo (Merrill, l.c.) belong to *Callerya vasta*.

2. *Callerya australis* (Endl.) Schot, *comb. nov.*

Pterocarpus australis Endl., Prod. Fl. Norf. (1823) 49. — *Millettia australis* (Endl.) Benth., Pl. Jungh. (1852) 250; Dunn, J. Linn. Soc. Bot. 41 (1912) 163; Verdc., Bot. Bull., Lae 11 (1977) 332. — Type: *Bauer s.n.*, Norfolk Island (iso K).

Millettia maideniana F.M. Bailey, Bot. Bull. Agric. Brisbane (1892) 12; Queensl. Fl. 2 (1900) 396; Cat. Queensl. Pl. (1913) 138, 110. — Type: *Maiden s.n.*, Port Macquarie (BRI).

Stipules narrowly triangular, 3–6 mm long, caducous. Leaf rachis 9–15 cm long, 1–1.5 mm in diameter, dark long-hairy; pulvinus 3–5 by 1.5–2 mm. Stipellae narrowly triangular, 1.5–2.5 mm long, mostly persistent. Petiolules 2–3 mm long, c. 1 mm in diameter. *Leaflets* 7–13, (narrowly) elliptic to (narrowly) obovate, 4–7 by 2–3.5 cm; base rounded to obtuse; apex cuneate to acuminate; dark long-hairy on both sides, more below, especially around the midrib and margin, glabrescent. Nervation dark long-hairy on both sides. Midrib flat above. Secondary nerves 4–7 pairs, prominent above, marginal arches near margin, variable. Intersecondary nerves variable. Venation distinct, prominent above, laxly reticulate. *Inflorescence* a terminal panicle, sometimes leafy, 16–30 cm long, rachis 1–1.5 mm in diameter, very densely short-hairy. Pedicel 6–8 mm long. Bracts to the inflorescence rachis narrowly triangular, 3–6 mm long, caducous; bracts to the flowers narrowly ovate, 4–5 mm long, caducous. Bracteoles at top of pedicel, linear, 3–5 by c. 0.5 mm, caducous. *Flower* 12–16 mm long. Calyx campanulate, oblique, cup 3–4 by 6–7 mm, hairy outside and sparsely hairy inside on teeth, teeth unequal, acuminate, 1–2.5 mm long. Standard blade broadly elliptic, not auricled, 10.5–13 by 11–17 mm, outside sparsely hairy, basal callosities absent, nectar guides present, claw 1.5–2 mm long. Wings approximately as long as keel, blades free, obovate, lower auricle indistinct, 9.5–12 by 5–6 mm, ciliate along lower margin, apex obtuse, claw 2.5–3.5 mm long. Keel blade obovate, upper auricle present, 7.5–11 by 4.5–5.5 mm, ciliate along lower margin or glabrous, apex obtuse, lateral pockets indistinct, claw 3–4 mm long. *Staminal tube* 9–11 mm long. Disc distinct, not or indistinctly lobed, c. 0.5 mm long. Ovary 10–12 mm long, not stiped, sericeous. Style sparsely ciliate at base. Ovules 7–9. *Pod* narrowly ovate, inflated, slightly convex around seeds, 13–23.5 by 2.5–3.5 cm, 3.5–4.5 cm thick, shallowly striate, very sparsely hairy along sutures and between seeds to glabrous. *Seeds* broadly lenticular, c. 14 by 12 mm, c. 7 mm thick, smooth.

Field notes – (Large) liana, climber, or scrambling shrub, 2–9 m high. Outer bark grey, very rough; inner bark white with red streaks and very sticky mucilage. Leaflets dark green shiny above, slightly paler below. Twigs purple. Calyx dark

brownish purple. Buds purple black. Flowers blue, violet or (deep) purple, whitish underneath. Fruit green, (slightly) hairy, linear.

Distribution – New Guinea, Norfolk Island, Australia (Queensland). Cultivated in Brisbane Botanical Gardens. Fig. 1f.

Habitat & Ecology – On edge of or in rain forest, in gallery forest, in low secondary forest, in regrowth, in scrub, or in open grassland. Along riverbanks or on hillsides. Altitude 1200–1650 m. Fl. June, Sept.–Dec.; fr. not known.

Note – The measurements of the pod were taken from the annotations on the type sheet.

3. *Callerya cinerea* (Benth.) Schot, *comb. nov.*

Millettia cinerea Benth., Pl. Jungh. (1852) 249; Miq., Fl. Ind. Bat. 1 (1855) 155; Baker, Fl. Brit. India 2 (1876) 104; Kurz, For. Fl. Burma (1877) 353; Dunn, J. Linn. Soc. Bot. 41 (1912) 158; Ohashi, Fl. E. Himal. 3 (1975) 67; Z. Wei, Acta Phytotax. Sin. 23 (1985) 284. — Type: *Wall. Cat. 5888*, Bengal/Assam (K).

Millettia sericosema Hance, J. Bot. 10 (1882) 259; Dunn, J. Linn. Soc. Bot. 41 (1912) 159; Z. Wei, Acta Phytotax. Sin. 23 (1985) 286. — Type: *Herb. Hance 21961* (Parker, 1881), China, Sechuan (BM).

Millettia dorwardi Collett & Hemsl., J. Linn. Soc. Bot. 28 (1890) 40; Dunn, J. Linn. Soc. Bot. 41 (1912) 157; Craib, Fl. Siam. Enum. 1 (1928) 388; Z. Wei, Acta Phytotax. Sin. 23 (1985) 285. — Syntypes: *Collett 759, 773*, Burma, Shan States (K).

Millettia dielsiana Harms ex Diels, Bot. Jahrb. 29 (1900) 412; Dunn, J. Linn. Soc. Bot. (1912) 160, t. 41; Gagnep., Fl. Gén. Indo-Chine 2 (1916) 373; Z. Wei, Acta Phytotax. Sin. 23 (1985) 289. — Type: unassigned.

Millettia oosperma Dunn, J. Linn. Soc. Bot. 41 (1912) 157; Z. Wei, Acta Phytotax. Sin. 23 (1985) 284. — Type: unassigned.

Millettia obovata Gagnep., Not. Syst. 2 (1913) 361; Fl. Gén. Indo-Chine 2 (1916) 391. — Type: unknown.

Millettia gentiliana Lév., Fl. Kouy-Tcheou (1914) 239; Z. Wei, Acta Phytotax. Sin. 23 (1985) 285. — Type: unknown.

Millettia congestiflora T. Chen, Acta Phytotax. Sin. 3 (1955) 362; Z. Wei, Acta Phytotax. Sin. 23 (1985) 288. — Type: unknown.

Millettia longipedunculata Z. Wei, Acta Phytotax. Sin. 23 (1985) 287. — Type: *Liang 11123*, China, Guangxi (KUN).

Millettia sphaerosperma Z. Wei, Acta Phytotax. Sin. 23 (1985) 285. — Type: *C. J. Li 3161*, China, Guangxi (SCBI).

Stipules narrowly triangular, 2–4 mm long, caducous. Leaf rachis 6–16 cm long, 1–2.5 mm in diameter, densely to sparsely strigose, glabrescent; pulvinus 4–8 by 2–3.5 mm. Stipellae linear, 2–7 mm long, mostly persistent. Petiolules 2–4 mm long, 1–1.5 mm in diameter. *Leaflets* 5, occasionally 3 or 7, (narrowly) ovate to (narrowly) elliptic to narrowly obovate, sometimes linear elliptic, 7.5–23 by 1.5–8 cm; base obtuse to rounded; apex cuspidate; long to short, white to brownish red, densely to sparsely strigose, mostly beneath, glabrescent. Nervation densely to sparsely strigose on both sides. Midrib sunken above, not forming marginal arches. Intersecondary nerves indistinct. Venation distinct, prominent to flat above, densely reticulate. *Inflorescence* a broad terminal panicle, sometimes leafy, 8–20 cm long, rachis 1–3 mm in diameter, puberulous. Pedicel 2–6 mm long. Bracts to the inflorescence rachis narrowly

