

## REVISION OF *MEDINILLA* (MELASTOMATACEAE) OF BORNEO

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### SUMMARY

Forty-eight species of *Medinilla* are now known from Borneo, 28 of which are described as new. At least 20 taxa are known only from one to three collections. Eleven species groups have been recognized and defined. A more thorough understanding of the genus awaits further study of Philippine and New Guinea materials. A key to the Bornean species, illustrations of 15 species, and ecological notes are provided. Two previously described species are recorded for the first time for Borneo: *Medinilla succulenta* (Blume) Blume, and *M. pterocaula* Blume. One new combination and five reductions have been made. *Medinilla tawaensis* Merrill is transferred to *Catanthera*; *M. caudatifolia* Schwartz and *M. hasseltii* Blume var. *subsessilis* Schwartz are reduced to *M. crassifolia* (Reinw. ex Blume) Blume; *M. dajakorum* Schwartz is reduced to *M. corallina* Cogn.; *M. borneensis* Blume and *M. motleyi* Hook. f. ex Triana are conspecific with *M. macrophylla* Blume.

### INTRODUCTION

*Medinilla* (Melastomataceae) is a genus of epiphytic and terrestrial shrubs and climbers of the Paleotropics. It includes about 400 species (Shaw, 1973) distributed in Africa, Madagascar, India, Ceylon, Burma, Indochina, southern China, Thailand, the Malay Peninsula, and eastward to the islands of the Malay Archipelago, New Guinea, northern Australia, Micronesia, and Melanesia. It is by far the largest of all melastome genera occurring in Malesia, a floristic region made up of the Malay Peninsula and islands of the Malay Archipelago extending to New Guinea. About 200 species are known from this region which is the center of diversity of the genus.

The objective of this study is to document the diversity of *Medinilla* in Borneo by this first attempt at a revision of the Bornean species. It is hoped that subsequent studies in the field and laboratory will provide better understanding of evolutionary trends and relationships of the species than is possible with the limited material now available.

### HISTORICAL ACCOUNT

*Medinilla* was established in 1826 by Charles Gaudichaud-Beaupré, a French naturalist and circumnavigator. The type species is *M. rosea* which was collected during an expedition to the SW Pacific. The genus is named in honor of Jose de Medinilla de Pineda, once governor of the Marianas (Ladrones) Islands.

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Carl Ludwig Blume, a German-born Dutch botanist and long-time Director of the Rijksherbarium, made the first extensive study of the genus. His initial publication on the Melastomataceae appeared in the 'Bijdragen tot de flora van Nederlandsch Indië' (1826), where *Medinilla* was included in *Melastoma*. It was not until 1831, when his paper 'Über einige ostindische und besonders javanische Melastomaceen' was published in *Flora* (vol. 14), that he separated *Medinilla* and nine other genera from *Melastoma*. Blume's species were classified under 4 sections (*Campsoplacuntia* [= *Medinilla*], *Sarcoplacuntia*, *Hypenanthè*, and *Dactyliota*). Blume (1849) subsequently published a two-volume work on the Melastomataceae in which he described 3 new species of *Medinilla* under section *Sarcoplacuntia*, elevated sections *Hypenanthè* and *Dactyliota* to generic rank, and established 2 new sections, *Heteroblemma* and *Apateon*.

The genus also has been considered in monographic and floristic works of Naudin (1851), Miquel (1855, 1860), Triana (1871), Cogniaux (1891), and Krasser (1893). Naudin's treatment added little to the knowledge of the genus already provided by Blume. He recognized 12 of Blume's species but was unable to study 17 others, presumably because of the unavailability of specimens. Miquel accepted Naudin's treatment in his 'Flora van Nederlandsch Indië' and described 3 new species, bringing the total to 37 species known at that time in the former Dutch East Indies. Cogniaux wrote the worldwide treatment of the Melastomataceae in De Candolle's 'Monographiae phanerogamarum' in which close to 100 species were enumerated from the Old World. Cogniaux also worked out the family in Boerlage's (1890) 'Handleiding tot de kennis der Flora van Nederlandsch Indië'. This included only generic descriptions, but a list of about 41 species known to occur in the former Dutch East Indies was included.

In the late 19th century Otto Stapf at Kew became a principal authority on the Melastomataceae. He described three new species of *Medinilla* from the collections by Haviland on Mount Kinabalu (Stapf, 1894) and three others from Sarawak (Stapf, 1895). Merrill (1929) described one new species from Elmer's collections in the eastern part of the former British North Borneo (Sabah). Schwartz (1931) described two new species from Central Borneo (Dutch Borneo), a vast area that is still relatively unexplored.

The Philippine species of *Medinilla* were extensively studied by Merrill (1913) at the Bureau of Science and by Elmer who worked independently and published in his 'Leaflets of Philippine Botany'. In 1923–26, Merrill published the 'Enumeration of Philippine Flowering Plants' wherein he recognized over 100 endemic species of *Medinilla* (Merrill, 1923).

Representatives of the genus in New Guinea were studied by E.G. Baker, Jr. (1914) who examined the collections of the Wollaston expedition and by Mansfeld (1927) who worked in northeastern New Guinea (former Kaiser-Wilhelmsland). Species from the Malay Peninsula were studied by Stapf and King in the 'Materials for a Flora of the Malay Peninsula' (1900), by Ridley in the 'Flora of the Malay Peninsula' (1922), and recently by Maxwell (1978).

In the 1930s, R.C. Bakhuizen van den Brink, Jr. (1943) prepared a monograph of the Melastomataceae in Southeast Asia. Due to prevailing war conditions he based the study only on specimens at Utrecht and Leiden. In the introduction he noted that

collections from Dutch Borneo had been distributed to only limited extent by the Buitenzorg (Bogor) herbarium. He also suggested that the genus might be segregated into two or more genera when more Philippine material was studied.

During the period when Bakhuizen van den Brink, Jr. was writing his treatment, intensive exploration was undertaken in the rich flora of Papua New Guinea, particularly the Archbold expedition, which resulted in more novelties (Merrill & Perry, 1943; Ohwi, 1943). Ohwi put several *in scheda* names on herbarium sheets of Bornean specimens but these were never published. The manuscript that Ohwi was working on at his period in Bogor has not been found (J.F. Veldkamp, pers. comm.).

#### OVERALL GEOGRAPHIC DISTRIBUTION

*Medinilla* has a bicentric distribution pattern. The two centers, Africa and Asia, have no known species in common and far more species occur in Southeast Asia than in Africa. In Africa the genus is distributed mainly south of the equator along the tropical rain forest belt. Most of the species are found in Madagascar and the east coast of Africa. The distribution pattern shows that the genus is adapted to warm and humid forest environments. The Sahara desert in the north and the Kalahari desert in the south act as barriers.

The Asian species are also found in warm and humid forest habitats. In Asia the distribution of the genus is in the Indian-Himalayan ranges southward to Burma, Thailand, Indochina, the Malay Peninsula, and eastward to the islands of the Malay Archipelago, New Guinea, Polynesia, and northern Australia.

Both Nayar (1972) and Cheih (1983) postulated the origin of the genus in Gondwanaland (South America, Africa, India, Australia, and Antarctica). By the end of the Cretaceous, these land masses had drifted apart. Cheih (1983) suggested that after the Indian plate drifted northward and collided with the Laurasian plate in the early Tertiary, several species of *Medinilla* successfully dispersed across southern Asia and ultimately migrated eastward to the Malesian islands, the Western Pacific, and northern Australia.

Populations of many original species that were established along the Himalayan region may have succumbed to the deterioration of climate in the Pleistocene and became extinct, leaving a few isolated disjunct species on the warmer southern flank of the Himalayas. The African species were forced by the desertification of the Sahara to move south of the equator into the surviving patches of rain forest.

#### BORNEAN DISTRIBUTION

Borneo is the largest island in the Malay Archipelago and the third largest in the world. In area it approximates 739,175 square kilometers. Borneo is divided politically into Sabah and Sarawak, which belong to the Federation of Malaysia, Brunei, an independent sultanate, and the largest portion, Kalimantan, which is part of Indonesia. The size and equatorial position of the island, the high temperature and humidity, the variation in seasonal rainfall, and the range in altitude are favorable conditions to the development of an exceedingly rich and diversified flora (Merrill, 1930). The island is traversed by long mountain ranges, including the Crocker

Range culminating in Mount Kinabalu (4101 m), the highest peak between the Himalayas and New Guinea.

Merrill (1921) listed 4,924 species of flowering plants credited to Borneo, representing 1,152 genera and 157 families. Masamune (1942) made a similar compilation and brought the total up to 7,201 species in 1,310 genera and 165 families. On the basis of a conservative estimate by Merrill (1950), the flora of Borneo is somewhere between 12,000 to 15,000 species. Merrill's list included 20 species of *Medinilla*.

There is no botanical exploration documented in Borneo prior to Korthals's pioneering work in 1836. Subsequent botanical reconnaissances were made by Odoardo Beccari, a distinguished Italian botanist, who came to Sarawak in 1865, and John Whitehead, a British ornithologist. Important collections were made between 1851–1900 by Low, Motley, Lobb, Burbidge, Hallier, Haviland, Hose, and Nieuwenhuis. Botanical exploration in the present century has been considerable although still highly inadequate. Collections of great importance have been made by Winkler, Endert, Gibbs, the Clemens, Topping, Elmer, Kostermans, and the foresters of the Sabah and Sarawak Forest Departments as well as botanists involved in the Oxford University and Royal Society Expeditions (van Steenis-Kruseman, 1950).

In spite of the efforts of these and other collectors, the flora of a major part of Borneo (Kalimantan in particular) is represented by one of the lowest collection densities of herbarium specimens of any place in the world. In 1972 194,200 herbarium specimens had been collected, the equivalent of only 26 specimens/100 square kilometers (Prance, 1978).

Of the 48 Bornean species of *Medinilla* recognized in this treatment, 40 are presumably endemic. Most of the species are rare, very local, and 20 of them are known from one to three collections only. Borneo shares a few of the common species with the Malay Peninsula, Java, and Sumatra, but no species exclusively occur in both the Philippines or Sulawesi and Borneo.

Borneo is rivaled by the Philippines and New Guinea in terms of diversity of *Medinilla*. Merrill (1917) noted that a very high percentage of Philippine *Medinillas* are not only endemic but also very local. The Philippine situation is often a result of insular isolation, while endemism of *Medinilla* in Borneo is mostly associated with edaphic and altitudinal factors. Several species of section *Heteroblemma*, for example, are exclusively confined to limestone hills in Sarawak. Mount Kinabalu, noted for its flora of high specific endemicity, harbors 17 species, 8 of which are endemic. Some species on Mount Kinabalu can be found also in lower but floristically similar mountains such as Alab in Sabah, Mulu in Sarawak, Raya in Central Kalimantan, and Kemul in East Kalimantan.

*Medinilla* ranges from coastal and low elevation riverine forests to mossy and mid-elevation montane forests. However, there is little apparent unity in distribution patterns of related species, perhaps in part because of the inadequacies of collections from Kalimantan. Sabah, Sarawak, and Brunei are relatively better collected.

No information is available on pollination and seed dispersal for *Medinilla*. The flowers are not scented and do not provide nectar, but perhaps the brightly coloured flowers and showy bracts in certain species attract pollinators that collect pollen. The fruits that ripen with red and fleshy pericarp are likely eaten and the seeds dispersed by birds.

## SYSTEMATIC POSITION AND TRIBAL RELATIONSHIPS

The Melastomataceae are a large predominantly tropical family of some 200 genera and 4,000 species (Cronquist, 1981). It ranks as the seventh largest family of flowering plants (Wurdack, 1986) and the second largest family in the order Myrtales (Cronquist, 1981). The family is best developed in South America; two-thirds of the known species occur in the New World tropics (Nayar, 1972).

Traditionally the family has been divided into 3 subfamilies (Astronioideae, Melastomatoideae, and Memecyloideae) and 14 tribes (Almeda, 1978). *Medinilla* belongs to the subfamily Melastomatoideae, tribe Dissochaeteae. At present there are several unresolved problems on tribal relationships (Veldkamp, 1978). Various authors have presented diverse schemes of classification and interpretation of the tribe (Triana, 1871; Cogniaux, 1891; Krasser, 1893; Bakhuizen van den Brink, Jr., 1943; Maxwell, 1980; van Vliet, 1981). The most extensive study of the tribe was made by Bakhuizen van den Brink, Jr. (1943). He pointed out that the usual subdivision of the Dissochaeteae based on the length of the stamens and the characters of the connective were of no value. He also regarded *Medinilla* to be a heterogeneous group. Backer and Bakhuizen van den Brink, Jr. (1963) suggested that the degree of concrescence between the calyx tube and the ovary and the depth of the extraovarian chambers can help delimit the various genera in the tribe.

It is beyond the scope of the present study to address problems in tribal and generic delimitation, but it is important to point out some of the characteristic features of closely related genera, namely *Carionia*, *Catanthera*, *Hypenanthe*, *Pachycentria*, *Plethiandra*, and *Pogonanthera*. *Medinilla* differs from the above mentioned genera by having anthers with a dorsal crest or keel or spur on the connective and a pair of lobed extensions, referred to as ventral appendages, at the base of each pollen sac. The monotypic genus *Carionia* of the Philippines closely resembles *Medinilla* in habit, but it can be distinguished by the long and narrow calyx lobes. *Pachycentria* differs from *Medinilla* in the absence of a dorsal spur and extraovarian chambers while *Pogonanthera* is well characterized by the presence of tufted hairs at the back of the anthers in place of a dorsal spur. The latter is often confused with *Pachycentria*, but the non-tuberous roots and biauriculate leaves distinguish *Pogonanthera* in sterile state. *Hypenanthe* is a segregate from *Medinilla* (Blume, 1849) but was not recognized by many authors until the time of Bakhuizen van den Brink, Jr. At least four species of the genus are distinguished by large, pilose, deciduous bracts and a furfuraceous or pilose calyx tube. In having anomalous xylem *Hederella* (= *Catanthera*) provides a close link with section *Heteroblemma*, but it differs in other characters as noted by Nayar (1966).

The infrageneric classification is not yet fully resolved. Bakhuizen van den Brink, Jr. (1943) did not recognize Blume's four sections and created instead two new sections, *Eumedinilla* and *Heteromedinilla*. These two sections differ in a) thickness of the calyx wall, b) length and shape of stamens, and c) length of the ovary in relation to that of the calyx tube. This classification, however, was not satisfactory for the Bornean species so I have recognized 12 informal species groups, two of which correspond to sections recognized by Blume. A more formal infrageneric classification must take into account the species from other geographic regions.

Table 1. Differential characters of the *Medinilla* species alliances.

<i>alliance</i>	<i>habit</i>	<i>stem cross section</i>	<i>phyllotaxy</i>	<i>inflorescence</i>	<i>vestiture</i>
1. <i>M. magnifica</i>	epiphytic or terrestrial shrubs	quadrangular	whorled	terminal panicles	glabrous
2. Sect. <i>Medinilla</i>	epiphytic shrubs	terete	whorled	axillary umbelliform cymes	glabrous
3. <i>M. corneri</i>	climbing shrubs	terete	opposite	axillary umbelliform cymes	glabrous
4. <i>M. beamanii</i>	epiphytic shrubs or small trees	terete	opposite	axillary umbelliform cymes	glabrous
5. <i>M. crassifolia</i>	epiphytic shrubs	terete	opposite	axillary panicles or umbelliform cymes	glabrous
6. <i>M. sessiliflora</i>	epiphytic shrubs	terete	opposite	solitary or paired	glabrous
7. <i>M. myrtiformis</i>	epiphytic shrubs	terete	opposite	axillary fascicles of cymes	glabrous
8. <i>M. succulenta</i>	epiphytic shrubs	subquadrangular or quadrangular	opposite	axillary fascicles of cymes	glabrous
9. <i>M. macrophylla</i>	epiphytic shrubs	terete	opposite	axillary or terminal cymes	pubescent
10. <i>M. stephanostegia</i>	climbing shrubs	terete	opposite	terminal panicles	pubescent
11. Sect. <i>Heteroblemma</i>	climbing or creeping shrubs	terete, xylem lobed	alternate	axillary fascicles or glomerules	glabrous/ pubescent

## SPECIES CONCEPT

Because the only sources of information in this revision are herbarium specimens and past taxonomic concepts, the species concept is a traditional morphological one. The criterion of reproductive and genetic isolation that defines a biological species concept (Mayr, 1970) cannot be applied as there are no available data on pollination biology, chromosome numbers, population dynamics, hybridization and polyploidy. Mishler and Donoghue (1982) suggest a pluralistic outlook on species and urge systematists to develop species concepts for their particular taxonomic groups.

The specimens were sorted geographically into homogeneous and mutually distinct entities, followed by analysis and evaluation of taxa (Leenhouts, 1968). To facilitate recognition of distinct entities, I employed the species-standard method (Rollins, 1952), using previously described species as biological standards of comparison. The taxonomic judgment depended in part on my experience with allied species occurring in the neighboring regions which were compared and related to the Bornean species. Specimens that had the same pattern of definitive characteristics were grouped together. In *Medinilla* variability is greatest among species that are widespread. These are represented by relatively numerous specimens which cannot be readily distinguished. On the other hand, many species of *Medinilla* tend to be highly localized or restricted in distribution. In Borneo the species of *Medinilla* are nearly parallel in their degree of distinctiveness, hence no infraspecific categories were assigned. The flora of Borneo is so poorly known that recognition of geographical subspecies or varieties would be of little taxonomic relevance.

## MATERIALS AND METHODS

This revision of the Bornean species of *Medinilla* is based upon a study of both herbarium specimens and the literature. Names published under *Medinilla* were reviewed from the Kew Index, Merrill's (1921) enumeration, and various floristic and monographic works. Specimens were borrowed from herbaria (cited in the Acknowledgements) that have significant collections from Borneo. About 1,500 specimens representing 690 collection numbers of *Medinilla* were examined. The specimens were sorted geographically, then by collector. Specimens were systematically examined for the morphological characters listed in table 1. Analyses were made on boiled flowers and fruits using a Zeiss dissecting microscope fitted with an eyepiece micrometer. Measurements were taken for all specimens that represented a particular taxon when ten or fewer specimens were available. In the case of taxa for which more than ten specimens were available, measurements were taken from specimens that had flowering and/or fruiting materials.

Data on the distribution of *Medinilla* in Borneo were gathered from specimen labels and entered into a database file (MEDINILA) using a microcomputer database management system, dBASE III Plus. Data include geographic as well as altitudinal distribution, abundance in terms of collection frequency, vernacular names, and economic importance. A program (CITATION) written by the author was used to prepare specimen citations, index to exsiccatae, and determination labels. This program was modified from the LABELS3 collection database software (Regalado

et al., 1987). It is also compatible with the Mount Kinabalu database project at MSC, wherein records of specimens collected on this mountain can be extracted and incorporated into the MEDINILA file without rekeying the data. Place names on labels without latitude and longitude information were located on the map using standard gazetteers for Malaysia, Brunei, and Indonesia (U.S. Board on Geographic Names, 1970, 1982).

## MORPHOLOGY

### *Vegetative morphology*

The species of *Medinilla* in Borneo are epiphytic or climbing shrubs, treelets, or creepers. *Medinilla* is reported to have 75 percent of total species that are epiphytes (Kress, 1986). A few specimens have been recorded as large trees, but they were probably epiphytes mistaken as trees. Some collectors have noted them as parasites, but parasitism is unknown in other Myrtales (Cronquist, 1981).

The stems are either terete or quadrangular. Certain species have distinctive winged branches, at least in the juvenile stage. Mature branches are more or less slender since the maximum diameter rarely goes beyond 10 mm in most herbarium specimens. The stem surface may be smooth or pustulate, glabrous or with varying forms and degrees of pubescence. Adventitious roots often grow from leaf axils or defoliated nodes which are sometimes swollen. Species of section *Heteroblemma* have wood with lobed xylem (van Vliet, 1981).

The nature of the leaves provides several features that are most useful in distinguishing the species. Leaves may be alternate (section *Heteroblemma*), verticillate (section *Medinilla*), or opposite. Opposite phyllotaxy is the most common condition. The venation of the leaves consists of subparallel longitudinal nerves (primaries) that range in an odd-numbered fashion from 3–11. Leaves are referred to as nerved when all primaries arise from a common point at the base of the blade. Leaves are referred to as plinerved when one or more pairs of inner nerves diverge from the midvein at a point above the leaf base. The midrib and lateral nerves are generally impressed on the adaxial surface and raised on the abaxial surface. Transverse veins run across the blade perpendicular to the midrib. The relative conspicuousness of transverse veins and the degree of reticulation are useful in distinguishing the species. Leaf shape and size range from large and rotund leaves in *Medinilla kemulensis* to the small and lanceolate leaves of *M. richardsonii*. The leaves of *Medinilla*, in general, are elliptic, coriaceous, and essentially glabrous. Pubescence on the leaves is observed only in species of section *Heteroblemma* and in the *M. macrophylla* alliance. The leaves are most commonly entire, except for some species in section *Heteroblemma* that have small serrulations. The leaf axils are generally glabrous but may be pilose, or tufted with bristles as in *M. speciosa*, *M. stephanostegia*, and *M. muricata*. The absence or presence of a petiole, except in a few cases, is a useful character in distinguishing species.

### *Floral morphology*

The inflorescence is derived from the basic cymose type that may be fascicled or glomerulate, umbellate or paniculate and few- to many-flowered. In some species the flowers are solitary or paired. Inflorescences are often lateral in position, arising

from leaf axils or from leafless nodes. Terminal inflorescences are exhibited in *M. speciosa* and *M. stephanostegia*. Only *M. speciosa* and *M. stephanostegia* display leafy and showy bracts. Bracteoles subtend the individual flowers and are often subulate and small (1 mm long), and persistent or caducous.

Flowers of *Medinilla* are ephemeral. Flowering material is scarce and often collected in the advanced stages. The flowers are 4-, 5-, rarely 6-merous. The number of floral parts was found unreliable in differentiating the species. The calyx (hypanthium) varies in shape from campanulate to urceolate and ovoid, is often red in colour, and is generally glabrous except in *M. serpens*, *M. capillipes*, and in the species of the *M. macrophylla* alliance. The rim may be truncate or marked with 4 or 5 calyx teeth. The corolla consists of 4 or 5 petals, rarely 6, that are white to pink to red and obovate. The stamens vary in number from 8 to 10 or 12, are equal or unequal in size, and open by a single terminal pore. A connective generally is not produced at the base. The pistil consists of a 4–5(–6)-celled ovary with numerous ovules axially attached to the placenta, a slender terete style, and a punctiform or minutely capitate stigma.

#### *Fruit and seed morphology*

The fruit is technically a berry that is often globose in shape, sometimes cupuliform or cylindrical. It is generally glabrous except in *Medinilla serpens* and *M. capillipes* and some species of the *M. macrophylla* alliance. The pericarp may be thick (section *Medinilla*) or thin (species allied to *M. succulenta*). Seeds of *Medinilla* are generally minute (0.5–1.5 mm long), cochleate to ovoid in shape, yellow to orange in colour; the testa may be smooth or reticulate. The seeds have a conspicuous lateral raphe.

