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(Melastomataceae) of Borneo

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John H. Beaman
Major professor

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REVISION OF *MEDINILLA* (MELASTOMATACEAE) OF BORNEO

By

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ABSTRACT

REVISION OF MEDINILLA (MELASTOMATACEAE) OF BORNEO

By

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Fifty-two species of Medinilla are now known from Borneo, 30 of which are described as new. Twenty-two taxa are known only from one to three collections. Twelve 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, distribution maps, and ecological notes are provided. Four previously described species are recorded for the first time for Borneo: Medinilla succulenta (Blume) Blume, M. pterocaula Blume, M. varingiifolia (Blume) Nayar, and M. ohwii Nayar. One new combination and four 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 and M. motleyi Hook. f. ex Triana are conspecific with M. corallina Cogn. and M. macrophylla Cogn., respectively.

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Institution, Washington, D.C. (US). Herbarium symbols are used in the citation of specimens according to Holmgren et al. (1981).

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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, 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-Beaupre, 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.

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 Indie (1826), where Medinilla was included in Melastoma. It was not until 1831 when his paper, Über einige östindische 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, Hypenanthe, 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 Hypenanthe 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 Indie 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 kenntnis der Flora van Nederlandsch Indie. 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-Wilhemland). 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 the time of his death has not been found (J. F. Veldkamp, personal communication).

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, 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 distributed 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 Korthal'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 52 Bornean species of Medinilla recognized in this treatment, 41 are presumably endemic. Most of the species are rare, very local, and 22 of them are known from one to three collections. Borneo shares a few of the common species with the Malay Peninsula, Java, and Sumatra, but no species 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 elevation 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 colored 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 4000 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). No genus occurs both in the New World and Old World. 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 differ from the above mentioned genera by having anthers with a dorsal crest or keel or spur on the connective and a pair of basal 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 it 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.

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 occuring 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 that have significant collections from Borneo. About 1500 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

Table 1. Morphological characters examined for Medinilla.

1. Habit

   a. creeper, shrub, treelet
   b. epiphytic, terrestrial
   c. height

2. Stem

   a. shape (cylindric, quadrangular, winged)
   b. texture (smooth, pustulate)
   c. pubescence (glabrous, furfuraceous, etc.)
   d. diameter

3. Leaves

   a. phyllotaxy (alternate, opposite, whorled)
   b. nervation (3, 5, 7, 9 -nerved or -plinerved)
   c. petiole (present, absent)
   d. petiole length
   e. leaf shape
   f. leaf length
   g. leaf width
   h. leaf apex
   i. leaf base
   j. leaf margin
   k. leaf axils (glabrous, pilose, tufted)

4. Inflorescence

   a. type (solitary, cymose, umbellate, paniculate, glomerulate)
   b. position (axillary, terminal, subterminal)
   c. number of flowers (few- or many- flowered)
   d. bracts and bracteoles
   e. pubescence
   f. peduncle and pedicel

5. Flower

   a. calyx color, shape, size, indument
   b. corolla color, shape, size
   c. stamen number, condition (equal or unequal)
   d. anther shape and length, appendages
   e. depth of extraovarian chambers
   f. style length
   g. shape of stigma

6. Fruit and seed

   a. fruit shape, texture, diameter, color
   b. seed shape, size, color

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. A list of specimen citations is on file in the herbaria at Kew, Leiden, Arnold, and Michigan State University. Dot maps were used to show distribution of taxa. 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 cylindric 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 of Medinilla kemulensis to small and lanceolate leaves of M. richardsii. 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, M. stephanostegia, M. ohwii and M. varingiifolia. 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 caducuous.

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 color 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 cylindric. It is generally glabrous except in Medinilla serpens, M. capillipes and M. brevipedunculata 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 color; the testa may be smooth or reticulate. The seeds have a conspicuous lateral raphe.

SYSTEMATIC TREATMENT

MEDINILLA

Gaudich., Voy. Uranie (1826) 484; DC., Prodr. 3 (1828) 167; Blume, Flora (1831) 464; Mus. Bot. Lugd.-Bat. 7 (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. Neerl. 40 (1943) 147. - Diplogenea Lindley, Quart. J. Sci. Arts 2 (1828) 122. - Triplectrum D. Don ex Wight & Arn., Prodr. (1834) 324. - Erpetina Naudin, Ann. Sci. Nat., III, 15 (1851) 299. - Cephalomedinilla Merrill, Philip. J. Sci. 5 (1910) 204.

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

Epiphytic and terrestrial shrubs, erect, scandent, or creeping. Branches generally cylindric, smooth or pustulate. Leaves alternate,

opposite, or verticillate, sessile or petiolate; blade fleshy or coriaceous, generally elliptic, glabrous, 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 hardly produced, dorsally 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, testa smooth or finely reticulate.

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 12 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.

Table 2. Differential characters of the *Medinilla* species alliances.

ALLIANCE	HABIT	STEM CROSS SECTION	PHYLLOTAXY	INFLORESCENCE	VESTITURE
1. *M. magnifica*	epiphytic or terrestrial shrubs	quadrangular	whorled	terminal panicles	glabrous
2. Sect. *Medinilla*	epiphytic shrubs	terete	whorled	axillary umbelliform cymes	glabrous
3. *M. corneri*	climbing shrubs	terete	opposite	axillary umbelliform cymes	glabrous
4. *M. beamanii*	epiphytic shrubs or small trees	terete	opposite	axillary umbelliform cymes	glabrous
5. *M. crassifolia*	epiphytic shrubs	terete	opposite	axillary panicles or umbelliform cymes	glabrous
6. *M. sessiliflora*	epiphytic shrubs	terete	opposite	solitary or paired	glabrous
7. *M. myrtiformis*	epiphytic shrubs	terete	opposite	axillary fascicles of cymes	glabrous
8. *M. succulenta*	epiphytic shrubs	subquadrangular or quadrangular	opposite	axillary fascicles of cymes	glabrous
9. *M. varingiifolia*	epiphytic or terrestrial shrubs	terete	opposite	terminal cymes	glabrous
10. *M. macrophylla*	epiphytic shrubs	terete	opposite	axillary or terminal cymes	pubescent
11. *M. stephanostegia*	climbing shrubs	terete	opposite	terminal panicles	pubescent
12. Sect. *Heteroblemma*	climbing or creeping shrubs	terete, xylem lobed	alternate	axillary fascicles or glomerules	glabrous/ pubescent

Group 1. Medinilla magnifica alliance

This group consists of a single species, M. speciosa, in Borneo and includes M. magnifica of the Philippines, M. teysmanii 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 to a total of seven species in this section 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. danumensis, 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 compact 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, and 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 four more species that clearly belong to this group, namely M. muricata, M. rayae, 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. amplectens, 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 varingiifolia alliance

A group of two species (M. varingiifolia and M. ohwii) with close resemblance to Pachycentria in having terminal inflorescences and fruits that are urceolate, constricted, forming a narrow neck.

Group 10. 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. lasioclados, M. corallina, and M. endertii.

Group 11. 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 12. 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 obsolete.

The section is comprised of ten 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 stream banks 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.

Five new species are being described in this section, namely, M.

sandakanensis, M. kemulensis, M. capillipes, M. formanii, and M. brevipedicellata.

Key to species

1a. Leaves whorled/verticillate 2

b. Leaves opposite or alternate 9

2a. Young branches alate 3

b. Young branches never alate 6

3a. Inflorescence of terminal panicles; nodes encircled by a dense mat of rigid, appressed bristles; plants succulent ..... 1. M. speciosa (Reinw. ex Blume) Blume

b. Inflorescence of axillary cymes; nodes without bristles; plants woody 4

4a. Lateral pair of nerves marginal; fruits green at maturity ..... 7. M. atroviridis Regalado

b. Lateral pair of nerves distant from the margin; fruits purplish at maturity 5

5a. Leaves elliptic, apex acuminate; fruits 10 mm across ..... 6. M. pterocaula Blume

b. Leaves broadly obovate, apex apiculate; fruits 10-20 mm across ..... 8. M. clemensiana Regalado

6a. Leaves 5-nerved, all lateral pairs directly arising from the base; stamens equal in size 7

b. Leaves 3-plinerved, lateral pair arising from the midrib ca 1 cm above the base; stamens unequal in size 8

7a. Leaves broadly elliptic to obovate, apiculate; flowers 5-merous; fruits small, ca. 5 mm across ..... 5. M. rubrifrons Regalado

b. Leaves narrowly elliptic, acuminate; flowers 6-merous; fruits large, ca. 1 cm across ..... 3. M. kinabaluensis Regalado

8a. Leaves chartaceous, apiculate; pedicels long and slender ..... 4. M. urophylla Stapf

b. Leaves coriaceous, acuminate; pedicels thick ..... 2. M. quadrifolia (Blume) Blume

9a. Leaves opposite, xylem not lobed, shrubs 10

b. Leaves alternate, xylem lobed, creepers 43

10a. Young branches and/or lower leaf surface glabrous or nearly so 11

b. Young branches and/or lower leaf surface, at least on nerves, pubescent or puberulous 37

11a. Inflorescences terminal; fruits urceolate, constricted, having an erect limb (neck) 12

b. Inflorescences axillary; fruits globose or subglobose to campanulate 13

12a. Branches smooth, reddish-brown when dry; leaves broadly elliptic ..... 34. M. varingiifolia (Blume) Nayar

b. Branches rough, yellowish-brown to gray when dry; leaves narrowly elliptic ..... 35. M. ohwii Nayar

13a. Leaves distinctly petiolate, petiole at least 1 cm or longer 14

b. Leaves sessile or subsessile, petiole 5 mm or less 18

14a. Leaves elliptic, 7-plinerved 15

b. Leaves ovate, 3- to 5-plinerved 16

15a. Transverse veins distinct on abaxial surface; petiole 35-40 mm long; peduncle less than 10 mm long ..... 9. M. corneri Regalado

b. Transverse veins invisible on abaxial surface; petiole 10-20 mm; peduncle 30-50 mm long .... 10. M. danumensis Regalado

16a. Inflorescences much-branched panicles; adaxial surface of leaves glaucous, bluish green ..... 17. M. laxiflora Ridley

b. Inflorescences not paniculate; adaxial surface of leaves not glaucous, pallid green 17

17a. Inflorescences of cymes crowded distally on a peduncle 8-11 cm long; leaves 16-18 cm long, petiole 1.5-2.5 cm ..... 18. M. botryocarpa Regalado

b. Inflorescences not as above, peduncle 1-3 cm long 16. M. crassifolia (Reinw. ex Blume) Blume

18a. Peduncles long, 4-10 (-15) cm long; inflorescences pendent 19

b. Peduncles absent or short, 0.5-3 cm long 23

19a. Inflorescence a panicle of cymes, fleshy and tender, disintegrating upon drying; leaves 3-plinerved, transverse veins not apparent on abaxial surface ..... 19. M. longipedunculata Cogn.

b. Inflorescence an umbel of cymes 20

20a. Branches smooth; leaves distinctly 5-plinerved 21

b. Branches verrucose, heavily pustulate; leaves distinctly 7-plinerved 22

21a. Peduncles ca. 15 cm long ... 15. M. pedunculosa Ohwi ex Regalado

b. Peduncles 5-7 cm long ..... 14. M. latericia Regalado

22a. Branches slender; leaves apiculate .... 13. M. fragilis Regalado

b. Branches stout; leaves acute ..... 15. M. beamanii Regalado

23a. Hypanthium botuliform, leaves compact ..... 11. M. allantocalyx Regalado

b. Hypanthium campanulate, leaves patent 24

24a. Stems and to some extent leaves fleshy 25

b. Stems woody, leaves subcoriaceous to coriaceous 30

25a. Transverse veins conspicuous on both surfaces, numerous, of 20-30 pairs ..... 33. M. amplectens Regalado

b. Transverse veins indistinct to absent 26

26a. Leaves 3-plinerved, 11-17 cm long 27

b. Leaves 5-plinerved, 18-30 cm long 29

27a. Leaves obovate, young branches flattened, bark yellowish, flaky ..... 30. M. myrmecorhiza Regalado

b. Leaves elliptic, young branches not flattened 28

28a. Branches terete to subquadrangular ..... 28. M. succulenta (Blume) Blume

b. Branches acutely quadrangular ..... 29. M. quadrialata Regalado

29a. Stems alate-quadrangular, bark not corky ..... 31. M. aggregata Bakh. f.

b. Stems subquadrangular, bark corky ..... 32. M. suberosa Regalado

30a. Flowers solitary or paired 31

b. Flowers cymose 33

31a. Leaves elliptic-oblong, coriaceous . 20. M. sessiliflora Regalado

b. Leaves narrowly lanceolate, stiff, sclerophyllous 32

32a. Leaves uninerved, petiole 3-5 mm long ..... 21. M. richardsii Regalado

b. Leaves 3-plinerved, petiole 1-2 mm . 22. M. montisaping Regalado

33a. Stems 4-angled, branches winged at the junction of adjacent faces, nodes articulated ..... 27. M. salicina Ohwi ex Regalado

b. Stems terete, branches not winged, nodes not articulated 34

34a. Nodes with a mat of bristles up to 1 cm long; leaves 7 (9)-nerved ..... 23. M. muricata Blume

b. Nodes seemingly glabrous except for minute, caducous ciliate hairs on young stems; leaves 3-5-nerved 35

35a. Leaves short petiolate, petiole 1-2 cm long, base rounded to emarginate ..... 24. M. homoeandra (Stapf) Nayar

b. Leaves sessile, base auriculate, amplexicaul 36

36a. Leaves 3-nerved, nerves flattened or shallowly impressed on adaxial surface; plants blackening on drying ..... 26. M. subauriculata Regalado

b. Leaves 5-nerved, nerves impressed on adaxial surface, plants usually greenish on drying ..... 25. M. rayae Regalado

37a. Inflorescences of terminal paniculate cymes, bracts white or pink, showy ..... 42. M. stephanostegia Stapf

b. Inflorescences of axillary cymes, simple or umbelliform, bracts absent 38

38a. Peduncles at least 4 cm or longer 39

b. Peduncles shorter 41

39a. Leaves large, up to 24 cm long, 9 cm wide, transverse veins of 25-30 pairs, reticulate ..... 40. M. endertii Regalado

b. Leaves smaller, transverse veins fewer, not reticulate 40

40a. Indument of minute and dense rusty brown hairs, fulvous, evenly spread on abaxial surface of leaves, leaves never glabrescent ..... 37. M. rufescens Regalado

b. Indument consisting of hirsute or hispid hairs, lining the primary nerves and transverse veins, intraveinal areas glabrous, leaves glabrous at maturity ..... 41. M. rufopilosa Ohwi ex Regalado

41a. Leaves petiolate, large ..... 36. M. macrophylla Blume

b. Leaves sessile to subsessile, smaller 42

42a. Leaves 3-plinerved, abaxial surface glabrous, base not at all auriculate; young shoots densely wooly ..... 39. M. lasioclados Stapf

b. Leaves 5-plinerved, abaxial surface pubescent, base subauriculate, young shoots minutely red-furfuraceous ..... 38. M. corallina Cogn.