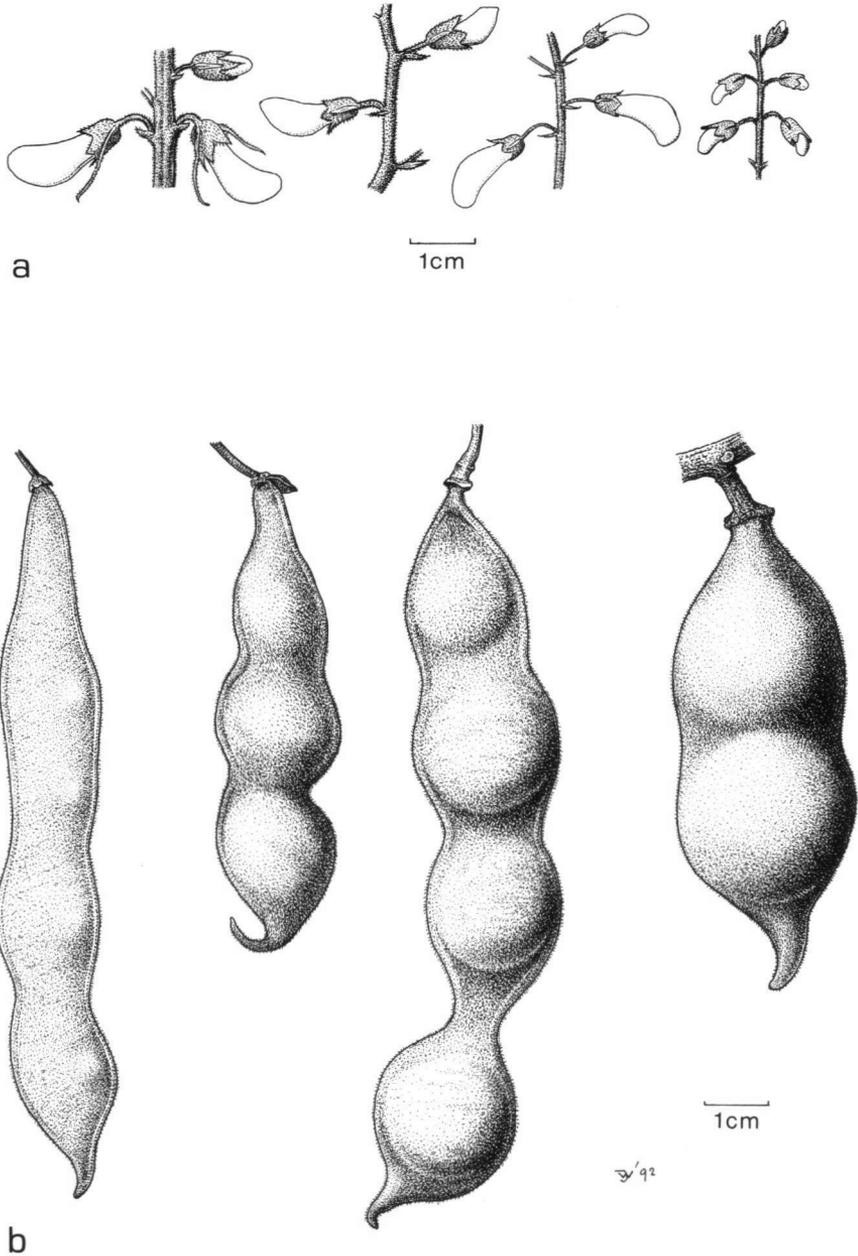


Fig. 2. Range of variation in flower and pod in *Callerya cinerea* (Benth.) Schot: a. (from left to right): Pételot s.n. ('*Milletia oosperma*'), Kerr 21003 ('*M. dorwardii*'), Herb. HK 645 ('*M. dielsiana*'), Tsui 532 ('*M. cinerea*'); b. (from left to right): Ching 3200 ('*M. dielsiana*'), Wilson 3412 ('*M. dielsiana*'), King's Coll. 60 ('*M. cinerea*'), Poilane 26851 ('*M. oosperma*').

triangular, 3–4 mm long, mostly caducous; bracts to the flowers narrowly ovate to linear, 2–6 mm long, mostly caducous. Bracteoles at top of pedicel to near calyx base, linear, some narrowly ovate, 1–6 by 0.3–1.5 mm, caducous. *Flower* 11–23 mm long. Calyx campanulate, distinctly oblique, cup 2.5–5 by 4–6 mm, teeth distinctly unequal, acute, 0.5–4.5 mm long. Standard blade elliptic to suborbicular, slightly auricled, auricles reflexed, 11–19 by 8–16 mm, outside densely sericeous, basal callosities absent, small nectar guides formed by the reflexed basal auricles, claw 2–4.5 mm long. Wings distinctly shorter than keel, blades free, narrowly obovate, lower auricle small, 5–10.5 by 2–4.5 mm, glabrous, lateral furrow present, claw 2.5–5 mm long. Keel blade (narrowly) obovate, upper auricle small, 8–14 by 3–6 mm, glabrous, lateral furrow present, claw 4–7 mm long. *Staminal tube* 9–15 mm long. Disc distinct, slightly lobed, 0.5–1 mm long. Ovary 7–14 mm long, sericeous. Style glabrous. Ovules 5–9. *Pod* narrowly elliptic to narrowly obovate, slightly to distinctly inflated, convex between the seeds, 7–15 by 1.5–3 cm, velvety, glabrescent, smooth, reticulate when young. *Seeds* 1–5, ellipsoid to lenticular, 13–19 by 20–29 mm, 15–17 mm thick, patchy hairy, smooth.

Field notes – Creeper, scandent shrub, (woody) vine, or (large) climber, 2–10 m high, c. 15 cm girth. Bark shining purplish grey to brown. Leaflets deep green above, lighter green beneath, pubescent. Sepals green. Flowers whitish in bud, open (pale) pink, salmon, wine, violet, purple, or red, standard exterior biscuit yellow to cinnamon, inside with white or green spot, wings and keel pale pink. Fruit greenish white, green, (greenish) brown, greyish to dark brown grey when old, tomentose, tawny.

Distribution – India, Indo-China, China. Fig. 1c.

Habitat & Ecology – Scattered in forest, in thickets, along stream or road, in valleys, on slopes, or on rocky cliffs; limy, clayey, or sandy soil. Altitude 150–2500 m. Fl. Apr.–Sept.; fr. Aug.–Dec.

Note – A very variable species in indumentum and thickness of leaflets and inflorescence and in the inflation of the pod (Fig. 2).

4. *Callerya cochinchinensis* (Gagnep.) Schot, *comb. nov.*

Millettia cochinchinensis Gagnep., Not. Syst. 2 (1913) 353; Fl. Gén. Indo-Chine 2 (1916) 371. —

Type: *Pierre s.n.*, March 1877, Cochinchina, prov. Bien-hoa (holo P; iso BO).

Millettia tsui Metcalf, Lingnan Sc. J. 29 (1940) 554; Z. Wei, Acta Phytotax. Sin. 23 (1985) 284.

— Type: *Tsui 217*, China (A).

Stipules caducous. Leaf rachis 4–16 cm long, 1–1.5 mm in diameter, sparsely hairy; pulvinus 6–8 by 1.5–2.5 mm. Stipellae caducous. Petiolules 5–6 mm long, 1–1.2 mm in diameter. *Leaflets* 3–5, (narrowly) elliptic, 6–14 by 3.5–8 cm; base obtuse, some slightly oblique; apex cuspidate; glabrous on both sides. Nervation very sparsely hairy on midrib near base beneath, glabrous above. Midrib flat above. Secondary nerves 4 or 5 pairs, raised above, marginal arches near margin, variably distinct. Inter-secondary nerves variable. Venation distinct, reticulate, prominent above. *Inflorescence* a terminal or axillary panicle or raceme, or a terminal leafy panicle, 6–23 cm long, rachis 1–1.5 mm in diameter, densely hairy. Pedicel 4–8 mm long. Bracts to the inflorescence rachis caducous; bracts to the flowers triangular, c. 1 mm long,

mostly caducous. Bracteoles at top of pedicel, ovate, 0.8–1 by c. 0.5 mm, persistent. *Flower* 18–21 mm long. Calyx campanulate, slightly oblique, cup 6–7 by c. 10 mm, teeth slightly unequal, subtruncate, 0.1–1 mm long. Standard blade suborbicular, not auricled, 15–17 by 14–16 mm, outside sericeous, basal callosities present, nectar guides absent, claw 3–5 mm long. Wings distinctly shorter than the keel, blades free, narrowly obovate, lower auricle very small, 14–16 by 3.5–4.5 mm, glabrous, upper auricle slightly rugose at base, claw 2.5–3.5 mm long. Keel blade obovate, upper auricle small, 13–15.5 by 5–7 mm, glabrous, lateral pockets indistinct, claw 5–6 mm long. *Staminal tube* 13–15 mm long. Disc distinct, lobed, 1–1.5 mm long. Ovary 15–17 mm long, densely sericeous. Style ciliate at base, glabrescent towards apex. Ovules 3 or 4. *Pod* elliptic, long-stalked and long-beaked, inflated, 7–10 by 3–4 cm, hairy, smooth. *Seeds* 1 (or 2), ellipsoid, 20–25 by 30–35 mm, 15–20 mm thick.

Field notes – Bush, scandent or twining shrub, or (semi-)woody climber, 1–20 m high. Leaflets deep lustrous green, light green below. Flowers white to cream to lavender, standard greyish yellow with purple stripes inside, wings and keel pink, (slightly) fragrant. Fruit green, tawny, pubescent.

Distribution – China (Hainan, Kwangtung, Kweichow, Yunnan), Indo-China (Annam). Fig. 1c.

Habitat & Ecology – In (light) scrub, thickets, woods, (forested) ravines, along creeks or riverbanks on steep or moist sandy or clayey soils. Altitude 200–1100 m. Fl. Mar.–Sept.; fr. June–Oct.

Note – The name *Millettia venusta* Chun appears on some specimens distributed by the A herbarium. Apparently, the homonymy with *M. venusta* Craib was discovered in time, and the name was never published. I have found no evidence of the species being subsequently published under a different name.

5. *Callerya dasyphylla* (Miq.) Schot, *comb. nov.*

Padbruggea dasyphylla Miq., Fl. Ind. Bat. 1 (1855) 150; Dunn, Kew Bull. (1911) 197; Ridley, Fl. Mal. Pen. 1 (1922) 587. — *Millettia dasyphylla* (Miq.) Boerl., Handl. Fl. Ned. Indië 1 (1890) 349; Koord., Nat. Tijd. Ned.-Indië 60 (1901) 238. — Type: *Horsfield s. n.*, Java (K).

Millettia oocarpa Prain, J. As. Soc. Beng. 66, 2 (1897) 92. — Syntypes: *Wray 2141*, *Scortechini 429*, Malacca, Perak, Batu Togoh (BM).

Millettia maingayi Baker, Fl. Brit. India 2 (1876) 110; Prain, J. As. Soc. Beng. 66, 2 (1897) 91. — *Padbruggea maingayi* (Baker) Dunn, Kew Bull. (1911) 197; Ridley, Fl. Mal. Pen. 1 (1922) 587. — Type: *Kew Distr. 605* (= *Maingay 2757*), Singapore (K).

Stipules narrowly triangular, 4–6 mm long, mostly caducous. Leaf rachis 11–19.5 cm long, 1.5–2.5 mm in diameter, densely hairy; pulvinus 5–7 by 2–3 mm. Stipellae narrowly triangular, 1.5–3 mm long, mostly persistent. Petiolules 3–5 mm long, 1–1.5 mm in diameter. *Leaflets* 9–17, (narrowly) elliptic to (narrowly) obovate, 3.5–8 by 1.5–4 cm; base rounded; apex rounded to obtuse; densely tomentose on both sides, more so beneath, often ciliate, glabrescent. Nervation densely tomentose on both sides. Midrib sunken above. Secondary nerves 4–6 pairs, flat to sunken above, not forming marginal arches. Intersecondary nerves variable. Vena-

tion flat, densely reticulate, variably distinct. *Inflorescence* an axillary or raminascent panicle, 10–35 cm long, rachis 1.5–3.5 mm in diameter, densely hairy. Pedicel 4–7 mm long. Bracts to the inflorescence rachis caducous; bracts to the flowers obovate, 5–9 mm long, caducous. Bracteoles on upper half of pedicel, narrowly obovate to linear, 3–6 by 0.5–2.5 mm, mostly caducous. *Flower* 10–15 mm long. Calyx campanulate, slightly oblique, cup 3–4 by 4.5–6 mm, densely hairy outside and on teeth inside, teeth unequal, obtuse to acute, 1–2.5 mm long. Standard blade suborbicular, auricled, auricles reflexed, 7.5–12.5 by 8.5–14.5 mm, outside sparsely shortly hairy, mostly on central part, basal callosities absent, small nectar guides formed by the reflexed auricles, claw 2.5–3.5 mm long. Wings approximately as long as keel, blades partly connate, (narrowly) obovate, lower auricle very small, 7–12 by 3–5 mm, glabrous or hairy only at apex, sometimes upper auricle with rough part at base, claw 2–5.5 mm long. Keel blade obovate, upper auricle small, 5–8.5 by 2.5–5 mm, glabrous or very sparsely hairy along lower margin, lateral pockets indistinct, claw 3–5 mm long. *Staminal tube* 6–11 mm long. Disc small or indistinct. Ovary 6–10 mm long, sericeous. Style glabrous. Ovules 2. *Pod* elliptic, inflated, 7.5–17 by 3.5–9 cm, densely velvety, deeply grooved. *Seeds* 1 or 2 fused together, ellipsoid, 45–65 by 30–40 mm, 15–25 mm thick.