## SYSTEMATIC TREATMENT

### MEDINILLA

*Medinilla* Gaudich., Voy. Uranie (1826) 484; DC., Prodr. 3 (1828) 167; Blume, Flora (1831) 464; Mus. Bot. Lugd.-Bat. 1 (1849) 17; Naudin, Ann. Sci. Nat. III, 15 (1851) 285; Triana, Trans. Linn. Soc., London 28 (1871) 85; Cogn., DC. Monogr. Phan. 7 (1891) 572; Bakh. f., Rec. Trav. Bot. Néerl. 40 (1943) 147. — *Diplogenea* Lindley, Quart. J. Sci. Arts 2 (1828) 122. — *Triplectrum* D. Don ex Wight & Arn., Prodr. (1834) 324. — *Dactyliota* Blume, Mus. Bot. Lugd.-Bat. 1 (1849) 21. — *Hypenanthe* Blume, Mus. Bot. Lugd.-Bat. 1 (1849) 21. — *Erpetina* Naudin, Ann. Sci. Nat., III, 15 (1851) 299. — *Medinillopsis* Cogn., DC. Monogr. Phan. 7 (1891) 603. — *Cephalomedinilla* Merr., Philip. J. Sci. 5 (1910) Bot. 204.

Epiphytic and terrestrial shrubs, erect, scandent, or creeping. Branches generally terete, angular or winged, smooth or pustulate. *Leaves* alternate, opposite, or verticillate, sessile or petiolate; blade fleshy or coriaceous, generally elliptic, glabrous, and entire; leaf axils glabrous or tufted with hairs. *Inflorescences* terminal or axillary paniculately or umbellately disposed cymes, often fascicled in leaf axils or defoliated nodes; flowers 4–5(–6)-merous; hypanthium campanulate or ovoid, glabrous or pubescent, rim very shortly dentate or truncate; petals thin, white or pink; stamens twice as many as petals, equal or unequal in size; filaments glabrous, flattened; anthers linear-lanceolate or linear-oblong, connective not or hardly produced, dorsal-

ly short-spurred, ventrally with a pair of short appendages; ovary 4–5(–6)-celled; extraovarian chambers generally extending to the middle of the ovary; style terete, glabrous; stigma minute, punctiform or minutely capitate. *Fruit* a berry, globose to subglobose; pericarp thick or thin; seeds few to many, minute, ovoid or subfalcate, testa smooth or finely reticulate.

**Distribution.** About 400 species in tropical Africa, Madagascar, India, Ceylon, Burma, Indochina, S China, and SE Asia throughout Malesia to N Australia and Polynesia.

### *Species alliances*

Neither Blume's nor Bakhuizen van den Brink's infrageneric classification was found suitable for characterizing the diverse species alliances in Borneo. I have therefore outlined the following 11 informally designated species groups which offer a convenient reference for further study and comparison (table 1). While most species alliances are defined by comparatively trivial characters, it is hoped that such cases are here so grouped that the ultimate solution of their relationship will be facilitated.

#### **Group 1 — *Medinilla magnifica* alliance**

This group consists in Borneo of a single species, *M. speciosa*, and includes *M. magnifica* of the Philippines, *M. teysmannii* of the Moluccas, and *M. alpestris* (= *M. javanensis*) of Java and Sumatra. It is characterized by whorled, sessile, fleshy, and large leaves. The stems are quadrangular, often alate, with bristly nodes. The dense terminal panicles have showy bracts. This species group is well diversified in the Philippines and New Guinea.

#### **Group 2 — Section *Medinilla* (= *Campsoplacuntia* Blume)**

This section was established by Blume in 1831 and originally consisted of five species (*M. quadrifolia*, *M. radicans*, *M. pterocaula*, *M. crassinervia*, *M. macrocarpa*) that are allied to the type of the genus, *M. rosea* Gaud. Bakhuizen van den Brink, Jr. (1943) renamed this section *Eumedinilla* and added new taxa from New Guinea. The species in this section are loosely defined and their relationships are poorly understood. Naudin (1851) indicated the similarity of *M. rosea* to *M. radicans* and *M. quadrifolia*. Bakhuizen van den Brink Jr. (1943) reduced *M. quadrifolia* to a variety of *M. radicans*, and *M. macrocarpa* was synonymized with *M. crassinervia*. Furtado (1963) ultimately reduced *M. radicans* var. *quadrifolia* to a synonym of *M. radicans*. My examination of herbarium specimens has shown a complex that involves more than five or six species. The problem proves to be more difficult when a dozen more species from the Philippines allied to *M. verticillata* Merr. are taken into consideration. This problem can only be resolved by study in the field.

In this revision I retain the distinctness of *M. quadrifolia* from *M. radicans* for reasons stated under notes for *M. quadrifolia*. In addition, three new species from Mount Kinabalu and one new species from Sarawak and East Kalimantan are described. This brings this section to a total of seven species represented in Borneo, which are characterized as follows: Epiphytic glabrous shrubs; leaves whorled, petiolate; inflorescence a few-flowered cyme, axillary; hypanthium truncate, ovary wall thick; fruits glabrous.

**Group 3 — *Medinilla corneri* alliance**

This group of epiphytic shrubs consists of two species, *M. corneri* and *M. danu-mensis*, and with several Philippine species forms an alliance characterized by opposite and petiolate leaves. The fruits resemble those of section *Medinilla*.

**Group 4 — *Medinilla beamanii* alliance**

This alliance which includes *M. beamanii*, *M. allantocalyx*, *M. fragilis*, *M. latericia*, and *M. pedunculosa* is distinguished by the robust habit and the opposite, sessile, and appressed leaves. The inflorescences are supported by long and slender peduncles, except for *M. allantocalyx* which has very short inflorescences.

**Group 5 — *Medinilla crassifolia* alliance**

*Medinilla crassifolia* forms an alliance with *M. laxiflora*, *M. longipedunculata*, and *M. botryocarpa*. These species are distinguished in having opposite leaves that are petiolate or sessile, generally 5-plinerved, with transverse veins not apparent on the abaxial surface.

**Group 6 — *Medinilla sessiliflora* alliance**

This is a group of 3 species (*M. sessiliflora*, *M. richardsii*, *M. montisaping*) which resemble *M. crassifolia* habitwise, but the cymes are reduced to a solitary flower or a pair of flowers in leaf axils. The leaves of *M. richardsii* and *M. montisaping* are narrowly lanceolate and notably sclerophyllous.

**Group 7 — *Medinilla myrtiformis* alliance**

This group was studied by Veldkamp (1978) but he included only one species (*M. homoeandra*) from Borneo. The present study uncovered three more species that clearly belong to this group, namely *M. muricata*, *M. salicina*, and *M. subauriculata*. The group is comprised of epiphytic shrubs or treelets (?) that are essentially glabrous. The leaves are opposite, sessile or subsessile (petiole very short except in *Medinilla homoeandra*), the blade rather small, thin, (1–)3-nerved. The inflorescences are axillary, fascicled or cymose; flowers are 4-merous with stamens equal in size (except for *Medinilla homoeandra*). The fruits have a thin pericarp.

**Group 8 — *Medinilla succulenta* alliance**

A group of 6 species (*M. succulenta*, *M. amplexans*, *M. suberosa*, *M. myrmecorhiza*, *M. quadrialata*, *M. aggregata*) that is distinguished by the fleshy nature of the leaves and stems. The leaves are opposite, sessile, stems quadrangular, flowers axillary, fascicled, fruit with thin pericarp, and seeds much larger than those in other species groups.

**Group 9 — *Medinilla macrophylla* alliance**

This group is unique in having pubescence on young shoots, leaf undersurface and petioles. Six species are recognized in this group, namely, *M. macrophylla*, *M. rufescens*, *M. rufopilosa*, *M. lasiocladus*, *M. corallina*, and *M. endertii*.

**Group 10** — *Medinilla stephanostegia* alliance

A single species endemic on Mount Kinabalu, *M. stephanostegia* Stapf, has no close relatives in Borneo but is apparently related to *M. cordata* and *M. fenicis* of the Philippines. This plant has terminal inflorescences with showy bracts.

**Group 11** — Section *Heteroblemma* Blume

Herbaceous climbers or creeping plants; stems flexuous, adventitious roots growing from nodes, wood of lobed xylem; leaves alternate, long-petiolate; flowers fascicled on leafless axils, pedicels slender, 2–5 cm long; ventral appendages to the anthers obsolete.

The section is comprised of nine species that are highly localized or very narrowly distributed. *Medinilla serpens*, *M. lorata* and *M. flagellata* are restricted to limestone hills of Sarawak. *Medinilla capillipes* and *M. decurrens* are found along streambanks of Sarawak. *Medinilla sandakanensis* and *M. kemulensis* are named after the only localities from which the species are known. *Medinilla formanii* is represented by two collections along the Belayan River in East Kalimantan. *Medinilla alternifolia* is known to be widely distributed in the Malay Peninsula, Java and Sumatra. It has been well collected, in contrast to the other species that are known from few collections.

Four new species are being described in this section, namely, *M. sandakanensis*, *M. kemulensis*, *M. capillipes*, and *M. formanii*.

## KEY TO THE SPECIES

- 1a. Leaves whorled . . . . . 2
- b. Leaves opposite or alternate . . . . . 9
- 2a. Inflorescence terminal, paniculate; nodes encircled by a dense mat of rigid appressed bristles; plants succulent . . . . . **1. M. speciosa**
- b. Inflorescence axillary, rarely terminal, umbelliform cymes; nodes without bristles; plants woody . . . . . 3
- 3a. Young branches terete or subterete . . . . . 4
- b. Young branches alate, angled, or undulate . . . . . 7
- 4a. Leaves 3-nerved or 3-plinerved, stamens unequal in size . . . . . 5
- b. Leaves 5-nerved or 5-plinerved, stamens equal in size . . . . . 6
- 5a. Leaves 3-plinerved, coriaceous, acuminate; pedicels 3–5 mm long, 1 mm thick . . . . . **2. M. quadrifolia**
- b. Leaves 3-nerved, chartaceous, apiculate; pedicels 8–10 mm long, slender . . . . . **4. M. urophylla**
- 6a. Leaves 5-nerved, broadly elliptic to obovate, apiculate; flowers 5-merous; fruits small, c. 5 mm across . . . . . **5. M. rubrifrons**
- b. Leaves 5-plinerved, narrowly elliptic, acuminate; flowers 6-merous; fruits large, c. 10 mm across . . . . . **3. M. kinabaluensis**
- 7a. Leaves 3-plinerved, narrowly elliptic, apex shortly acuminate . . . . . **6. M. pterocaula**
- b. Leaves 3-nerved, narrowly or broadly obovate, apex apiculate . . . . . 8

- 8a. Leaves narrowly obovate; fruits 7–10 mm across, green at maturity  
7. *M. atroviridis*
- b. Leaves broadly obovate; fruits 10–20 mm across, purplish at maturity  
8. *M. clemensiana*
- 9a. Leaves opposite; xylem not lobed; shrubs . . . . . 10  
b. Leaves alternate; xylem mostly lobed; creepers . . . . . 41
- 10a. Whole plant glabrous or nearly so . . . . . 11  
b. Young branches, leaf undersurfaces, and inflorescences more or less pubescent, setose, tomentose, or furfuraceous . . . . . 35
- 11a. Inflorescence mostly paniculate or umbelliform; peduncle 0.5–15 cm. . . . . 12  
b. Inflorescence fasciculate or flowers solitary or paired; inflorescence sessile or peduncle sometimes up to 0.5 cm. . . . . 24
- 12a. Leaves sessile or subsessile, petiole rarely more than 5 mm (up to 10 mm) 13  
b. Leaves distinctly petiolate, petiole at least 10 mm . . . . . 20
- 13a. Leaves 3-plinerved, transverse veins not visible on abaxial surface. . . . . 14  
b. Leaves 5- or 7-plinerved, transverse veins distinct on abaxial surface . . . . . 16
- 14a. Peduncle 6–9 cm long . . . . . 19. *M. longipedunculata*  
b. Peduncle 1–3 cm long . . . . . 15
- 15a. Branches terete; leaf apex acuminate . . . . . 16. *M. crassifolia*  
b. Branches acutely 4-angled; leaf apex obtuse . . . . . 28. *M. quadrialata*
- 16a. Leaves 7-plinerved . . . . . 17  
b. Leaves 5-plinerved . . . . . 18
- 17a. Flowers 4-merous . . . . . 11. *M. beamanii*  
b. Flowers 5-merous . . . . . 13. *M. fragilis*
- 18a. Flowers 4-merous; peduncle 0.5 cm . . . . . 12. *M. allantocalyx*  
b. Flowers 5-merous; peduncle 5–15 cm . . . . . 19
- 19a. Peduncles 5–7 cm long . . . . . 14. *M. latericia*  
b. Peduncles c. 15 cm long . . . . . 15. *M. pedunculosa*
- 20a. Leaves 7-plinerved . . . . . 20  
b. Leaves 3- to 5-plinerved . . . . . 21
- 21a. Transverse veins distinct on abaxial surface; petiole 3.5–4 cm long; peduncle less than 1 cm long . . . . . 9. *M. corneri*  
b. Transverse veins invisible on abaxial surface; petiole 1–2 cm long; peduncle 3–5 cm long . . . . . 10. *M. danumensis*
- 22a. Inflorescence much branched panicles; adaxial surface of leaves glaucous, bluish green . . . . . 17. *M. laxiflora*  
b. Inflorescences not paniculate; adaxial surface of leaves not glaucous, pallid green. . . . . 22
- 23a. Leaves 14–18 × 5–8 cm, 5-plinerved; flowers 5-merous  
18. *M. botryocarpa*
- b. Leaves 7.5–12 × 2.5–4.5 cm, 3-plinerved; flowers 4-merous  
20. *M. sessiliflora*
- 24a. Leaves small, leaf blade less than 1 cm wide, narrowly lanceolate, stiff. . . . . 25  
b. Leaves larger, leaf blade more than 1 cm wide, elliptic, erecto-patent . . . . . 26
- 25a. Leaves uninerved, petiole 3–5 mm long . . . . . 21. *M. richardsii*  
b. Leaves 3-plinerved, petiole 1–2 mm long . . . . . 22. *M. montisaping*

- 26a. Leaf apex long acuminate, often prolonged to a caudate tip, base rounded to cordate, often amplexicaul or auriculate . . . . . 27
- b. Leaf apex shortly acuminate, acute or obtuse, not prolonged, base cuneate 30
- 27a. Stems 4-angled, branches winged at the junction of adjacent faces, nodes articulated . . . . . 26. *M. salicina*
- b. Stems terete, branches not winged, nodes not articulated . . . . . 28
- 28a. Nodes with a mat of bristles up to 1 cm long; leaves 7(-9)-nerved
23. *M. muricata*
- b. Nodes seemingly glabrous except for minute, caducous, ciliate hairs on young stems; leaves 3(-5)-plinerved . . . . . 29
- 29a. Leaves short petiolate, petiole 1-2 cm long, base rounded to emarginate
24. *M. homoeandra*
- b. Leaves sessile, base auriculate, amplexicaul . . . . . 25. *M. subauriculata*
- 30a. Transverse veins conspicuous on both surfaces, numerous, of 20-30 pairs
32. *M. amplectens*
- b. Transverse veins indistinct to absent . . . . . 31
- 31a. Leaves 3-plinerved . . . . . 32
- b. Leaves 5-plinerved . . . . . 34
- 32a. Petiole 5-10 mm long . . . . . 20. *M. sessiliflora*
- b. Petiole 0-3 mm long . . . . . 33
- 33a. Leaves coriaceous, 11-13(-16) × 3-5 cm . . . . . 27. *M. succulenta*
- b. Leaves thin-papyraceous, 12-17(-24) × 6-9(-12) cm
29. *M. myrmecorhiza*
- 34a. Branches alate-quadrangular; flowers 5-merous . . . . . 30. *M. aggregata*
- b. Branches subquadrangular; flowers 4-merous . . . . . 31. *M. suberosa*
- 35a. Inflorescences of terminal paniculate cymes; bracts 6-12 mm long, white or pink, showy . . . . . 39. *M. stephanostegia*
- b. Inflorescences of axillary or sometimes terminal cymes, simple or umbelliform; bracts smaller, not showy . . . . . 36
- 36a. Peduncles at least 4 cm or longer . . . . . 37
- b. Peduncles 2 cm long or shorter . . . . . 39
- 37a. Leaves large, up to 24 cm long, 9 cm wide, transverse veins of 25-30 pairs, reticulate . . . . . 37. *M. endertii*
- b. Leaves smaller, transverse veins fewer, not reticulate . . . . . 38
- 38a. Indument of minute and dense rusty brown hairs, evenly spread on abaxial surface of leaves, leaves never glabrescent . . . . . 34. *M. rufescens*
- b. Indument consisting of reddish brown hirsute or hispid hairs, lining the primary nerves and transverse veins, intraveinal areas glabrous, leaves glabrous at maturity . . . . . 38. *M. rufopilosa*
- 39a. Leaves distinctly petiolate, the petiole 1.5-2.5 cm long 33. *M. macrophylla*
- b. Leaves sessile to subsessile . . . . . 40
- 40a. Leaves 3-plinerved, abaxial surface glabrous, base not at all auriculate; young shoots densely woolly; flowers 4-merous . . . . . 36. *M. lasiocladus*
- b. Leaves 5-plinerved, abaxial surface pubescent, base subauriculate; young shoots minutely red-furfuraceous; flowers 5-merous . . . . . 35. *M. corallina*

- 41a. Leaves glabrous on adaxial surface, minutely setose or fusco-pilose along reticulations on abaxial surface . . . . . 42  
 b. Leaves glabrous on both surface. . . . . 44
- 42a. Leaf blade broadly ovate, base cordate; petiole 13–17 cm long; fruit glabrescent, stalk 1.0–1.5 cm long, hirsute . . . . . 44. *M. serpens*  
 b. Leaf blade narrowly elliptic or oblong-elliptic, base attenuate to cuneate; petiole up to 8 cm long; fruit glabrous, stalk 2.5–5 cm long, glabrous . . . . . 43
- 43a. Leaf blade narrowly elliptic, fuscopilose along reticulations below  
 41. *M. formanii*  
 b. Leaf blade oblong-elliptic, minutely setose along reticulations below  
 46. *M. flagellata*
- 44a. Leaf base decurrent into the petiole . . . . . 42. *M. decurrens*  
 b. Leaf base not decurrent . . . . . 45
- 45a. Leaf blade rotund, 9-plinerved . . . . . 43. *M. kemulensis*  
 b. Leaf blade elliptic or linear-oblong, 5-plinerved . . . . . 46
- 46a. Fruits and stalks setose . . . . . 45. *M. capillipes*  
 b. Fruits and stalks glabrous . . . . . 47
- 47a. Upper pair of nerves arising from the midrib 4 cm above leaf base  
 47. *M. lorata*  
 b. Upper pair of nerves arising from the midrib 1–2 cm above leaf base . . . . 48
- 48a. Leaves broadly elliptic, 14–24 cm long, 7–12 cm wide; fruit stalk c. 1 cm long  
 40. *M. alternifolia*  
 b. Leaves narrowly elliptic, 25–30 cm long, 7.5–9 cm wide; fruit stalk 2.5–3 cm long . . . . . 48. *M. sandakanensis*

## 1. *Medinilla speciosa* (Reinw. ex Blume) Blume

*Medinilla speciosa* (Reinw. ex Blume) Blume in Van Hall, Bijdr. Nat. Wet. 6 (1831) 256; Bot. Mag. 73 (1847) t. 4321; Bakh. f., Rec. Trav. Bot. Néerl. 40 (1943) 162; Maxwell, Gard. Bull. Sing. 31 (1978) 185. — *Melastoma speciosa* Reinw. ex Blume, Flora 14 (1831) 515. — Type: *Reinwardt s.n.* (L; iso K), Java, sine loc.

Epiphytic or terrestrial shrub, 1.5–3 m high. Branches quadrangular or alate, smooth, glabrous, 7–10 mm in diameter; nodes densely covered with stiff setaceous bristles 15 mm long. *Leaves* appressed, ternate or quaternate, sessile or subsessile, the latter with thickened petiole less than 5 mm long; blade fleshy, coriaceous, glabrous on both surfaces, broadly elliptic or obovate, 17–37 cm long, 9–20 cm wide; margin entire, sometimes remotely crenulate; apex obtuse and mucronate at the tip to acute and abruptly acuminate; base slightly unequal, acute to rounded, decurrent to the petiole; 5- or 7-plinerved, nerves impressed adaxially, raised abaxially; transverse veins faint to nearly invisible on both surfaces. *Inflorescence* a terminal many-flowered panicle of cymes, glabrous, pendulous, (12–)15–32 cm long, 9–15 cm across; peduncle fleshy, quadrangular, glabrous, red; bracts in whorls of 3 or 4, obovate or lanceolate, acute, (5–)8–10(–30) mm long, (1–)2–3(–4) mm wide, veined, persistent; bracteoles 5–11 mm long, 3 mm wide, deciduous; pedicels (3–)

4–5 mm long. *Hypanthium* campanulate, 4–5 mm long, 3–4 mm wide, glabrous, rim truncate or shallowly 4–5-toothed, pink or red. *Petals* 4 or 5, thin, membranous, glabrous, oblong to ovate, 5–10(–12) mm long, 4–6(–8) mm wide, white or pink. *Stamens* 8–10, equal in size; filament flattened, 5–6 mm long; anther rostrate, 5–7 mm long. *Ovary* 4- to 5-celled; style slender, cylindrical, 5–7(–8) mm long; stigma punctiform. *Fruits* globose, constricted at the top, 5–7 mm across, pink, ripening red then blue-purple; stalk 7–10 mm long; seeds numerous, c. 1 mm long.

**Distribution.** Malay Peninsula, Sumatra, Java, Lesser Sunda Islands (W Sumbawa, Lombok), Sulawesi, Moluccas, Borneo (Kalimantan, 2 coll.; Sabah, 38 coll.; Sarawak, 5 coll.).

**Habitat.** In secondary or primary forests between (900–)1500–1900 m, locally common in oak-laurel forests on Mt Kinabalu.

**Note.** Cultivated in botanic gardens and noted for its dense panicle of delicate pink flowers.

## 2. *Medinilla quadrifolia* (Blume) Blume

*Medinilla quadrifolia* (Blume) Blume, Flora 14 (1831) 509; Bakh. f., Rec. Trav. Bot. Néerl. 40 (1943) 161; Furtado, Gard. Bull. Sing. 20 (1963) 118; Maxwell, Gard. Bull. Sing. 31 (1978) 169. — *Melastoma quadrifolium* Blume, Bijdr. Fl. Ned.-Ind. 17 (1826) 1069. — Type: Blume s.n. (L; iso K), Java, Mt Salak.