43a. Leaves glabrous on adaxial surface, minutely setose along reticulations on abaxial surface, margins serrulate 44

b. Leaves glabrous on both surfaces, margins entire 45

44a. Leaf blade ovate, apex acuminate, base cordate; fruit glabrescent, crowned with persistent calyx lobes, stalk 10-15 mm long, hirsute ..... 47. M. serpens Stapf

b. Leaf blade elliptic, apex cuspidate, base obtuse to rounded; fruit glabrous, truncate, stalk 25-50 mm long, glabrous ..... 49. M. flagellata Stapf

45a. Leaf blade linear, strap-like, more than three times as long as wide 46

b. Leaf blade elliptic or oblong to rotund, at most twice as long as wide 48

46a. Central pair of nerves arising from the midrib 4-8 cm above the base ..... 50. M. lorata Stapf

b. Central pair of nerves arising from the midrib 1 cm above the base 47

47a. Fruits glabrous, pedicel 2.5-3 cm long ..... 51. M. sandakanensis Regalado

b. Fruits setose, pedicel 1 cm long or shorter ..... 52. M. brevipedicellata Regalado

48a. Leaf base decurrent into the petiole .... 45. M. decurrens Cogn.

b. Leaf base not decurrent 49

49a. Leaf blade rotund, 9-plinerved ..... 46. M. kemulensis Regalado

b. Leaf blade elliptic, 5-plinerved 50

50a. Fruits and pedicels setose ..... 47. M. capillipes Regalado

b. Fruits and pedicels glabrous 51

51a. Upper pair of nerves arising from the midrib 4 cm above leaf base; inflorescences multiflowered ..... 44. M. formanii Regalado

b. Upper pair of nerves arising from the midrib 1-2 cm above leaf base, inflorescences few-flowered ..... 43. M. alternifolia Blume

1. Medinilla speciosa (Reinw. ex Blume) Blume

Medinilla speciosa (Reinw. ex Blume) Blume, Bijdr. Nat. Wet. 6 (1831) 256; Bot. Mag. 73 (1847) t. 4321; Bakhuizen van den Brink, Jr., Rec. Trav. Bot. Neerl. 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 1.5 cm long. Leaves compact, ternate or quarternate, sessile or subsessile, the latter with thickened petiole less than 5 mm long; blades 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; pedicel (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 4-5, thin, membranous, glabrous, oblong to ovate, 5-10 (-12) mm long, 4-6 (-8) mm wide, white or pink. Stamens 10, equal in size; filaments flattened, 5-6 mm long; anthers rostrate, 5-7 mm

long. 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, ca 1 mm long.

Distribution. Malay Peninsula, Sumatra, Java, Lesser Sunda Islands (West Sumbabwa and Lombok), Sulawesi, Moluccas. Borneo: Kalimantan (2 collections), Sabah (36 collections), Sarawak (5 collections).

Ecology. In secondary or primary forests between (900-) 1500-1900 m, locally common in oak-laurel forests on Mount Kinabalu.

Notes. 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; Bakhuizen van den Brink, Jr., Rec. Trav. Bot. Neerl. 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. Leaves verticillate, quarternate, petiolate, obovate or oblong-lanceolate, apex acuminate, acumen ca. 1 cm long, base acute, coriaceous, entire, 8.5-9 cm long, 4-5 cm wide, 3-nerved, rarely 5-nerved, transverse veins inconspicuous; petiole 2-3 cm long. Inflorescence umbelliform, axillary, produced on older branches below the leaves, up to 3 cm long; peduncle 1-2.5 cm long, bracteoles lanceolate, 5-6 mm long, 1 mm wide (observed in Haviland 1962). Calyx

tube broadly ovoid to campanulate, truncate, pink to red, 10 mm long, 6 mm wide; 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; ovary wall 1-2 mm thick; style up to 12 mm long. Fruits globose, green, turning red when ripe, 1 cm in diameter; stalk 0.5-0.8 cm long.

Distribution. Malay Peninsula, Sumatra, Java. Borneo: Kalimantan (5 collections), Sabah (2 collections), Sarawak (5 collections). - Figure 1.

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

Notes. Medinilla quadrifolia Blume 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 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 cylindric 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, Jr. (1963) that M. quadrifolia has narrower leaves than M. radicans does not hold for a number of specimens examined.

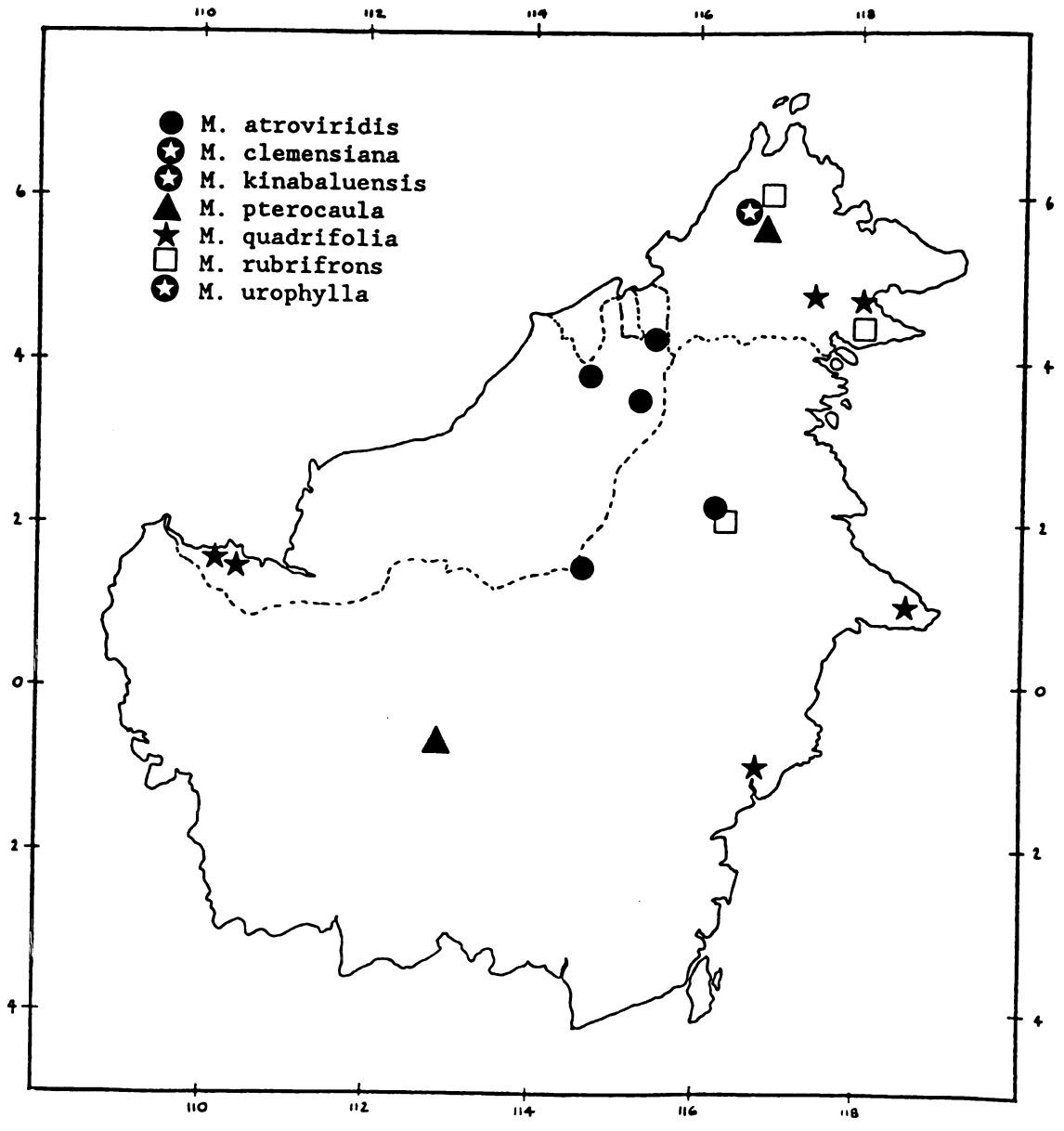

Figure 1. Distribution of species of Medinilla section Medinilla.

3. Medinilla kinabaluensis Regalado, sp. nov. - Figure 2.

Frutex scandens, epiphyticus, glaber; ramis tetragonis, ramulis teretibus; foliis verticillatis, ellipticis, 6-7.5 cm longis, 3-3.5 cm latis, quinquenervibus; apice acuminato, acumine ad 1 cm longo; basi acuminata; petiolo 1-1.5 cm longo; inflorescentiis umbellate dispositis, terminalibus vel axillaribus, circiter 3 ad 4 cm longis, floribus sexmeris, staminibus 12, aequalibus; fructibus globosis, sexlocellatis. - Typus: Clemens 28775 (UC, iso BO, K, L, NY, SING), Sabah, Mount Kinabalu, Tenompok.

Climbing shrub, epiphytic, glabrous. Branchlets terete and smooth, becoming ribbed and rough at maturity. Leaves quarternate; petiole 1-1.5 cm long; blade coriaceous, elliptic, 6-7.5 cm long, 3-3.5 cm wide; margin entire; apex acuminate, acumen up to ca. 1 cm long; base acuminate; nerves 5, arising from the base, marginal pair less conspicuous and diminishing near the apex; drying olive green adaxially, yellowish brown abaxially. Inflorescence terminal or axillary, few-flowered, umbelliform, ca. 3-4 cm long; peduncle up to 2 cm long, glabrous. Hypanthium obconical, truncate, 7 mm long, 7 mm wide. Petals 6, ovate, glabrous, entire, 7 mm long, 5 mm wide. Stamens 12, equal in size; anthers linear-oblong, 5 mm long. Ovary one-half the length of hypanthium, 6-celled; style cylindric, 6 mm long; stigma minute, punctiform. Fruits globose, dark red, large, up to 1 cm in diameter, stalk thick, 1 cm long; pericarp thick, ca. 1 mm across; seeds numerous, minute, embedded in pulpy tissue.

Distribution. Sabah: Mount Kinabalu (7 collections), endemic. - Figure 1.

Figure 2. Medinilla kinabaluensis Regalado - a. habit, x 0.66; b. fruit, x 1.5; c. seeds, x 10.

Ecology. Primary forest at 1500 m.

Notes. Nearest to M. quadrifolia (Blume) Blume but leaves 5-nerved, the nerves arising directly from the base, narrowly elliptic with acuminate tips and bases; the flowers are 6-merous with equal stamens.

4. Medinilla urophylla Stapf

Medinilla urophylla Stapf, Trans. Linn. Soc., London II, 4 (1894) 160. - Type: Haviland 1278 (K), Sabah. Mount Kinabalu.

Scandent shrub, epiphytic. Branches terete, glabrous, bark ivory white. Leaves verticillate, quarternate, drying red-brown above, ochraceous beneath; petiole 2-3 cm long; blade subcoriaceous, elliptic to oblanceolate or obovate, 6-7.5 cm long, 3-4 cm wide; margin entire; apex acuminate, acumen about 5 mm long and rolled up, thus apex appears caudate; base acute; trinerved, nerves raised on abaxial surface; transverse veins obscure except those of new shoots. Inflorescence axillary, umbelliform; peduncle 10-20 mm long; pedicel 8-10 mm long. Hypanthium campanulate, truncate, glabrous, 6 mm long, 5 mm wide. Petals 5, white, transparent, membranous, broadly obovate, 12 mm long, 10 mm wide. Stamens 10 or 12, 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 one-half the length of hypanthium, 5-celled; style slender, 12 mm long; stigma minute, punctiform, reddish brown. Fruit subglobose, pink to purple, 5-6 mm across, pericarp on drying shedding of waxy layers; seeds numerous, minute.

Distribution. Sabah: Mount Kinabalu (6 collections), endemic. - Figure 1.

Ecology. On ridges or edges of cliffs, 900-1200 m.

5. Medinilla rubrifrons Regalado, sp. nov.

Frutex scandens, epiphyticus, glaber; ramis ramulisque teretibus; foliis verticillatis, quarternis, ad frondescentiam rubris, ellipticis ad obovatis, subcoriaceis, 8 ad 9 cm longis, 4 ad 5.5 cm latis, quinquenervibus; apice cuspidato vel caudato; basi angustata vel acuta; petiolo ad 2.5 cm longo; inflorescentiis axillaribus, fasciculatis, umbelliformibus, floribus albis, quinquemeris. - Typus: Clemens 27693 (A, iso BM, BO, K, L, NY, UC), Sabah, Mount Kinabalu, Tenompok.