Field notes – Large woody lianas, climbers, creepers, or climbing or scrambling shrubs, 10–35 m high, 6–45 cm girth. Bark thin papery, peeling in thin papery pieces, grey-whitish to tan-brown. Branches flattish. Leaflets dark green above, (light) green (velvety) underneath. Inflorescence axes pale greenish. Pedicels whitish. Calyx whitish to dull pink with yellowish border. Flowers pale carmine or pale pink, fading to white proximally, or white tinged with pink, or white; standard white, mid-area inside light yellow; wings pinkish turning white; keel white; filaments whitish; ovary tan; fragrant. Fruit hard dark brown velvety tomentose outside, pale yellowish inside; hairs black to gold-brown, not irritating.

Distribution – Thailand, Malay Peninsula, Sumatra, Java, Borneo. Fig. 1a.

Habitat & Ecology – Canopy of evergreen forest, secondary forest, disturbed forest; in dense jungle, sandy coastal fringe of trees, scrub or light forest along river. Granitic, rocky soil, on limestone or sandstone. Altitude < 50–900 m. Fl. Apr.–Oct.; fr. July–Nov.

Note – The distinction between *Callerya dasyphylla* and *Padbruggea maingayi* was based on the differences in hairiness of the leaflets and the pod size. Both characters can depend on age and habitat of the specimen, and are therefore not usable as distinguishing characters. No difference in flowers has been found or even ever recorded (cf. Prain, l.c.).

6. *Callerya eriantha* (Benth.) Schot, *comb. nov.*

Millettia eriantha Benth., Pl. Jungh. (1852) 250; Miq., Fl. Ind. Bat. 1 (1855) 150; Baker, Fl. Brit. India 2 (1876) 108; Prain, J. As. Soc. Beng. 66, 2 (1897) 88. — *Adinobotrys erianthus* (Benth.) Dunn, Kew Bull. (1911) 194; Ridley, Fl. Mal. Pen. 1 (1922) 586. — *Whitfordiodendron erianthum* (Benth.) Merr., Pap. Mich. Acad. Sc. Arts Lett. 19 (1934) 160. — *Padbruggea eriantha* (Benth.) Craib, Fl. Siam. Enum. 1 (1928) 397. — Type: *Griffith s.n.* (Kew Dist. 1836), Malacca (K).

Stipules narrowly triangular, c. 3 mm long, sparsely hairy, mostly persistent. Leaf rachis 9.5–17 cm long, 2–3 mm in diameter, sparsely hairy to glabrous; pulvinus 5–8 by 3–4 mm. Stipellae caducous. Petiolules 6–7 mm long, 2–3 mm in diameter. *Leaflets* 5(–7), ovate to (narrowly) elliptic to obovate, 4–14 by 2.5–7.5 cm, thick leathery; base acute to obtuse; apex acuminate to cuspidate; glabrous above, sparsely hairy to glabrous beneath. Nervation glabrous above, glabrous to sparsely hairy beneath. Midrib flat above. Secondary nerves 4–5 pairs, flat above, not forming marginal arches. Intersecondary nerves distinct. Venation distinct, scalariform-reticulate. *Inflorescence* a terminal to axillary panicle with few side branches, rachis 9.5–17 cm long, densely yellow/red short-hairy. Pedicel 0.5–1.5 mm long. Bracts to the inflorescence rachis linear, c. 4 mm long; bracts to the flowers ovate to elliptic, 4–7 mm long, caducous. Bracteoles one third to halfway of the calyx, ovate to elliptic, 3–5.5 by 4.5–5 mm, persistent. *Flower* (13–)20–23 mm long. Calyx campanulate, slightly oblique, cup 4–5 by 8–9 mm, densely hairy outside, teeth unequal, acuminate, 2.5–3 mm long, hairy inside and outside. Standard blade suborbicular, very slightly auricled, 16.5–17.5 by 13–16.2 mm, outside densely sericeous, basal callosities present, nectar guides absent, claw 1.5–2 mm long. Wings approximately as long as keel, blades free, obovate, lower auricle very small, 13.5–18 by 4.5–5 mm, sericeous at apex outside, lower margin ciliate, apex obtuse, upper auricle rugose at base, claw 2.5–4 mm long. Keel blade obovate, upper auricle small, 14–19 by 5.5–6 mm, sericeous outside, mostly along lower margin, apex obtuse, claw 2.5–4.5 mm long. *Staminal tube* 9–12 mm long. Disc distinct, not lobed, 1–1.8 mm long. Ovary indistinctly stiped, 10–12 mm long, sericeous. Style sparsely ciliate. Ovules 2. *Pod* ovate to obovate, inflated, 6–9.5 by 4–5 cm, velvety hairy, rugose. *Seed* 1, rarely 2 fused together, lenticular, c. 45 by 35 mm, c. 20 mm thick, smooth.

Field notes – Woody climber or vine, 12–25 m high, c. 25 cm girth. Stem smooth, brown to green. Red exudate. Leaflets dark green above, green underneath. Calyx green with golden to silvery-brown indumentum, dull maroonish. Flowers pink, dark red, maroon, claret, outside glossy golden brown indumentum; standard dark red with yellow bar or blaze inside; filaments pinkish; anthers yellow; pistil white. Pod green.

Distribution – Malay Peninsula, Sumatra, Borneo. Fig. 1b.

Habitat & Ecology – Mixed dipterocarp rain forest, yellow sandy soil or wooded cliffs. Altitude 1–600 m. Fl. Feb.–Nov.; fr. Aug.–Sept.

Vernacular name – Kog padi (Tenuan).

Note – Some Bornean specimens differ from those on the Malay Peninsula and Sumatra by the hairy lower side of the leaflets. The stipules are sometimes caducous. Some of these specimens, and the one from Sumatra, have small flowers. None of these characters are, I think, enough to distinguish more species in this group. The characteristically placed and shaped bracteoles and the thick golden shiny indumentum of the inflorescence indicate them to be *C. eriantha*.

7. *Callerya eurybotrya* (Drake) Schot, *comb. nov.*

Millettia eurybotrya Drake, Journ. de Bot. 5 (1891) 187; Dunn, J. Linn. Soc. Bot. 41 (1912) 155; Gagnep., Fl. Gén. Indo-Chine 2 (1916) 368. — Lectotype (proposed here): *Balansa* 2304, Tonkin, Thu Phap (holo P; iso K).

Stipules linear, c. 3 mm long, glabrous, mostly persistent. Leaf rachis 8–17 cm long, c. 1 mm diam., glabrous; pulvinus 4–6 by 2–3 mm. Stipellae linear, 2–5 mm long, mostly persistent. Petiolules 3–4 mm long, c. 1 mm diameter. *Leaflets* 5–9, ovate to (narrowly) elliptic, thin papery, 4–15 by 2.5–7 cm; base rounded; apex acuminate to cuspidate; glabrous above, very sparsely hairy beneath. Nervation sparsely hairy on both sides. Midrib sunken above. Secondary nerves 4–6 pairs, flat above, forming variably distinct marginal arches. Intersecondary nerves distinct. Venation distinct, prominent above, densely reticulate. *Inflorescence* a terminal panicle, sometimes leafy, 10–40 cm long, rachis 1–1.5 mm diam., (sparsely) shortly hairy. Pedicel 4–7 mm long. Bracts to the inflorescence narrowly triangular, c. 2 mm long, caducous; bracts to the flowers narrowly triangular, c. 1 mm long, caducous. Bracteoles at top of pedicel, narrowly ovate, 1–1.5 by 0.5 mm, persistent. *Flower* (7–)10–15 mm long. Calyx campanulate, slightly oblique, cup (1.5–)3 by (3–)4–6 mm, hairy outside and upper part inside, teeth slightly unequal, obtuse, 0.25–0.5 mm long. Standard blade (sub-)orbicular, not auricled at base, (7.5–)10–11.5 by (7.5–)10–10.8 mm, glabrous, basal callosities absent, small nectar guides present, claw c. 2.5 mm long. Wings approximately as long as keel, blades free, obovate, upper auricle small, lower auricle indistinct, (7.5–)12–13 by (2.5–)4–4.5 mm, glabrous, apex acute, lateral furrow slight, claw 2–2.5 mm long. Keel blade obovate, upper auricle small, (7–)9–10 by (3–)3.5–4.5 mm, glabrous, apex acute, lateral pockets absent, claw (2.5–)3.5 mm long. *Staminal tube* (5–)8–10 mm long. Disc indistinct, not lobed, less than 0.1 mm long. Ovary indistinctly stiped, (7–)8–10 mm long, margins thickened, glabrous. Style glabrous. Ovules 9–11. *Pod* narrowly ovate to narrowly elliptic, not inflated, slightly convex between seeds, 6.5–12.5 by 1.5–3 cm, glabrous, smooth with thickened margins. *Seeds* 1–6, suborbicular, flattish, c. 28 by 20 by c. 5 mm, smooth.

Field notes – Liana or scandent shrub in thickets, 3–30 m high, semi-woody. Leaflets deep green above, light green below. Flowers dark purple to rose (greenish blue), standard with yellow centre. Fruit green when young, later brownish black, tawny.

Distribution – Indo-China (Tonkin, Annam), Thailand, China (Kwangtung, Kweichow). Fig. 1d.

Habitat & Ecology – Among scattered shrubs, on open slopes or riversides, dry clayey soil, fairly common. Altitude 130–400 m. Fl. June–Aug.; fr. Aug.–Nov.