Epiphytic shrub. Young branches terete, smooth, becoming subquadrangular and ribbed, 5–10 mm in diameter. *Leaves* quaternate; petiole 2–3 cm long; blade coriaceous, glabrous, obovate or oblong-lanceolate, 8.5–9 cm long, 4–5 cm wide; margin entire; apex acuminate, acumen c. 1 cm long; base acute; 3-plinerved, rarely 5-plinerved, the nerves flattened adaxially, raised abaxially, transverse veins inconspicuous. *Inflorescences* axillary, umbelliform, produced in 2s or 3s around a node on older branches below the leaves, up to 3 cm long; bracteole lanceolate, 5–6 mm long, 1 mm wide (observed in Haviland 1962); peduncle 1–2.5 cm long; pedicels 3–5 mm long, 1 mm thick. *Hypanthium* broadly ovoid to campanulate, 10 mm long, 6 mm wide, glabrous, truncate, pink to red. *Petals* 5, white. *Stamens* 10, unequal in length; short stamens with 6 mm long anthers, 5 mm long filaments; long stamens with 9 mm long anthers, 6 mm long filaments. *Ovary* 5-celled; style up to 12 mm long. *Fruits* globose, 1 cm in diameter, green, turning red when ripe; stalk 0.5–0.8 cm long.

**Distribution.** Malay Peninsula, Sumatra, Java, Borneo (Kalimantan, 5 coll.; Sabah, 2 coll.; Sarawak, 5 coll.).

**Habitat.** Forests along rivers on loam soil, sea level to 700 m altitude.

**Note.** *Medinilla quadrifolia* has been confused with *M. radicans* Blume. Bakhuizen van den Brink Jr. (1943) reduced it as a variety of the latter. Furtado (1963) and Maxwell (1978) believed that the two taxa are conspecific. Blume (1831) described *M. radicans* as having uninerved leaves and *M. quadrifolia* with 3-nerved leaves. Subsequent collections of *M. radicans* showed both uninerved and trinerved leaves on the same specimen, which became the basis of the reduction. However, *M. radicans* sensu stricto is distinguished by its consistently 4-merous flowers and narrowly campanulate calyx tube which is prolonged into a short cylindrical neck. In the

absence of flowers, the number of stamens can be determined by counting the staminal scars on the fruit. On the other hand, *M. quadrifolia* has a broadly campanulate or ovoid calyx tube and the number of floral parts ranges from 4 to 6. In the Bornean specimens the flowers are 5-parted. The distinction made by Bakhuizen van den Brink (1963) that *M. quadrifolia* has narrower leaves than *M. radicans* does not hold for a number of specimens examined.

### 3. *Medinilla kinabaluensis* Regalado, *spec. nov.* — Fig. 1.

Frutex scandens, epiphyticus, glaber; ramis tetragonis, ramulis teretibus; foliis quaternatim verticillatis, ellipticis, 6–7,5 cm longis, 3–3,5 cm latis, quintuplinerviis; apice acuminato, acumine ad 1 cm longo; basi attenuata; petiolo 1–1,5 cm longo; inflorescentiis umbellate dispositis, terminalibus vel axillaribus, circiter 3 ad 4 cm longis; floribus sexmeris; staminibus aequalibus; fructibus globosis, ad 1 cm latis. — **T y p u s:** *Clemens 28775* (UC; iso A, BO, K, L, NY; SING), Sabah, Mt Kinabalu, Tenompok.

Climbing shrub, epiphytic, glabrous. Young branches terete and smooth, becoming ribbed and rough at maturity, 3–10 mm in diameter. *Leaves* quaternate; petiole 1–1.5 cm long; blade coriaceous, drying olive green adaxially, yellowish brown abaxially, elliptic, 6–7.5 cm long, 3–3.5 cm wide; margin entire; apex acuminate, acumen up to c. 1 cm long; base attenuate; 5-plinerved, marginal pair less conspicuous and diminishing near the apex; nerves impressed adaxially, raised abaxially; transverse veins absent on both surfaces. *Inflorescences* terminal or axillary, few-flowered, umbelliform, clustered in whorls at defoliated nodes, c. 3–4 cm long; peduncle up to 2 cm long, glabrous; pedicels 7–10 mm long. *Hypanthium* obconical, 7 mm long, 7 mm wide, glabrous, truncate, pink. *Petals* 6, ovate, glabrous, entire, 7 mm long, 5 mm wide. *Stamens* 12, equal in size; anther linear-oblong, 5 mm long. *Ovary* 6-celled; style cylindrical, 6 mm long; stigma minute, punctiform. *Fruits* globose, dark red, large, up to 1 cm in diameter; stalk thick, 1 cm long; pericarp thick, c. 1 mm across; seeds numerous, minute, embedded in pulpy tissue.

**D i s t r i b u t i o n.** Sabah: Mt Kinabalu (7 coll.), endemic.

**H a b i t a t.** Primary forest at 1500 m.

**N o t e.** Nearest to *Medinilla quadrifolia* but the leaves are 5-plinerved, flowers are 6-merous with equal stamens, and fruits are larger, up to 1 cm in diameter.

### 4. *Medinilla urophylla* Stapf

*Medinilla urophylla* Stapf, Trans. Linn. Soc. London, Bot. 4 (1894) 160. — **T y p e:** *Haviland 1278* (K), Sabah, Mt Kinabalu.

Scandent epiphytic shrub. Branches terete, glabrous, bark ivory white. *Leaves* quaternate, drying red-brown above, ochraceous beneath; petiole 2–3 cm long; blade chartaceous, elliptic to oblanceolate or obovate, 6–7.5 cm long, 3–4 cm wide; margin entire; apex apiculate; base acute; trinerved, nerves flattened adaxially, raised abaxially; transverse veins obscure except those of new shoots. *Inflorescences* axillary, umbelliform, arising singly around a node on older branches below the leaves; peduncle 10–20 mm long; pedicels slender, 8–10 mm long. *Hypanthium* campanulate, 6 mm long, 5 mm wide, truncate, glabrous. *Petals* 5, broadly obovate, 12 mm



Fig. 1. *Medinilla kinabaluensis* Regalado — a. Branch with fruits,  $\times 0.5$ ; b. fruit,  $\times 1.3$ ; c. seeds,  $\times 8$  (all Chew & Corner RSNB 4135, 4419).

long, 10 mm wide, white, transparent, membranous. *Stamens* 10, unequal; short stamens with 4–5 mm long anthers, 5 mm long filaments, 1 mm long dorsal spur; long stamens with 7 mm long anthers, 8 mm long filaments, and shorter dorsal spurs than the former. *Ovary* 5-celled; style slender, 12 mm long; stigma minute, punctiform, reddish brown. *Fruit* subglobose, 5–6 mm across, pink to purple, pericarp on drying shedding off waxy layers; seeds numerous, minute.

**Distribution.** Sabah: Mt Kinabalu (6 coll.), endemic.

**Habitat.** On ridges or edges of cliffs, 900–1200 m.

**Note.** Closely allied to *Medinilla quadrifolia* but distinguished from that species by its trinerved leaves and much longer and slender pedicels.

### 5. *Medinilla rubrifrons* Regalado, *spec. nov.*

Frutex scandens, epiphyticus, glaber; ramis ramulisque teretibus; foliis quaternatim verticillatis, ad frondescentiam rubris, ellipticis ad obovatis, subcoriaceis, 8–9 cm longis, 4–5,5 cm latis, quinque-nerviis; apice cuspidato vel caudato; basi angustata vel acuta; petiolo ad 2,5 cm longo; inflorescentiis axillaribus, fasciculatis, umbelliformibus; floribus albis, quinque-meris; staminibus aequalibus; fructibus globosis, ad 5 mm latis — **T y p u s:** *Clemens* 27693 (A; iso BM, BO, K, L, NY, UC), Sabah, Mt Kinabalu, Tenompok.

Scandent epiphytic shrub. Branches terete, glabrous, 5–8 mm in diameter. *Leaves* quaternate; petiole 1.5–2.5 cm long, blade subcoriaceous, young leaves in dry state flushed red, elliptic to obovate, 8–9 cm long, 4–5.5 cm wide; margin entire; apex cuspidate or caudate; base attenuate or acute; 5-nerved, lateral pair of nerves coalesced at the base and percurrent into the apical point; nerves flattened adaxially, slightly raised abaxially; transverse veins absent on both surfaces. *Inflorescences* axillary, umbelliform, fascicled in 3s or 4s on leafless nodes, up to 5 cm long when expanded; peduncle 2 cm long; pedicels 5 mm long. *Hypanthium* campanulate, 5 mm long, 4 mm wide, truncate. *Petals* 5, obovate, white, translucent. *Stamens* 10, equal; anther 9 mm long, rod-shaped, slender; filament 6–8 mm long; dorsal spur 1–2 mm long, ventral appendages gibbose. *Ovary* 5-celled; style 8–10 mm long, stigma capitate, minute, reddish-brown. *Fruits* globose, c. 5 mm in diameter, pink; stalk up to 1 cm long.

**Distribution.** East Kalimantan (2 coll.), Sabah (3 coll.).

**Note.** Distinguished from the closely allied *Medinilla kinabaluensis* in having elliptic-obovate leaves, 5-merous flowers, and smaller fruits.

### 6. *Medinilla pterocaula* Blume

*Medinilla pterocaula* Blume, *Flora* 14 (1831) 509; in Van Hall, *Bijdr. Nat. Wet.* 6 (1831) 251; Bakh. f., *Rec. Trav. Bot. Néerl.* 40 (1943) 156. — **T y p e:** *Blume s.n.* (L), Java, Mt Salak.

Scandent epiphytic shrub, up to 1 m high. Young branches distinctly winged or undulate, becoming ribbed on older branches, glabrous, 5–8 mm in diameter. *Leaves* quaternate, rarely ternate, glabrous on both surfaces; petiole 1.5–2 cm long; blade subcoriaceous, narrowly elliptic, 7–10 cm long, 3–4.5 cm wide; margin entire; apex shortly acuminate; base acute or attenuate into the petiole; 3-plinerved, sometimes with an inconspicuous marginal pair; transverse veins hardly evident adaxially, not visible abaxially. *Inflorescences* axillary, umbelliform, arising from leafless nodes; peduncle up to 4 cm long. *Hypanthium* ovoid to campanulate, 10 mm long, 6–7 mm wide, truncate, cream white, glabrous. *Petals* 5, somewhat fleshy, ovate, 5 mm long, 4 mm wide, white, glabrous. *Stamens* 10, equal in size; filament 1–1.5 mm long; anther linear lanceolate, rostrate, 3–5 mm long, dorsal spur c. 1 mm long, ventral appendages gibbose. *Ovary* 5-celled; style 3–5 mm long; stigma mi-

nute, punctiform, red-orange. *Fruit* ovoid, up to 10 mm across, purple; stalk 10 mm long; seeds numerous, smooth.

*Distribution.* Malay Peninsula, Java, Sumatra, Sulawesi, Moluccas, Borneo (Kalimantan, 1 coll.; Sabah, 2 coll.).

*Habitat.* Primary forest; seems to be an ultramafic species in Sabah.

*Note.* Rare, only three gatherings from Borneo were examined.



Fig. 2. *Medinilla atroviridis* Regalado — a. Branch with fruits,  $\times 0.5$ ; b. stamen,  $\times 3$ ; c. flower bud,  $\times 1.5$ ; d, seeds,  $\times 4$ ; e. fruit,  $\times 1.25$  (a, d, e Anderson S 28398; b, c Endert 3441).

**7. *Medinilla atroviridis* Regalado, *spec. nov.* – Fig. 2.**

Frutex epiphyticus, glaber; ramis teretibus, ramulis 8-angulatis; foliis quaternatim verticillatis, anguste obovatis, usque ad 7 cm longis, 3,5 cm latis, trinerviis; apice apiculato; basi acuta; petiolo ad 2 cm longo; inflorescentiis axillaribus, fasciculatis, umbelliformibus; floribus quinque-meris; staminibus aequalibus; fructibus globosis. — T y p u s: *Anderson S 28398* (K; iso A, L, SING), Sarawak, 3rd Div., Kapit District, Balleh River, foothills of Bt Batu Tibang.

Epiphytic shrub, climbing on trees up to 10 m high. Young branches 8-angled, slightly winged, pale yellow, brown-furfuraceous, becoming terete, striate and glabrous at maturity, 5 mm in diameter. *Leaves* quaternate; petiole 1.5–2 cm long; blade coriaceous, narrowly obovate, 6–7 cm long, 3–3.5 cm wide, drying yellow green adaxially, yellow brown abaxially; margin entire; apex apiculate, lengthened to a point 5 mm long; base acute; 3-nerved, the lateral pair of nerves running 2–5 mm from the margin, nerves impressed adaxially, raised abaxially, transverse veins hardly evident above, not visible below. *Inflorescences* axillary, umbelliform, fascicled in 2s or 3s around leafless nodes; peduncle 2–2.5 cm long; pedicels 6–10 mm long. *Hypanthium* ovoid, 7–10 mm long, 4–5 mm wide, cream coloured, minutely brown-furfuraceous. *Petals* 5, ovate, 5 mm long, 4 mm wide, glabrous, entire, cream white. *Stamens* 10, equal; filament ligulate, flat, 4–5 mm long; anther linear to lanceolate, 3–4 mm long; dorsal spurs short, almost obsolete, ventral appendages gibbose. *Ovary* 5-celled; style cylindrical, 4 mm long; stigma punctiform. *Fruits* globose, 7–10 mm across, green; pericarp thick, 1.5–2 mm across; seeds numerous, minute, fulvous.

**Distribution.** East Kalimantan (2 coll.), Sarawak (4 coll.).

**Habitat.** In primary and secondary forests on igneous derived soils or limestone at 700–900 m.

**Vernacular name.** Wa tengkang (Kelabit).

**Note.** Closely related to *Medinilla pterocaula*, but the leaves are much smaller, narrowly obovate, apiculate.

**8. *Medinilla clemensiana* Regalado, *spec. nov.* – Fig. 3.**

Frutex scandens epiphyticus glaber; ramis teretibus, ramulis alatis vel undulatis; foliis quaternatim verticillatis, late obovatis, usque ad 9 cm longis, 5 cm latis, trinerviis; apice apiculato; base acuta; petiolo ad 2,5 cm longo; inflorescentiis axillaribus, umbelliformibus; floribus quinque-meris; staminibus aequalibus; fructibus globosis, 1–2 cm latis. — T y p u s: *Clemens 34232* (BM; iso A, BO, NY), Sabah, Mt Kinabalu, Penataran Basin.

Scandent epiphytic glabrous shrub. Young branches winged or undulate, old stems terete, ribbed, yellow brown when dry. *Leaves* quaternate; petiole 2–2.5 cm long; blade subcoriaceous, broadly obovate, 7–9 cm long, 3.5–5 cm wide; margin entire; apex apiculate; base acute; 3-nerved; transverse veins inconspicuous on adaxial surface, not apparent on abaxial surface. *Inflorescences* axillary, umbelliform; peduncle 2 cm long; pedicels 1 cm long. *Hypanthium* ovoid, 8 mm long, 4–5 mm wide, truncate, glabrous. *Petals* 5, ovate, 5 mm long, 4 mm wide, glabrous, entire, cream white. *Stamens* 10, equal in size; filament linear, short, c. 2 mm long; anther linear-oblong, 4–5 mm long; dorsal spur reaching 1 mm long. *Ovary* 5-celled; style

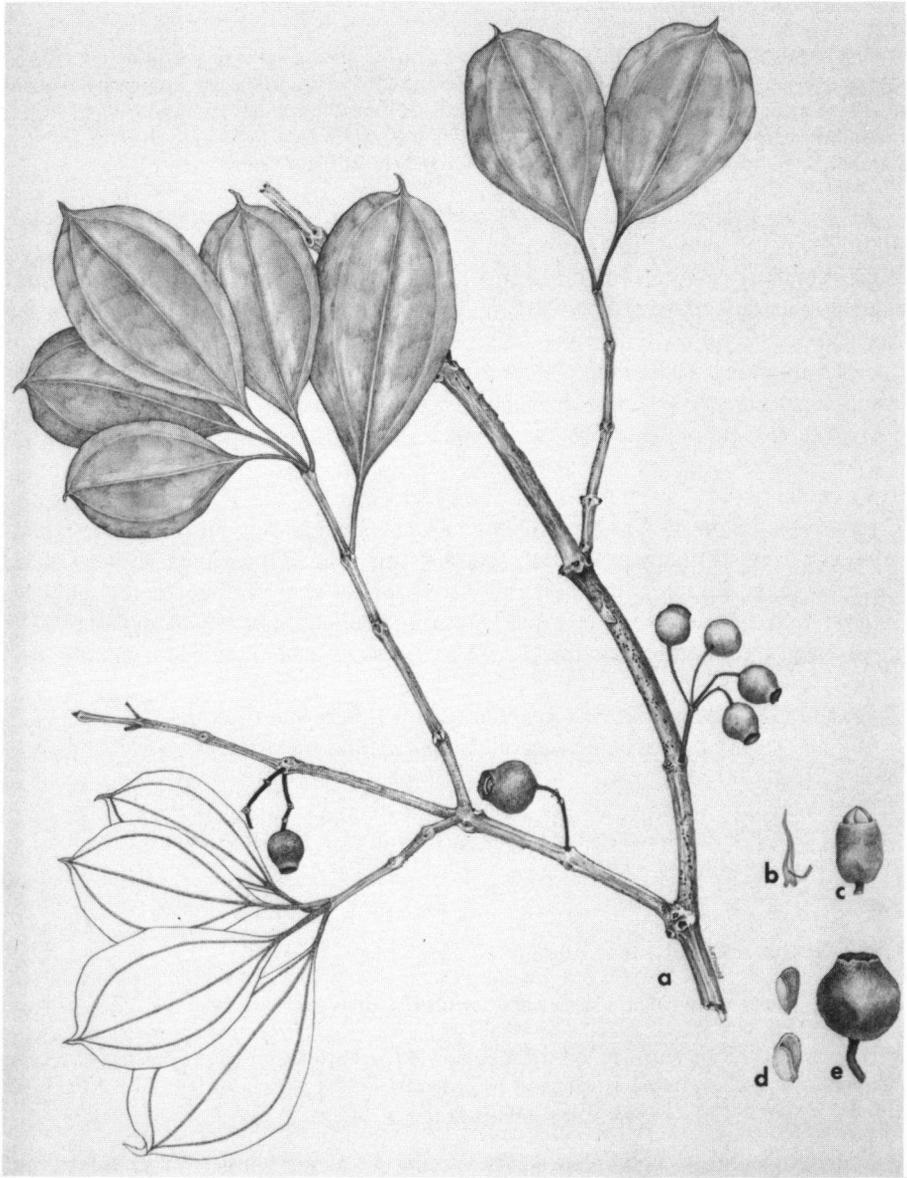


Fig. 3. *Medinilla clemensiana* Regalado — a. Branch with fruits,  $\times 0.66$ ; b. anther,  $\times 1.3$ ; c. flower,  $\times 0.9$ ; d, seeds,  $\times 4.5$ ; e. fruit,  $\times 0.66$  (a–c, e *Clemens 34232*; d *Clemens 30582*).

3–5 mm long; stigma punctiform. *Fruit* globose, 1–2 cm across, purplish; seeds numerous, ovoid, 1 mm long, yellow-orange, smooth.

*Distribution.* Sabah: Mt Kinabalu (3 coll.), endemic.

*Habitat.* Epiphyte on ridges at 900–1200 m; flowering in July, fruiting in October–December.

*Notes.* The only reliable distinctions of this species from the closely related and sympatric species *Medinilla pterocaula* seem to be the broadly obovate leaves with mucronate tips in addition to larger flowers and fruits.

This species is dedicated to Mary Strong Clemens who made an extraordinary collection on Mt Kinabalu in 1915 and 1931/33.

### 9. *Medinilla corneri* Regalado, *spec. nov.*

Frutex scandens glaber, ramis teretibus; foliis oppositis, late ellipticis ad oblongis, 15–16 cm longis, 9–10 cm latis, septuplinerviis; apice acuto; basi obtusa ad rotundata; subtus venis transversis prominentibus; petiolo 3,5–4 cm longo; inflorescentiis ex axillis defoliatis; fructibus campanulatis, 8–10 mm latis, 5-locellatis, minute quinquedenticulatis. — *Type*: Chew, Corner & Stainton RSNB 279 (K; iso L, SING), Sabah, Ranau District, Mt Kinabalu, Eastern Shoulder.

Scandent shrub. Branches terete, striate, sparsely pustulate, glabrous, 8 mm in diameter. *Leaves* opposite; petiole 3.5–4 cm long, thickened, 3 mm in diameter; blade coriaceous, glabrous on both surfaces, drying pale green above, dark brown below, broadly elliptic to oblong, 15–16 cm long, 9–10 cm wide; margin entire; apex acute; base obtuse to rounded; 7-plinerved, nerves flattened adaxially, raised abaxially, innermost pair arising from the midrib 1.5 cm above the base; transverse veins faintly visible on adaxial surface, prominent on abaxial surface, of 15–20 pairs. *Flowers* unknown, remains of inflorescence axillary, arising above defoliated nodes. *Fruits* cymosely arranged and borne on a 7 mm peduncle, campanulate, 8–10 mm across, 5-celled, rim shallowly 5-dentate, yellow, turning red when ripe; pericarp 1 mm thick, smooth, glabrous; stalk 5 mm long; seeds numerous, light yellow, 0.5 mm long.

*Distribution.* Sabah (Mt Kinabalu), known only from type collection at an elevation of 1300 m.

*Notes.* This species and *Medinilla danumensis* are related to a group of species endemic to the Philippines (*M. coriacea* Merr., *M. megacarpa* Merr., *M. merrittii* Merr., *M. rotundifolia* Elmer) which is characterized by large opposite leaves, long petioles, and large baccate fruits.

This species is named in honor of Edred John Henry Corner who led the Royal Society Expeditions on Mt Kinabalu in 1961 and 1964.

### 10. *Medinilla danumensis* Regalado, *spec. nov.*

Frutex glaber usque ad 1 m alta; ramis teretibus; foliis oppositis, ellipticis, 10–15 cm longis, 5–6,5 cm latis, septuplinerviis; apice cuspidato; basi acuta; petiolo ad 2 cm longo; inflorescentiis umbellate dispositis, ex axillis defoliatis vel lateralibus; pedunculo 3,5 cm longo suffultis; fructibus ovoideis campanulatisve, 5–8 mm latis, 4-locellatis — *Type*: Cockburn SAN 84910 (L; iso K, SAN), Sabah, Lahad Datu District, Sg Segama, below Kuala Beatrice.