Scandent shrub, epiphytic; stems and branches terete, glabrous. Leaves verticillate, quarternate, petiole 1.5-2.5 cm long, subcoriaceous, young leaves in dry state flushed red, elliptic to obovate, blade 8-9 cm long, 4-5.5 cm wide, apex cuspidate or caudate, base attenuate or acute; 5-nerved, lateral pair of nerves coalesced at the base and percurrent into the apical point. Inflorescences umbelliform, axillary, fascicled in 3s or 4s on leafless nodes, up to 5 cm long when expanded, peduncle 2 cm long. Calyx campanulate, truncate, 5 mm long, 4 mm wide; petals 5, white, translucent, obovate. Stamens 10, equal; anthers 9 mm long, rod-shaped, slender; filaments 6-8 mm long; dorsal spur 1-2 mm long, ventral appendages gibbose. Ovary one-half the length of hypanthium, extraovarian chambers extending to the base of ovary; style 8-10 mm long, stigma capitate, minute, reddish-brown. Fruits pink, ca. 5 mm in diameter, stalk up to 1 cm long.

Distribution. East Kalimantan (2 collections), Sabah (3 collections). - Figure 1.

6. Medinilla pterocaula Blume

Medinilla pterocaula Blume, Flora 14 (1831) 509; Bijdr. Nat. Wet. 6 (1831) 251; Bakhuizen van den Brink, Jr., Rec. Trav. Bot. Neerl. 40 (1943) 156. - Type: Java: Mt. Salak, Blume s.n. (L).

Scandent shrub, epiphytic, up to 1 m high. Branches distinctly winged or undulate, becoming ribbed on older branches, glabrous. Leaves quarternate, 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. Inflorescence axillary, arising from leafless nodes; flowers in cymes umbellately disposed on a peduncle up to 4 cm long. Hypanthium ovoid to campanulate, truncate, cream white, glabrous, 10 mm long, 6-7 mm wide. Petals 5, white, ovate, somewhat fleshy, glabrous, 5 mm long, 4 mm wide. Stamens 10, sometimes 12, equal in size; filaments 1-1.5 mm long; anthers linear lanceolate, rostrate 3-5 mm long, dorsal spur ca 1 mm long, ventral appendages gibbose. Ovary one-half as long as hypanthium, ovary wall thick, 2 mm across; style 3-5 mm long; stigma minute, punctiform, red-orange. Fruit ovoid, 5-loculate, purple, up to 10 mm across; stalk 10 mm long; seeds numerous, smooth.

Distribution. Malay Peninsula, Java, Sumatra, Sulawesi, Moluccas. Borneo: Kalimantan (1 collection), Sabah (2 collections). - Figure 1.

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

Notes. Rare, only three gatherings from Borneo were examined.

7. Medinilla atroviridis Regalado, sp. nov. - Figure 3.

Medinilla pterocaulae affinis sed foliis plerumque minoribus laminisque praesertim obovatis, apiculatis differt. Typus: 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 alate, pale yellow, brown-furfuraceous, becoming ribbed and glabrous at maturity. Leaves quarternate, verticillate; 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-plinerved, the lateral pair of nerves running 2-5 mm from the margin, transverse veins hardly evident above, not visible below. Inflorescence axillary, fascicled on leafless nodes, many-flowered, umbelliform; peduncle 2-2.5 cm long. Hypanthium ovoid, cream colored, 7-10 mm long, 4-5 mm wide, minutely brown- furfuraceous. Petals 5, cream white, ovate, glabrous, entire, 5 mm long, 4 mm wide. Stamens 10, equal; filaments ligulate, flat, 4-5 mm long; anthers linear to lanceolate, 3-4 mm long; dorsal spurs short, almost obsolete, ventral appendages gibbose. Ovary one-half the length of hypanthium, 5-celled; ovary wall 1-1.5 mm thick; style cylindric, 4 mm long; stigma punctiform. Fruits globose, green,

Figure 3. Medinilla atroviridis Regalado - a. habit, x 0.66; b. flower bud, x 2; c. stamen, x 3; d. fruit, x 1.5; e. seeds, x 5.

7-9 mm across; pericarp thick, 1.5-2 mm across; seeds numerous, minute, fulvous.

Distribution. East Kalimantan (2 collections), Sarawak (4 collections). - Figure 1.

Ecology. In primary and secondary forests on igneous derived soils or limestone at 700-900 m.

Vernacular name. Wa tengkang (Kelabit).

Notes. Closely related to M. pterocaula, but the leaves are much smaller, narrowly obovate, apiculate.

8. Medinilla clemensiana Regalado, sp. nov.

Medinilla pterocaulae proxima sed foliis late obovatis cum apice mucronato et floribus fructibusque majoribus differt; M. rubrifrondi aemulans sed ramis alatis differt. - Typus: Clemens 34232 (BM, iso A, BO, NY), Sabah, Mount Kinabalu, Penataran Basin.

Scandent shrub, epiphytic. Young branches winged or undulate, old stems cylindric, ribbed, yellow brown when dry. Leaves quarternate, verticillate; petiole 2-2.5 cm long; blade subcoriaceous, broadly obovate, 7-9 cm long, 3.5-5 cm wide; margin entire; apex mucronate; base acute; 3-plinerved; transverse veins inconspicuous on adaxial surface, not apparent on abaxial surface. Inflorescence axillary, umbelliform; peduncle 2 cm long; pedicel 1 cm long. Hypanthium ovoid, 8 mm long, 4-5 mm wide, truncate, glabrous. Petals 5, cream white, ovate, glabrous, entire, 5 mm long, 4 mm wide. Stamens 10, equal in size; filaments linear, short, ca 2 mm long; anthers linear-oblong, 4-5

mm long; dorsal spur reaching 1 mm long. Ovary one-half the length of hypanthium, 5-celled; ovary wall thick, ca. 2 mm across; style 3-5 mm long; stigma punctiform. Fruit globose, purplish, 1-2 cm across; seeds numerous, ovoid, 1 mm long, yellow-orange, smooth.

Distribution. Sabah: Mount Kinabalu (3 collections), endemic. - Figure 1.

Ecology. 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, M. 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 Mount Kinabalu in 1915 and 1931-33.

9. Medinilla corneri Regalado, sp. nov.

Frutex scandens glaber, ramis teretibus, striatis; foliis oppositis, coriaceis, late ellipticis ad oblongis, 15-16 cm longis, 9-10 cm latis, septuplinervibus; apice acuto; basi obtusa ad rotundata; subtus venis transversis prominentibus; petiolo 3.5-4 cm longo; inflorescentiis ex axillis defoliatis; fructibus campanulatus, 7-8 mm latis, 5-locularibus, minute quinquedenticulatis. - Typus: Chew, Corner & Stainton RSNB 279 (K, iso L, SING), Sabah, Ranau District, Mount Kinabalu, Eastern Shoulder.

Climber. Branches cylindric, 8 mm in diameter, striate, sparsely

pustulate, glabrous. Leaves opposite; petiole 3.5-4 cm long, thickened, 3 mm in diameter; blade glabrous on both surfaces, drying pale green above, dark brown below, coriaceous, 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, rim shallowly 5-dentate, yellow, turning red when ripe, 8-10 mm across, 5-celled, pericarp 1 mm thick, smooth, glabrous, stalk 5 mm long; seeds numerous, light yellow, 0.5 mm long.

Distribution. Sabah (Mount Kinabalu), known only from type collection at an elevation of 1300 m. - Figure 4.

Notes. This species and M. danumense are related to a group of six species endemic to the Philippines (M. bagobo, M. copelandii, M. coriacea, M. megacarpa, M. merrittii, M. piperoides) 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 Mount Kinabalu in 1961 and 1964.

10. Medinilla danumensis Regalado, sp. nov.

Species Medinilla corneri similis, sed venis transversis indistinctis et petiolo breviore differt; fructibus umbellate

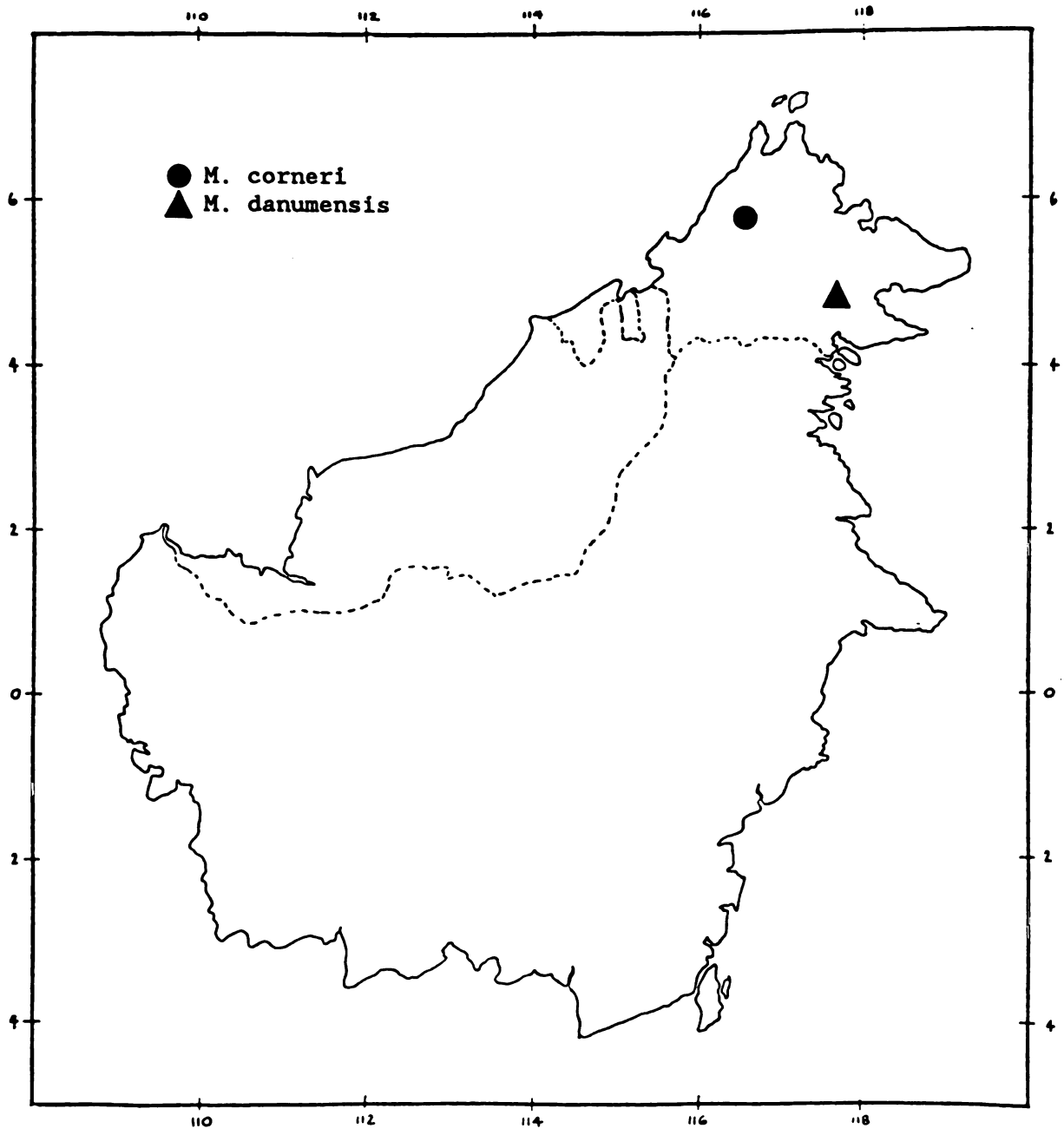

Figure 4. Distribution of species of the M. corneri alliance.

dispositis, pedunculo 3.5 cm longo suffultis. - Typus: Cockburn SAN 84910 (L, iso K, SAN), Sabah, Lahad Datu District, Sg. Segama, below Kuala Beatrice.

Shrub up to 1 m high. Branches cylindric, slender, 5 mm in diameter, glabrous; bark yellow, lightly 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. - Figure 4.

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, sp. nov. - Figure 5.

Species nova insignis Medinilla verrucosae affinis sed habitu robustiore differt; foliis compactis, basi obtusa ad rotundata; inflorescentiis brevioribus. - Typus: 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, heavily pustulate, verrucose, 8-10 mm in diameter. Leaves opposite, compact, sessile, 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 acumen 1-2 cm long; 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 ca 45 degrees. Inflorescence 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; filaments flattened, 2 mm long; anthers ovate-lanceolate, 2 mm long. Ovary one-half the length of hypanthium; extraovarian chambers reaching two-thirds the length of ovary; ovary wall 0.7 mm across; 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.