Notes – 1. *Callerya eurybotrya* is most easily recognizable when fully flowering with abundant flowers and acute petals that dry to a light orange colour.

2. The Chinese specimen *Tsang* 26712 from Kwangtung has very small flowers, which are recorded to be greenish blue, but in other characters it is a true *C. eurybotrya*.

3. Two specimens have a pod that more resembles *C. reticulata*, but they are too large for this species. The leaflets also lack the emarginate (very) apex and I have thus placed both specimens in *C. eurybotrya*.

8. *Callerya fordii* (Dunn) Schot, *comb. nov.*

Milletia fordii Dunn, J. Linn. Soc. Bot. 41 (1912) 136. — Type: *Ford* 62, China, Kwangtung, Lienchow River (K).

Stipules linear, c. 2 mm long, mostly caducous. Leaf rachis 3–10 cm long, c. 1 mm in diameter, sparsely hairy, glabrescent; pulvinus 3–6 by c. 1 mm. Stipellae linear,

2–3 mm long, mostly persistent. Petiolules 1–2.5 mm long, c. 0.5 mm in diameter. *Leaflets* 5–7, narrowly ovate to narrowly elliptic, 3–9 by 0.75–4 cm; base rounded to obtuse; apex acuminate to slightly cuspidate; glabrous on both sides. Nervation hairy at midrib above, sparsely hairy to glabrous on midrib and secondary nerves beneath. Midrib flat above. Secondary nerves 4–6 pairs, flattish above, very slightly raised beneath, indistinct, forming marginal arches at 2/3 to 3/4 of lamina. Intersecondary nerves variable. Venation indistinct, flat, laxly reticulate. *Inflorescence* a terminal or axillary raceme, sometimes a terminal leafy panicle, 4.5–10 cm long, rachis 1.5–2 mm in diameter, shortly sericeous. Pedicel 4–6 mm long. Bracts to the inflorescence rachis narrowly triangular, 4–5 mm long; bracts to the flowers narrowly triangular, 3–4 mm long, caducous. Bracteoles at top of pedicel, near the calyx base, narrowly ovate, 1.5–4 by c. 1 mm, persistent. *Flower* 15–19 mm long. Calyx campanulate, slightly oblique, cup c. 4 by 5.5 mm, sparsely hairy outside, densely hairy on teeth inside, teeth slightly unequal, obtuse, 1.5–3.2 mm long. Standard blade suborbicular, not auricled at base, 11.5–18 by 11.5–15 mm, glabrous, basal callosities and nectar guides absent, claw 3.5–4 mm long. Wings approximately as long as keel, blades free, narrowly obovate, lower auricle very small, 13–15 by 4–5 mm, glabrous, upper auricle rugose at base, slight lateral furrow present, claw 4–4.5 mm long. Keel blade narrowly obovate, upper auricle small, 13–13.5 by 4.5–5 mm, glabrous, lateral pockets distinct, claw 5–6 mm long. *Staminal tube* 14–16 mm long. Disc distinct, slightly lobed, c. 0.5 mm long. Ovary shortly stiped, c. 14 mm long, body completely sericeous, or only along thickened margins. Style glabrous. Ovules 9–14. *Pod* and *seeds* not known.

Field notes – Vine or climber, c. 1 m long, fairly common. Flowers white, fragrant, inside pale green.

Distribution – China (Kwangtung), Indo-China (Tonkin). Fig. 1e.

Habitat & Ecology – Growing in thicket, on dry clayey soil. Fl. Aug.–Sept.

Note – Three collections seen, one without locality. Dunn's type specimen has very small leaflets, but other specimens show that these are only those directly below the inflorescences. In other parts the plant has larger and broader leaflets.

9. *Callerya kityana* (Craib) Schot, *comb. nov.*

Millettia kityana Craib, Kew Bull. (1927) 58; Fl. Siam Enum. 1 (1928) 390. — Type: Kerr 3347, Thailand, Chuginai (K).

Stipules narrowly triangular, 3–4 mm long, mostly caducous. Leaf rachis 12.5–30 cm long, 2–3 mm in diameter, glabrous; pulvinus 8–12 by c. 4 mm. Stipellae linear, 4–6 mm long, persistent. Petiolules 4–6 mm long, 1–2 mm in diameter. *Leaflets* 7–11, narrowly elliptic to narrowly obovate, 7.5–16.5 by 2.5–5.2 cm; base cordate; apex cuspidate; glabrous on both sides. Nervation glabrous on both sides. Midrib flat to sunken above. Secondary nerves 69 pairs, flat on both sides, forming marginal arches at 2/3 to 3/4 of lamina. Intersecondary nerves variable. Venation flat, distinct, reticulate. *Inflorescence* a terminal to axillary panicle, 20–50 cm long, rachis c. 3 mm in diameter, sparsely hairy. Pedicel 3–4 mm long. Bracts to the inflorescence rachis narrowly triangular, 3–4 mm long; bracts to the flowers linear, 6–8 mm long, sericeous, caducous. Bracteoles absent. *Flower* 16–20 mm long.

Calyx campanulate, slightly oblique, cup c. 4 by 5–6 mm, almost subtruncate, densely short hairy outside and on upper part inside, lobes rounded to obtuse, unequal, 0.1–1.5 mm long. Standard blade suborbicular, slightly auricled at base, 10–11 by c. 12.5 mm, outside densely red short-hairy, basal callosities present, nectar guides absent, claw 0.5–2 mm long. Wings longer than keel, blades free, narrowly obovate, lower auricle absent, 10–14 by 3–3.2 mm, glabrous, lateral pocket present, claw 1–3 mm long. Keel blade obovate, upper auricle distinct, 10.5–12 by 3.5–5.8 mm, glabrous, lateral pockets absent, claw 1–2.5 mm long. *Staminal tube* 7–12 mm long. Disc distinct, not lobed, c. 1 mm long. Ovary 8–11 mm long, glabrous, slightly striate. Style glabrous. Ovules 7 or 8. *Pod* narrowly obovate, flat, c. 9.3 by 1.8 cm, glabrous, smooth except prominent veins. *Seeds* not seen.

Field notes – Large woody climber. Flowers pink, standard chocolate to golden brown outside, purple to pale pink with a yellow centre inside, wings pink to purple. Cultivated for medicinal purposes, said to have been brought from forest.

Distribution – Thailand (Chunginai, Lampun, Prae). Fig. 1e.

Habitat & Ecology – Cultivated, near village. Altitude 270–300 m. Fl. Aug.–Nov.; fr. Nov.

Vernacular names – Lang yen (Chunginai), hang chud (Lampun).

Note – Close to *Endosamara racemosa* (Roxb.) Geesink, but because of the ‘normal’ pod (without the lomentating endocarp) better be kept in *Callerya*.

10. *Callerya megasperma* (F. Muell.) Schot, *comb. nov.*

Wistaria megasperma F. Muell., *Fragm.* 1 (1858) 10. — *Milletia megasperma* (F. Muell.) Benth., *Fl. Austr.* 2 (1864) 211; Bailey, *Fl. Queensl.* 2 (1900) 396; *Cat. Queensl. Pl.* (1913) 138; Dunn, *J. Linn. Soc. Bot.* 41 (1912) 162. — Type: *C. Moore s.n.*, Australia, NSW, Richmond River (iso K).

Stipules narrowly triangular, 4–6 mm long, mostly persistent. Leaf rachis 12–22 cm long, c. 1 mm in diameter, sparsely long-hairy; pulvinus 4–6 by c. 1.5 mm. Stipellae linear, 0.5–1.5 mm long, mostly caducous. Petiolules 3–5 mm long, c. 1 mm in diameter. *Leaflets* 7–15, narrowly ovate to narrowly elliptic to narrowly obovate, 4.5–9 by 1.5–4 cm; base cuneate; apex acuminate to cuspidate; margins yellowish white in colour, often scarious; sparsely white long-hairy on both sides, more below, mostly along midrib and margin, glabrescent. Nervation sparsely white long-hairy on both sides, glabrescent. Midrib sunken above. Secondary nerves 5–7 pairs, prominent above, forming variably distinct marginal arches near the margin. Intersecondary nerves variable. Venation prominent above, laxly reticulate. *Inflorescence* a terminal panicle, sometimes leafy, 10–30 cm long, rachis c. 2 mm in diameter, densely short-hairy. Pedicel 10–18 mm long. Bracts to the inflorescence rachis narrowly triangular, 3–4 mm long, caducous; bracts to the flowers ovate, 4–5 mm long, caducous. Bracteoles on upper half of pedicel, linear, 1.5–2 by c. 0.5 mm, caducous. *Flower* 9–12 mm long. Calyx campanulate, slightly oblique, cup 2–3 by 4–6 mm, sparsely hairy outside and on teeth inside, teeth unequal, obtuse, 0.5–3 mm long. Standard blade broadly suborbicular, slightly auricled at base, 8–12.5 by 10–20 mm, sparsely short-hairy outside, one half-arch shaped callosity at base of claw, nectar guides absent, claw c. 2.5 mm long. Wings approximately as long as keel,

blades free, obovate, lower auricle absent, 6–11 by 4–6.5 mm, glabrous, margin scarios, lateral furrow present, claw 4–4.5 mm long. Keel blade obovate, upper auricle distinct, 4.5–8 by 3–5.5 mm, glabrous, margin scarios, lateral pockets absent, claw c. 5 mm long. *Staminal tube* 8.5–10.5 mm long. Disc distinct, not lobed, c. 0.5 mm long. Ovary stiped, 7–9 mm long, densely sericeous. Style glabrous. Ovules 5. *Pod* narrowly elliptic, inflated, slightly convex around seeds, c. 14 by 4 cm, with (shallow) longitudinal grooves, velvety, glabrescent. *Seeds* 2–4, ellipsoid, not seen, probably less than 20 by 30 mm.

Field notes – A climbing, medium high liana, many-stemmed, c. 6 m high, 5–75 cm girth. Bark mottled grey and yellow brown. Leaflets dark green. Calyx white. Flowers purple to purplish blue. Standard mauve, darker inside towards centre around pale yellow vertical honeycomb; wings deep purple outside, paler inside; keel white, tinged purple towards tip.

Distribution – Australia (Queensland, New South Wales). Fig. 1f.

Habitat & Ecology – In scrub or gully rain forest along creek. Altitude 150–300 m. Fl. Oct.–Nov.