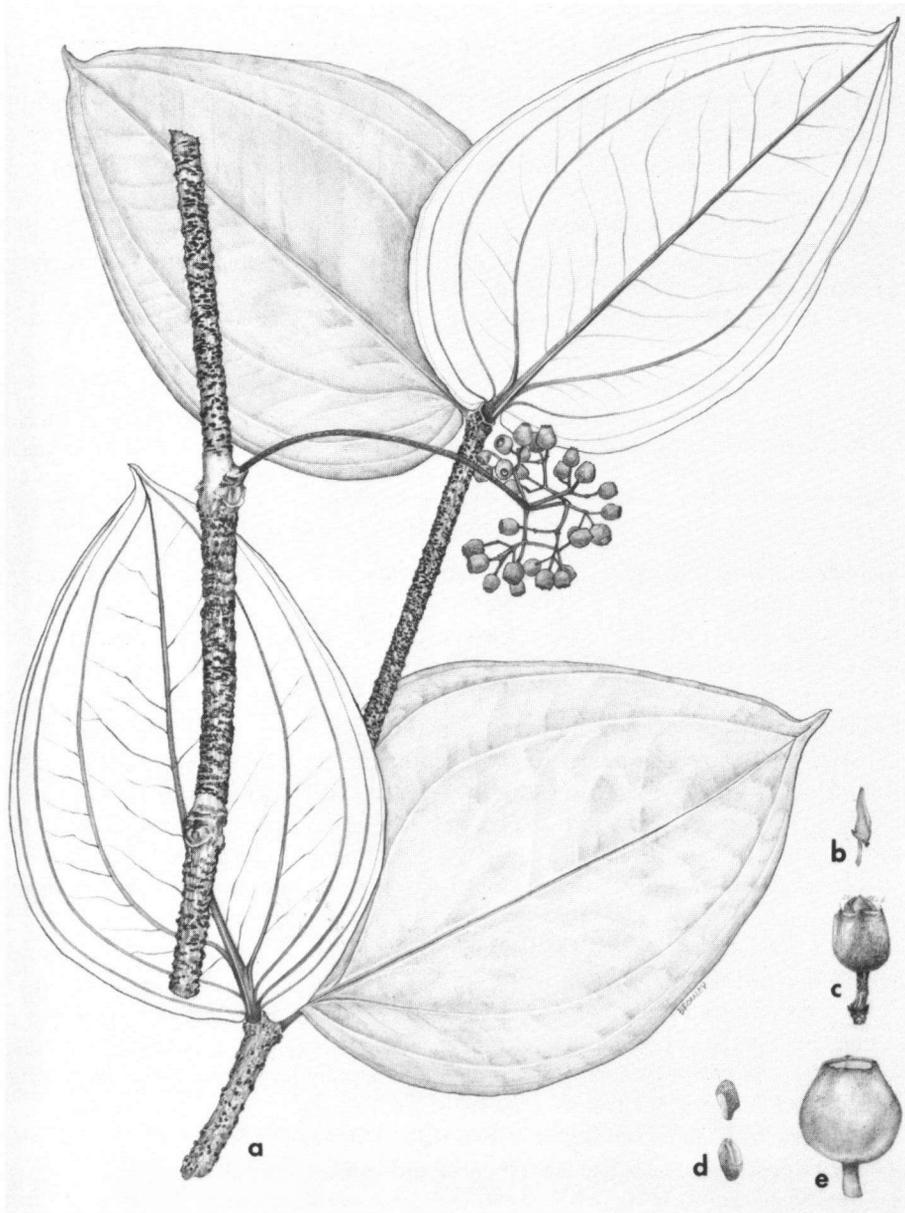


Fig. 4. *Medinilla beamanii* Regalado — a. Branch segments with infructescence,  $\times 0.5$ ; b. stamen,  $\times 3.5$ ; c. flower,  $\times 2$ ; d. seeds,  $\times 5$ ; e. fruit,  $\times 2$  (all *Beaman 6901*).

Shrub up to 1 m high. Branches terete, slender, 5 mm in diameter, glabrous; bark yellow, sparsely pustulate, striate. *Leaves* opposite; petiole 1–2 cm long, flattened; blade coriaceous, drying light brown above, yellow green beneath, elliptic, 10–15 cm long, 5–6.5 cm wide; margin entire; apex cuspidate; base acute; 7-plinerved, innermost pair of nerves departing from the midrib 3–4 cm above the base, nerves flattened on both surfaces, transverse veins obscure to nearly absent on adaxial surface, invisible on abaxial surface. *Flowers* unknown. *Fruits* 5–10 together umbellately disposed on a terete, slender peduncle 3–5 cm long, arising from leaf axils or from defoliated nodes, ovoid to campanulate, 5–8 mm across, 4-celled, glabrous, red when ripe, pericarp 1 mm thick, rim shallowly 4-dentate; stalk 3 mm long; seeds numerous, ovoid, hilum concave, lucid yellow, 0.8–1 mm long, testa reticulate.

**Distribution.** Sabah, known only from the type collection.

**Notes.** At first glance this species could be mistaken as belonging to section *Medinilla* but the leaves are opposite, not verticillate. Allied to *M. corneri* but differing in having indistinct transverse veins, shorter petiole, and umbellately arranged fruits on a much longer peduncle.

The type was collected during the World Wildlife Fund Danum Valley Survey in August–September 1976, hence the name points to its narrow range of distribution.

#### 11. *Medinilla beamanii* Regalado, *spec. nov.* – Fig. 4.

Frutex vel arbor parva epiphyticus glaber, habitu robustiore; ramis teretibus, verrucosis; foliis oppositis, sessilibus, ovato- vel elliptico-oblongis, 12–15 cm longis, 7–9 cm latis, septuplinervi- bus; apice acuto; basi obtusa ad rotundata; inflorescentiis axillaribus; floribus 4-meris, ad pedunculo 5–8 cm longo cymosim dispositis; staminibus aequalibus; fructibus globosis, 6–8 mm latis. — **T y p u s:** *Beaman 6901* (MSC; iso A, K, L, NY, S, UKMS), Sabah, Tambunan District, Km 55 on Kota Kinabalu-Tambunan Road.

A robust shrub or small tree, 2.5 m high, epiphytic. Branches terete, verrucose, heavily pustulate, stout, 8–10 mm in diameter. *Leaves* opposite, sessile, appressed, glabrous on both surfaces; blade coriaceous, ovate-oblong to elliptic-oblong, 12–15(–17) cm long, 7–9(–11) cm wide, drying olive to grayish green above, yellow-brown below; margin entire; apex acute with blunt tip or caudate, prolonged to a 1–2 cm long acumen; base obtuse to rounded; 7-plinerved, nerves impressed adaxially, raised abaxially, the marginal pair faint, indistinct, the innermost pair arising from the midrib 2 cm above the base; transverse veins faint to nearly absent on adaxial surface, distinct on abaxial surface, oriented acropetally to an angle of c. 45 degrees. *Inflorescences* axillary, flowers disposed in cymes and clustered at the distal end of a 5–8 cm long peduncle. *Hypanthium* ovoid, 4.5 mm long, 4 mm wide, glabrous, shallowly 4-dentate. *Petals* 4, ovate, concave, 5 mm long, 3 mm wide. *Stamens* 8, equal in size; filament flattened, 2 mm long; anther ovate-lanceolate, 2 mm long. *Ovary* 4-celled; style slender, 4.5 mm long; stigma minute, punctiform. *Fruit* globose, 6–8 mm across, orange to red; stalk short, 2–5 mm long, stout; seeds numerous, 1 mm long.

**Distribution.** Sabah (14 coll.): Mt Kinabalu, Gunung Alab, endemic.

**Habitat.** Rather common in oak-laurel and mossy forests at 1500–1800 m, scarce in upper dipterocarp forest at 1000–1400 m.

**Note.** The species is named for John H. Beaman who first collected flowering material of this species in 1983.

## 12. *Medinilla allantocalyx* Regalado, *spec. nov.*

Frutex vel arbor parva 1,5 m alta, robusta, epiphytica; ramis teretibus, pustulatis; foliis oppositis, late ellipticis ad oblongis, 21–25 cm longis, 11–12 cm latis, quintuplinervibus; apice acuto; basi cuneata ad rotundata; inflorescentiis ex axillis defoliatis, paucifloris; floribus 4-meris, calyce botuliformis; staminibus aequalibus; fructibus ovoideis, 6 mm latis. — **T y p u s:** *Chai S 33972* (L; iso K), Sarawak, 2nd Div., Lubok Antu District, Bukit Sengkayang, Lanjak-Entimau Protected Forest.

Robust shrub to small tree, 1.5 m high, epiphytic. Branches terete, 10 mm in diameter; bark rough, warty; nodes sometimes provided with adventitious roots. *Leaves* opposite, sessile, appressed, glabrous on both surfaces, flushed red to scarlet below; blade thickly coriaceous, broadly elliptic to oblong, (16–)21–25 cm long, (8–)11–12 cm wide; margin entire; apex acute; base cuneate to rounded, more or less clasping the stem; 5-plinerved, nerves flattened adaxially, raised abaxially, the primary nerve (midrib) woody, stout at the base, the innermost pair of nerves arising from the midrib c. 2 cm above the base; transverse veins distinct on both surfaces, running across the blade in 15–20 pairs. *Inflorescences* axillary, often arising from leafless nodes, few-flowered cymes borne on a short and stout peduncle 0.5 cm long; bracteoles persistent, subulate, 1 mm long; pedicels 1.5 mm long. *Hypanthium* botuliform, 6.5 mm long, 3.5 mm wide, reddish brown; calyx rim shallowly 4-dentate, prolonged to 3 mm, almost enclosing the corolla at bud stage, becoming cleft or irregularly jagged at anthesis. *Petals* 4, concave, ovate, acute, glabrous, 4.5 mm long, 2.5 mm wide, fleshy, white. *Stamens* 8, equal in size; filament flattened, 1.5 mm long; anther elliptic-lanceolate, 2.5 mm long, rostrate. *Ovary* 4-celled; style stout, 2.5 mm long; stigma punctiform. *Fruits* ovoid, minutely red-furfuraceous, 6 mm across, red when ripe; stalk 1.5–2 mm long; seeds ovoid, light yellow, 1–1.2 mm long.

**Distribution.** Sarawak (2 coll.), endemic.

**Habitat.** On ridge top in mossy forest at 900–1000 m.

## 13. *Medinilla fragilis* Regalado, *spec. nov.*

Frutex epiphyticus glaber; ramis teretibus, tenuibus, verrucosis; foliis oppositis, sessilibus, ovatis ad ellipticis, 16–19 cm longis, 6–8 cm latis, septuplinervibus; apice cuspidato; basi obtusa ad rotundata; venis transversis subtus distinctis; inflorescentiis axillaribus, multifloris; floribus 5-meris, ad pedunculo gracilis 4–7 cm longo subumbellatum dispositis; fructibus campanulatis, 5 mm latis. — **Typus:** *Chai S 36155* (K; iso L, SAN), Sarawak, 7th Div., Bukit Goram, Ulu Sg Kapit.

Epiphytic glabrous shrub. Branches terete, slender, bark whitish, verrucose, heavily pustulate. *Leaves* opposite, sessile; blade coriaceous, ovate to elliptic, 16–19 cm long, 6–8 cm wide; margin entire; apex cuspidate, prolonged into a point 1–1.5 cm long; base obtuse to rounded, slightly emarginate at the node, subauriculate; 7-plinerved, nerves impressed adaxially, raised abaxially, transverse veins faintly visible on adaxial surface, distinct on abaxial surface. *Inflorescences* axillary, many-flowered cymes subumbellately disposed at the distal end of a slender, terete, gla-

brous peduncle 4–7 cm long. *Hypanthium* campanulate, 4.5 mm long, 3.5 mm wide, glabrous, red. *Petals* 5, ovate, 3 mm long, 2 mm wide, apex acute, white. *Stamens* 10, equal; filament c. 1 mm long; anther rostrate, 2.5 mm long. *Ovary* 5-celled; style terete, 2 mm long; stigma punctiform. *Fruit* campanulate, 5 mm across, constricted 2 mm below the rim, light green, turning pink when ripe; pericarp 0.5 mm thick; stalk 1–1.5 mm long; seeds numerous, dolabriform, minute, 0.5 mm long, yellow-orange.

**Distribution.** Sarawak (5 coll.), endemic.

**Habitat.** Near streams and riversides in mossy forests from 150–500 m, ascending to 800 m on Bukit Goram.

**Vernacular name.** Daun kesula (Kayan).

**Note.** The specific epithet for this species points to the fragile nature of the leaves when dry.

#### 14. *Medinilla latericia* Regalado, *spec. nov.*

Frutex epiphyticus glaber; ramis laevigatis vix verrucosis; foliis oppositis, sessilibus, elliptico-oblongis, 15–18 cm longis, 6–8 cm latis, quintuplinerviis; apice acuminato; basi obtusa ad rotundata; nervis transversis subtus prominentibus; inflorescentiis axillaribus, ex nodis defoliatis; fructibus ad pedunculo 5–7 cm longo umbellatim dispositis, 5-locellatis, minute denticulatis. — **T y p u s:** *Ilias* S 26592 (K; iso L), Sarawak, 3rd Div., Kapit District, Bukit Salong, Ulu Sampurau waterfall.

Epiphytic glabrous shrub. Branches terete, slender, 3–5 mm in diameter, smooth, hardly pustulate. *Leaves* opposite, sessile; blade coriaceous, elliptic-oblong, 15–18 cm long, 6–8 cm wide, drying reddish brown adaxially, yellowish brown abaxially; margin entire; apex long acuminate, prolonged to a sharp acumen 2 cm long; base obtuse to rounded; 5-plinerved, innermost pair arising from the midrib 1 cm above the base, nerves impressed on adaxial surface, slightly raised on abaxial surface, minutely red-furfuraceous; transverse veins distinct on abaxial surface, running across the blade in 15–20 pairs. *Flowers* unknown. *Fruits* arising from leafless nodes, borne on a terete, slender, pendulous, glabrous peduncle 5–7 cm long, developing from cymes umbellately clustered at the distant end of the peduncle, globose, 5 mm across, 5-celled, crowned with 5 sharp calyx teeth, bright red.

**Distribution.** Sarawak, known only from the type.

**Habitat.** Mossy forest at 1000 m, fruiting in August.

**Notes.** Closely related to *Medinilla fragilis* but distinguished in having smooth, not verrucose branches, parallel unbroken transverse venation of the leaves, a slender and flexuous or pendulous peduncle, and globose fruits, not constricted below the rim.

The name for this species alludes to the brick-red colour of the leaves when dry.

#### 15. *Medinilla pedunculosa* Ohwi ex Regalado, *spec. nov.*

Frutex glaber; ramis teretibus; foliis oppositis, sessilibus, ovato-ellipticis, 15 ad 20 cm longis, 5 ad 8 cm latis, quintuplinerviis; apice acuminato; basi cuneata; inflorescentiis umbelliformis, multifloris; pedunculo ad 15 cm longo; floribus 5-meris; staminibus aequantibus; fructibus subglobosis, 3 mm latis. — **T y p u s:** *Hallier* 583 (BO), W Kalimantan, Gunung Damus.

Shrub. Branches terete, smooth, glabrous; nodes swollen; bark grayish. *Leaves* opposite, sessile, glabrous on both surfaces; blade coriaceous, ovate-elliptic, 15–20 cm long, 5–8 cm wide; margin entire; apex acuminate; base cuneate, unequal; 5-plinerved, with or without an additional pair of marginal nerves which terminates halfway up the blade, midrib and lateral nerves impressed adaxially, raised abaxially, midrib sclerified near the base; transverse veins at least 15 pairs. *Inflorescences* axillary, umbelliform, 9–10 cm in diameter, cymes twice branched, secondary axes 9–12 mm long, primary axes 18–24 mm long; peduncle slender, 15 cm long; bracteoles subulate, persistent, 1 mm long. *Hypanthium* cylindrical, 5 mm long, 3 mm wide, smooth, glabrous, 5-dentate. *Petals* 5, oblong-elliptic, 8 mm long, 3 mm wide. *Stamens* 10, equal; filament flattened, 3–4 mm long; anther linear, 4–5 mm long; dorsal spur prolonged up to 1 mm. *Ovary* 5-celled; style 9 mm long; stigma punctiform. *Fruits* subglobose, 3 mm across, smooth, glabrous, slightly constricted below the rim; stalk 6 mm long; seeds 0.7 mm long.

**Distribution.** West Kalimantan (2 coll.).

**Note.** A very handsome species remarkable for its umbelliform inflorescences supported by a peduncle 15 cm long. No ecological information is available. Material only seen at BO.

## 16. *Medinilla crassifolia* (Reinw. ex Blume) Blume

*Medinilla crassifolia* (Reinw. ex Blume) Blume, *Flora* 14 (1831) 511; Bakh. f., *Rec. Trav. Bot. Néerl.* 40 (1943) 188; Maxwell, *Gard. Bull. Sing.* 31 (1978) 157. — *Melastoma crassifolium* Blume, *Bijdr. Fl. Ned.-Ind.* 17 (1826) 1075. — **T y p e:** Reinwardt s. n. (L), Java.

*Medinilla caudatifolia* Schwartz, *Mitt. Inst. Bot. Hamburg* 7 (1931) 252, syn. nov. — **T y p e:** Winkler 901 (HBG; iso BO), W Kalimantan, Bukit Raya.

*Medinilla hasseltii* Blume var. *subsessilis* Schwartz, *Mitt. Inst. Bot. Hamburg* 7 (1931) 255, syn. nov. — **T y p e:** Winkler 458 (HBG), W Kalimantan, Bukit Mulu.

Refer to Bakhuizen van den Brink Jr. (1943) and Maxwell (1978) for full synonymy.

Epiphytic shrub, up to 1 m high, climbing or scrambling. Branches terete, smooth to sparsely pustulate, glabrous, 4–5 mm in diameter. *Leaves* opposite, glabrous on both surfaces, appressed to erectopate, petiolate to subsessile; petiole up to 2 cm long; blade coriaceous, shape variable from elliptic-lanceolate to ovate, (8–)10–19 cm long, 3–8 cm wide; margin entire; apex acuminate, prolonged to an acumen 1–1.5 cm long; base variable, ranging from rounded to emarginate or subcordate; 3-plinerved; nerves impressed adaxially, raised abaxially; transverse veins obscure to invisible on both surfaces. *Inflorescences* axillary, of few- to many-flowered cymes, one or three together on defoliated nodes; peduncle 1–3 cm long, red, pendent or erect; pedicels 3–5 mm long. *Hypanthium* campanulate, truncate, smooth, glabrous, pink to red, (2.5–)4–5 mm long, 3 mm wide. *Petals* 4–5, elliptic-oblong to obovate, 4–6 mm long, 3 mm wide, membranous, delicately veined, creamy white to translucent white. *Stamens* 8–10, equal in size; filament flattened, 1–3 mm long; anther linear to ovate lanceolate, slightly rostrate, 2–4 mm long. *Ovary* 4- to 5-celled; style slender, 4–6 mm long; stigma minute, punctiform. *Fruit* globose, 4–6 mm across, orange to red when ripe; stalk 3–5 mm long; seeds minute, 1 mm long.

**Distribution.** Malay Peninsula, Sumatra, Java, Philippines, Sulawesi, Borneo (Brunei, 2 coll.; Kalimantan, 51 coll.; Sabah, 134 coll., Sarawak, 60 coll.).

**Habitat.** Mostly in peat swamp and secondary forests or disturbed situations at low altitudes, occasionally in primary forest, up to 1000 m.

**Note.** An exceedingly variable entity. Nearly 250 collections of this polymorphic species have been examined. Every gradation in the nature of the leaves seems to occur. It is difficult to believe that the extremes can be conspecific, but they appear to be linked by innumerable transitions. There is apparently no taxonomic significance in differences in leaf shape and length of petiole, hence intermediate forms are not given special taxonomic recognition.

### 17. *Medinilla laxiflora* Ridley

*Medinilla laxiflora* Ridley, Kew Bull. 1 (1946) 38. — **Type:** *Haviland 1529* (K; iso BM, BO, GH, L, UC), Sarawak, near Kuching.

Epiphytic shrub. Branches terete, densely pustulate to verrucose, glabrous, 5 mm in diameter. *Leaves* opposite, drying bluish green on adaxial surface, glaucous; petiole 1–1.5 cm long; blade subcoriaceous, ovate-lanceolate, 12–15 cm long, 5–5.5 cm wide; margin entire; apex long acuminate; base rounded to subcordate, 5-plinerved, midrib and lateral nerves flattened adaxially, shallowly raised abaxially, transverse veins hardly distinct on adaxial surface, not apparent on abaxial surface. *Inflorescences* axillary, many-flowered, divaricate panicles 2–8 cm long, branching up to 6 orders, arranged in 4s or 5s at the distal end of a slender peduncle 2–3 cm long; bracteoles ovate, acute, 1 mm long, persistent; pedicels 6 mm long, glabrous. *Hypanthium* campanulate, reddish, glabrous, 5 mm long, 5 mm wide; calyx lobes 5, minute, almost obsolete. *Petals* 5, oblong, obtuse, 4–5 mm long, 4 mm wide. *Stamens* 10, equal, filament 2 mm long, anther 3 mm long, narrowly triangular, dorsal spur 2 mm long. *Ovary* 5-celled; style 3 mm long; stigma capitate. *Fruit* globose, 7 mm across, seed tawny yellow, 1 mm long.

**Distribution.** Sarawak, known only from the type, endemic.

**Note.** This species is particularly distinct from *Medinilla crassifolia* in having much larger, lax and branched inflorescences. A little known species; no ecological information is available.

### 18. *Medinilla botryocarpa* Regalado, *spec. nov.* — Fig. 5.

Frutex epiphyticus glaber; ramis teretibus; foliis oppositis, ovatis, 16–18 cm longis, 5–8 cm latis, quintuplinerviis; petiolo 1,5–2,5 cm longo; inflorescentiis axillaribus; pedunculo 8–11 cm longo suffultis; floribus 5-meris; staminibus aequantibus; fructibus globosis, 5–7 mm latis. — **Type:** *Chai & Ilias S 31519* (K; iso L, SAN, SING), Sarawak, 5th Div., Kenya Forest Reserve, Ulu Lawas.

Epiphytic shrub. Branches terete, sparsely pustulate, glabrous, at least 0.5 cm in diameter. *Leaves* opposite, petiole terete, thickened, (1–)1.5–2.5 cm long; blade ovate, coriaceous, (14–)16–18 cm long, 5–8 cm wide; margin entire; apex cuspi-



Fig. 5. *Medinilla botryocarpa* Regalado — a. Branch with infructescence,  $\times 0.5$ ; b. seeds,  $\times 6.5$ ; c. fruit,  $\times 2$  (all Chai & Ilias S 31519).

date; base rounded, emarginate to subcordate; distinctly 5-plinerved, sometimes with an additional pair of marginal nerves, nerves except midrib flattened above, shallowly impressed below, transverse veins reticulate, conspicuous above, indistinct or not apparent beneath, drying pallid green adaxially, ochraceous abaxially. *Inflorescences* axillary, many-flowered, flowers cymosely disposed, cymes crowded together in whorls of 5 or more at the distal end of the peduncle forming a head; peduncle slender, deep orange to red, (6-)8-11 cm long, glabrous; bracteoles paired, subtending each articulation of the inflorescence, subulate, glabrous, 1 mm long. *Hypanthium* campanulate, 4-5 mm long, 3.5 mm wide, glabrous; calyx lobes 5, inconspicuous, almost obsolete. *Petals* 5, greenish white, 3 mm long, 2 mm wide, ovate, glabrous, membranous. *Stamens* 10, equal in size; filament ligulate, 1 mm long; anther narrowly triangular, S-shaped, ventral spur subulate, almost obsolete (1 mm long), dorsal appendages calcarate. *Ovary* 5-celled; style cylindric, 4 mm long; stigma punctiform. *Fruit* globose, 5-7 mm across, smooth, glabrous, rim shallowly 5-dentate, green, turning red when ripe; seeds numerous, bright yellow, 1.2 mm long.

**Distribution.** Borneo (Brunei, 1 coll.; E Kalimantan, 1 coll.; Sabah, 1 coll.; Sarawak, 4 coll.), endemic.

**Habitat.** Hill slopes at 200-300 m in primary forests on sandstone or clay soil; flowers collected in August, fruits in April, August, October and December.