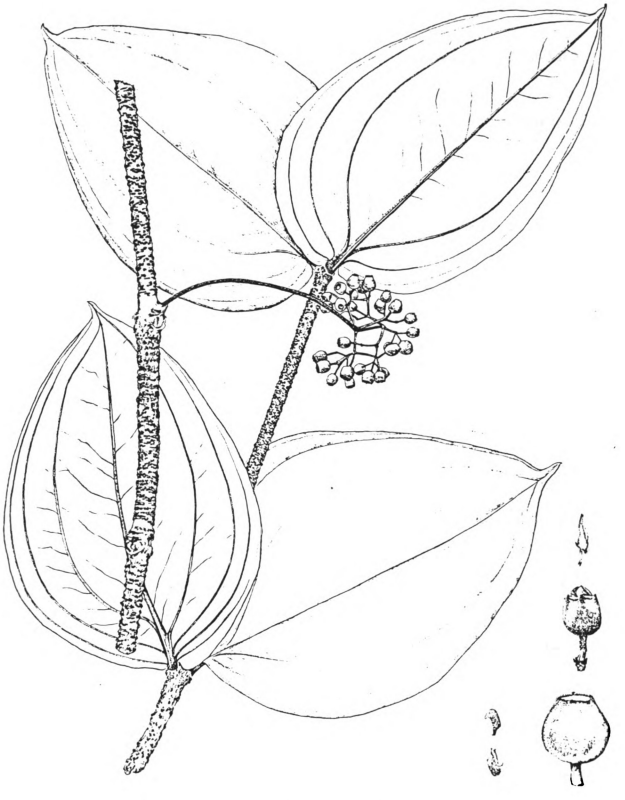

Figure 5. Medinilla beamanii Regalado - a. habit, x 0.66; b. flower bud, x 2.5; c. stamen, x 5; d; fruit, x 3; e. seeds, x 7.

Distribution. Sabah (14 collections): Mount Kinabalu, Gunung Alab, endemic. - Figure 6.

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

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

12. Medinilla allantocalyx Regalado, sp. nov.

Medinilla beamanii affinis sed calyce botuliformis et inflorescentiis brevissime pedunculatis differt. - Typus: 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 cylindric, 10 mm in diameter; bark rough, warty; nodes sometimes provided with adventitious roots. Leaves opposite, compact, sessile, 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 ca 2 cm above the base; transverse veins distinct on both surfaces, running across the blade in 15-20 pairs. Inflorescence 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; pedicel 1.5 mm long. Hypanthium botuliform, 6.5 mm long, 3.5 mm wide, reddish brown;

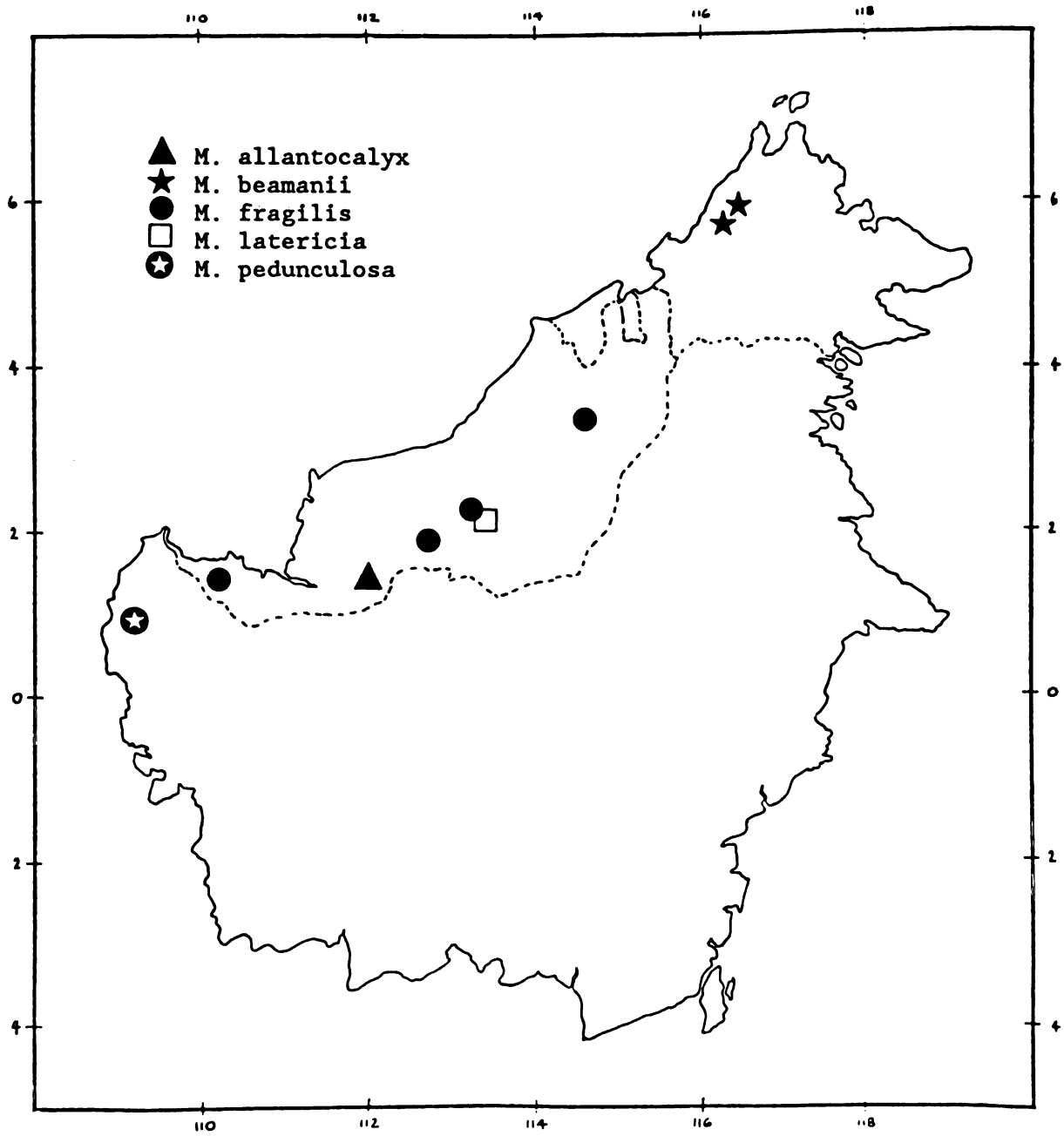

Figure 6. Distribution of species of the M. beamanii alliance.

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, white, ovate, apex acute, glabrous, fleshy, concave, 4.5 mm long, 2.5 mm wide. Stamens 8, equal in size; filaments flattened, 1.5 mm long; anthers elliptic-lanceolate, 2.5 mm long, rostrate. Ovary one-half the length of hypanthium, extraovarian chambers extending to the bottom of ovary, 5-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, hilum concave, light yellow, 1-1.2 mm long.

Distribution. Sarawak (2 collections), endemic. - Figure 6.

Ecology. On ridge top in mossy forest at 900-1000 m.

13. Medinilla fragilis Regalado, sp. nov.

Medinilla beamanii similis sed ramis tenuibus, foliis minoribus et angustatis, apiculatis differt. - Typus: Chai S 36155 (K, iso L, SAN), Sarawak, 7th Div., Bukit Goram, Ulu Sg. Kapit.

Epiphytic shrub. Branches cylindric, slender, glabrous, bark whitish, heavily pustulate, verrucose. 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 on adaxial surface, transverse veins faintly visible on adaxial surface, distinct on abaxial surface. Inflorescence axillary, many-flowered cymes subumbellately disposed at the distal end of a slender, terete, glabrous peduncle 4-7 cm long.

Hypanthium campanulate, red, glabrous, 4.5 mm long, 3.5 mm wide. Petals 5, white, ovate, apex acute, 3 mm long, 2 mm wide. Stamens 10, equal; filament ca 1 mm long; anthers rostrate, 2.5 mm long. Ovary one-half the length of hypanthium, extraovarian chambers extending to bottom of ovary, ovary wall 0.7 mm across; 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 collections), endemic. - Figure 6.

Ecology. Near streams and riversides in mossy forests from 150-500 m, ascending to 800 m on Bukit Goram.

Vernacular name. Daun kesula (Kayan).

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

14. Medinilla latericia Regalado, sp. nov.

Medinilla fragili affinis sed ramis laevigatis vix verrucosis differt. - Typus: Ilias S 26592 (K, iso L), Sarawak, 3rd Div., Kapit District, Bukit Salong, Ulu Sampurau waterfall.

Epiphytic shrub. Branches cylindric, 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 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 terete, slender, pendulous, glabrous peduncle 5-7 cm long, developing from cymes umbellately clustered at the distant end of the peduncle, globose, bright red, 5 mm across, crowned with 5 sharp calyx teeth.

Distribution. Sarawak, known only from the type. - Figure 6.

Ecology. 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, slender and flexuous or pendulous peduncle, and globose fruits, not constricted below the rim. The name for this species alludes to the brick-red color of the leaves when dry.

15. Medinilla pedunculosa Ohwi ex Regalado, sp. nov.

Frutex glaber; ramis teretibus; foliis oppositis, sessilibus, ovato-ellipticis, 15 ad 20 cm longis, 5 ad 8 cm latis, quintuplinervibus; apice acuminato; basi cuneata; inflorescentiis umbelliformis, multifloris; pedunculo ad 15 cm longo; floribus 5-meris, calyce cylindrico, quinquedentato, petalis oblongo-ellipticis, staminibus 10, aequantibus; fructibus subglobosis, 3 mm latis. - Typus: Hallier 583 (BO), West Kalimantan, Gunung Damus.

Shrub. Branches cylindric, 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 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 cylindric, 5 mm long, 3 mm wide, smooth, glabrous, 5-dentate. Petals 5, oblong-elliptic, 8 mm long, 3 mm wide. Stamens 10, equal; filaments flattened, 3-4 mm long; anthers linear, 4-5 mm long; dorsal spur prolonged up to 1 mm. Ovary one-half the length of hypanthium, extraovarian chambers extending to bottom of ovary; 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 collections). - Figure 6.

Notes. 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; Bakhuizen van den Brink, Jr., Rec. Trav. Bot. Neerl. 40 (1943) 188; Maxwell, Gard. Bull. Sing. 31 (1978) 157. - Melastoma crassifolium Blume, Bijdr. Fl. Ned.-Ind. 17: 1075. 1826. - Type: Reinw. s.n. (L, n.v.), Java.

Medinilla caudatifolia Schwartz, Mitt. Inst. Bot. Hamburg 7 (1931) 252, syn. nov. Type: Winkler 901 (HBG, iso BO), West Kalimantan, Bukit Raya.

Medinilla hasseltii Blume var. subsessilis Schwartz, Mitt. Inst. Bot. Hamburg 7 (1931) 255, syn. nov. Type: Winkler 458 (HBG), West 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 cylindric, smooth to sparsely pustulate, glabrous, 4-5 mm in diameter. Leaves opposite, glabrous on both surfaces, compact to erectopatent, 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. Inflorescence 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; filaments flattened, 1-3 mm long; anthers linear to ovate lanceolate, slightly rostrate, 2-4 mm long. Ovary one-half the length of hypanthium; 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 collections), Kalimantan (51 collections), Sabah (134 collections), Sarawak (60 collections).

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

Notes. 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. Inflorescence 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; pedicel 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, filaments 2 mm long, anthers 3 mm long, narrowly triangular, dorsal spur 2 mm long. Ovary two-thirds the length of the hypanthium, 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. - Figure 7.

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

18. Medinilla botryocarpa Regalado, sp. nov.

Species Medinilla crassifoliae similis et ut videtur affinis, sed foliis multo majoribus usque ad 18 cm longis, petiolis pedunculisque longioribus differt. Frutex epiphyticus; ramis teretibus; foliis oppositis, ovatis, coriaceis, 16-18 cm longis, 5-8 cm latis,

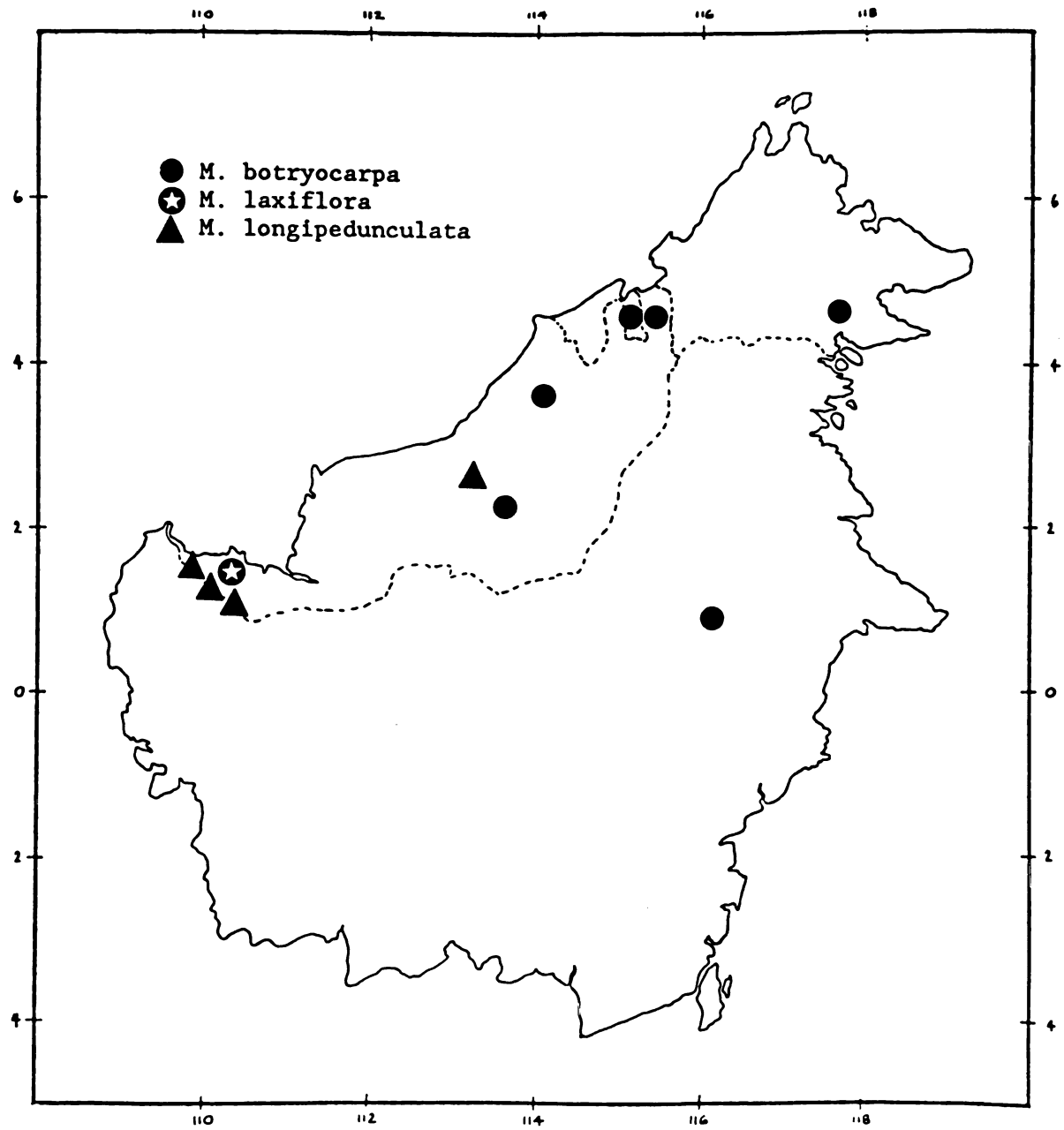

Figure 7. Distribution of species of the M. crassifolia alliance.