11. *Callerya nieuwenhuisii* (J.J. Sm.) Schot, *comb. nov.*

Millettia nieuwenhuisii J.J. Sm., Bull. Dept. Agr. Ind. Néerl. 3 (1906) 17; Ic. Bog. 3 (1907) t. 230, 231. — *Adinobotrys nieuwenhuisii* (J.J. Sm.) Dunn, Kew Bull. (1911) 196; Merr., Enum. Born. (1921) 303. — *Whitfordiodendron nieuwenhuisii* (J.J. Sm.) Merr., Univ. Calif. Publ. Bot. 15 (1929) 106. — Type: *Nieuwenhuis 1294*, Borneo, Bloeo-oe (cultivated as HB XVII 32 a (= 180), Java, Buitenzorg) (BO).

Adinobotrys myrianthus Dunn, Kew Bull. (1911) 196; Merr., Enum. Born. (1921) 303. — *Whitfordiodendron myrianthum* (Dunn) Merr., Pap. Mich. Acad. Sc. Arts Letters 19 (1934) 160. — Syntypes: *Hose 248, 436*, Sarawak (K).

Millettia cuspidata Ridley, Kew Bull. (1929) 254. — Type: *Ridley s.n.*, Jan. 1915, Sarawak, Matang woods (K).

Stipules (narrowly) triangular, 1–4 mm long, caducous. Leaf rachis 15–25 cm long, 2–3 mm in diameter, glabrescent; pulvinus 7–10 by 3–5 mm. Stipellae caducous. Petiolules 5–9 mm long, c. 2 mm in diameter. *Leaflets* 3–13, ovate to (narrowly) elliptic to (narrowly) obovate, 7.5–25 by 4–12 cm; base rounded to cuneate; apex cuspidate; sparsely hairy on both sides. Nervation sparsely hairy on both sides. Midrib flat above. Secondary nerves 4–6 pairs, flat to sunken above, not forming marginal arches. Intersecondary nerves variable. Venation distinct, reticulate-scalariform. *Inflorescence* a panicle, caulinascent from near base of plant, 24–60 cm long, rachis 2–5 mm in diameter, soft hairy, glabrescent. Pedicel 0.5–1 mm long. Bracts to the inflorescence rachis narrowly ovate, c. 2 mm long; bracts to the flowers narrowly obovate, 2–3 mm long, caducous. Bracteoles on lower half of calyx, (narrowly) obovate, acuminate, 1.5–2 by 1–1.5 mm, persistent. *Flower* 8–12 mm long. Calyx campanulate, oblique, cup 2.5–3 by 3.5–4 mm, teeth unequal, acute, 0.5–1.5 mm long. Standard elliptic to suborbicular, slightly auricled, 9–10 by 5–9 mm, outside densely sericeous, basal callosities present, nectar guides absent, claw 1–1.5 mm long. Wings approximately as long as keel, blades free, obovate, lower auricle very small, 8–9 by 1.8–3.2 mm, slightly ciliate along lower margin, upper auricle rugose at base, claw 2–2.2 mm long. Keel blade obovate, upper auricle present, 7.5–

9.5 by 2.5–3.5 mm, outside sparsely to densely hairy near the margin, lateral pock-ets distinct, claw 2–2.5 mm long. *Staminal tube* 7–7.5 mm long. Disc often distinct, not lobed, up to 1 mm long. Ovary 6–7.5 mm long, sericeous. Style ciliate. Ovules 2. *Pod* ovate to obovate, inflated, convex around seeds, 4.5–9.5 by 2–4.5 cm, ruminate, sparsely hairy, glabrescent. *Seeds* 1–3, lenticular, fused together when more than one, c. 35 by 35 mm, 25 mm thick, smooth.

Field notes – (Large) liana or climber, 9–45 m high, 3–30 cm girth. Bark grey, slightly fissured. Stem pale brown, used for binding. Sticky pink sap. Inflorescence starting near ground, on first few feet. Peduncle cream. Bud grey. Flowers dull red, red-purple, dark red, carmine, pale orange-red, pale red, turning pink, with yellow to green stripes inside standard, staminal tube white, anthers yellow greenish, pistil (very light) yellow, stigma white; fragrant, visited by Xylocopids and inhabited by ants. Fruits in bunches, hanging, yellowish to brown to rusty green, fleshy, edible.

Distribution – Borneo. Fig. 1b.

Habitat & Ecology – Mixed dipterocarp forest, slightly swampy forest, periodically inundated soil, near rivers on humid loamsoil or on sandstone, limestone, graniorite or basalt. Flatland to steep slopes. Altitude 0–1300 m. Fl. May–Jan.; fr. Aug.–Dec.

Vernacular names – Via dusan, blungka, akar kelalai, akar belum, rendan belum (Iban), bingol (Kinabalu).

Notes – 1. A very characteristic species with its caulinascent large bunchy panicles. One collector noted it even as a ‘leafless parasite’.

2. Dunn separated *Adinobotrys myriantha* from *Callerya nieuwenhuisii* on the fewer leaflets and the bracteoles placed lower. I have found both characters to be dependent on the age of the plant.

3. The hollow stems of younger branches are inhabited by ants, *Cladomyrna* spec. (pers. comm.).

12. *Callerya nitida* (Benth.) Geesink

Callerya nitida (Benth.) Geesink, Leiden Bot. Series 8 (1984) 83. — *Millettia nitida* Benth., Lond. J. Bot. 1 (1842) 484; Pl. Jungh. (1852) 249; Fl. Hongk. (1861) 78; Dunn, J. Linn. Soc. Bot. 41 (1912) 161; Z. Wei, Acta Phytotax. Sin. 23 (1985) 287. — Type: *Millett s.n.*, Hong Kong (K).

Stipules narrowly triangular, 1.5–2 mm long, mostly persistent. Leaf rachis 3–10 cm long, c. 1.5 mm in diameter, shortly hairy, glabrescent; pulvinus 3–5 by c. 2 mm. Stipellae linearly triangular, 3–4 mm long, persistent. Petiolules 4–5 mm long, 1–1.5 mm in diameter. *Leaflets* 5, (narrowly) elliptic to (narrowly) obovate, the lower pair much smaller than the second pair, the terminal one distinctly the largest, 4–9.5 by 1.5–4.2 cm; base rounded; apex acuminate to slightly cuspidate; glabrous above, short-hairy beneath, glabrescent. Nervation short-hairy on both sides, glabrescent. Midrib sunken above. Secondary nerves 3–6 pairs, flat above, marginal arches indistinct. Intersecondary nerves indistinct. Venation distinct, finely reticulate. *Inflorescence* a terminal panicle, sometimes in combination with axillary racemes, 6–20 cm long, 1–1.5 mm in diameter, densely hairy. Pedicel 4–7 mm long. Bracts to the inflorescence rachis narrowly triangular, 2–3 mm long, persistent; bracts to the flowers (narrowly) ovate, 4–5 mm long, caducous. Bracteoles on calyx base, narrowly ovate, 3–4 by c. 1 mm, caducous, flexing before dropping. *Flower* 16–28 mm

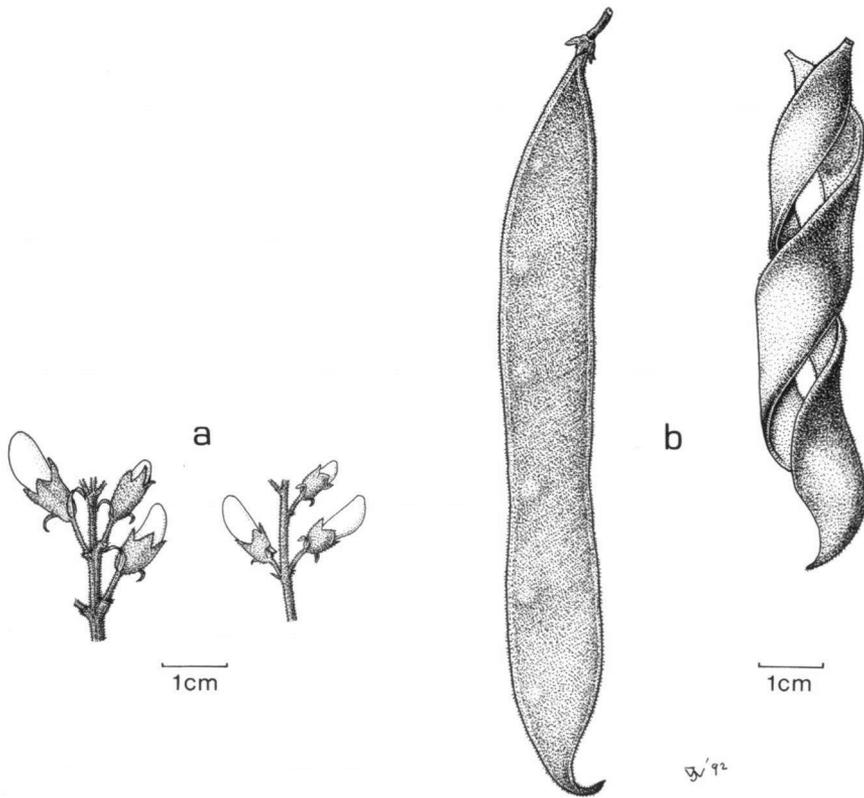


Fig. 3. *Callerya nitida* (Benth.) Geesink, variation in flower and pod: a. (left) *S.Y. Hu 10550*, (right) *Ting & Shih 695*; b. (left) *Ting & Shih 891*, (right) *Taam 260*.

long. Calyx campanulate, distinctly oblique, cup 4.5–6 by 4.5–10 mm, sparsely hairy outside and only on teeth inside, teeth unequal, obtuse, 1–3 mm long. Standard blade elliptic, auricled, auricles reflexed, 14.5–25 by 10–17 mm, outside densely sericeous, basal callosities and nectar guides absent, claw 2–2.5 mm long. Wings shorter than keel, blades free, narrowly obovate, lower auricle very small to indistinct, 10.5–15.5 by 3–5.5 mm, glabrous, lateral pocket present, claw 2–3 mm long. Keel blade narrowly obovate, upper auricle very small to indistinct, 12.5–16 by 3.5–5 mm, glabrous, lateral pockets absent, claw 3.5–4.5 mm long. *Staminal tube* 14–20 mm long. Disc distinct, not lobed, 0.5–1.5 mm long. Ovary 13–20 mm long, densely sericeous. Style glabrous. Ovules 5–7. *Pod* narrowly elliptic to narrowly obovate, flat, not convex between seeds, 7–10.5 by c. 1.5 cm, soft velvety, smooth, thick. *Seeds* 1–5, orbicular, flat, 9–14 by 9–12 mm, 2–3 mm thick.