**Vernacular name.** Buah wa-perata (Murut).

**Note.** Related to *Medinilla crassifolia* in leaf characters but differing from the latter in having 5-plinerved leaves and longer peduncles.

### 19. *Medinilla longipedunculata* Cogn.

*Medinilla longipedunculata* Cogn., DC. Monogr. Phan. 7 (1891) 577. — **Type:** Beccari 1646 (FI?, n.v.), Sarawak, Matang.

Epiphytic or scandent glabrous shrub, 1.5 m high. Branches terete, sparsely pustulate, 4-6 mm in diameter. *Leaves* opposite, subsessile to almost sessile; petiole 2-3 mm long; blade coriaceous, ovate to narrowly elliptic, 8-12 cm long, 4-6 cm wide; margin entire; apex acuminate; base acute to rounded, 3-plinerved, midrib and lateral nerves flattened adaxially, shallowly raised abaxially, transverse veins hardly evident on adaxial surface, not apparent on abaxial surface. *Inflorescences* axillary, few- to many-flowered, of paniculate cymes, lax, pendent, reportedly bright orange to red; peduncle 6-9 cm long, glabrous; bracteoles persistent, subulate, 1 mm long, glabrous; pedicels slender, 5-7 mm long. *Hypanthium* cylindric, 4-5 mm long, 2.5-3 mm wide, reportedly white-tinged pink, glabrous; calyx lobes 5, minute, nearly obsolete, triangular. *Petals* 5, white-tinged pink to red, ovate, membranous, 4.5-5 mm long, 3-6 mm wide. *Stamens* 10, equal in size; filament ligulate, 3 mm long; anther linear lanceolate, 4-5 mm long, connective hardly produced, ventral spur 4 mm long, dorsal appendage 5-6.5 mm long. *Ovary* 5-celled; style 8 mm long; stigma punctiform. *Fruits* globose, red, 5-6 mm across, slightly constricted below the torus, stalk 15 mm long; seeds brownish, 1 mm long.

**Distribution.** Sarawak (9 coll.), endemic.

**Habitat.** On upper slopes of limestone hills of Bidi Cave, abundant on crest of ridge near summit of Mt Berumput, 1000–1500 m, and summit mossy forest of Mt Poi (Gunung Pueh), 1300–1800 m; flowers collected in April–June, August–September; fruits in May.

**Collector's note.** Inflorescences showy, bright red to orange, fleshy and tender, disintegrating upon drying; corolla delicate pink, stamens purple.

## 20. *Medinilla sessiliflora* Regalado, *spec. nov.* — Fig. 6.

Frutex glaber, ut videtur erectus, 1–3 m altus; ramis teretibus; foliis oppositis, petiolatis, elliptico-oblongis, 7,5–9,5 cm longis, 3–4,5 cm latis, triplinerviis; apice cuspidato; basi acuta; inflorescentiis axillaribus, plerumque sessilibus vel breviter pedunculatis, floribus 4-meris, bibracteolatis; staminibus aequantibus; fructibus globosis, 5 mm latis. — **T y p u s:** *Brooke 10590* (BM; iso L, US), Sarawak, Tanjong Po.

Shrub 1–3 m high, terrestrial or epiphytic (?). Branches terete, glabrous, brown with shades of yellow or black, sparsely to copiously pustulate; nodes slightly swollen. *Leaves* opposite, erecto-patent; petiole terete, 5–7(–10) mm long; blade elliptic-oblong, scarcely elliptic-lanceolate, 7.5–9.5(–12) cm long, (2.5–)3–4.5 cm wide, coriaceous, drying bluish green above, reddish brown below; margin entire; apex acute, terminating in a cuspidate tip; base acute; triplinerved, lateral pair of nerves departing about 5 mm from the base, transverse veins inconspicuous above, absent below. *Flowers* axillary, often solitary, sometimes in simple cymes, the latter with a peduncle up to 5 mm long; bracteoles persistent, subulate, 1 mm long; pedicels terete, glabrous, 2–5 mm long. *Hypanthium* cylindric, pink or red, 5 mm long, 3 mm wide, 4-dentate, glabrous. *Petals* 4, reportedly white or pink, glabrous, ovate, 4 mm long, 3 mm wide. *Stamens* 8, equal in size; filament 1.5 mm long; anther linear-oblong, 3 mm long. *Ovary* 4-celled; style 4 mm long; stigma punctiform. *Fruit* globose, 5 mm across, calyx teeth persistent; seeds 1–2 mm long.

**Distribution.** Kalimantan (1 coll.), Sarawak (8 coll.).

**Habitat.** In mixed lowland dipterocarp or riparian forests, 100–200 m, collected on Mt Gading at 600 m, also found in heath forest of Mt Dulit at 900 m.

**Note.** This species resembles *Medinilla crassifolia* in leaf characters but is distinguished from it in having solitary, almost sessile flowers.

## 21. *Medinilla richardsii* Regalado, *spec. nov.*

Frutex epiphyticus, glaber, ut videtur erectus, circiter 1 m altus; ramis ramulisque teretibus, tenuibus; foliis oppositis, anguste lanceolatis, uninerviis; apice acuminato; basi attenuata vel cuneata, venis transversis nullis; petiolo ad 5 mm longo; floribus axillaribus, solitariis, fere sessilibus, calycibus longis et acute quadridentatis; staminibus aequalibus. — **T y p u s:** *Richards 2172* (K), Sarawak, Mt Dulit.

Slender, glabrous, epiphytic shrub, c. 1 m high. Branches and branchlets terete, slender. *Leaves* opposite; petiole 3–5 mm long; blade coriaceous, narrowly lanceolate, 6.5–7 cm long, 0.8–1 cm wide; margin entire; apex acuminate, prolonged into a straight and stiff tip; base attenuate or narrowly cuneate; nerve 1, impressed adaxially, thickened and raised abaxially; transverse veins not apparent; coriaceous to



Fig. 6. *Medinilla sessiliflora* Regalado — a. Branch with fruits,  $\times 0.4$ ; b. anther,  $\times 3.4$ ; c. flower,  $\times 1.7$ ; d. seeds,  $\times 5$ ; e. fruit,  $\times 1.7$  (all Brooke 10590).

sclerophyllous, adaxial surface drying grayish green, abaxial surface yellowish brown. *Flowers* axillary, solitary at the nodes, almost sessile; bracteoles ovate, glabrous, 1–1.5 mm long; pedicels terete, glabrous, c. 1 mm long. *Hypanthium* urceolate, cream, 4–5 mm long, 3–5 mm wide, glabrous; calyx lobes 4, acute, prolonged beyond the rim to a subulate point, c. 1 mm long. *Petals* 4, ovate, membranous, 3.5–5 mm long, 2–3 mm wide. *Stamens* 8, equal in size; filament glabrous, flattened, 1.5 mm long; anther narrowly triangular, 2.5–3 mm long. *Ovary* 4-celled; style short, c. 2 mm long; stigma minute, punctiform. *Fruit* unknown.

*Distribution*. Sarawak (Mt Dulit), known only from the type collection.

*Habitat*. Open mossy forest, on ridges of Mt Dulit at 1300–1400 m.

**Note.** Named in honor of Paul W. Richards who led the Oxford University Expedition to Sarawak in 1932, the only time this species has been collected. The characteristic features of this species are the small, narrowly lanceolate, uninerved, sclerophyllous leaves.

## 22. *Medinilla montisaping* Regalado, *spec. nov.*

*Species Medinilla richardsii* affinis sed foliis triplinervibus, petiolo minore, 1–2 mm longo dif- fert. Frutex erectus glaber, ramulis angulatis; foliis oppositis, subsessilibus, anguste lanceolatis, usque ad 4 cm longis; apice caudato; basi obtusa ad rotundata; fructibus subglobosis, 3 mm latis, calyce persistente quadridentato coronatis. — **T y p u s:** *Collenette 738* (K), Sarawak, 1st Div., Gunung Aping.

Erect, glabrous, epiphytic shrub, 0.5 m tall. Branches openly divided; bark black, sparsely pustulate; branchlets roughly quadrangular, ribbed or angled, puberulent, indument of erect caducuous hairs, soon becoming glabrous. *Leaves* opposite, patent, subsessile, petiole 1–2 mm long; blade narrowly lanceolate, 4 cm long, 0.5–0.7 cm wide; margin entire; apex caudate; base obtuse to rounded; 3-plinerved, median nerve impressed on upper surface, raised below, lateral pair of nerves absent on upper surface, conspicuous below; transverse veins not apparent. *Flowers* unknown. *Fruit* arising from leaf axils, subglobose, 3–4 mm across, smooth, glabrous, red, crowned with persistent 4-dentate calyx; stalk 3 mm long; seeds numerous, ovoid, light yellow, 0.7 mm long.

**D i s t r i b u t i o n.** Sarawak, known only from the type collection.

**H a b i t a t.** Mossy forest, summit crest of Mt Aping at 900 m.

**Note.** A species related to *Medinilla richardsii* but differing in having 3-plinerved leaves and shorter petioles.

## 23. *Medinilla muricata* Blume

*Medinilla muricata* Blume, Mus. Bot. Ludg.-Bat. 1 (1849) 20; Ridley, Kew Bull. 1 (1946) 38. — **T y p e:** *Blume s.n.* (L; iso K), Sumatra.

Epiphytic glabrous shrub, branches widely spreading, reportedly reaching up to 2.5 m long. Branchlets slender, 2–3 mm in diameter, subquadrangular, ribbed, soon becoming terete, smooth, nodes slightly thickened, beset with a dense mat of stiff bristles 3–5(–10) mm long. Older stems terete, up to 10 mm in diameter, yellow-brown to reddish brown, nodes greatly thickened, bristles persistent. *Leaves* opposite, sessile; blade chartaceous and brittle when dry, ovate to cordiform, 7–12 cm long, 4–6 cm wide; margin entire; apex long acuminate, acumen up to 2 cm long; base cordate, the basal lobes often amplexicaul; nerves 7, sometimes with an additional pair of inconspicuous intramarginal nerves, all departing from the base or the innermost pair emerging from the midrib 1–2 cm above the base, strongly impressed adaxially and raised abaxially; transverse veins not visible adaxially, flat abaxially. *Flowers* densely crowded in leaf axils; pedicels up to 2 mm long. *Hypanthium* campanulate, red, 3 mm long, 2 mm wide, minutely glandular-punctate; calyx lobes 4, acute, each terminating in a sharp aciculate cusp. *Petals* 4, pink or red, ovate-oblong, glabrous, 5–6 mm long, 2 mm wide. *Stamens* 8, unequal in size; short sta-

mens with 2 mm long anther, 2.5 mm long filament; long stamens with 2.5 mm long anther, 3 mm long filament; anther narrowly ovate-lanceolate; dorsal and ventral appendages hardly produced, very short (0.25 mm long). *Ovary* 4-celled; style 5 mm long; stigma capitate. *Fruit* globose, 5–6 mm in diameter, cupped with persistent calyx remains, subtended by a stalk c. 5 mm long; seeds tawny yellow, c. 1 mm long.

**Distribution.** Sumatra, Sulawesi. Borneo (Brunei, 1 coll.; Kalimantan, 23 coll.; Sabah, 7 coll.; Sarawak, 19 coll.).

**Habitat.** Epiphytic shrub, procumbent on rocks or pendent in trees, in lowland dipterocarp, mossy heath, and riparian forests on limestone, sandstone, or basalt at 50–1000 m elevation; flowers collected from May–July, fruits in January–September.

**Vernacular name.** Akar (Malay).

**Note.** Easily recognizable by the bristly nodes which are also characteristic of *Medinilla speciosa* and *M. stephanostegia*. One specimen (*Ashton S 17636*) collected on dacite rocks has leaves with magenta undersurface which could have been an edaphic effect.

#### 24. *Medinilla homoeandra* (Stapf) Nayar

*Medinilla homoeandra* (Stapf) Nayar, Kew Bull. 20 (1966) 240; Veldkamp, Blumea 24 (1978) 450. — *Anplectrum homoeandrum* Stapf, Trans. Linn. Soc. London, Bot. 4 (1894) 161; Merrill, Enum. Born. Pl. (1921) 443. — **Type:** *Haviland 1170* (K), Sabah, Mt Kinabalu.

Erect, slender, glabrous, epiphytic shrub, 1–2 m high. Young branchlets quadrangular, slightly ribbed or grooved, soon becoming terete. Older branches terete, brown; nodes somewhat thickened; bark split. *Leaves* opposite; petiole narrowly winged, 1 mm long; blade ovate, 3.5–6.5 cm long, 1.2–2.5 cm wide; margin entire; apex long acuminate, prolonged into a caudate tip up to 2 cm long; base rounded to slightly emarginate; 3-plinerved, sometimes with an additional inconspicuous pair; transverse veins inconspicuous; leaf drying greenish brown to dark brown, pergamentaceous. *Flowers* axillary, in fascicles of 1 or 2 (3) at the nodes; bracteoles triangular-lanceolate, acute, glabrous; pedicels terete, thickened, sparsely ciliolate, up to 4 mm long. *Hypanthium* urceolate to campanulate, constricted below the torus, 4.5 mm long, 2.3 mm wide, glabrous, orange to red; calyx lobes 4, erect to erecto-patent, ovate-oblong, 2.3 mm long. *Petals* 4, glabrous, white or cream, ovate-lanceolate, 6 mm long, 2 mm wide. *Stamens* 8, equal in size; filament glabrous, linear, up to 3 mm long; anther 3 mm long, base of locules rounded; dorsal spur triangular-hastate. *Ovary* 4-celled; style 3–4 mm long; stigma punctiform. *Fruit* globose, 5 mm in diameter, crowned with persistent calyx lobes; red when ripe; stalk 6 mm long; bracteoles persistent; seeds numerous, minute, whitish.

**Distribution.** Borneo, endemic (Kalimantan, 3 coll.; Sabah, 23 coll.; Sarawak, 1 coll.).

**Habitat.** Primary forests, 1500–2100 m.

**Note.** Two recent coll. from Bukit Raya (*Mogea 3833* and *Nooteboom 4576*) show a form having sessile leaves with auriculate base.

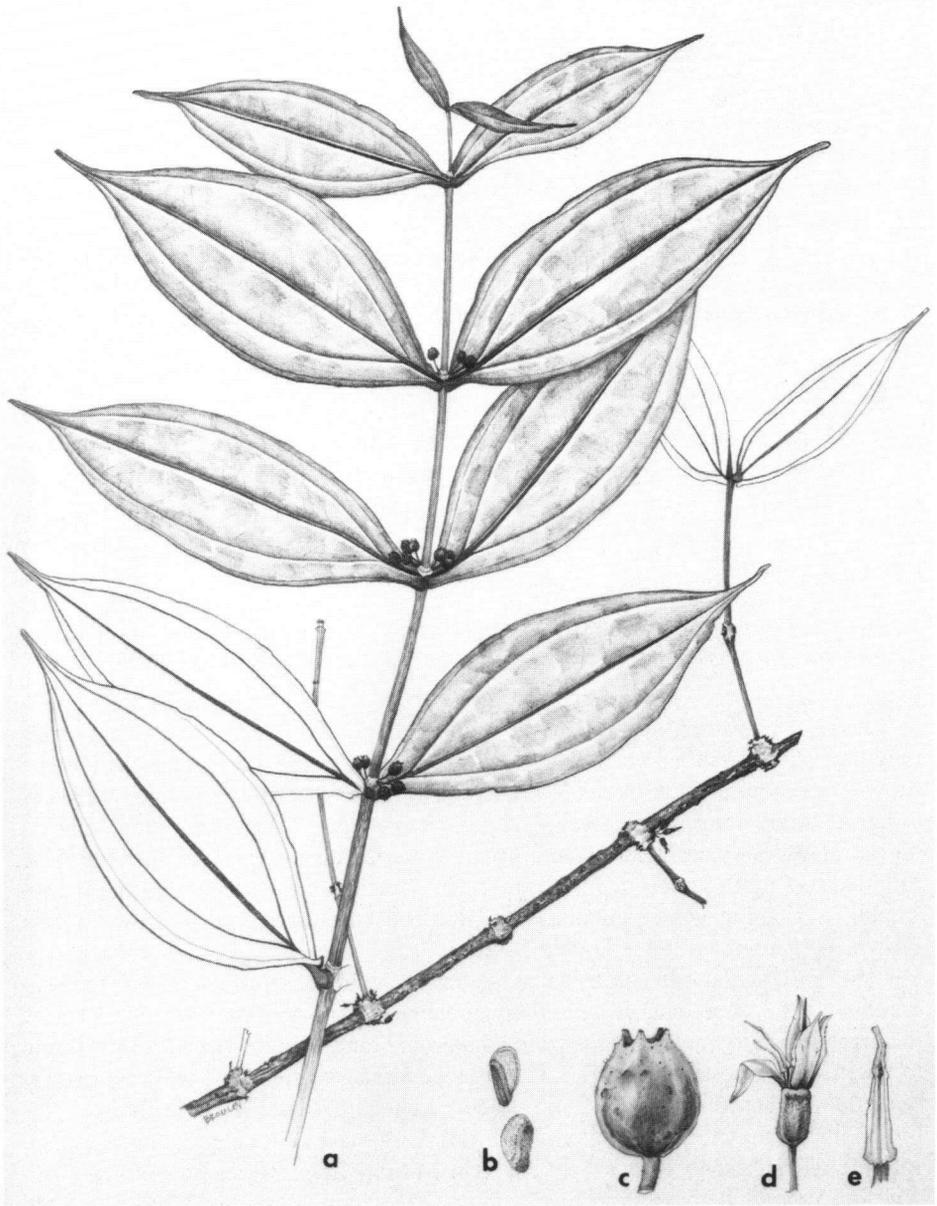


Fig. 7. *Medinilla subauriculata* Regalado — a. Lower branch segment with flowers and leafy branch with fruits,  $\times 0.5$ ; b. seeds,  $\times 10$ ; c. fruit,  $\times 3$ ; d. flower,  $\times 2.5$ ; e. stamen,  $\times 7.5$  (a, d, e Wright S 27200; b, c Anderson & Ilias S 28281).

**25. *Medinilla subauriculata* Regalado, *spec. nov.* – Fig. 7.**

Frutex epiphyticus, glaber; ramis ramulisque laevibus, castaneis; foliis oppositis, sessilibus, anguste ovatis, usque ad 15 cm longis, 4,5 cm latis, triplinerviis; apice acuminato; basi breve angustata, subauriculata; floribus 4-meris, axillaribus, solitariis vel cymose dispositis; staminibus valde inaequalibus; fructibus globosis, ad 4 mm latis. — T y p u s: *Wright S 27200* (K; iso A, L, SING), Sarawak, Bintulu, Ulu Segan.

Epiphytic glabrous shrub, laxly branching; pendent branches up to 2.5 m long; adventitious roots sometimes growing from the nodes. Young branchlets slender, quadrangular, reddish brown to black, tinged with gray, glabrous except for the nodes that are beset with a cushion of rusty brown hairs. Older branches subquadrate to terete, chocolate brown to black; nodes swollen; bark generally smooth, becoming striate and cracked, sparsely pustulate. *Leaves* opposite, sessile; blade pergamentaceous when dry, narrowly ovate, 10–12.5(–15) cm long, 3.5–4.5 cm wide; margin entire; apex gradually acuminate, tapering into a caudate tip; base subauriculate; 3-plinerved, transverse veins absent; upper surface drying greenish brown, shiny. *Flowers* solitary or in simple cymes, crowded in the leaf axils; bracteoles subulate, exceedingly small (< 0.5 mm long), glabrous, persistent; pedicels slender, terete, at most 1.5 mm long, glabrous. *Hypanthium* cylindrical to narrowly campanulate, red, 4 mm long, 3 mm wide, glabrous; calyx lobes 4, inconspicuous, reduced to very fine cusps. *Petals* 4, pinkish or yellow, elliptic lanceolate, acute, entire, 2.5 mm long, 1 mm wide. *Stamens* 8, unequal in length; short stamens with 1–1.5 mm long anther, filament not greater than 1 mm; long stamens with 2 mm long anther, filament 1–1.5 mm; anther narrowly ovate-lanceolate, bilobed at the base, connective hardly produced. *Ovary* 4-celled; style cylindrical, 2–3 mm long; stigma minute, punctiform. *Fruits* globose, 3–4 mm across, glabrous, pink to red when ripe, crowned with 4 persistent calyx lobes; pericarp thin; stalk up to 3 mm long; seeds numerous, ovoid, 0.8 mm long, testa golden yellow, hilum orange.

*Distribution.* Borneo (Sarawak, 5 coll.; Kalimantan, 1 coll.).

*Habitat.* Epiphyte growing on trees at height of 15–25 m above the ground; in primary forests at 500–1000 m; frequently along streams; flowers collected in August, fruits in April–July.

*Note.* This species is distinguished from *Medinilla myrtiformis* (Naudin) Triana and allied species by its smooth, reddish brown stems, subauriculate leaves, and thin pericarp. The stamens are greatly unequal in size and the anther connective hardly produced. The stems and to some extent the leaves become chocolate-brown to blackish on drying.

**26. *Medinilla salicina* Ohwi ex Regalado, *spec. nov.* – Fig. 8.**

Species insignis ramulis tetragonis, angulis alatis, nodis articulatis. Frutex glaber, epiphyticus; foliis oppositis, subsessilibus, anguste ovatis, in siccitate subcoriaceis fragilisque, usque ad 10 cm longis, 2,5 cm latis, quinquenerviis; apice longe acuminato, basi obtusa vel rotundata; fructibus axillaribus, globosis, ad 5 mm crassis, 4-locellatis. — T y p u s: *Ilias S 26590* (K; iso L), Sarawak, 3rd Div., Kapit District, Ulu Sampurau, Bukit Salong.



Fig. 8. *Medinilla salicina* Ohwi ex Regalado — a. Branch with fruits,  $\times 0.48$ ; b. fruit,  $\times 2.8$ ; c. seeds,  $\times 9.5$  (all Ilias S 26590).

Epiphytic glabrous shrub, on trees at c. 3 m height. Branches erecto-patent, 4-angled, winged at junction of adjacent faces, wings crisped when dry, reddish brown to yellow-brown. Older stems quadrangular, 4-ribbed, non-pustulate, light brown, wings light yellow, exfoliating; nodes articulated. *Leaves* opposite, sessile; petiole thickened, 1–2 mm long; blade narrowly ovate, 10–10.5 cm long, 2.5–2.8 cm wide; margin entire; apex gradually acuminate, extended into a caudate tip 1–1.5 cm long; base obtuse or rounded, slightly emarginate above the petiole; 5-nerved, nerves impressed on the upper leaf surface, raised and thickened below; transverse veins inconspicuous; subcoriaceous and brittle when dry, deep green to yellow green. *Flowers* unknown. *Fruits* axillary, globose, 4-loculate, reportedly red in colour, 3.5–5 mm in diameter; calyx lobes 4, persistent, ovate with an apiculate tip, erect, glabrous, bracteoles persistent, cymbiform, glabrous; stalk terete, up to 2 mm long, glabrous; seeds numerous, 0.7 mm long, tawny yellow, embedded in pulpy tissue.