quintuplinervibus; petiolo 1.5-2.5 cm longo; inflorescentiis axillaribus, pedunculo 8-11 cm longo suffultis, floribus quinquemeris, calycibus campanulatis, glabris, staminibus aequantibus; fructibus globosis, 4-5 mm latis. - Typus: Chai & Ilias S 31519 (K, iso L, SAN, SING), Sarawak, 5th Div., Kenaya 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 cuspidate; 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. Inflorescence 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, 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; anthers narrowly triangular, S-shaped, ventral spur subulate, almost obsolete (1 mm long), dorsal appendages calcarate. Ovary two-thirds the length of the hypanthium, ovary wall thin, 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 collection), East Kalimantan (1 collection), Sabah (1 collection), Sarawak (4 collections), endemic. - Figure 7.

Ecology. 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).

Notes. Related to M. crassifolia in leaf characters but differing from the latter in having larger leaves, longer petioles, 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 shrub, 1.5 m high. Branches terete, moderately 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, 5-plinerved, midrib and lateral nerves flattened adaxially, shallowly raised abaxially, transverse veins hardly evident on adaxial surface, not apparent on abaxial surface. Inflorescence axillary, few- to many-flowered, of paniculate or umbellate cymes, lax, reportedly bright orange to red; peduncle 6-9 cm long, glabrous; bracteoles persistent, subulate, 1 mm long, glabrous; pedicel 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; filaments ligulate, 3 mm long; anthers linear lanceolate, 4-5 mm long, connectives hardly produced, ventral spur 4 mm long, dorsal appendage 5-6.5 mm long. Ovary one-half the length of hypanthium; 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 collections), endemic. - Figure 7.

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

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

20. Medinilla sessiliflora Regalado, sp. nov.

Frutex glaber, ut videtur erectus, 1-3 m altus; ramis ramulisque teretibus; foliis oppositis, petiolatis, elliptico-oblongis, 7.5-9.5 cm longis, 3-4.5 cm latis, triplinervibus; apice cuspidato; basi acuta; inflorescentiis axillaribus, plerumque sessilibus vel breviter pedunculatis, floribus 4-meris, bibracteolatis, calyce quadridentato, staminibus aequantibus; fructibus globosis, 5 mm latis. - Typus: 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, erect-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 peduncle up to 5 mm long; bracteoles persistent, subulate, 1 mm long; pedicel 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 one-half the length of hypanthium, 4-celled; ovary walls thin; style 4 mm long; stigma punctiform. Fruit globose, 5 mm across, calyx teeth persistent; seeds minute.

Distribution. Kalimantan (1 collection), Sarawak (8 collections). - Figure 8.

Ecology. In mixed lowland dipterocarp or riparian forests, 100-200 m, collected on Mount Gading at 600 m, also found in heath forest of Mount Dulit at 900 m.

Notes. This species resembles M. crassifolia in leaf characters but is distinguished from it in having solitary, almost sessile flowers.

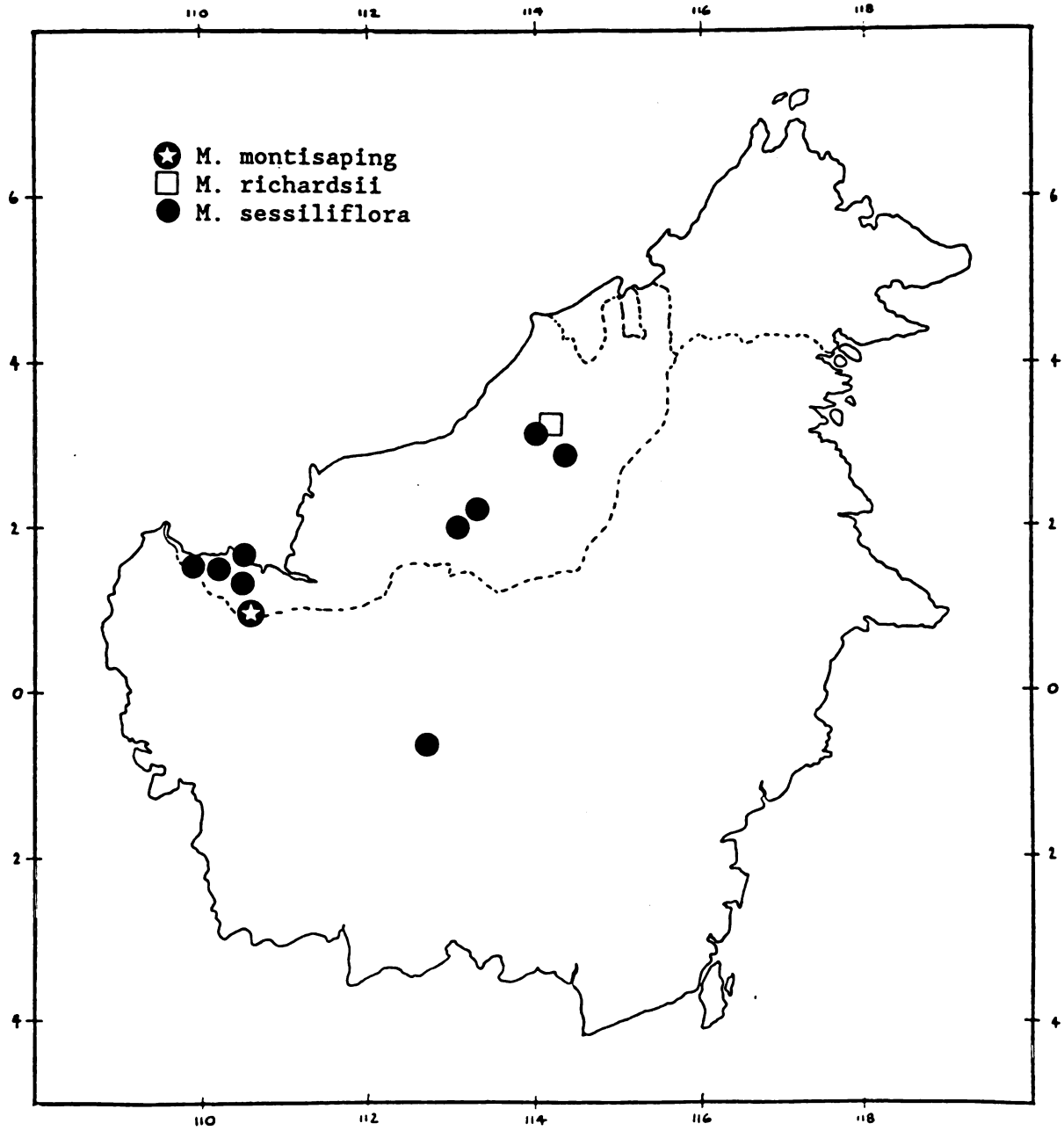

Figure 8. Distribution of species of the M. sessiliflora alliance.

21. Medinilla richardsii Regalado, sp. nov.

Frutex epiphyticus, glaber, ut videtur erectus, circiter 1 m altus; ramis ramulisque teretibus, tenuibus; foliis oppositis, anguste lanceolatis, coriaceis, uninervibus; apice acuminato; basi attenuata vel cuneata, venis transversis nullis; petiolo ad 5 mm longo; floribus axillaribus, solitariis, fere sessilibus, longis et acute quadridentatis, staminibus 8, aequalibus. - Typus: Richards 2172 (K), Sarawak, Mount Dulit.

Slender, epiphytic shrub, ca 1 m high. 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, adaxial surface drying grayish green, abaxial surface yellowish brown. Flowers axillary, solitary at the nodes; bracteoles ovate, glabrous, ca 1-1.5 mm long; pedicel terete, glabrous, ca 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, ca 1 mm long. Petals 4, ovate, membranous, 3.5-5 mm long, 2-3 mm wide. Stamens 8, equal in size; filaments glabrous, flattened, 1.5 mm long; anthers narrowly triangular, 2.5-3 mm long. Ovary four-fifths the length of the hypanthium, 4-celled; extraovarian chambers extending three-fourths the length of the ovary; ovary wall ca 0.5 mm thick; style short, ca 2 mm long; stigma minute, punctiform. Fruit unknown.

Distribution. Sarawak (Mount Dulit), known only from the type collection. - Figure 8.

Ecology. Open mossy forest, on ridges of Mount Dulit at 1300-1400 m. Apparently extremely local, so far as known confined to Mount Dulit.

Notes. 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, sp. nov.

Species Medinilla richardsii affinis sed foliis triplinervibus, petiolo minore, 1-2 mm longo differt. 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. - Typus. Collenette 738 (K), Sarawak, 1st Div., Gunung Aping.

Erect, virgate, 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, 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 ovoid, smooth, glabrous, red, 3-4 mm across, crowned with persistent 4-dentate calyx; stalk 3 mm long; seeds numerous, ovoid, light yellow, 0.7 mm long.

Distribution. Sarawak, known only from the type collection. - Figure 8.

Ecology. Mossy forest, summit crest of Mount Aping at 900 m.

Notes. A species related to M. 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. - Type: 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 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; 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; pedicel up to 2 mm long. Hypanthium narrowly ovate to oblong, 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 stamens with 2 mm

long anthers, 2.5 mm long filaments; long stamens with 2.5 mm long anthers 2.5 mm long, 3 mm long filaments; anthers narrowly ovate-lanceolate; dorsal and ventral appendages hardly produced, very short (0.25 mm long). Ovary two-thirds the length of the hypanthium, 4-celled; extra-ovarian chambers extending to the base of the ovary; style 5 mm long; stigma capitate. Fruit globose, 5-6 mm in diameter, cupped with persistent calyx remains, subtended by a stalk ca 5 mm long. Seeds tawny yellow, ca 1 mm long.

Distribution. Sumatra, Sulawesi. Borneo: Brunei (1 collection), Kalimantan (23 collections), Sabah (7 collections), Sarawak (19 collections). - Figure 9.

Ecology. 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).

Notes. Easily recognizable by the bristly nodes which are also characteristic of M. speciosa Blume and M. stephanostegia Stapf. 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, II, 4 (1894) 161; Merrill, Enum. Born. Pl. (1921) 443. - Type: Haviland 1170 (K), Sabah, Mount Kinabalu.

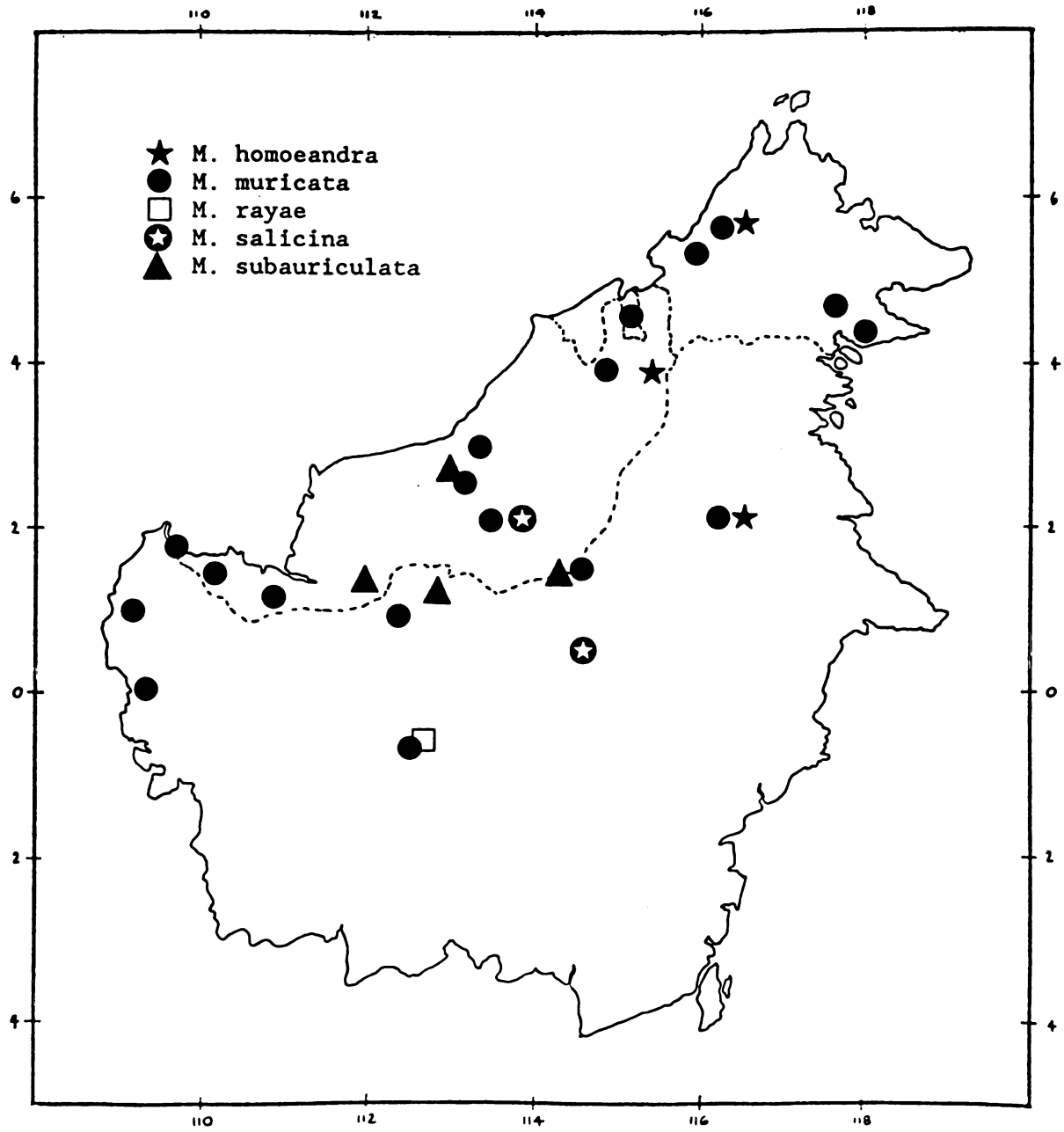

Figure 9. Distribution of species of the M. myrtiformis alliance.