Field notes – (Shrubby) vine, scandent or bushy shrub, c. 0.5 m high. Young leaves pilose beneath. Flowers white to purple. Calyx (dull) red, pink, greenish white to white; standard cream or white outside, inside purple with greenish centre; wing red to purple to light lavender; keel purple or white.

Distribution – Hong Kong, China (Kwangtung, Kwangsi, Kweichow, Hainan, Fukien, Szechuan). Fig. 1c.

Habitat & Ecology – On dry slopes or summit of mountains. Fl. June–Nov.; fr. Oct.–Feb.

Note – This very handsome species is very close to the *C. cinerea*-group. The species can be distinguished without doubt only when in fruit. Flowering specimens can differ in the shape of the bracteoles and the flower size (Fig. 3).

13. *Callerya pilipes* (F.M. Bailey) Schot, *comb. nov.*

Millettia pilipes F.M. Bailey, Add. 3th Suppl. Syn. Queensl. Fl. (1890) 108; Queensl. Fl. 2 (1900) 397; Dunn, J. Linn. Soc. Bot. 41 (1912) 163. — Type: *Bailey s.n.*, Australia, Queensland, Johnstone River (iso K).

Stipules narrowly triangular, 1.5–2 mm, caducous. Leaf rachis 12.5–20 cm long, c. 1.5 mm in diameter, sparsely shortly hairy; pulvinus 4–5 by 2–2.5 mm. Stipellae caducous. Petiolules 4–5 mm long, c. 1.5 mm in diameter. *Leaflets* 5–7, (narrowly) elliptic, 5.2–8 by 3.3–5 cm; base rounded to obtuse, sometimes unequal; margin slightly undulate; apex acuminate; glabrous above, very sparsely hairy beneath, mostly near the base of the midrib, glabrescent. Nervation glabrous above, sparsely hairy beneath, glabrescent. Midrib flat to sunken above. Secondary nerves 4–6 pairs, flat above. Intersecondary nerves indistinct. Venation distinct, prominent, densely reticulate. *Inflorescence* a terminal panicle or leafy panicle, 15–20 cm long, rachis 1–1.5 mm thick, pubescent. Pedicel 8–10 mm long. Bracts to the inflorescence rachis caducous; bracts to the flowers narrowly ovate, 7–12 mm long, caducous. Bracteoles at top of pedicel, linear, c. 0.5 mm long, hairy. *Flower* 9–12 mm long. Calyx campanulate, cup 2–2.5 mm long, almost glabrous; teeth distinctly unequal, 1.5–3 mm long, ciliate. Standard blade orbicular, not auricled, 9–12 by c. 15 mm, outside sparsely hairy, basal callosities as one half-circle at apex of claw, nectar guides absent, claw c. 4 mm. Wings approximately as long as keel, both narrowly obovate, slightly auricled, c. 19 by 7 mm, glabrous. Disc small. Ovary sericeous. Style glabrous. Ovules 5. *Pod* narrowly elliptic, inflated, slightly convex around seeds, 20–23 by c. 3 cm, lineate, velvety, glabrescent. *Seeds* 4 or 5, not seen.

Field notes – Large liana. Pods large, brown pubescent.

Distribution – Australia (Queensland). Fig. 1f.

Habitat & Ecology – Rain forest. Altitude low. Fr. Feb.

Note – Only one fruiting and one badly flowering specimen seen. The descriptions of the inflorescence and flower are partly based on those of Bailey (l.c.) and Dunn (l.c.).

14. *Callerya reticulata* (Benth.) Schot, *comb. nov.*

Millettia reticulata Benth., Pl. Jungh. (1852) 249; Hance, J. Linn. Soc. Bot. 13 (1873) 101; Forbes & Hemsl., J. Linn. Soc. Bot. 23 (1886) 159; Dunn, J. Linn. Soc. Bot. 41 (1912) 154; Gagnep., Fl. Gén. Indo-Chine 2 (1916) 367; Z. Wei, Acta Phytotax. Sin. 23 (1985) 282. — Lectotype (proposed here): *Fortune A 95*, China, Fokien (K; iso P).

Millettia championii Benth., Kew J. Bot. 4 (1852) 74; Dunn, J. Linn. Soc. Bot. 41 (1912) 152; Z. Wei, Acta Phytotax. Sin. 23 (1985) 283. — Type: *Champion 263*, Hong Kong (K).

Millettia kiangsiensis Z. Wei, Acta Phytotax. Sin. 23 (1985) 283. — Type: *Y. G. Xiong 4143*, China, Jiangxi (HLG).

Stipules narrowly triangular, 3–6 mm long, mostly persistent. Leaf rachis 5–13 cm long, c. 1 mm in diameter, sparsely hairy; pulvinus 3–4 by 1.5–2 mm. Stipellae linear, 2–3 mm long, persistent. Petiolules 1.5–3 mm long, c. 1 mm in diameter. *Leaflets* 3–9, the fewest directly below the inflorescence, (narrowly) ovate to narrowly elliptic to narrowly obovate, some linear elliptic, 3.5–12 by 1–5 cm; base rounded to obtuse; apex acuminate to cuspidate, very apex often mucronate; glabrous above, very sparsely hairy beneath, glabrescent. Nervation sparsely hairy on both sides. Midrib flat to sunken above. Secondary nerves 3–5 pairs, sunken above, marginal arches near the margin, variably distinct. Intersecondary nerves variable. Venation variably distinct, densely reticulate, prominent to flat above. *Inflorescence* a terminal panicle or terminal leafy panicle, 10–22 cm long, c. 1 mm in diameter, (sparsely) hairy. Pedicel 3–5 mm long. Bracts to the inflorescence rachis narrowly triangular, 2–3 mm long, caducous; bracts to the flowers narrowly triangular, 1–1.5 mm long, mostly persistent. Bracteoles at top of pedicel, ovate, 1–2 by 0.5 mm, persistent. *Flower* 10–16 mm long. Calyx campanulate, slightly oblique, cup 2.5–3 by 4.5–5 mm, sparsely hairy to glabrous outside, densely hairy on teeth inside, teeth slightly unequal, rounded to obtuse, 0.3–1.5 mm long, ciliate. Standard blade sub-orbicular to elliptic, auricles small, reflexed, 10–13.5 by 9.5–12.5 mm, glabrous, basal callosities and nectar guides absent, claw 1.5–2 mm long. Wings approximately as long as keel, blades free, narrowly elliptic, lower auricle very small, upper auricle very narrow or indistinct, 10.5–13.5 by 3–5.2 mm, glabrous, claw 2–2.5 mm long. Keel blade narrowly obovate, upper auricle small, 9.5–11.5 by 4–5.5 mm, glabrous, lateral pocket absent, claw 3–4 mm long. *Staminal tube* 9–13 mm long. Disc distinct, not lobed, 0.2–0.5 mm long. Ovary shortly stiped, margins slightly thickened, 9–12.5 mm long, glabrous. Style glabrous. Ovules (6–)8–11. *Pod* narrowly elliptic, flat, very slightly or not convex between the seeds, 7–14 by 1–1.5 cm, glabrous, smooth, thin woody. *Seeds* 1–6, flat, orbicular, 7–9 by 6–9 mm, smooth.

Field notes – (Woody) climber, vine or shrub, 2–12 m high, c. 2.5 cm girth. Bark whitish, greenish, grey to reddish brown, papery. Leaflets dark to light green above, paler beneath. Flowers very showy, dark purple red to rose, lavender, shaded pink-purple to white, standard with green spot. Fruit green, pale green when young. Common, abundant.

Distribution – China (Hainan, Chekiang, Kwangtung, Fukien, Anhwei, Hupeh, Kwangsi, Kiangsi, Kiangsu, Hunan), Taiwan, Hong Kong; introduced in Japan and the U.S.A. (Florida). Fig. 1d.

Habitat & Ecology – In thickets, open woods, near edge of wood, or near stream, on hillsides, (open) slopes, roadsides, ravines. Rocky, grassy, open to wooded land, twining on shrubs; moist level land, swamp. Altitude 25–1000 m. Fl. Apr.–Aug.; fr. July–Nov.

Vernacular names – Lo king t'ang; kam shu t'ang (Kwangtung).

Notes – 1. *Millettia championii* has always been distinguished from *Callerya reticulata* by its more slender habit and smaller, greenish white flowers. I do not doubt

that *M. championii* is in the field easily distinguishable from *Callerya reticulata*, but in the herbarium it is not, for flower colour is not always recorded in flowering specimens and never in fruiting specimens. No other deviating characters were found and I will treat *M. championii* as part of *C. reticulata*. This latter species shows, as far as is recorded, variation in flower colour from dark red to rose, so white flowers are not so different as to earn separation.

2. Wei (l.c.) separated *M. kiangsiensis* and *M. championii* on flower colour (white vs. green) and inflorescence type (axillary, pendulous vs. terminal, patent). Both characters are variable in other *Callerya*-species, so separation on these characters here would be illogical.

15. *Callerya scandens* (Elmer ex Dunn) Schot, *comb. nov.*

Whitfordia scandens Elmer, Leaf. Philipp. Bot. 2 (1910) 689, nom. illeg. (non *Whitfordia* Merrill 1908 = *Fungi*) — *Adinobotrys scandens* Dunn, Kew Bull. (1912) 364. — *Whitfordiodendron scandens* Elmer ex Dunn, Kew Bull. (1913) 363; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 281. — Type: *Elmer 12259*, Philippines, Sibuyan, Magellanes (PNH; iso A, BO, K, L).