**Distribution.** Borneo, endemic (Kalimantan, 1 coll.; Sarawak, 1 coll.).

**Note.** This species is well-characterized and distinguished from its allies by winged branchlets. The species is known from only two collections. The type is a recently collected specimen from Sarawak at 1000 m altitude and agrees perfectly with an earlier collection (*Amdjah 464*) made in Kalimantan almost a century ago.

## 27. *Medinilla succulenta* (Blume) Blume

*Medinilla succulenta* (Blume) Blume, *Flora* 14 (1831) 513; Bakh. f., *Rec. Trav. Bot. Néerl.* 40 (1943) 193; Maxwell, *Gard. Bull. Sing.* 31 (1978) 187. — *Melastoma succulentum* Blume, *Bijdr. Flor. Ned.-Ind.* 17 (1826) 1070. — **T y p e:** *Anonymous* (L), Java.

Epiphytic glabrous shrub. Branches terete to subquadrangular, fleshy, glabrous, smooth to slightly verrucose, striate or sometimes ribbed. *Leaves* opposite, sessile to subsessile; petiole 1–3 mm long; blade fleshy, coriaceous, normally elliptic, sometimes oblanceolate or obovate, glabrous on both surfaces, 11–13(–16) cm long, 3–5 cm wide; margin entire; apex acute to shortly acuminate; base cuneate; 3-plinerved, transverse veins hardly conspicuous to invisible. *Inflorescences* axillary cymes, 1.5–2.5 cm long; flowers sometimes solitary or paired; pedicels 3–4(–6) mm long. *Hypanthium* campanulate, 3–4 mm long, 3 mm wide, obscurely 4-dentate. *Petals* 4, thin, oblong to obovate, acute, 4–7 mm long, 3–4 mm wide, white or pale pink. *Stamens* 8, equal in size; filament flattened, c. 4 mm long; anther narrowly triangular, straight, c. 5 mm long. *Fruits* globose, red, 5 mm across, pericarp thin; stalk 5 mm long; seeds numerous, smooth, 1.5 mm long.

**Distribution.** Malay Peninsula, Sumatra, Java, Sulawesi, Moluccas, Borneo (Kalimantan, 2 coll.; Sabah, 1 coll.; Sarawak, 1 coll.).

**Note.** This species is here recorded for the first time from Borneo.

## 28. *Medinilla quadrialata* Ohwi ex Regalado, *spec. nov.*

Frutex epiphyticus glaber; ramis acute quadrangulatis; foliis oppositis, sessilibus, anguste ellipticis, 9–22 cm longis, 3–7 cm latis, triplinervibus; apice obtuso; basi cuneata; inflorescentiis axillaribus; floribus 4-meris; staminibus aequantibus; fructibus globosis, ad 5 mm latis. — **T y p u s:** *Amपुरia SAN 32819* (K; iso L), Sandakan, Paitan Forest Reserve.

Epiphytic glabrous shrub c. 0.5 m high. Branches acutely 4-angled, slightly winged at the junctions, sparsely pustulate, glabrous, 4–6 mm in diameter. *Leaves* opposite, sessile; blade fleshy, red to scarlet undersurface, narrowly elliptic, 9–22 cm long, 3–7 cm wide; margin entire; apex obtuse; base cuneate; 3-plinerved, transverse veins conspicuous on both surfaces. *Inflorescences* axillary, many-flowered cymes, clustered in 3s or 4s on defoliated nodes, 4–6 cm long; peduncle slender, (1–)1.5–2 cm long, glabrous; pedicels terete, 3 mm long. *Hypanthium* narrowly cylindrical to campanulate, 3–4 mm long, 2 mm wide, minutely 4-dentate. *Petals* 4, obovate, thin, 4 mm long, 2 mm wide, white. *Stamens* 8, equal in size; filament flattened, 2 mm long; anther linear, 2 mm long. *Ovary* 4-celled; style terete, 3 mm long; stigma punctiform, light orange. *Fruits* globose, 5 mm across, orange to red; pericarp thin; stalk 3.5 mm long; seeds ovoid, 1.5 mm long.

**Distribution.** West Kalimantan (5 coll.), Sabah (2 coll.), Sarawak (3 coll.).

**Habitat.** In forests from sea level to 600 m.

**Note.** Allied to *Medinilla succulenta* but the branches are acutely quadrangular.

## 29. *Medinilla myrmecorhiza* Regalado, *spec. nov.*

*Species Medinilla succulenta* affinis sed radicibus cum formicariis paratis et foliis plerumque majoribus differt. Frutex epiphyticus glaber, radicans; foliis in siccitate tenuiter papyraceis, oppositis, sessilibus, obovatis, triplinerviis; apice obtuso, mucronato; basi cuneata; inflorescentiis fasciculatis, multifloris; floribus 4-meris; calyce anguste campanulato, truncato; staminibus aequantibus; fructibus subglobois, 4–5 mm latis. — **T y p u s:** *Jacobs 5577* (L), Brunei, along Temburong and Belalang rivers.

Epiphytic shrub, glabrous, rooting at the nodes, characterized by ant nests among the roots. Branches cylindrical, succulent; branchlets flattened, yellowish; bark sparsely to moderately pustulate, smooth, becoming rough with age, glabrous, flaking and peeling off easily. *Leaves* opposite, sessile; blade thinly papyraceous, obovate, rarely broadly elliptic, slightly panduriform in larger leaves, 12–17(–24) cm long, 6–9(–12) cm wide; margin entire; apex obtuse, abruptly terminating in a mucronate point c. 1 cm long; base cuneate; 3-plinerved; transverse veins thin, faintly visible on adaxial and abaxial surfaces. *Inflorescences* axillary, of many-flowered fascicles on leafless nodes. *Hypanthium* narrowly campanulate, truncate, reddish to pale orange, 3 mm long, 1.5 mm wide. *Petals* 4, white, translucent, obovate, 4 mm long, 2 mm wide. *Stamens* 8, equal in size; filament flattened, 2 mm long; anther purplish, linear-oblong, c. 2 mm long; connective hardly produced, dorsal spur 0.5 mm long. *Ovary* 4-celled; style cylindrical, 4 mm long; stigma punctiform. *Fruits* subglobose, 4–5 mm across, glabrous, smooth, truncate, ripening to bright orange to red; pericarp thin; stalk slender, terete, 10–12 mm long; seeds 1.5 mm long.

**Distribution.** Brunei (1 coll.), West Kalimantan (4 coll.), Sabah (1 coll.), Sarawak (4 coll.).

**Habitat.** Lowland dipterocarp forest at 150–400 m.

**Note.** Nearest to *Medinilla succulenta* but differing by its obovate and much larger leaves, as well as the presence of ant nests in the roots. Whether or not the

presence of ants is of any benefit to the plant is still open to question. It is interesting to note that this feature is also found in the closely related genus *Pachycentria*, which is known to bear tuberous formicaria in the roots.

### 30. *Medinilla aggregata* Bakh. f.

*Medinilla aggregata* Bakh. f., Rec. Trav. Bot. Néerl. 40 (1943) 169. — **T y p e:** *Rutten 581* (U), Kalimantan, Samarinda, Sg. Boengaloen.

Epiphytic glabrous shrub. Branches robust, distinctly alate-quadrangular, up to 1 cm in diameter; nodes stout, concave, 1 cm across. *Leaves* opposite, sessile; blade coriaceous, elliptic-oblong, 19–30 cm long, 10–12 cm wide; margin entire; apex acute; base cuneate; 5-plinerved, upper pair of nerves arising from the midrib 3–4 (–6) cm from the base, nerves flattened above, raised and more or less thickened below; transverse veins faint above, hardly evident or not apparent below. *Inflorescences* axillary, flowers borne on dense and many-flowered fascicles up to 3 cm long; pedicels 10–12 mm long; bracteoles persistent, subulate, up to 1 mm long. *Hypanthium* narrowly campanulate, light orange to red, truncate, glabrous, 4 mm long, 3 mm wide. *Petals* 5, white, translucent, obovate, 4–5 mm long, 3 mm wide, more or less clawed. *Stamens* 10, equal in size; filament ligulate, 2–3 mm long; anther linear-triangular, 3 mm long; connective hardly produced at the base. *Ovary* 5-celled; style cylindrical, 3 mm long; stigma punctiform. *Fruits* globose, orange to brick-red when ripe, 4 mm across, pericarp thin; stalk 7–15 mm long; seeds numerous, ovoid, 0.5 mm long, bright orange.

**D i s t r i b u t i o n.** East Kalimantan (8 coll.), Sabah (2 coll.), endemic.

**H a b i t a t.** In primary forest, frequent along rivers at low altitudes (10–300 m); flowers in June–July, November–December; fruits in June and December.

**N o t e.** Distinguished from other species in the *Medinilla succulenta* alliance by its large leaves, stout (up to 1 cm in diameter) and acutely quadrangular stems, and dense inflorescences.

### 31. *Medinilla suberosa* Regalado, *spec. nov.* – Fig. 9.

Haec species a *Medinilla aggregatae* ramis haud alatis, cortice suberoso differt. Frutex epiphyticus glaber, ad 1–2 m altis; foliis oppositis, sessilibus, elliptico-oblongis, 18–23 cm longis, 8–10 cm latis, quintuplinervibus; apice acuto vel obtuso, breviter acuminato; basi cuneato-attenuata; venis transversis utrinque vix prominentibus; inflorescentiis axillaribus, multifloris, agglomeratis; floribus 4-meris, pedicellis filiformibus 10 mm longis, calyce urceolato; staminibus aequalibus; fructibus subglobosis, 5 mm latis. — **T y p u s:** *Clemens 28773* (BM; iso A, BO, K, L, NY), Sabah, Mt Kinabalu, Tenompok.

Epiphytic shrub 1–2 m high. Branches subquadrangular, glabrous, up to 10 mm in diameter; bark corky; nodes 8–10 mm across. *Leaves* opposite, sessile, glabrous on both surfaces; blade coriaceous, elliptic-oblong, 18–23 (–26) cm long, 8–10 cm wide; margin entire; apex acute and shortly acuminate or obtuse and abruptly lengthened to a point 1 cm long; base cuneate-attenuate; 5-plinerved, nerves impressed or flattened adaxially, raised abaxially; transverse veins hardly distinct on both surfaces, midrib sclerified and thickened near the base. *Inflorescences* axillary, many-flower-



**Fig. 9.** *Medinilla suberosa* Regalado — a. Branch with flowers,  $\times 0.5$ ; b. flower bud,  $\times 1.5$ ; c. anther, adaxial view,  $\times 4$ ; d. fruit,  $\times 1.5$ ; e. seeds,  $\times 10$  (a–c Clemens 28773; d, e Chew, Corner & Stainton RSNB 1001).

ed, of fascicled cymes; pedicels slender, glabrous, 10 mm long. *Hypanthium* urceolate to funnellform, pruinose, 3 mm long, 1.5 mm across. *Petals* 4, white, oblong-elliptic to ovate, 3.5 mm long, 3 mm wide, thin, translucent. *Stamens* 8, equal in size; filament flattened, 4 mm long; anther linear-oblong, 2 mm long. *Ovary* 4-celled; style terete, 3–5.5 mm long; stigma punctiform. *Fruits* subglobose, orange to bright red when ripe, 5 mm across, crowned with cup-shaped calyx lobes; stalk terete, 10–13 mm long; seeds numerous, ovoid, 0.7 mm long, bright orange.

*Distribution.* Sabah: Mt Kinabalu (6 coll.), endemic.

*Habitat.* In montane oak-laurel forest at 1500 m on Mt Kinabalu, once collected in low stature forest on ultramafic soil.

### 32. *Medinilla amplexens* Regalado, *spec. nov.* – Fig. 10.

Frutex scandens epiphyticus glaber; ramis teretibus, ramulis angulatis; foliis oppositis, sessilibus amplexicaulibusque, ovato-oblongis, 22–25 cm longis, 10–11 cm latis, septuplinerviis; apice acuto; basi cuneata; venis transversis subtus numerosis distincta; inflorescentiis axillaribus, multifloris; floribus 4-meris; staminibus aequantibus; fructibus subglobois, 3 mm latis. — *Type*: Beaman 8954 (MSC; iso A, K, L, MO, NY, S, UKMS, US), Sabah, Penampang District, Crocker Range, Km 51.8 on Kota Kinabalu-Tambunan Road.

Robust glabrous shrub or woody climber up to c. 5 m high, epiphytic. Branches terete, angular in young stems, bark suberose, smooth, becoming irregularly cracked with age, 1–1.5 cm in diameter; wood yellowish, pith large, spongy; nodes stout, 8–14 mm across. *Leaves* opposite, sessile, appressed, clasping the stem thus gathering forest debris in leaf axils from which tufts of adventitious roots grow; blade coriaceous, ovate-oblong, 22–25(–40) cm long, 10–11(–21) cm wide; margin entire, very slightly sinuate; apex acute, ending with a small mucro at the tip; base cuneate, amplexicaul; 7-plinerved, midrib becoming woody toward the base, upper pair of nerves arising 5 cm above the base, transverse veins in 20–30 pairs, venation impressed above, raised below. *Inflorescences* axillary, many-flowered, glomerulate, arising from defoliated nodes; pedicels 3–5 mm long, orange to red. *Hypanthium* narrowly campanulate, orange to red, 4 mm long, 3 mm wide, minutely 4-dentate, slightly constricted 1 mm below the rim, scatteredly covered with minute, red, furfuraceous hairs. *Petals* 4, white, translucent, glabrous, entire, ovate-lanceolate, 6–10 mm long, 3–4 mm wide. *Stamens* 8, equal in size, filament ligulate, flattened, whitish, 2 mm long, anther elliptic-lanceolate, rounded at the base of the locules, 2.5 mm long, connective hardly produced, dorsal spur and ventral appendages red-orange, dorsal spur triangular, c. 1 mm long. *Ovary* 4-celled; style cylindric, slender, 4 mm long; stigma punctiform. *Fruits* subglobose, 3 mm across, pink; pericarp thin, stalk slender, terete, 1.2–1.5 cm long; seeds ovoid, 1 mm long, yellowish brown.

*Distribution.* Kalimantan (1 coll.), Sabah (18 coll. around Mt Kinabalu area), Sarawak (1 coll.).

*Habitat.* Frequent in oak-laurel forest at 1400–2000 m on Mt Kinabalu and Gunung Alab.

*Note.* The epithet for this species draws attention to its large, sessile and amplexicaul leaves which are ovate-oblong, acute, and cuneate at the base. The leaves may attain a length of 40 cm and a width of 21 cm (*Endert 3927*).

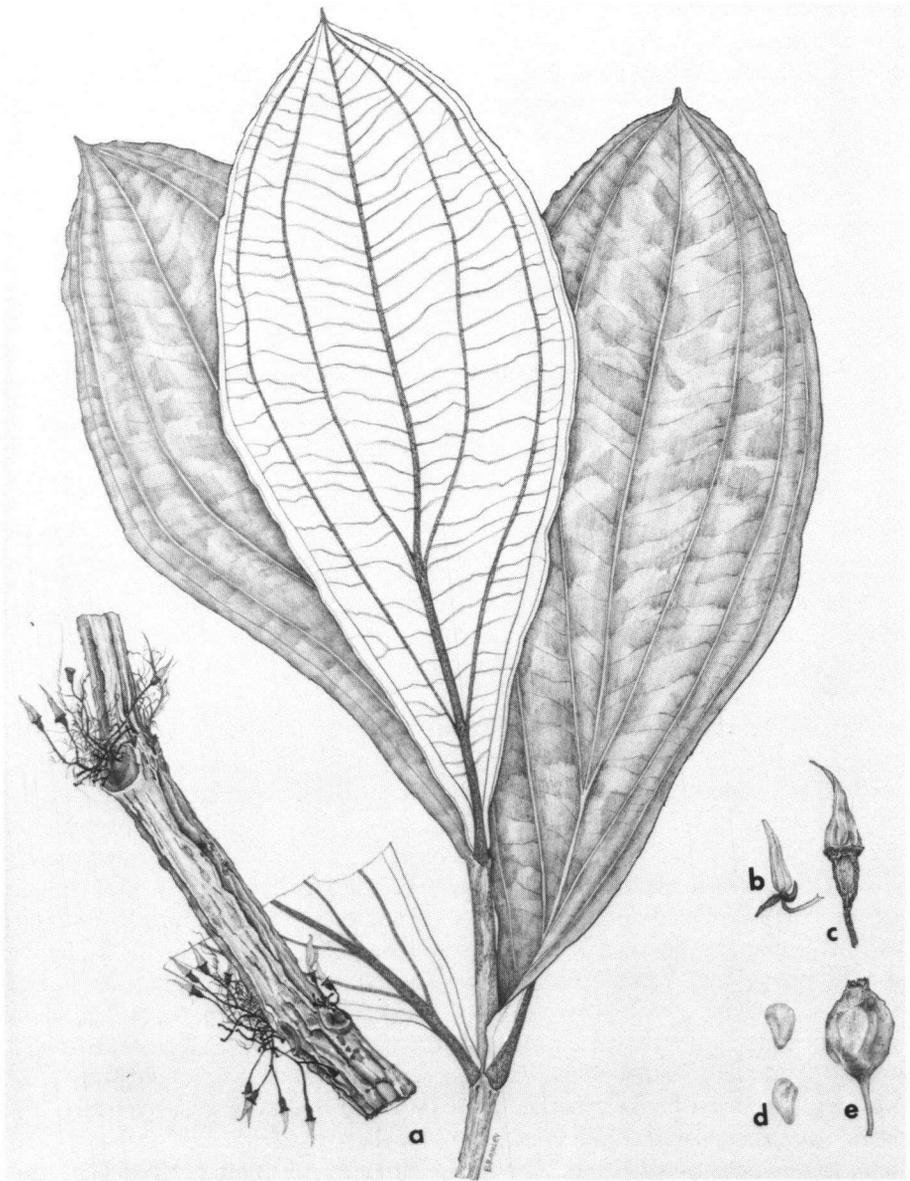


Fig. 10. *Medinilla amplexans* Regalado — a. Bare lower branch segment with flowers and upper leafy branch,  $\times 0.5$ ; b. stamen,  $\times 9$ ; c. flower bud,  $\times 9$ ; d. seeds,  $\times 6$ ; e. fruit,  $\times 1.5$  (a–c *Beaman* 8954; d, e *Beaman* 8036).

### 33. *Medinilla macrophylla* Blume

*Medinilla macrophylla* Blume, Mus. Bot. Lugd.-Bat. 1 (1849) 19; Cogn., DC. Monogr. Phan. 7 (1891) 600; Bakh. f., Rec. Trav. Bot. Néerl. 40 (1943) 180. — T y p e: *Korthals s.n.* (L), Sumatra.

*Medinilla borneensis* Blume, Mus. Bot. Lugd.-Bat. 1 (1849) 20. — T y p e: *Korthals s.n.* (L), Borneo, Banjarmasin, Gunung Sakumbang.

*Medinilla motleyi* Hook. f. ex Triana, Trans. Linn. Soc. 28 (1871) 87, syn. nov. — T y p e: *Motley s.n.* (K), S Kalimantan, Banjarmasin.

Epiphytic shrub. Branches terete or subquadrangular, verrucose; ultimate branchlets furfuraceous to fusco-pilose, 5–8 mm in diameter. *Leaves* opposite; petiole terete, 1.5–2.5 cm; blade coriaceous, glabrous above, brown leprose beneath, ovate, 12.5–25 cm long, 8.5–13.5 cm wide; margin entire; apex acute; base rotund or subcordate; 5-plinerved, nerves impressed adaxially, raised abaxially, primary and secondary nerves lined with brown leprose hairs beneath. *Inflorescences* axillary, simple or umbelliform cymes that arise solitary or paired on leafless nodes, 3.5–4.5 cm long, sparsely to densely furfuraceous; peduncle terete to angled, 10–15 mm long; bracts paired, linear lanceolate, 3–4 mm long, 0.5 mm wide; bracteoles sublanceolate, 1 mm long; pedicel 3–4 mm long. *Hypanthium* cylindrical, 4 mm long, 2.5–3 mm wide, minutely red-furfuraceous, shallowly 5-dentate, light red. *Petals* 5, obovate, asymmetric, 5.5–6 mm long, 2.5–3 mm wide, glabrous, pink. *Stamens* 10, equal in size; filament 3 mm long; anther linear-lanceolate, 2.5–3 mm long. *Ovary* 5-celled; style filiform. *Fruits* globose, 5–6 mm across, reddish to pink; seeds 0.7 mm, yellow.

*Distribution.* Sumatra, Sulawesi, Moluccas, Borneo (Kalimantan, 16 coll.; Sabah, 6 coll.; Sarawak, 7 coll.).

*Notes.* A widespread and variable taxon in Borneo in which I am convinced *Medinilla motleyi* must be included. There is much variation in the leaf shape but constancy in the nature of the inflorescence, floral structure, and fruit. Among the species with pilose to hirsute indumentum it is readily recognizable by the larger and distinctly petiolate leaves.

*Medinilla borneensis* was erroneously reduced to *M. verrucosa* (Blume) Blume by Bakhuizen van den Brink Jr. (1943). The type material of *M. borneensis* at L is in poor condition consisting of stem and leaf fragments. In spite of its condition the specimen could still be referred to as *M. macrophylla*. At present I have not seen any specimen of *M. verrucosa* collected in Borneo and it is doubtful that the species occurs in the island. Furthermore the description of *M. borneensis* seems to agree with the characters of *M. macrophylla* rather than with *M. verrucosa*. Since the two names are published simultaneously by Blume, the rules of priority do not hold in this situation.

I prefer to use the epithet *macrophylla* because this species has a wider range of distribution than would the epithet *borneensis* suggests.



**Fig. 11.** *Medinilla rufescens* Regalado — a. Lateral branch with infructescence,  $\times 0.54$ ; b. fruit,  $\times 2$ ; c. seeds,  $\times 8$  (all Wright S 27156, S 27964).

**34. *Medinilla rufescens* Regalado, *spec. nov.* – Fig. 11.**

Frutex epiphyticus; ramis teretibus, glaber, ramulis gracilibus, fusco-tomentosis; foliis oppositis, sessilibus, elliptico-oblongis, ad 12,5 cm longis, 6 cm latis, quintuplinerviis; apice acuto; basi cordata; subtus minutissime et densissime fusco-tomentosis; inflorescentiis axillaribus; pedunculo ad 10 cm longo; floribus 5-meris; staminibus aequantibus; fructibus globosis, 5–8 mm latis. — *T y p u s*: *Wright S 27964* (K; iso A, BO, L, SAN), Sarawak, 4th Div., Bintulu, Ulu Segan.

Epiphytic shrub. Branches terete, smooth, glabrous, branchlets slender, brown-tomentose. *Leaves* opposite, sessile, adaxial surface glabrous, abaxial surface covered with indumentum of minute and dense rusty brown hairs; blade elliptic-oblong, 11–12.5 cm long, 4.5–6 cm wide; margin entire; apex acute; base deeply cordate; 5-plinerved, nerves impressed adaxially, raised abaxially; transverse veins faint to obscure adaxially, visible abaxially, not reticulate. *Inflorescences* axillary; peduncle (4–)8–10 cm long, pendent, dark red; pedicels 1.5 mm long. *Hypanthium* ovoid, 4 mm long, 3 mm wide, minutely red-furfuraceous, shallowly 5-dentate. *Petals* 5, white, obovate, mucronate, 6–7 mm long, 3 mm wide, asymmetric. *Stamens* 10, equal in size; filament 2.5 mm long; anther linear-lanceolate, 2.5–3 mm long. *Ovary* 5-celled; style slender, 5 mm long; stigma punctiform. *Fruits* globose, 5–8 mm across, green, ripening orange to bright red; seeds numerous, minute, 0.1 mm long.