Erect, slender 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 caudate, prolonged into an apiculate 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; pedicel 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 erect-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; filaments glabrous, linear, up to 3 mm long; anthers 3 mm long, base of locules rounded; dorsal spur triangular-hastate. Ovary ca. two-thirds the length of the hypanthium, 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 (1 collection), Sabah (23 collections), Sarawak (1 collection). - Figure 9.

Ecology. Primary forests, 1500-2100 m.

25. Medinilla rayae Regalado, sp. nov. - Figure 10.

Frutex epiphyticus glaber, ut videtur erectus, ramis ramulisque teretibus, innovationibus ad nodos ciliolatis, foliis oppositis, sessilibus amplexicaulisque, in siccitate chartaceis, usque ad 9-10 cm longis, 2.5-3 cm latis; basi auriculata; nervis supra impressis subtus prominentibus, floribus axillaribus, sessilibus, confertis, breviter pedicellatis, calyce acute quadridentato, glabro, petalis 4, albis, lanceolatis, staminibus 8, inaequalibus, ovario quadriloculari. - Typus: Nooteboom 4576 (L), Central Kalimantan, Bukit Raya.

Epiphytic, glabrous shrub. Young branches erect-patent, terete, smooth, minutely red-ciliolate at the nodes. Older stems terete, 7 cm in diam., the bark with irregular and shallow fissures, yellow brown, nodes slightly swollen. Leaves opposite, sessile, amplexicaul; blade chartaceous when dry, ovate, 9-10 cm long, 2.5-3 cm wide; margin entire; apex gradually acuminate, tapering into a caudate tip up to 2 cm long, base auriculate, the auricles clasping the stem; nerves 5, the outermost pair less conspicuous than the inner ones, departing at 3-5 mm above the base, the midrib and innermost pair of nerves strongly impressed adaxially, raised abaxially, transverse nerves not visible. Flowers axillary, crowded, fascicled at the nodes; bracteoles subulate, 1 mm long; pedicel 2 mm long. Hypanthium cylindric, 3-4 mm long, 2 mm wide, glabrous. Calyx lobes 4, acute. Petals 4, white, lanceolate, 5-6 mm long, 2-2.5 mm wide, glabrous. Stamens 8, unequal in size; short stamens with 3 mm long anthers, 1.5 mm long filaments; long stamens with 4 mm long anthers, 2 mm long filaments; anthers linear-oblong. Ovary 4-celled, ovary wall thin; style 5-7 mm long, stigma punctiform. Fruits unknown.

Figure 10. Medinilla rayae Regalado - a. habit, x 0.66; b. flowering branch, 0.66; c. flower bud, x 3; d. stamen, x 6.

Distribution. Central Kalimantan (Bukit Raya), known only from the type collection. - Figure 9.

Ecology. Primary mountain forest at 1500 m, flowers collected in January.

Notes. Similar in habit to Medinilla homoeandra (Stapf) Nayar but distinguished by the sessile leaves with auriculate bases.

26. Medinilla subauriculata Regalado, sp. nov. - Figure 11.

Frutex epiphyticus, glaber; ramis ramulisque laevibus, castaneis; foliis oppositis, sessilibus, anguste ovatis, usque ad 15 cm longis, 4.5 cm latis, triplinervibus; apice acuminato; basi breve angustata, subauriculata; floribus solitariis vel cymose dispositis, axillaribus, staminibus 8, valde inaequalibus; fructibus globosis, ad 4 mm diam., pericarpio tenui. - Typus: Wright S 27200 (K; iso A, L, SING), Sarawak, Bintulu, Ulu Segan.

Epiphytic 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 beset with a cushion of rusty brown hairs. Older branches subquadrangular 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-nerved, lateral pair of nerves departing just above the base; 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; pedicel slender, terete, at most 1.5 mm long, glabrous. Hypanthium cylindric 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 apically, entire, 2.5 mm long, 1 mm wide. Stamens 8, unequal in length; short stamens with 1-1.5 mm long anthers, filament not greater than 1 mm; long stamens with 2 mm long anthers, filament 1-1.5 mm; anthers narrowly ovate-lanceolate, bilobed at the base, connectives hardly produced. Ovary three-fourths the length of the hypanthium; extra-ovarian chambers extending to the middle of the ovary, 4-celled; style cylindric, 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; stalks up to 3 mm long; seeds numerous, ovoid, 0.8 mm long, testa golden yellow, hilum orange.

Distribution. Borneo: Sarawak (5 collections), Kalimantan (1 collection). - Figure 9.

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

Notes. 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 connectives hardly produced. The stems and to some extent the leaves become chocolate-brown to blackish on drying.

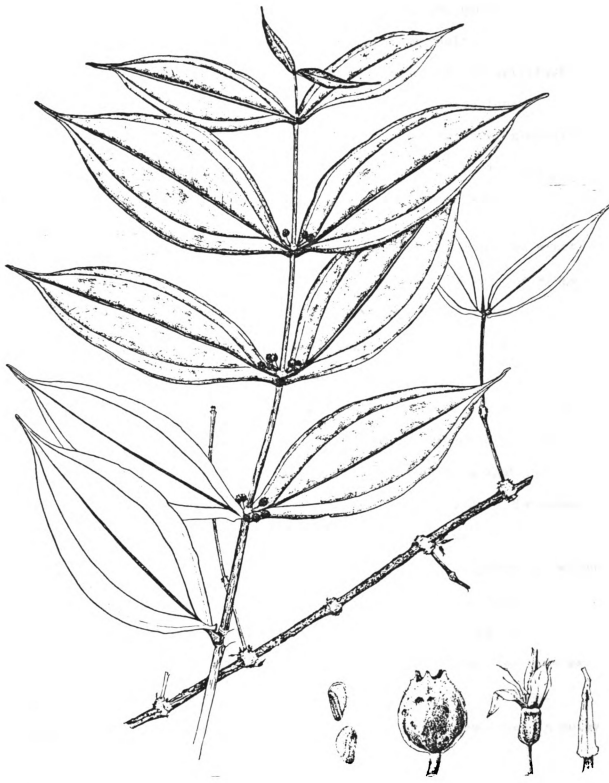

Figure 11. Medinilla subauriculata Regalado - a. habit, x 0.66; b. flower bud, x 3; c. stamen, x 9; d. fruit, x 4; e. seeds, x 13.

27. Medinilla salicina Ohwi ex Regalado, sp. nov. - Figure 12.

Species insignis ramulis tetragonis, angulis alatis, nodis articulatis. Frutex glaber, epiphyticus; foliis oppositis, subsessilibus, anguste ovatis, in siccatate subcoriaceis fragilisque, usque ad 10 cm longis, 2.5 cm latisquinquenervibus; apice longe acuminato, basi obtusa vel rotundata; fructibus axillaribus, globosis, ad 5 mm crassis, 4-locellatis. - Typus: Ilias S 26590 (K, iso L), Sarawak, 3rd Div., Kapit District, Ulu Sampurau, Bukit Salong.

Epiphytic shrub, on trees at height of about 3 m. Branches erect-patent, 4-angled, winged at the junction of adjacent faces, the wings crisped when dry, reddish brown to yellow-brown. Older stems quadrangular, 4-ribbed, non-pustulate, light brown, the wings light yellow, exfoliating; nodes articulated. Leaves opposite; 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, ca 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. Fruit axillary, globose, 4-loculate, reportedly red in color, 3.5-5 mm in diameter. Calyx lobes 4, persistent, ovate with an apiculate tip, erect, glabrous. Bracteoles persistent, cymbiform, glabrous. Stalks terete, up to 2 mm long, glabrous. Seeds numerous, 0.7 mm long, tawny yellow, embedded in pulpy tissue.

Figure 12. Medinilla salicina Ohwi ex Regalado - a. habit, x 0.66; b. fruit, x 4; c. seeds, x 13.

Distribution. Borneo (endemic): Kalimantan (1 collection), Sarawak (1 collection). - Figure 9.

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

28. Medinilla succulenta (Blume) Blume

Medinilla succulenta (Blume) Blume, Flora 14 (1831) 513; Bakhuizen van den Brink, Jr., Rec. Trav. Bot. Neerl. 40 (1943) 193; Maxwell, Gard. Bull. Sing. 31 (1978) 187. - Melastoma succulentum Blume, Bijdr. Flor. Ned.-Ind. 17 (1826) 1070.

Epiphytic 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; blades 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. Inflorescence in axillary cymes, 1.5-2.5 cm long; flowers sometimes solitary or paired; pedicel 3-4 (-6) mm long. Hypanthium campanulate, 3-4 mm long, 3 mm wide, obscurely 4-dentate. Petals 4, thin, oblong to obovate, acute at tip, 4-7 mm long, 3-4 mm wide, white or pale pink. Stamens 8, equal in size; filaments flattened, ca 4 mm long; anthers

narrowly triangular, straight, ca 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, Philippines (Palawan?), Sulawesi, Moluccas, Borneo: Kalimantan (2 collections), Sabah (1 collection), Sarawak (1 collection). - Figure 13.

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

29. Medinilla quadrialata Regalado, sp. nov.

Species Medinilla succulentae affinis sed ramis acute quadrangulatis, inflorescentiis pedunculatis differt. - Typus: Ampuria SAN 32819 (K, iso L), Sandakan, Paitan Forest Reserve.

Epiphytic glabrous shrub ca. 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, 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; pedicel terete, 3 mm long. Hypanthium narrowly cylindric to campanulate, 3-4 mm long, 2 mm wide, minutely 4-dentate; petals 4, obovate, thin, 4 mm long, 2 mm wide; stamens 8, equal in size; filament flattened, 2 mm long; anthers linear, 2 mm long; ovary one-half the length of ovary, extraovarian chambers extending to the middle of ovary; style terete, 3 mm long; stigma punctiform, light orange. Fruit globose, 5 mm across, red; pericarp thin; stalk 3.5 mm long; seeds ovoid, 1.5 mm long.

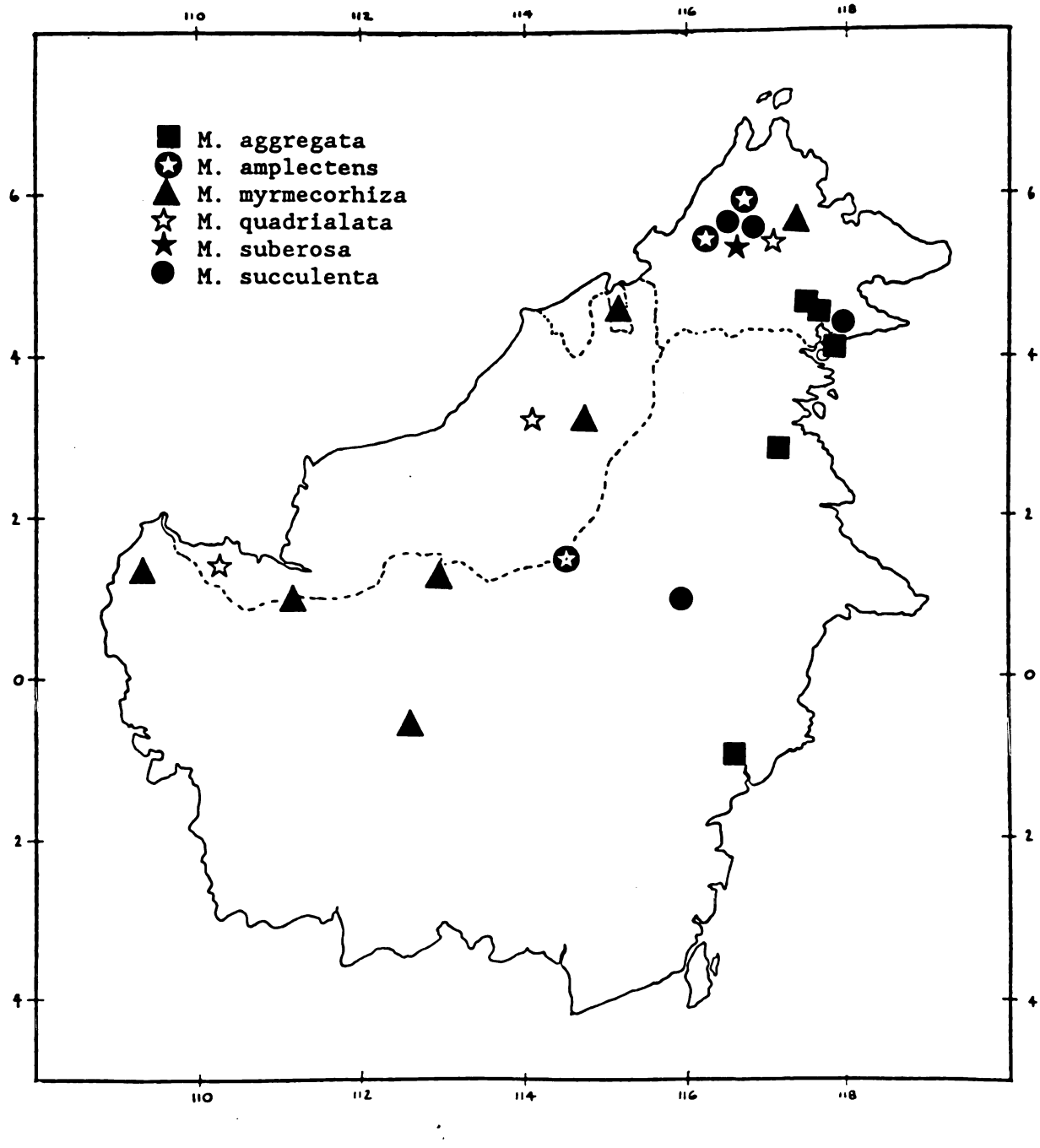

Figure 13. Distribution of species of the M. succulenta alliance.