Stipules triangular, 1.5–2 mm long, mostly caducous. Leaf rachis 9–14.5 cm long, c. 1.5–2 mm in diameter, sparsely hairy; pulvinus 5–9 by 2–3 mm. Stipellae caducous. Petiolules 7–10 mm long, c. 1.5 mm in diameter. *Leaflets* 5(–7), (narrowly) elliptic to (narrowly) obovate, 7.5–15 by 3–9 cm; base rounded to obtuse, some slightly attenuate; apex acuminate; glabrous on both sides. Nervation glabrous on both sides. Midrib slightly raised above. Secondary nerves 4 or 5 pairs, slightly raised to flat above, not forming marginal arches. Intersecondary nerves variable. Venation distinct, reticulate-scalariform. *Inflorescence* an axillary panicle, 5–10 cm long, c. 2 mm in diameter, sericeous. Pedicel 0.5–2 mm long. Bracts to the inflorescence rachis narrowly triangular, 3.5–4 mm long, caducous; bracts to the flowers (broadly) obovate, 4–5 mm long, apex mucronate, caducous. Bracteoles halfway on the calyx, (narrowly) elliptic, 3–3.5 by 1.5–2 mm, persistent. *Flower* 13–15 mm long. Calyx campanulate, slightly oblique, cup 3–4 by 4–5 mm, hairy outside and on teeth inside, teeth slightly unequal, acute, 1.5–2.5 mm long. Standard blade suborbicular, not auricled, 12.5–13 by 9–11.5 mm, outside densely sericeous, basal callosities present, nectar guides absent, claw c. 1.5 mm long. Wings approximately as long as the keel, blades free, obovate, lower auricle very small or absent, the blade obovate, 10.5–12 by 4–5 mm, sparsely hairy along lower margin to glabrous, upper auricle rugose at base, claw 2–3.2 mm long. Keel blade obovate, upper auricle distinct, 9–10.5 by 4–5 mm, sparsely hairy outside, sericeous near lower margin, lateral pockets present, claw 2.5–3.2 mm long. *Staminal tube* c. 8.5 mm long. Disc indistinct. Ovary shortly stiped, 7–10 mm long, short-sericeous. Style ciliate. Ovules 2. *Pod* ovate, slightly inflated, 4–5 by 3–3.5 cm, slightly rugose, short velvety, glabrescent. *Seeds* 1 or 2, broadly elliptic, flattish, 12–15 by c. 18 mm.

Distribution — Philippines (Palawan, Sibuyan, Mindanao). Fig. 1b.

Habitat & Ecology — Fl. Feb.–June; fr. Aug.

Note — See note 2 under *C. sumatrana*.

16. *Callerya speciosa* (Champ.) Schot, *comb. nov.*

Millettia speciosa Champ., Kew J. Bot. 4 (1852) 73; Benth., Fl. Hongk. (1861) 78; Forbes & Hemsl., J. Linn. Soc. Bot. 23 (1886) 159; Dunn, J. Linn. Soc. Bot. 41 (1912) 155; Gagnep., Fl. Gén. Indo-Chine 2 (1916) 372. — Lectotype (proposed here): *Champion 505*, Hong Kong (K).

Stipules narrowly triangular, c. 4 mm long, mostly persistent. Leaf rachis 9–27 cm long, 1–2 mm in diameter, hairy, glabrescent; pulvinus 5–10 by 2–4 mm. Stipellae linear, 1.5–3 mm long, persistent. Petiolules 2–4 mm long, c. 1.5 mm in diameter. *Leaflets* 7–17, narrowly elliptic, 4–7.5 by 1.5–3 cm; base rounded to obtuse; apex acuminate; sparsely hairy on both sides, mostly on lower side near base, glabrescent. Nervation hairy on both sides, glabrescent. Midrib slightly raised to sunken above. Secondary nerves 5–7 pairs, slightly prominent above, forming marginal arches at c. 3/4 of lamina. Intersecondary nerves indistinct. Venation prominent to flat above, indistinct, laxly reticulate. *Inflorescence* an axillary or terminal raceme, sometimes a terminal leafy panicle, 8–20 cm long, 2–3 mm in diameter, densely hairy. Pedicel 7–11 mm long. Bracts to the inflorescence rachis caducous; bracts to the flowers narrowly triangular, 4–7 mm long, mostly persistent. Bracteoles at base of calyx, (narrowly) elliptic, 3–5 by 1–3 mm, persistent. *Flower* 20–32 mm long. Calyx campanulate, distinctly oblique, cup c. 6 by 9.5 mm, teeth distinctly unequal, 1–1.5 mm long. Standard blade suborbicular, not auricled, c. 17 by 18 mm, glabrous, basal callosities and nectar guides absent, claw c. 4 mm long. Wings approximately as long as keel, blades free, falcate, lower auricle small, 16.3–17.5 by c. 6.5 mm, glabrous, claw 4–5.1 mm long. Keel blade falcate, upper auricle small, 14–16 by 4–6 mm, glabrous, lateral pocket distinct, claw 6.5–9 mm long. *Staminal tube* 19–20.5 mm long. Disc small. Ovary c. 17 mm long, sericeous. Style ciliate, glabrescent towards apex. Ovules 10. *Pod* linear, not or slightly inflated, not convex around seeds, 16–21 by 1–2 cm, densely hairy. *Seeds* 3–10, elliptic to orbicular, flattish, 10–12 by 9–12 mm, 5–7 mm thick, smooth.

Field notes – Small shrub with tendrils on branches or scandent shrub or (semi-) woody vine, 1–5 m high. Branches dangling down. Bark green tomentose. Leaf green, laxly pubescent. Flowers pure white to whitish to (pale) yellow to yellowish orange, standard with greenish nectar guides, fragrant. Fruit brown-grey to green, dark brown when young, covered with white hairs. Rare to fairly common.

Distribution – Indo-China (Tonkin); China (Hainan, Kwangtung, Kwangsi); Hong Kong. Fig. 1e.

Habitat & Ecology – Dry level land, open forest, forested ravines, in thickets; on dry clayey or sandy soil among scattered shrubs, trailing over trees and tall shrubs. Altitude 100–300 m. Fl. June–Sept.; fr. Sept.–Dec.

Vernacular name – Lo king t'ang (Cantonese).

17. *Callerya strobilifera* Schot, *spec. nov.* — Figs. 4, 5

Quoad inflorescentia *C. eriantham* accedit, sed ab ea differt in inflorescentia strobiliforma ob bracteis grandiores glabras et in legumine lineare et brevi hirsute. — Type: *Winckler 350* (holo L; iso C), Borneo, Serawai.



Fig. 4. *Callerya strobilifera* Schot. Habit and flower (Kostermans 5443).

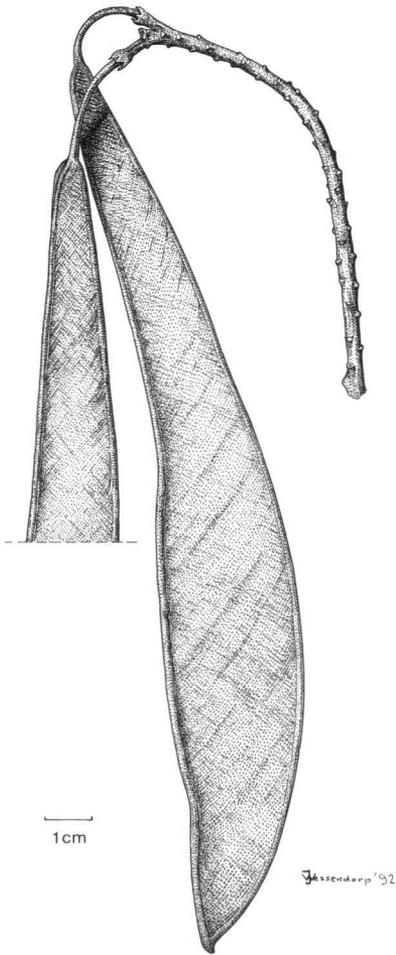


Fig. 5. *Callerya strobilifera* Schot. Pod (SAN 54923).

Stipules linear, 5–8 mm long, caducous. Leaf rachis 5–19 cm long, 1–1.5 mm in diameter, glabrous; pulvinus 5–8 by 1.5–2.5 mm. Stipellae linear, 3–4 mm long, mostly persistent. Petiolules 3–5 mm long, c. 1 mm in diameter. *Leaflets* 5–7, (narrowly) ovate to (narrowly) elliptic, 4–14 by 2–7 cm; base rounded to slightly cordate; apex cuspidate; glabrous on both sides. Nervation glabrous on both sides. Midrib sunken above. Secondary nerves 5–8 pairs, flat to slightly sunken above, not forming marginal arches. Intersecondary nerves distinct. Venation densely reticulate, flat above. *Inflorescence* a terminal or axillary raceme or panicle with few side-axes, conical-like in bud, rachis 12–21 cm long, 1.5–2 mm in diameter, short-hairy, especially in longitudinal rows. Pedicel 4–6 mm long. Bracts to the inflorescence rachis triangular, c. 2 mm long, caducous; bracts to the flowers elliptic to obovate, hairy inside, margin ciliate, 15–18 mm long, persistent. Bracteoles linear, near top of pedicel, 6–7 by c. 1 mm, caducous. *Flower* 15–21 mm long. Calyx campanulate, slightly oblique, cup 3–6 by 4–6 mm, sparsely hairy outside and on teeth inside, teeth distinctly unequal, acute, ciliate, 2–5.5 mm long. Standard blade suborbicular, slightly auricled, 15.5–18 by 11.5–17 mm, outside very sparsely short-hairy, basal callosities present, nectar guides absent, claw 2.2–2.5 mm long. Wings approximately as long as keel, blades free, obovate, lower auricle indistinct, 12–14 by 4.5–5 mm, glabrous, apex obtuse, lateral furrow present, upper auricle slightly rugose at base, claw 2–3 mm long. Keel blade obovate, upper auricle distinct, 11.5–13 by c. 4 mm, glabrous, apex obtuse, lateral pocket distinct, claw 3–3.2 mm long. *Staminal tube* c. 10 mm long. Disc indistinct. Ovary distinctly stiped, 9–12.5 mm long, sparsely hairy. Style glabrous. Ovules 3–5. *Pod* narrowly obovate, flat, stiped, beaked, 19–29 by 2.5–3.5 cm, very sparsely short stiff hairy, smooth. *Seeds* 2 or 3, orbicular, flat, c. 17 by 17 mm, smooth.

Standard blade suborbicular, slightly auricled, 15.5–18 by 11.5–17 mm, outside very sparsely short-hairy, basal callosities present, nectar guides absent, claw 2.2–2.5 mm long. Wings approximately as long as keel, blades free, obovate, lower auricle indistinct, 12–14 by 4.5–5 mm, glabrous, apex obtuse, lateral furrow present, upper auricle slightly rugose at base, claw 2–3 mm long. Keel blade obovate, upper auricle distinct, 11.5–13 by c. 4 mm, glabrous, apex obtuse, lateral pocket distinct, claw 3–3.2 mm long. *Staminal tube* c. 10 mm long. Disc indistinct. Ovary distinctly stiped, 9–12.5 mm long, sparsely hairy. Style glabrous. Ovules 3–5. *Pod* narrowly obovate, flat, stiped, beaked, 19–29 by 2.5–3.5 cm, very sparsely short stiff hairy, smooth. *Seeds* 2 or 3, orbicular, flat, c. 17 by 17 mm, smooth.