*Distribution*. Sarawak (5 coll.), endemic.

*Note*. The specific epithet for this taxon refers to the shortly and densely fusco-tomentose undersurface of the leaves.

**35. *Medinilla corallina* Cogn.**

*Medinilla corallina* Cogn., DC. Monogr. Phan. 7 (1891) 599; Schwartz, Mitt. Inst. Bot. Hamburg 7 (1931) 253. — *T y p e*: *Beccari 3145* (FI, n.v.), Sarawak.

*Medinilla dajakorum* Schwartz, Mitt. Inst. Bot. Hamburg 7 (1931) 254, syn. nov. — *T y p e*: *Winkler 1424* (HBG), W Borneo, Sg. Bika.

Epiphytic shrub. Branches slender, terete, internodes elongate, 4–7 cm long; nodes swollen; innovations fusco-pilose, soon glabrescent; bark longitudinally striatulate-verruculose. *Leaves* opposite, subsessile; young leaves finely furfuraceous on abaxial surface, glabrescent with age, nerves and veins fusco-pilose; drying intense green adaxially, pallid green abaxially; blade coriaceous, oblong-lanceolate, 8–14 cm long, 2–4 cm wide; margin entire; apex acute to abruptly or long acuminate; base obtuse, subauriculate; 5-plinerved, 3 central nerves percurrent from bottom to top of leaf; transverse veins indistinct. *Inflorescences* axillary, of few-flowered congested cymes; peduncle 5 mm long, brown-leprose; pedicels 1–3 mm long; bracteoles minutely denticuliform. *Hypanthium* urceolate to campanulate, 4 mm long, 4 mm wide, externally fusco-furfuraceous, thickly fleshy; rim truncate and minutely 5-denticulate. *Petals* 5, fleshy, pellucid white or pink, obovate, base conspicuously narrowed, apex obtuse to broadly rounded and minutely apiculate or inequilateral, 5–6 mm long, 4–5 mm wide. *Stamens* 10, equal in size; filament slightly compressed, 2 mm long; anther long subulate, rostrate, 4–5 mm long. *Ovary* 5-celled; style elongate, terete, slender, 4–5 mm long; stigma punctiform. *Fruits* globose, 5–6 mm across, red when ripe; seeds ovoid, 1 mm long, bright yellow.

**Distribution.** West and Central Kalimantan (10 coll.), Sarawak (2 coll.).

**Habitat.** On stream banks in swampy or lowland dipterocarp forest from 50–150 m.

**Note.** Allied to *Medinilla rufescens* and *M. rufopilosa* but distinguished by its much narrower leaves, short peduncles, and less pronounced indumentum on leaf undersurface. Although the type was not seen, the materials studied agree with the original description. Schwartz (1931) identified *Winkler 1378* as this species by comparison with a photograph of the type provided by the Beccari herbarium (FI-B).

### 36. *Medinilla lasiocladus* Stapf

*Medinilla lasiocladus* Stapf, Trans. Linn. Soc. London, Bot. 4 (1894) 161. — Type: *Haviland 1225* (K), Sabah, Mt Kinabalu.

Shrub. Young branches terete to subquadrangular, densely and minutely red-tomentose, glabrescent; older stems subterete to quadrangular, glabrous, pustulate. *Leaves* opposite, subsessile; leaf buds covered with reddish stellate hairs; blade subcoriaceous, elliptic-oblong, 6–7.5 cm long, 4 cm wide; margin entire; apex acute; base rounded; 3-plinerved. *Inflorescences* axillary, often in old branches, few-flowered cymes, 1–2 cm long, minutely furfuraceous or tomentulose; bracteoles ovate, acute, 1–3 mm long, persistent. *Hypanthium* ovoid to campanulate, 4 mm long, 2.5 mm wide, red-furfuraceous, glabrescent, 4-dentate. *Petals* 4, broadly obovate, 5 mm long, pink. *Stamens* 8, equal; filament flattened, 1.5 mm long; anther linear-oblong, 2 mm long. *Ovary* 4-celled; style slender, terete, 4 mm long; stigma minute, punctiform. *Fruits* unknown.

**Distribution.** Sabah (Mt Kinabalu), known only from the type.

**Habitat.** No ecological data available. The type collection originated from an altitude of 1800 m.

**Note.** Distinguished by its indumentum on young branches, leaf buds, and hypanthia, which consists of red, stellate, furfuraceous hairs; differs from *M. macrophylla* in having 4-merous flowers and subsessile leaves.

### 37. *Medinilla endertii* Regalado, *spec. nov.*

Frutex epiphyticus; ramis teretibus, ramulis fusco-tomentosis; foliis oppositis, sessilibus, subtus fusco-tomentosis, elliptico-oblongis ovatisve, ad 24 cm longis, 9,5 cm latis, septuplinervibus; apice acuto; basi obtusa vel rotundata; venis subtus transversis numerosis utrinque prominentibus; inflorescentiis axillaribus; pedunculo ad 8 cm longo; fructibus globosis, 5-locellatis. — Type: *Ender 4463* (L; iso A), E Kalimantan, W Kutai, Mt Kemul.

Epiphytic shrub. Branches terete, 8 mm in diameter; branchlets fulvous brown-tomentose, becoming glabrous at maturity, up to 10 mm in diameter; bark yellowish; nodes orbicular. *Leaves* opposite, sessile, glabrous on adaxial surface, brown tomentose on abaxial surface, this pronounced along primary and secondary veins; blade thinly coriaceous, elliptic-oblong or ovate (*Ilias S 40958*), 22–24 cm long, 8.5–9.5 cm wide; margin entire; apex acute; base obtuse or rounded, slightly lobed; 7-plinerved, nerves impressed adaxially, raised abaxially; transverse veins numerous, 25–30 pairs, conspicuous on both surfaces, secondary veins reticulate. *Flowers*

unknown. *Inflorescences* axillary; peduncle terete, slender, 6–8 cm long. *Fruits* globose, bright orange to red, 5-celled, crowned by minutely dentate calyx lobes; stalk 10 mm long; seeds numerous, 0.8–0.9 mm long, tawny yellow.

*Distribution*. East Kalimantan (1 coll.), Sarawak (1 coll.).

*Habitat*. Mossy and submontane forest, 1300–1800 m.

*Note*. The species is named in honor of Frederik H. Endert, a Forest Officer in the Dutch East Indies Forest Service, whose botanical collecting in East Kalimantan brought numerous novelties to science.

### 38. *Medinilla rufopilosa* Ohwi ex Regalado, *spec. nov.* – Fig. 12.

Frutec epiphyticus; ramis teretibus, gracilibus, ramulis densissime hirsutis; foliis oppositis, breviuscule petiolatis, subtus praesertim primariis nervis nervulisque plus minusve hirsutis vel hispidopilosis, anguste ovatis lanceolatisve, 12–15 cm longis, 3–5 cm latis, septuplinerviis; apice longe acuminato; basi rotundata; inflorescentiis axillaribus vel terminalibus; floribus 5-meris, umbellatim vel racemosim dispositis; pedunculo 2–4 cm longo; staminibus aequantibus; fructibus ovoideis, 6 mm latis. — *Type* *Ashton S 12106* (K; iso L, SAN, SING), Sarawak, N. Pengiran, Mujong, Balleh.

Epiphytic shrub. Branches terete, slender, growing up to 1.5 m long, pendent; young branches densely covered with orange to red bristles, becoming glabrous with age; bark grayish. *Leaves* opposite, the adaxial surface glabrous, the abaxial surface lined with reddish brown hirsute or hispid hairs along midrib and primary veins, the hairs up to 2 mm long, soon caducous and leaves essentially glabrous at maturity; petiole very short, 1–2 mm long, thickened, densely covered with hairs on new shoots; blade coriaceous, narrowly ovate to lanceolate, 12–15 cm long, 3–5 cm wide; margin entire; apex long acuminate to cuspidate; base rounded, manifestly subauriculate; 7- (rarely 9-)plinerved, nerves all extending to the apex except the marginal pair which terminates halfway up the blade, flattened adaxially, slightly raised abaxially; transverse veins faint and hardly conspicuous adaxially, not apparent abaxially. *Inflorescences* of axillary or terminal cymes umbellately or racemosely disposed, forming a congested head, erect, borne on a stout furfuraceous peduncle 2–4 cm long; pedicels short, 1 mm long, furfuraceous; bracteoles subulate, caducous, 1.5 mm long. *Hypanthium* campanulate, 5 mm long, 5 mm wide, externally red-furfuraceous, truncate. *Petals* 5, white, obovate, 3 mm long, 5 mm wide, glabrous. *Stamens* 10, equal in size; filament flattened, 2.5 mm long; anther ovate-lanceolate, 6 mm long. *Ovary* 5-celled; style slender, 5 mm long, glabrous; stigma punctiform. *Fruits* ovoid, 6 mm across, red-furfuraceous, orange when ripe; seeds numerous, cochleate, minute, 0.1 mm long.

*Distribution*. West Kalimantan (5 coll.), Sarawak (2 coll.).

*Habitat*. Primary forest along rivers from 150–500 m altitude.

*Note*. A remarkable species belonging to the *Medinilla macrophylla* alliance and readily characterized by the deciduous indument of orange or red bristles (hence the name *rufopilosa*) on the young branches, petioles, and leaf undersurfaces along primary nerves. There is considerable variation in density and length of the indument. *Endert 4049* represents a form that has finer reddish pilose parts and may eventually merit taxonomic recognition.



Fig. 12. *Medinilla rufopilosa* Ohwi ex Regalado — a. Branch segment with infructescence,  $\times 0.48$ ; b. fruit,  $\times 2.4$ ; c. seeds,  $\times 7.2$  (all Ashton S 12106).

### 39. *Medinilla stephanostegia* Stapf

*Medinilla stephanostegia* Stapf, Trans. Linn. Soc. London, Bot. 4 (1894) 160. — T y p u s: *Haviland 1171* (K), Sabah, Mt Kinabalu.

Climbing shrub, 2–3 m high, sprawling among trees. Branches cylindrical, striate to ribbed, sparsely pustulate to verruculose, 7 mm in diameter; innovations minutely setose, clothed with short, reddish, furfuraceous indument, soon glabrescent; leaf axils densely matted with appressed and rigid bristles up to 7 mm long; bark yellowish. *Leaves* opposite; sessile to subsessile with a petiole less than 5 mm long; blade coriaceous, ovate-elliptic or oblong-elliptic, 7–10(–15) cm long, 4–6 cm wide; margin entire; apex shortly acuminate; base acute to obtuse or rounded; distinctly 3-plinerved, sometimes provided with an additional pair of marginal nerves. *Inflorescences* terminal, many-flowered, of paniculate cymes up to 12 cm long, pyramidal in shape, pendent, minutely setose; peduncle terete, slender, (2.5–)4–6 cm long; inflorescence axes pinkish purple, the primary axes bearing secondary axes in whorls of 4 at intervals of 1.5–2 cm; bracts white or pink, oblong or oblong-lanceolate, in whorls of 4 at nodes of primary axes, paired at nodes of secondary axes, 6–12 mm long; pedicels pink, c. 2–6 mm long, bracteolate. *Hypanthium* shortly campanulate, white or cream, 4 mm long, glabrous. *Petals* 4, pink to purple, broadly ovate, obtuse, shortly acuminate, 8 mm long. *Stamens* 8, equal in size; anthers lanceolate, 4 mm long. *Ovary* 4-celled; style 6–8 mm long. *Fruits* globose, greenish white, turning red when ripe, 4 mm across, crowned with persistent calyx lobes; seeds numerous, 1 mm long, light yellow with red-orange hilum.

*Distribution*. Sabah: Mt Kinabalu (29 coll.), endemic.

*Habitat*. In mossy oak-laurel forest, common along streams and rivers, between 1600–2000 m altitude.

*Note*. The name derived from Greek meaning a crown or wreath befits this beautiful plant that has showy inflorescences with pink-purple bracts and flowers. A characteristic species without close relatives in Borneo; strikingly similar to *Medinilla congesta* Merr., *M. cordata* Merr., and *M. fenicis* Merr. of the Philippines. A very local species only known from Mt Kinabalu.

### 40. *Medinilla alternifolia* Blume

*Medinilla alternifolia* Blume, Mus. Bot. Lugd.-Bat. 1 (1849) 19; Bakh. f., Rec. Trav. Bot. Néerl. 40 (1943) 176; Maxwell, Gard. Bull. Sing. 31 (1978) 149. — T y p e: *Blume s.n.* (L.; iso K), Sumatra.

Woody or suffrutescent climber up to 10 m long, attached to substrate by numerous adventitious roots. Young stems terete, slender, slightly compressed, glabrescent. Older stems cylindrical, 0.8–1 cm in diameter, glabrous; bark rugose, brown; xylem lobed in cross section. *Leaves* alternate; petiole 6–15 cm long; blade subcoriaceous, broadly elliptic, 14–24 cm long, 7–12 cm wide; margin entire; apex acute; base acute to rounded; 5- (rarely 7-)plinerved, the marginal pair of nerves from just above the base, the inner pair of nerves arising 0.5–1(–2) cm above the base; transverse veins distinct, c. 20–24 pairs; nerves and veins sunken adaxially, raised abaxially. *Flowers* in densely crowded glomerules or 3-flowered cymes from raised

tubercles in leaf axils or on leafless nodes; pedicels terete, 8 mm long, minutely red-furfuraceous. *Hypanthium* campanulate to obovoid, broadest at the rim, 3–5 mm long, 2–4 mm wide, smooth, glabrous; calyx lobes 4, very shallowly triangular, sometimes ending in a mucronate tip. *Petals* 4, ovate, acute, 5–7 mm long, 3–4 mm wide, reportedly pink in colour. *Stamens* 8, equal in size; filament ligulate, 2 mm long; anther linear-oblong, 4.5–5 mm long, 1 mm across; dorsal spur deltoid; ventral appendages obsolete. *Ovary* 4-celled; style 7 mm long, cylindrical, thick; stigma minute, punctiform. *Fruits* globose, sometimes ribbed or angled, cupped with persistent calyx lobes, 4–5(–7) mm across, glabrous, orange to red when ripe; stalks slender, up to 1 cm long, glabrous; seeds numerous, 0.5–0.6 mm long, light yellow.

**Distribution.** Malay Peninsula, Sumatra, Borneo (Brunei, 1 coll.; Kalimantan, 13 coll.; Sabah, 23 coll.; Sarawak, 15 coll.). Surprisingly, this species does not occur in Java.

**Vernacular name.** Tingkut (Malay).

**Note.** Bakhuizen van den Brink Jr. (1943) wrote that the connective is ventrally inappendiculate, but close microscopic examination reveals the presence of ventral appendages in a vestigial condition.

#### 41. *Medinilla formanii* Regalado, *spec. nov.*

Frutex scandens, radicans, ramorum innovationibus petiolisque fusco-pilosis; foliis alternis, petiolatis, anguste ellipticis, usque ad 19–23 cm longis, 6.5 cm latis, quintuplinerviis; apice acuto; basi attenuata; venis reticulatis; inflorescentiis axillaribus ex axillis defoliatis, fasciculatis, aggregatis, pedicellis ad 2.5 cm longis. — **T y p u s:** *Forman 521* (K; iso BO, L, US), E Kalimantan, Tabang, Belajan River.

Epiphytic climber. Stems subterete, rugose, glabrous, 5 mm in diameter, attached to substrate by adventitious roots, innovations brown-furfuraceous, wood light brown, showing distinct xylem lobes in cross section. *Leaves* alternate, glabrous above, fusco-pilose along reticulations below; petiole subterete, flattened, fusco-pilose, 6–8 cm long; blade chartaceous, narrowly elliptic, 19–23 cm long, 6.5 cm wide; margin entire; apex acute; base attenuate; 5-plinerved, upper pair of nerves arising from the midrib c. 4 cm above the base, midrib and lateral nerves impressed adaxially, raised abaxially, secondary and tertiary veins reticulate. *Flowers* crowded in dense clusters in leaf axils or from old wood; pedicels slender, 2–2.5 cm long. *Hypanthium* campanulate, truncate, thickened at the rim, purple, 4–5 mm long, 3–4 mm wide. *Petals* 4, oblanceolate, apex acute, 5 mm long, 3 mm wide, entire, glabrous, pale pink. *Stamens* 8, equal in size; filament ligulate, 2 mm long; anther narrowly oblong, rostrate, rounded at the base of locules, 4–5 mm long, dorsal spur triangular-hastate, fringed. *Ovary* 4-celled; style 16 mm long; stigma minute, punctiform. *Fruits* ovoid, red, 5 mm across, 4-celled; stalk up to 3 cm long; seeds ovoid, 0.5 mm long, bright yellow.

**Distribution.** Brunei (1 coll.), East Kalimantan (2 coll.), endemic.

**Habitat.** Forest by rivers, 0–100 m.

**Notes.** Named after Mr. Lewis Leonard Forman in recognition of his many contributions to the knowledge of Malesian botany.

Leaves similar to *Medinilla alternifolia* but with different nervation.

I refer to this species two recent collections from Central Kalimantan (*Mogea* 4210, 4250) which have similar habit and leaf features but the leaves are entirely glabrous.

#### 42. *Medinilla decurrens* Cogn.

*Medinilla decurrens* Cogn., DC. Monogr. Phan. 7 (1891) 591; Stapf, Hook. Ic. Pl. 4 (1895) t. 2411. — **T y p e:** *Beccari 4016* (FI?, n.v.; iso BR), Sarawak.

Climber, reportedly to a height of c. 10 m. Young stems terete, glabrous, smooth, 3–5 mm in diameter, attached to the substrate by numerous adventitious roots. Older stems roughly quadrangular, glabrous, sparsely pustulate, roughly striate, c. 10 mm in diameter; xylem distinctly lobed in cross section. *Leaves* alternate, glabrous on both surfaces, drying olive green above, reddish brown below, brittle, pergamentaceous; petiole brown-ciliolate, appearing winged with decurrent leaf base, 10–15 cm long; blade narrowly ovate to oblong, 25–30 cm long, (8–)12–14 cm wide; margin entire; apex acute to shortly acuminate; base attenuate, decurrent along the petiole; 5-plinerved with an additional inconspicuous pair of nerves; transverse veins distinct on lower and upper surfaces, c. 25–35 pairs; secondary and tertiary veins developed into a reticulate network. *Flowers* fascicled in dense clusters along the length of old wood, borne singly, rarely cymose; peduncle terete, smooth, 10 mm long; pedicels terete, minutely red-furfuraceous, 8–10 mm long. *Hypanthium* campanulate, truncate, broadest at the rim, slightly constricted below the rim, glabrescent, 3–4.5 mm long, 2.5–3 mm wide, reportedly orange in colour. *Petals* 4, ovate, acute, base claw-ed, 6 mm long, 4 mm wide, reportedly yellow in colour. *Stamens* 8, equal in size; filament ligulate, glabrous, 2 mm long; anther linear-oblong, rounded at the base, 4.5–5 mm long; dorsal spur deltoid, slightly fringed; ventral appendages short, not exceeding 0.25 mm. *Ovary* 4-celled; style cylindrical, thick, 5 mm long, tapered distally; stigma minute, punctiform. *Fruits* globose, 5–6 mm across, glabrous, pale yellow to orange when ripe; stalk 20–30 mm long; seeds flattened, 0.5 mm long, light yellow.

**D i s t r i b u t i o n.** Sarawak (6 coll.), endemic.

**H a b i t a t.** Apparently a rheophyte occurring along streams.

**N o t e.** Likely to be confused with *Medinilla alternifolia* but differs in having decurrent leaf bases, widely spaced lateral pairs of nerves, and dense inflorescences.

#### 43. *Medinilla kemulensis* Regalado, *spec. nov.* – Fig. 13.

Frutex scandens, radicans, glaber; foliis alternis, longe petiolatis, late ellipticis ad rotundatis, usque ad 20–25 cm longis, 14–16 cm latis, novemplinervibus; apice obtuso cum acumine; basi obtusa ad late rotundata; fructibus ellipsoideis, glabris, quadrilocularibus, pedicellis crassis, 10 mm longis. — **T y p u s:** *Enderit 4330* (K; iso BO, L), E Kalimantan. West Kutai, near Mt Kemul.

Woody climber. Stems flexuous, glabrous, slightly wrinkled, subquadrangular to terete, 5–6 mm in diameter, innovations covered with adventitious roots. *Leaves* alternate, glabrous on both sides; petiole glabrous, rather smooth, woody, yellow-

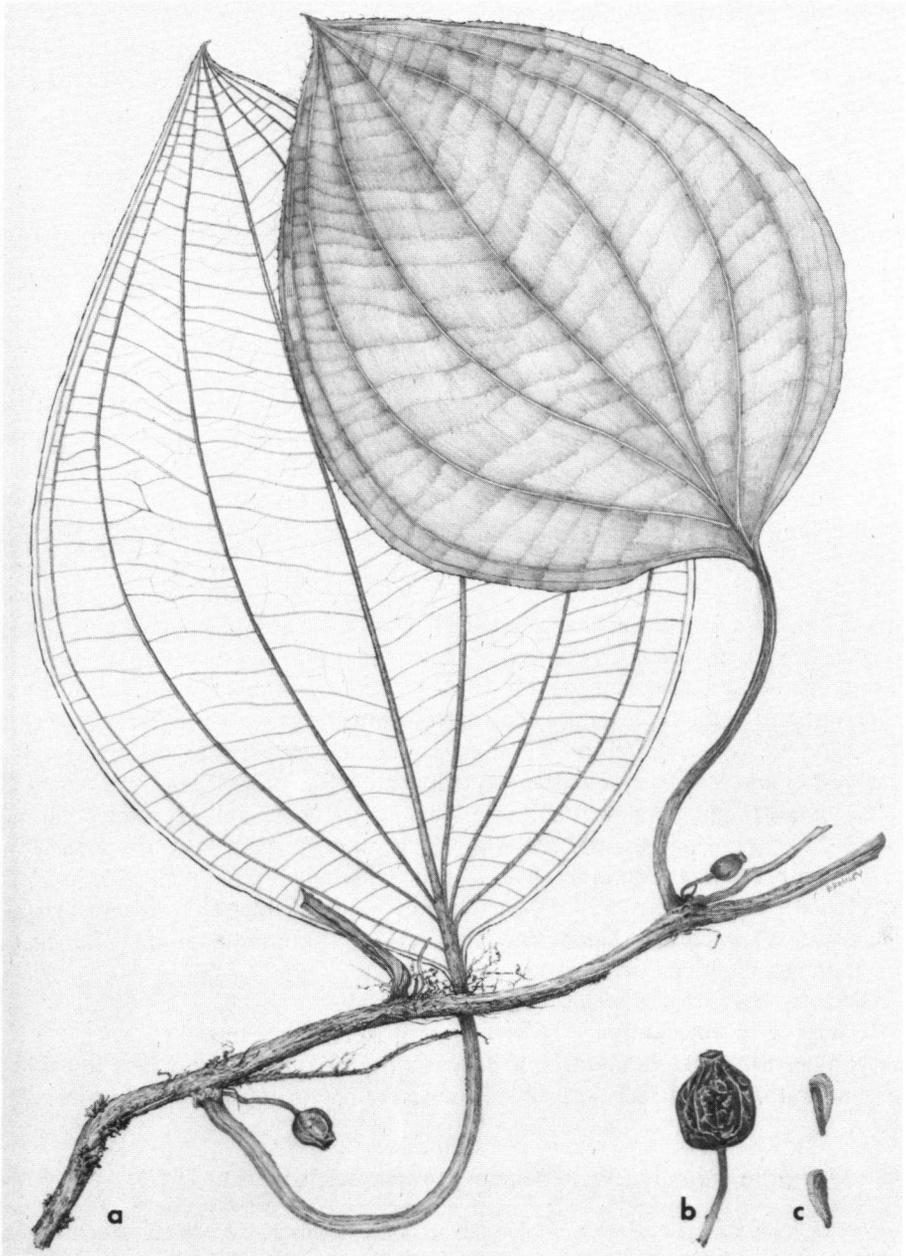


Fig. 13. *Medinilla kemulensis* Regalado — a. Branch segment with fruits,  $\times 0.5$ ; b. fruit, natural size; c. seeds,  $\times 10$  (all Endert 4330).

ish, 15–17 cm long; blade papyraceous when dry, rotund, 20–25 cm long, 14–16 cm wide; margin slightly erose, serrulate near the apex, ends of the teeth minutely ciliate; apex obtuse, abruptly acuminate; base obtuse to broadly rounded; 9-plinerved, outermost pair inconspicuous and marginal, the three inner pairs departing from the midrib at c. 0.5 cm intervals above the base and converging at the apex, slightly impressed or flattened on adaxial surface, raised and thickened on abaxial surface. *Flowers* unknown. *Fruits* ellipsoid, glabrous, smooth, slightly ribbed, 10–13 mm in diameter, 4-loculed, borne on a thick glabrous stalk 1 cm long and arising singly from leaf axils; seeds numerous, minute, 0.7 mm long.