Distribution. West Kalimantan (4 collections), Sabah (2 collections), Sarawak (2 collections). - Figure 13.

Ecology. In forests from sea level to 600 m.

30. Medinilla myrmecorhiza Regalado, sp. nov.

Species Medinilla succulentae affinis sed radicibus cum formicariis paratis et foliis plerumque majoribus differt. Frutex epiphyticus glaber, radicans; foliis in siccitate tenuiter papyraceis, oppositis, obovatis, triplinervibus; apice obtuso, mucronato; basi cuneata; inflorescentiis fasciculatis, multifloris, floribus quadrimeris, calyce anguste campanulato, truncato, staminibus aequantibus; fructibus subglobosis, 4-5 mm latis. - Typus: Jacobs 5577 (L), Brunei, along Temburong and Belalang rivers.

Epiphytic shrub, glabrous, rooting at the nodes, characterized by ant nests among the roots. Branches cylindric, 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 ca 1 cm long; base cuneate; 3-plinerved; transverse veins thin, faintly visible on adaxial and abaxial surfaces. Inflorescence 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; anthers purplish, linear-oblong, ca 2 mm long; connectives hardly produced, dorsal spur 0.5 mm long. Ovary one-half the length of hypanthium, 4-celled; style cylindric, 4 mm long; stigma punctiform. Fruit 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 collection), West Kalimantan (3 collections), Sabah (1 collection), Sarawak (3 collections). - Figure 13.

Ecology. Lowland dipterocarp forest at 150-400 m.

Notes. Nearest to M. succulenta (Blume) Blume 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.

31. Medinilla aggregata Bakh. f.

Medinilla aggregata Bakh. f., Rec. Trav. Bot. Neerl. 40 (1943) 169. - Type: Rutten 581 (U), Kalimantan, Samarinda, Sg. Boengaloen.

Epiphytic shrub, rooting, glabrous. 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. Inflorescence axillary, flowers borne on dense and many-flowered fascicles up to 3 cm long; pedicel 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; filaments ligulate, 2-3 mm long; anthers linear-triangular, 3 mm long; connectives hardly produced at the base. Ovary one-half the length of the hypanthium, extraovarian chambers extending to bottom of ovary, 5-celled; style cylindric, 3 mm long; stigma punctiform. Fruit 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.

Distribution. East Kalimantan (7 collections), Sabah (2 collections), endemic. - Figure 13.

Ecology. In primary forest, frequent along rivers at low altitudes (10-300 m); flowers in June-July, November-December; fruits in June and December.

Notes. Distinguished from other species in the M. succulenta alliance by its large leaves, stout (up to 1 cm in diameter) and acutely quadrangular stems, and dense inflorescences.

32. Medinilla suberosa Regalado, sp. nov.

Haec species a Medinilla aggregatae ramis haud alatis, cortice suberoso differt. Frutex epiphyticus glaber, ad 1-2 m altis; foliis

oppositis, sessilibus, coriaceis, 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 sexmeris, pedicellis filiformibus 10 mm longis, calyce urceolato, staminibus aequalibus; fructibus subglobosis, 5 mm latis. - Typus: Clemens 28773 (BM, iso A, BO, K, L, NY), Sabah, Mount 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. Inflorescence axillary, many-flowered, of fascicled cymes; pedicel slender, glabrous, 10 mm long. Hypanthium urceolate to funnelform, 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; filaments flattened, 4 mm long; anthers linear-oblong, 2 mm long. Ovary one-half the length of hypanthium; extraovarian chambers extending to the middle of the ovary; 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: Mount Kinabalu (6 collections), endemic. - Figure 13.

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

33. Medinilla amplectens Regalado, sp. nov. - Figure 14.

Medinilla succulentae affinibusque similis et proxima sed habitu robustiore, foliis magnis, sessilibus amplexicaulibusque, et praesertim venis transversis numerosis distincta - Typus: 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 epiphytic shrub or woody climber up to about 5 m high. 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, compact, 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. Inflorescence axillary, many-flowered, glomerulate, arising from defoliated nodes; pedicel 3-5 mm long, orange to red. Hypanthium narrowly campanulate, orange to red, 4 mm long, 3 mm wide, slightly constricted 1 mm below the rim, scatteredly covered with

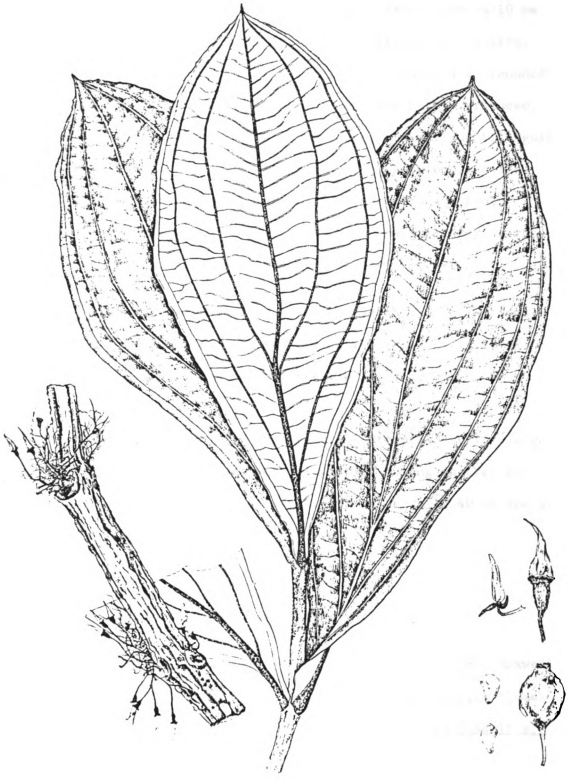

Figure 14. Medinilla amplectens Regalado - a. habit, x 0.66; b. flowering branch, x 0.66; c. flower bud, x 6; d. stamen, x 6; e. fruit, x 4; f. seeds, x 8.

minute, red furfuraceous hairs. Calyx lobes 4, inconspicuous. Petals 4, white, translucent, glabrous, entire, ovate-lanceolate, 6-10 mm long, 3-4 mm wide. Stamens 8, equal in size, filaments ligulate, flattened, whitish, 2 mm long, anthers elliptic-lanceolate, rounded at the base of the locules, 2.5 mm long, connectives hardly produced, dorsal spur and ventral appendages red-orange, dorsal spur triangular, ca 1 mm long. Ovary one-half the length of hypanthium, 4-celled; style cylindric, slender, 4 mm long; stigma punctiform. Fruit 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 collection), Sabah (17 collections around Mount Kinabalu area), Sarawak (1 collection). - Figure 13.

Ecology. Frequent in oak-laurel forest at 1400-2000 m on Mount Kinabalu and Gunung Alab.

Notes. 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 width of 21 cm (Endert 3927).

34. Medinilla varingiifolia (Blume) Nayar

Medinilla varingiifolia (Blume) Nayar, Blumea 18 (1970) 569; Maxwell, Gard. Bull. Sing. 31 (1978) 189. - Melastoma varingiaefolium Blume, Bijdr. Fl. Ned.-Ind. 17 (1826) 1071. - Type: Kuhl & van Hasselt s.n. (L, n.v.), Java.

Shrub up to 3 m high, epiphytic or terrestrial. Branches cylindric, smooth, glabrous, reddish brown upon drying. Leaves opposite, glabrous

on both surfaces, drying green adaxially, reddish abaxially; petiole 10-15 mm long, glabrous; blade coriaceous, elliptic to ovate, 6-8 cm long, 2.5-3.5 cm wide; margin entire; apex acuminate; base acute to rounded; 3-nerved, lateral pair of nerves arising directly from the base, nerves sunken adaxially, raised abaxially; transverse veins obscure to invisible on both surfaces. Inflorescence terminal, solitary or a panicle of cymes, 3-6 cm long. Hypanthium funnel-shaped, pink to red, widened near the rim, 5-10 mm long, 4-6 mm wide, glabrous, calyx lobes 4, mucronate. Petals 4, oblong to ovate, acute, thin, waxy white-tinged with pink, glabrous, 12-19 mm long, 7-9 mm wide. Ovary one-third to one-fourth the length of hypanthium, extraovarian chambers absent; style ca 20 mm long. Fruit urceolate, cupped by the persistent calyx lobes, 7-9 mm wide, 10 mm long, green, turning light red, glabrous; seeds numerous, ovoid, 0.7-0.8 mm long.

Distribution. Malay Peninsula, Sumatra, Java, Borneo (1 collection). - Figure 15.

Notes. Apparently rare in Borneo, but abundant in the Malay Peninsula. The species is recorded for the first time in Borneo (Banyeng & Sibat S 24489). The smooth and reddish brown color of the stems on drying and terminal inflorescences are distinctive.

The orthographic form of the epithet has been corrected here in accordance with Article 73.8 of the International Code of Botanical Nomenclature.

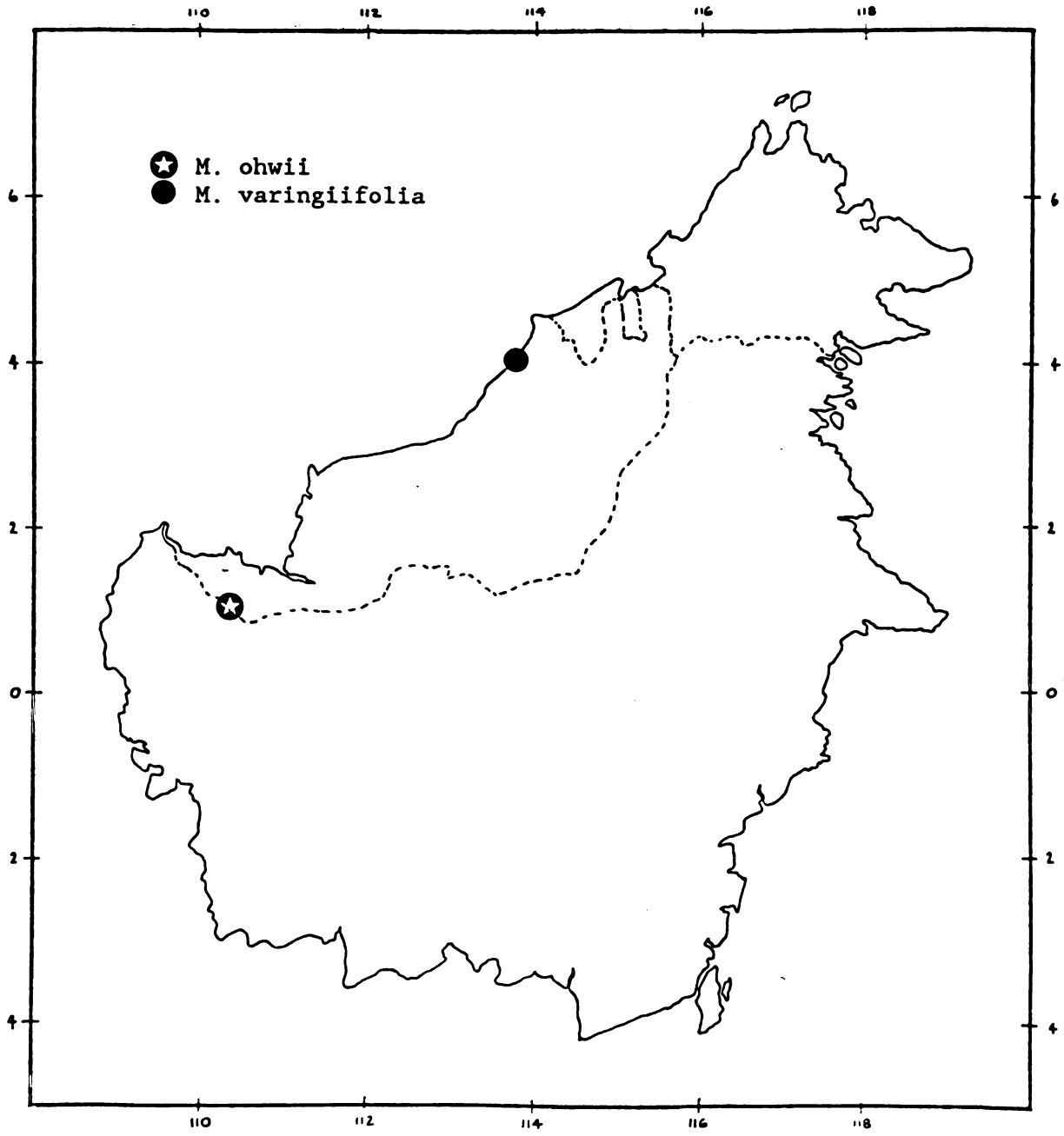

Figure 15. Distribution of species of the M. varingiifolia alliance.