Field notes – Climber or liana, 7–8 m high, c. 17.5 cm girth. Bark white. Inflorescence yellow. Flowers light to dark yellow, inside with dark yellow longitudinal rectangular spot. Young fruit greenish, fruit white.

Distribution – Borneo. Fig. 1b.

Habitat & Ecology – Primary or secondary forest, lowland, steep to low riverbanks, (exposed) ridges, edge of path. Loam soil containing lime, yellowish soil. Altitude 6–250 m. Fl. Mar.–Aug.; fr. July–Aug.

Vernacular name – Bansisik (Dusun).

Note – A very characteristic species, that has remained undescribed for a long time.

18. *Callerya sumatrana* (Merr.) Schot, *comb. nov.*

Whitfordiodendron sumatranum Merr., Pap. Mich. Acad. Sc. Arts Lett. 19 (1934) 159. — Type: Yates 1261, Sumatra, East Coast, Boenoet, Asahan (MI; iso A, BO).

Stipules narrowly triangular, 3–4 mm long, mostly caducous. Leaf rachis 8.5–18.5 cm long, 1–3 mm in diameter, glabrous; pulvinus 7–9 by 2–4 mm. Stipellae caducous. Petiolules 7–10 mm long, 1.5–2 mm in diameter. *Leaflets* 5, ovate to elliptic to obovate, 6–12 by 3–6 cm; base rounded; apex acuminate; glabrous on both sides. Nervation glabrous on both sides. Midrib slightly sunken above. Secondary nerves 4 or 5 pairs, flat above, not forming marginal arches. Intersecondary nerves variable. Venation distinct, prominent above, reticulate-scalariform. *Inflorescence* an axillary panicle, 10–18 cm long, 1.5–2 mm in diameter, sericeous. Pedicel 1–2 mm long. Bracts to the inflorescence rachis narrowly triangular, 2.5–3 mm long, caducous; bracts to the flowers ovate, 3.5–7 mm long, glabrescent towards apex, caducous. Bracteoles on base of calyx, narrowly obovate, 4–7 by c. 1 mm, persistent. *Flower* 11–13 mm long. Calyx campanulate, slightly oblique, cup 3–3.5 by c. 4 mm, hairy outside, inside on teeth only, teeth slightly unequal, acute, 0.8–1.5 mm long. Standard blade suborbicular to elliptic, not auricled, c. 8 by 9 mm, outside densely sericeous, basal callosities present, nectar guides absent, claw 1.5–2 mm long. Wings approximately as long as keel, blades free, obovate, lower auricle very small, c. 9.5 by 2.5–3 mm, very sparsely hairy near lower margin, lateral furrow present, upper auricle rugose at base, claw 2.2–3 mm long. Keel blade obovate, upper auricle distinct, blade obovate, 8–9 by c. 3.8 mm, sericeous on outside, mostly along lower margin, lateral pocket distinct, claw 3.2–3.5 mm long. *Staminal tube* c. 7.5 mm long. Disc indistinct. Ovary c. 7 mm long, sericeous. Style ciliate. Ovules 2. *Pod* and *seeds* not known.

Field notes – Liana, 15–18 m tall. Inflorescence erect. Flowers salmon-greyish.

Distribution – Sumatra. Fig. 1b.

Habitat & Ecology – Riverside forest, sand-clay soil. Altitude 50–100 m. Fl. July.

Vernacular name – Olor kalibeu.

Notes – 1. Three collections in flower seen, vegetative characters also seen from a specimen collected sometime somewhere by Korthals, which has only galled flowers, and probably belongs to *C. sumatrana*.

2. It is not clear whether *C. sumatrana* should be kept distinct from *C. scandens*. In flower and vegetative characters they are alike, there are only some minor differences in shape and placement of the bracts and bracteoles. The pod of *C. sumatrana* is needed before deciding on species delimitation.

19. *Callerya vasta* (Kosterm.) Schot, *comb. nov.*

Milletia vasta Kostermans, Reinwardtia 5 (1960) 349. — Type: *Kostermans 12516 A*, E Borneo, Belajan River (BO; iso L).

Stipules caducous. Leaf rachis 11–33 cm long, 2–4 mm in diameter, glabrous; pulvinus 8–15 by 4–6 mm. Stipellae caducous. Petiolules 7–13 mm long, 2–3 mm in diameter. *Leaflets* 5–9, (narrowly) ovate to (narrowly) elliptic to (narrowly) obovate, 5–21 by 2.5–11 cm; base obtuse; apex acuminate; glabrous on both sides. Nervation glabrous on both sides. Midrib flat above. Secondary nerves 6–9 pairs, slightly prominent above, not forming marginal arches. Intersecondary nerves distinct. Venation distinct, prominent above, laxly reticulate, slightly scalariform. *Inflorescence* a terminal panicle, 17–40 cm long, 2–3 mm in diameter, sparsely hairy. Pedicel 2–3 mm long. Bracts to the inflorescence rachis triangular, c. 1 mm long; bracts to the flowers narrowly ovate, 3–4 mm long, caducous. Bracteoles at base of the calyx, narrowly triangular, 1.5–2 by c. 0.5 mm, persistent. *Flower* 14–15 mm long. Calyx campanulate, slightly oblique, cup c. 6 by 6 mm, (sparsely) hairy outside, teeth small, obtuse, 0.1–0.5 mm long, (sparsely) hairy outside and inside. Standard blade orbicular, slightly auricled, c. 11.5–13.5 by 13–14 mm, glabrous, basal callosities and nectar guides absent, claw 2.2–3 mm long. Wings approximately as long as keel, blades free, obovate, lower auricle distinct, 12–14.2 by 5–5.5 mm, glabrous, lateral pocket present, claw 3.5–4 mm long. Keel blade obovate, upper auricle distinct, 11–13 by 5.5–6 mm, glabrous, lateral furrow present, claw 3.5–5 mm long. *Staminal tube* 12–13 mm long. Disc distinct, up to 2 mm long, slightly lobed. Ovary stiped, 10–11.3 mm long, sparsely hairy only on the sutures or glabrous. Style glabrous. Ovules 2–4. *Pod* narrowly obovate, not inflated, 11–25 by 3.5–4.8 cm, glabrous, margins slightly thickened, slightly rough. *Seeds* 2–4, flat, orbicular, 15–20 by 25–30 mm, 3–5 mm thick, smooth.

Field notes – Tree, 12–35 m. Girth 30–150 cm. Bole short, c. 8 m, thick with enormous buttresses 1–2 m long, 45 cm out, 7.5 cm thick. Bark smooth, yellow brownish grey to light brown, mottled, fissured. Outer bark scaly, brown, the inner bark laminated, yellowish. Sapwood white yellow. Twigs greenish brown. Red latex. Buds light purple covered with fine silvery hairs. Calyx and pedicel green. Flowers pink to dark purple, paler at base, stamens with white filaments and pale yellow anthers, pistil pink, style yellow, stigma green. Pod green. Edible oil from fruit.

Distribution – Borneo. Fig. 1a.

Habitat & Ecology – Common. Periodically inundated alluvial. On flat to hilly (dry) slopes, along creek or swamp. Brown/yellow sandy clay. Altitude 15–230 m. Fl. May–Nov.; fr. Aug.–Feb.

Vernacular names – Kedang belom, kadang blum (Iban), talapak (Brunei), nakap (Brawan), oering (Dajalish), dalok merak.

IDENTIFICATION LIST

(material seen from A, AAU, BM, BO, C, CAL, E, K, KYO, L, P, SAN, US)

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2. <i>australis</i>	11. <i>nieuwenhuisii</i>
3. <i>cinerea</i>	12. <i>nitida</i>
4. <i>cochinchinensis</i>	13. <i>pilipes</i>
5. <i>dasyphylla</i>	14. <i>reticulata</i>
6. <i>eriantha</i>	15. <i>scandens</i>
7. <i>eurybotrya</i>	16. <i>speciosa</i>
8. <i>fordii</i>	17. <i>strobilifera</i>
9. <i>kityana</i>	18. <i>sumatrana</i>
	19. <i>vasta</i>

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nitida (Benth.) Geesink 12
pilipes (Bailey) Schot 13
reticulata (Benth.) Schot 14
scandens (Elmer ex Dunn) Schot 15
speciosa (Champ.) Schot 16
strobilifera Schot 17
sumatrana (Merr.) Schot 18
vasta (Kosterm.) Schot 19

Millettia Wight & Arn.

- atropurpurea* (Wall.) Benth. 1
australis (Endl.) Benth. 2
championii Benth. 14
cinerea Benth. 3

(Millettia)

- cochinchinensis* Gagnep. 4
congestiflora T. Chen 3
cuspidata Ridley 11
dasyphylla (Miq.) Boerl. 5
dielsiana Harms ex Diels 3
dorwardii Collett & Hemsl. 3
eriantha Benth. 6
eurybotrya Drake 7
fordii Dunn 8
gentiliana Lév. 3
kiangsiensis Z. Wei 14
kityana Craib 9
longipedunculata Z. Wei 3
maideniana F.M. Bailey 2
maingayi Baker 5
megasperma F. Muell. 10
nieuwenhuisii J.J. Sm. 11
nitida (Benth.) Geesink 12
obovata Gagnep. 3
oocarpa Prain 5
oosperma Dunn 3
pilipes F.M. Bailey 13

(Millettia)

- reticulata* Benth. 14
sericosoma Hance 3
speciosa Champ. 16
sphaerosperma Z. Wei 3
tsui Metcalf 4
vasta Kostermans 19

Padbruggea Miq.

- atropurpurea* (Wall.) Craib 1
dasyphylla Miq. 5
eriantha (Benth.) Craib 6
maingayi (Baker) Dunn 5
pubescens Craib 1

Whitfordiodendron Elmer

- atropurpureum* (Wall.) Merr. 1
erianthum (Benth.) Merr. 6
myrianthum (Dunn) Merr. 11
nieuwenhuisii (J.J. Sm.) 11
pubescens (Craib) Burkill 1
scandens Elmer 15
sumatranum Merr. 18