**Distribution.** East Kalimantan, so far known only from a solitary fruiting collection from Mt Kemul (= Kongkemul).

**Habitat.** Primary forest, at 1600 m; fruits collected in October.

**Note.** Recognizable by the large rotund leaves and the rather stoutly pedicelled fruits.

#### 44. *Medinilla serpens* Stapf

*Medinilla serpens* Stapf, Hook. Ic. Pl. 4 (1895) t. 2411. — **Type:** *Haviland & Hose 551 (K)*, Sarawak, near Kuching.

Climber on trees, reportedly to a height of c. 5 m. Young branchlets slender, flagellate, densely tomentose; hairs reddish brown, up to 2 mm long. Older stems terete, irregularly grooved, glabrescent, 0.5–1 cm in diameter; epidermis rough, dark brown, pustulate; xylem lobed in cross section. *Leaves* alternate, glabrous above, minutely setose below; young petiole terete, sparsely tomentose, becoming flattened and ligneous with age, 13–17 cm long; blade broadly ovate, 25–27 cm long, 21–24 cm wide; margin serrulate; apex acuminate; base cordate; 7-plinerved, transverse veins prominent, subfurfuraceous; secondary and tertiary veins anastomosed in a reticulate pattern. *Flowers* in dense fascicles on leafless branches; pedicels and hypanthia covered throughout with reddish brown hairs, up to 1 mm long; pedicels 10–15 mm long. *Hypanthium* campanulate, 4–4.5 mm long, 2.5–3 mm wide; calyx lobes 4, narrowly triangular, erect, sparsely tomentose. *Petals* 4, membranous, ovate, apex acute, 6–7 mm long, 3–5 mm wide. *Stamens* 8, equal in size; filament ligulate, 2–3 mm long; anther linear-oblong, distally rostrate, basally lobed; dorsal spur deltoid, up to 1 mm long; ventral appendages obsolete. *Ovary* 4-celled; style 6–9 mm long, thick, minutely red-furfuraceous, tapering into a minute punctiform stigma. *Fruits* ovoid, c. 5 mm across, ribbed, crowned with persistent calyx lobes, glabrescent, reportedly orange in colour when ripe; stalk slender, 1.0–1.5 cm long, hirsute; seeds numerous, 0.5–0.6 mm long, 0.2 mm across, light yellow.

**Distribution.** Borneo (extreme southwestern Sarawak, 7 coll.), also found in Riau Archipelago (Tudjuh Island) as documented by *Bünnemeyer 5921 (BO)*.

**Habitat.** In Sarawak restricted to limestone hills.

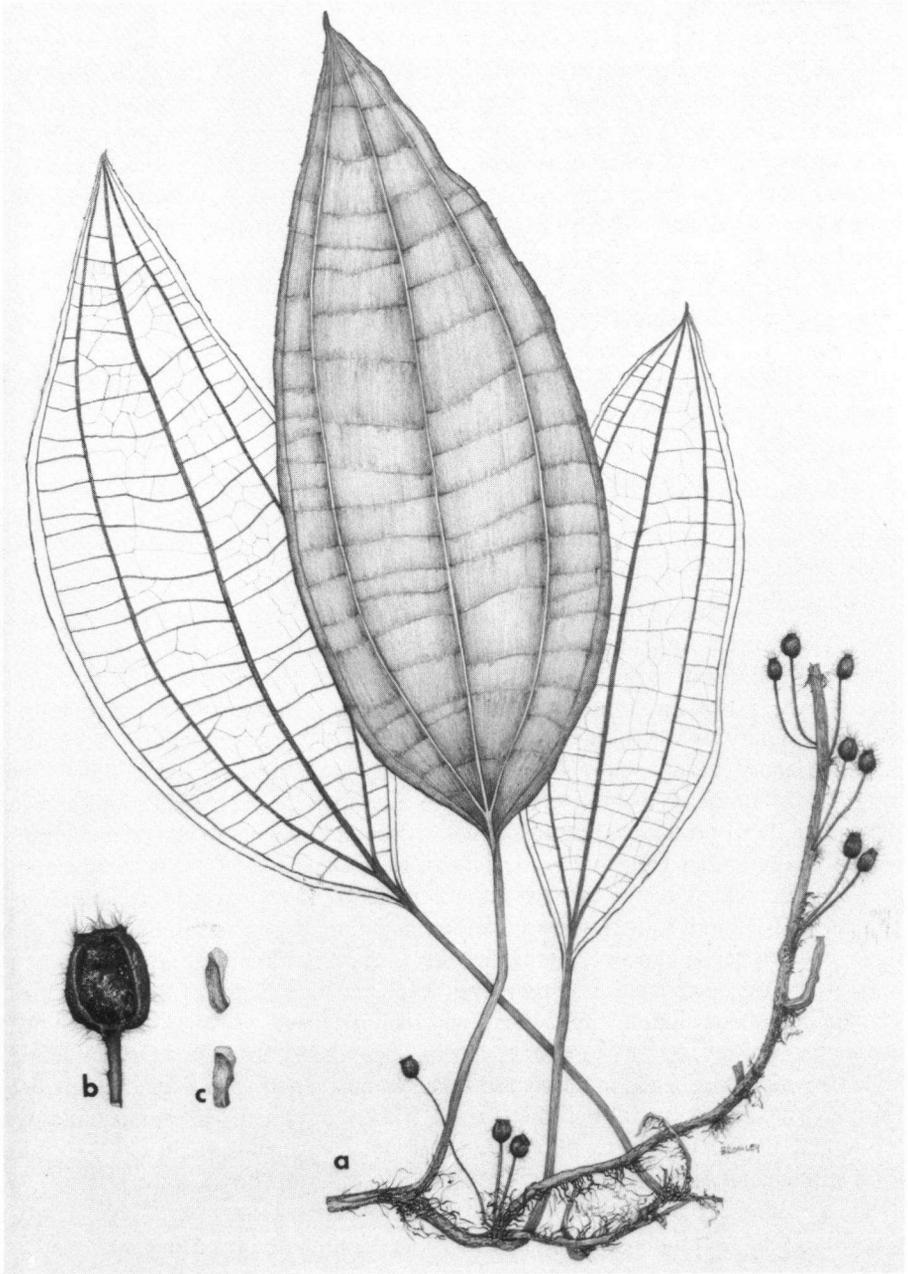


Fig. 14. *Medinilla capillipes* Regalado — a. Branch segment with fruits,  $\times 0.5$ ; b. fruit,  $\times 2$ ; c. seeds,  $\times 20$  (all *Ilias S 36279*).

**45. *Medinilla capillipes* Regalado, *spec. nov.* – Fig. 14.**

Frutex scandens, radicans; rhizomatibus teretibus, glabris, striatis, haud pustulatis, pallide flavidis, innovationibus elongatis, tenuissimis, setis ad 2 mm longis sparse vestitis; foliis alternis, utrinque glabris, petiolatis, ellipticis, usque ad 18–22 cm longis, 7.5–9.5 cm latis; apice abrupte acuminato ad acuto; basi obtusa ad plus minusve rotundata; quintuplinervibus, nervis supra complanatis subtus elevatis, venis transversis utrinque prominentibus, fructibus pedicellisque setosis. — T y p u s: *Ilias S 36279* (K; iso L, MO, SAN), Sarawak, 7th Div., Apa River between Bt. Bakar and Bt. Goram.

Suffrutescent climber. Young stems terete, 1–2 mm in diameter, covered with minute, reddish brown, caducous setae up to 2 mm long. Older stems terete, 3–5 mm in diameter, glabrous, striate, hardly pustulate, pale yellow upon drying. *Leaves* alternate, glabrous on both surfaces; petiole flattened, smooth and minutely red-setose when young, soon becoming striate, rugulose, and slightly indurate, pale yellow when dry, 5–12 cm long; blade subcoriaceous, elliptic, 18–22 cm long, 7.5–9.5 cm wide; margin erose; apex abruptly acuminate to acute; base obtuse to slightly rounded; 5-plinerved, sometimes with an additional inconspicuous marginal pair, the three central nerves flattened adaxially, elevated and thickened abaxially, the innermost pair departing from the midrib 5 mm above the base; secondary and tertiary veins prominent on both surfaces. *Flowers* unknown, remains of inflorescences along old branches. *Fruits* cylindric, ribbed, constricted below the rim, 5 mm in diameter, covered with setae up to 3 mm long, fascicled in leafless axils, borne on a setose pedicel 2 mm long; seeds 0.4 mm long, light yellow.

**Distribution.** Sarawak (3 coll.), endemic.

**Habitat.** Along stream banks in forests at low altitudes; fruits in March and April.

**Vernacular name.** Kemunting umang (Iban Melinau)

**Note.** One specimen (*Chai et al S 37559*) shows a much narrower leaf but has orange yellow fruits with yellowish hairs which is distinctive of this species.

**46. *Medinilla flagellata* Stapf**

*Medinilla flagellata* Stapf, Hook. Ic. Pl. 4 (1895) t. 2411. — T y p e: *Haviland 68* (K), Sarawak, Mt Braang.

Climber. Stems rugose, glabrous, sparsely pustulate, 5 mm in diameter, xylem lobes obtuse-angled in cross section. *Leaves* alternate, glabrous above, minutely setose along primary nerves and pubescent along secondary and tertiary nerves below; petiole flattened adaxially, slightly thickened and geniculate at the base, 5–8 cm long; blade chartaceous, drying green adaxially, reddish brown abaxially, oblong-elliptic, 20–23 cm long, 10–12.5 cm wide; margin serrulate, ciliolate; apex cuspidate; base shortly attenuate to cuneate; 7-plinerved, midrib and lateral nerves more or less impressed adaxially, slightly raised abaxially, secondary veins in 20–25 pairs transversing the midrib at right angles, tertiary veins reticulate. *Flowers* unknown. *Fruits* globose, 5–6 mm in diameter, constricted at the top, orange when ripe, smooth, glabrous, fascicled on old branches; stalk glabrous, slender, 2.5–5 cm long; seeds numerous, narrowly ovoid, minute, 0.3 mm long, faint yellow.

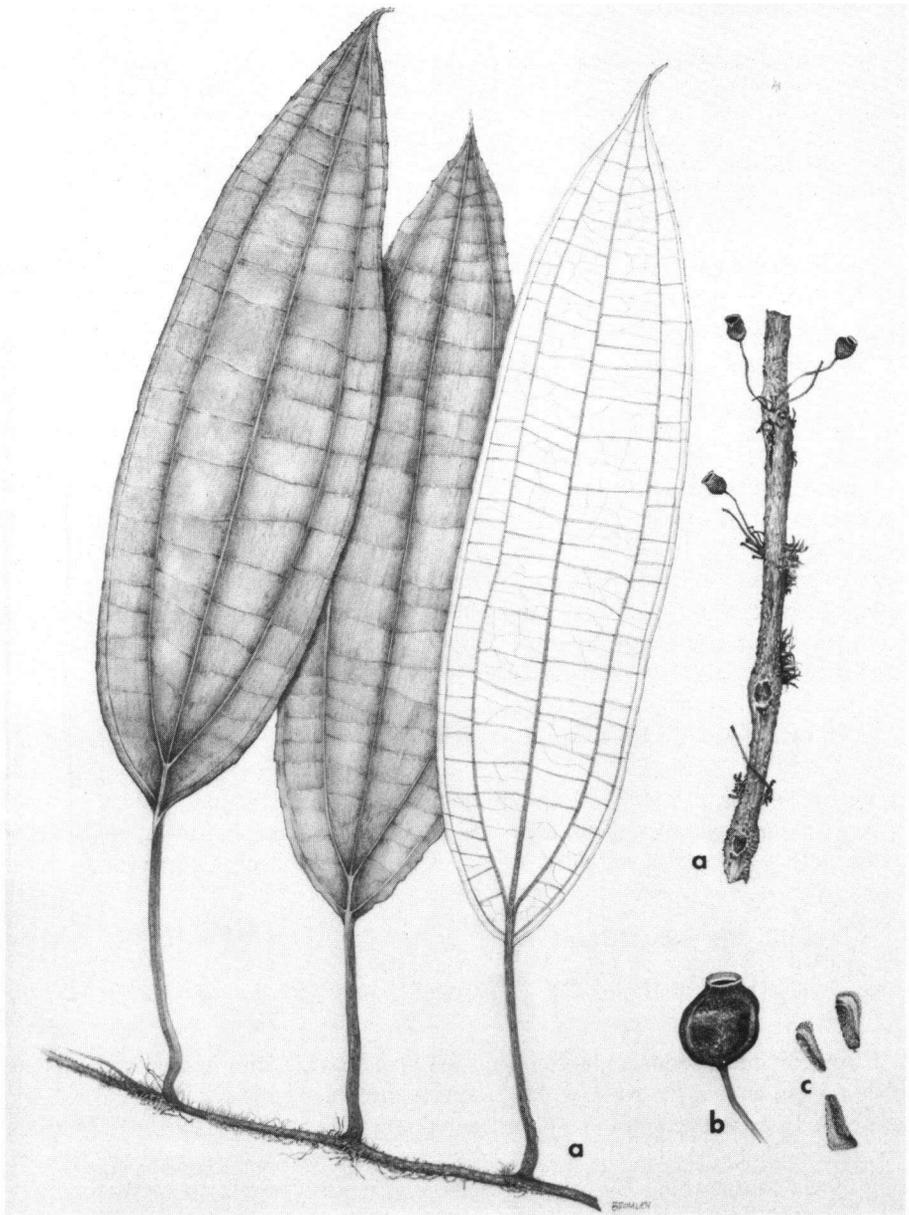


Fig. 15. *Medinilla sandakanensis* Regalado — a. Leafy branch segment and bare lower branch segment with fruits,  $\times 0.4$ ; b. fruit,  $\times 2$ ; c. seeds,  $\times 10$  (all Patrick Ping Sam SAN 20602).

**Distribution.** Sarawak (2 coll.), endemic.

**Habitat.** On limestone hills at 300 m, fruits in March.

**Note.** Allied to *Medinilla serpens* but the leaves are not cordate and fruits are smooth and glabrous. Long known only from the type but a collection of the species nearly a century later confirmed the status of this species.

#### 47. *Medinilla lorata* Stapf

*Medinilla lorata* Stapf, Hook. Ic. Pl. 4 (1895) t. 2417. — **Type:** *Haviland 1785* (K), Sarawak, Kuching.

Climber, up to 5 m long, attached to substrate by adventitious roots. Stems terete, glabrous, rugulose, 5–6 mm in diameter, xylem not deeply divided in cross section, internodes 2–3 cm long. *Leaves* alternate, glabrous on both surfaces; petiole sub-quadrangular, laterally flattened, slightly grooved on the adaxial side, (4–)8–12 cm long; blade subcoriaceous, linear-oblong, strap-shaped, tapering at point where central pair of nerves departs from the midrib, 25–30 cm long, 4–6.5 cm wide; margin entire; apex acute; base long attenuate; 5-plinerved, outermost pair of nerves marginal and inconspicuous, central pair of nerves arising from the midrib 4–8 cm above the base, midrib and central pair of nerves more or less flattened adaxially, impressed and thickened abaxially, transverse veins distinct on both surfaces. *Inflorescences* glomerulate, from leaf axils or from old wood; pedicels slender, glabrous, 1–2 cm long. *Hypanthium* obconical to campanulate, truncate, glabrous. *Petals* 4, glabrous, acute, 6 mm long, 3 mm wide. *Stamens* 8, equal in size; anther 5 mm long, dorsal lobes minutely subulate, ventral spur linear-triangular, flattened. *Ovary* 4-celled; style 6 mm long, minutely red-furfuraceous; stigma punctiform. *Fruits* globose, red, ribbed, glabrous, 5 mm across; stalk slender, glabrous, 2.5 cm long.

**Distribution.** Sarawak (5 coll.), endemic.

**Habitat.** Climber on yellow clay level land in primary forest at low elevation; flowers in October; fruits collected in November.

**Note.** *Banyeng ak Nudong S 25080* has a similar habit but the leaves are thinly chartaceous and the fruits crowned with acute calyx remains. I am not sure if it is conspecific; perhaps a proper species.

#### 48. *Medinilla sandakanensis* Regalado, *spec. nov.* — **Fig. 15.**

Frutex scandens, glaber; ramulis teretiusculis, radicanibus, ramis teretibus, sparsim pustulatis; foliis alternis, petiolatis, ellipticis, usque ad 25–30 cm longis, 7.5–9 cm latis, quintuplinerviis; apice breviter acuminato; basi rotundata; nervis supra impressis subelevatis, venis transversis utrinque prominentibus; fructibus late ovoideis ad subglobosis, quadrilocularibus, ex axillis defoliatis, fasciculatis, pedicellis filiformibus, ad 2.5–3 cm longis. — **Type:** *Patrick Ping Sam SAN 20602* (K; iso L), Sabah, Sandakan, Sepilok Forest Reserve.

Woody climber. Young stems subterete, 2 mm in diameter, reddish brown, producing aerial adventitious roots up to 5 mm long, these soon caducous. Older stems terete, glabrous, pale brown, sparsely pustulate, 5–7 mm in diameter; wood light yellow, with more than 8 xylem lobes in cross section; internodes 3–5 cm long. *Leaves* alternate, glabrous on both surfaces; petiole 7–9 cm long, flexuous, slightly

thickened and geniculate at the base; blade thinly subcoriaceous, narrowly elliptic, 25–30 cm long, 7.5–9 cm wide; margin sinuate; apex shortly acuminate; base rounded; 5-plinerved, the nerves flattened or slightly impressed on adaxial surface, raised and thickened on abaxial surface, the outermost (marginal) pair inconspicuous, departing about 3 mm from the base and running parallel 2 mm from the margin, the innermost pair departing about 2 cm above the base; transverse veins conspicuous and prominent on both surfaces, running in pairs (20–25 pairs) at right angle to the midrib. *Flowers* unknown. *Fruits* fasciculate on leafless nodes, broadly ovoid to subglobose, slightly constricted below the rim, truncate, glabrous, 5 mm across, 4-celled, stalk slender, terete, unbranched, glabrous, 2.5–3 cm long; seeds numerous, 0.7 mm long, yellow with bright orange hilum.

**Distribution.** Sandakan, known only from the type collection.

**Habitat.** In primary forest by stream, at low altitude, fruits collected in January.

#### EXCLUDED TAXA

*Medinilla beccariana* Cogn., DC. Monogr. Phan. 7 (1891) 600. — **Type:** *Beccaria* 3439 (FI?, n.v.), Sarawak, Lamadgiam. = *Plethiandra beccariana* (Cogn.) Nayar.

*Medinilla dispar* Cogn. in Winkler, Bot. Jahrb. Syst. 48 (1912) 108.— *Triuranthera dispar* (Cogn.) Nayar, Journ. Jap. Bot. 48 (1973) 50. — **Type:** *Winkler* 2812 (BR, n.v.; iso BM, K), SE Borneo, between Batu Babi and Lumowia. = *Driesenia dispar* (Cogn.) C. Hansen, Nord. J. Bot. 5 (1985) 346.

*Medinilla robusta* Cogn., DC. Monogr. Phan. 7 (1891) 576. — **Types:** *Beccaria* 542, 573, 851, 4049 (FI?, n.v.), Sarawak. = *Plethiandra robusta* (Cogn.) Nayar.

*Medinilla setigera* (Blume) Miq., Fl. Ned. Indië 1 (1855) 550. — *Melastoma setigera* Blume, Bijdr. (1826) 1077. — **Type:** *Korthals s.n.* (L), Sumatra. = *Hypenanthe setigerum* (Blume) Bakh. f.

*Medinilla tawaensis* Merr., Univ. Calif. Publ. Bot. 15 (1929) 225. — **Type:** *Elmer* 21490 (UC), Sabah, near Tawao. = *Catanthera tawaensis* (Merr.) Regalado, *comb. nov.*

This species is like other members of the genus *Catanthera* in having several xylem bundles embedded in the phloem, unlike any species of *Medinilla*. It is also readily distinguished from *Medinilla* by the ivy-like habit and a connective produced at the anther base (cf. Nayar, 1966).

#### UNDETERMINED SPECIMENS

I am unable to refer the following specimens to any known species. The material is inadequate, however, for description of new taxa.

1. *Teijsmann 8148* (BO). Kalimantan. B. Singkadjang. — Close to *Medinilla corallina* Cogn. but distinguished by its exceptionally bullate nervation.

2. *Kostermans 6022* (L). East Kalimantan. East Kutai, Tepian Lobang, Menubar region NE of Sangkulirang. — The obovate triplinerved leaves are reminiscent of *Medinilla clarkei* King but the leaves are opposite, not verticillate. Branchlets are 4-angled and slightly winged.

3. *Kostermans 21499* (L). East Kalimantan. Berau, Mt Njapa on Kelai River. — With close resemblance to *Medinilla cauliflora* Hemsley of New Guinea.

4. *Jaheri (Exp. Nieuwenhuis) 18* (BO). Kalimantan, without locality. — Similar to *Medinilla sandakanensis* Regalado in leaf shape but it has shorter pedicels and bristly fruits.

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