35. Medinilla ohwii Nayar

Medinilla ohwii Nayar, Blumea 18 (1970 569. - Type: van Steenis 8992 (K, L, n.v.), Sumatra, Gajo and Alas Lands, Mt. Goh Lembuh.

Shrub 0.5-1.5 m high. Young branches subangular, puberulent, soon becoming terete, glabrous. Leaves opposite, glabrous adaxially, minutely puberulent abaxially; petiole 1-1.5 cm, puberulent; blade subcoriaceous, elliptic-lanceolate, 6-10 cm long, 1.5-2.8 cm wide; margin entire; apex acuminate, attenuate; base cuneate; 3-plinerved, transverse nerves indistinct. Inflorescence terminal, of few-flowered cymes; peduncle 3-5 cm long; pedicel 4-6 mm long. Hypanthium cylindric or campanulate, greenish-yellow, 5.5-7 mm long, 4-dentate, lightly puberulent or glabrate. Petals 4, cream white, ovate to ovate-oblong, 10-11 mm long, 3.5-4.5 mm wide. Stamens 8, subequal; filaments 4.5-5 mm long; anthers linear-lanceolate, 5.5-6.5 mm long. Fruits light green, tinged red; seeds ovoid, 1.5 mm long, yellow-orange.

Distribution. Sumatra, Borneo: Sarawak (2 collections). - Figure 15.

Ecology. On limestone slopes and ridges at 350 m. Notes. I refer to this species two specimens from Sarawak (Ilias S 28079 and Wright & Chai S 27415), apparently the first records of M. ohwii for Borneo.

36. Medinilla macrophylla Blume

Medinilla macrophylla Blume, Mus. Bot. Ludg.-Bat. 1 (1849) 19; Cogn., DC. Monog. phan. 7 (1891) 600; Bakhuizen van den Brink, Jr., Rec. Trav. Bot. Neerl. 40 (1943) 180. - Type: Korthals s.n. (L), Sumatra.

Medinilla motleyi Hook. f. ex Triana, Trans. Linn. Soc. 28 (1871) 87, syn. nov. - Type: Motley s.n. (K), South Kalimantan, Banjarmasin.

Epiphytic shrub. Branches cylindric or subquadrangular, verrucose; ultimate branchlets furfuraceous to fusco-pilose; 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 shortly cordate. Inflorescences axillary, solitary or in cymes of 2 or 3, 3.5-4.5 cm long. Hypanthium cylindric, 4 mm long, 2.5-3 mm wide, minutely red-furfuraceous. Petals 5, obovate, asymmetric, 5.5-6 mm long, 2.5-3 mm wide. Stamens 10, equal in size; filaments 3 mm long; anthers linear-lanceolate, 2.5-3 mm long. Ovary half the length of hypanthium; style filiform, 5-6.5 mm long. Fruit globose, 5-6 mm across; seeds 0.7 mm, yellow.

Distribution. Sumatra, Sulawesi, Moluccas, Borneo: Kalimantan (14 collections), Sabah (5 collections), Sarawak (7 collections). - Figure 16.

Notes. A widespread and variable taxon in Borneo in which I am convinced M. motleyi Hook. f. ex Triana 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.

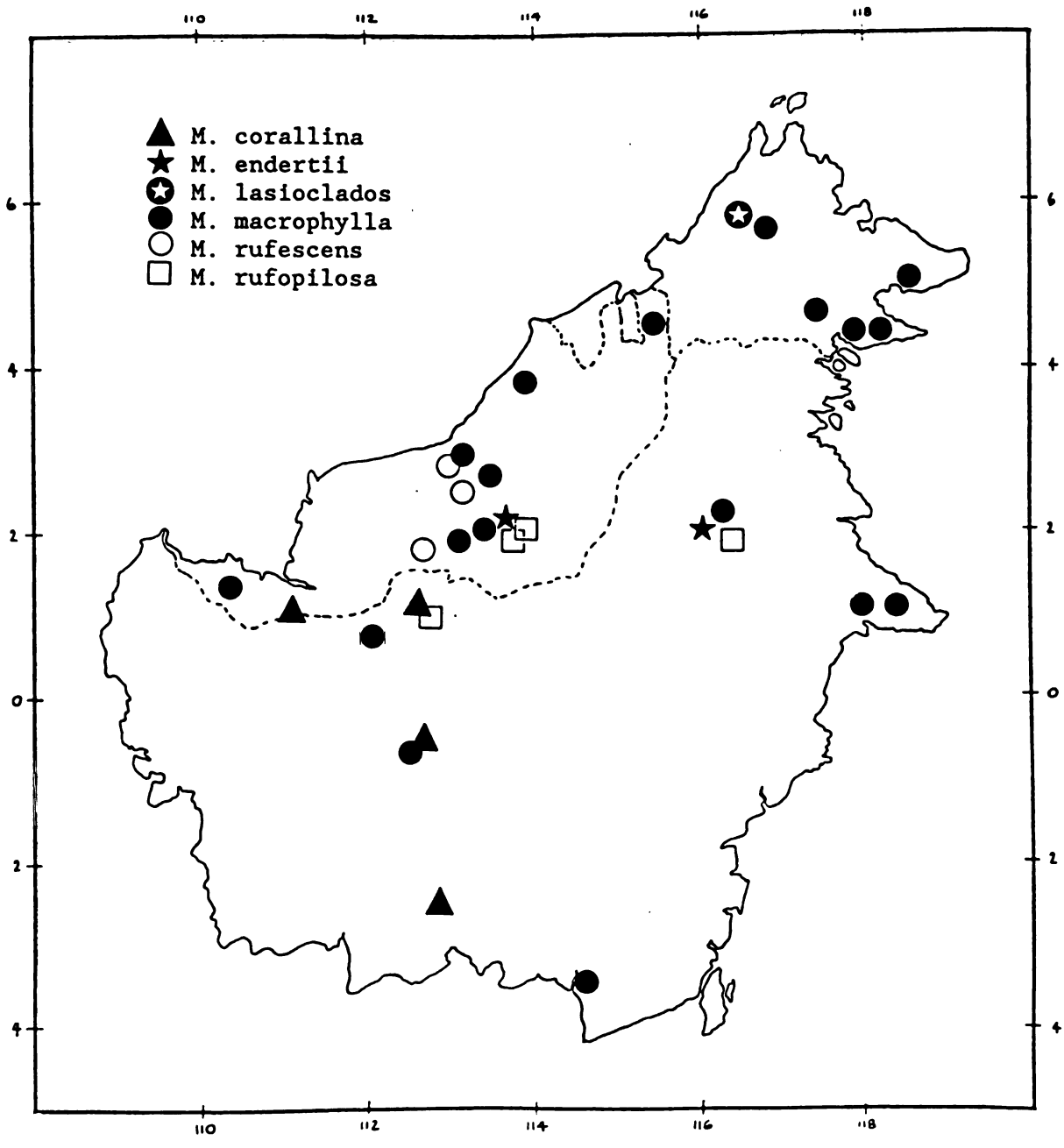

Figure 16. Distribution of species of the M. macrophylla alliance.

37. Medinilla rufescens Regalado, sp. nov.

Medinilla corallinae affinis, a qua imprimis differt foliis subtus minutissime et densissime fusco-tomentosis et inflorescentibus longioribus differt. - Typus: Wright S 27964 (K; iso A, BO, L, SAN), Sarawak, 4th Div., Bintulu, Ulu Segan.

Epiphytic shrub. Branches cylindric, smooth, glabrous, branchlets slender, brown-tomentose. Leaves opposite, sessile, adaxial surface glabrous, abaxial surface brown-tomentose; blade elliptic-oblong, 11-12.5 cm long, 4.5-6 cm long; margin entire; apex acute; base rounded, subauriculate. Inflorescence axillary; peduncle (4-) 8-10 cm long, pendent, dark red; pedicel 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; filaments 2.5 mm long; anthers linear-lanceolate, 2.5-3 mm long. Ovary one-half the length of hypanthium, 5-celled; extraovarian chambers extending to the bottom of ovary; 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 collections), endemic. - Figure 16.

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

38. Medinilla corallina Cogn.

Medinilla corallina Cogn., DC. Monogr. phan. 7 (1891) 599; Schwartz, Mitt. Inst. Bot. Hamburg 7 (1931) 253. - Type: Beccari 3145 (FI, n.v.), Sarawak.

Medinilla dajakorum Schwartz, Mitt. Inst. Bot. Hamburg 7 (1931) 254, syn. nov. - Type: Winkler 1424 (HBG), West Borneo, Sg. Bika.

Epiphytic shrub. Branches slender, terete, internodes elongate, 4-7 cm long; nodes swollen; innovations fusco-pilose, soon becoming glabrescent; bark longitudinally striatulate-verruculose. Leaves opposite, subsessile; young leaves finely furfuraceous on abaxial surface, becoming 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. Inflorescence 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; filaments slightly compressed, 2 mm long; anthers long subulate, rostrate, 4-5 mm long. Ovary one-half the length of hypanthium, extraovarian chambers extending to the middle of ovary; style elongate, terete, slender, 4-5 mm long; stigma punctiform. Fruits globose, 5-6 mm across, red when ripe; pericarp 0.5 mm thick; seeds ovoid, 1 mm long, bright yellow.

Distribution. West and Central Kalimantan (6 collections), Sarawak (2 collections). - Figure 16.

Ecology. On stream banks in swampy or lowland dipterocarp forest from 50-150 m.

Notes. Allied to M. 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 to him by the Beccari herbarium (FI-B).

39. Medinilla lasioclados Stapf

Medinilla lasioclados Stapf, Trans. Linn. Soc., London II, 4 (1894) 161. - Type: Haviland 1225 (K), Sabah, Mount Kinabalu.

Shrub. Young branches terete to subquadrangular, densely and minutely red-tomentose, then becoming 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 mm wide; margin entire; apex acute; base rounded; 3-plinerved. Inflorescence 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, becoming glabrescent; calyx lobes 5. Petals 4, pink, broadly obovate, 5 mm long. Stamens 8, equal; filaments flattened, 1.5 mm long; anthers linear-oblong, 2 mm long. Ovary one-half the length

of hypanthium; extraovarian chambers reaching halfway the length of ovary; style slender, terete, 4 mm long; stigma minute, punctiform. Fruits unknown.

Distribution. Sabah (Mount Kinabalu), endemic, known only from the type. - Figure 16.

Ecology. No ecological data available. The type collection originated from an altitude of 1800 m on Mount Kinabalu. It appears never to have been recollected.

Notes. 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.

40. Medinilla endertii Regalado, sp. nov.

Species Medinilla rufopilosae affinis sed foliis multo majoribus, venis transversis numerosis utrinque prominentibus differt. - Type: Endert 4463 (L, iso A), East Kalimantan, West Kutai, Mount Kemul.

Epiphytic shrub. Branches cylindric, 8 mm in diameter; branchlets brown fulvous-tomentose, becoming glabrous at maturity; bark yellowish; nodes orbicular, up to 10 mm across. 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. Fruit 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 collection), Sarawak (1 collection) - Figure 16.

Ecology. Mossy and submontane forest, 1300-1800 m.

Notes. 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.

41. Medinilla rufopilosa Ohwi ex Regalado, sp. nov.

Species haec a Medinilla rufescens foliis subtus praesertim primariis nervis nervulisque plus minusve hirsutis vel hispido-pilosis differt. - Typus: Ashton S 12106 (K, iso L, SAN, SING), Sarawak, N. Pengiran, Mujong, Balleh.

Epiphytic shrub. Branches cylindric, 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 bristles along midrib and primary veins, the hairs up to 2 mm long, soon caducuous and leaves essentially glabrous at maturity; petiole very short, 1-2 cm 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. Inflorescence of axillary or terminal cymes umbellately or racemosely disposed forming a congested head, erect, borne on stout furfuraceous peduncle 2-4 cm long; pedicels short, 1 mm long, furfuraceous; bracteoles subulate, caducuous, 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; filaments flattened, 2.5 mm long; anthers ovate-lanceolate, 6 mm long. Ovary one-half the length of hypanthium, 5-celled; extraovarian chambers extending to the middle of the ovary; style slender, 5 mm long, glabrous; stigma punctiform. Fruit ovoid, 6 mm across, red-furfuraceous, orange when ripe; seeds numerous, cochleate, minute, 0.1 mm long.

Distribution. West Kalimantan (5 collections), Sarawak (2 collections). - Figure 16.

Ecology. Primary forest along rivers from 150-500 m altitude.

Notes. A remarkable species belonging to the M. macrophylla Blume 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 indumentum. Endert 4049 represents a form that has finer reddish pilose parts and may eventually merit taxonomic recognition.

42. Medinilla stephanostegia Stapf

Medinilla stephanostegia Stapf, Trans. Linn. Soc. London II, 4 (1894) 160. - Type: Haviland 1171 (K), Sabah, Mount Kinabalu.

Climbing shrub, 2-3 m high, sprawling among trees. Branches cylindric, striate to ribbed, sparsely pustulate to verruculose, 7 mm in diameter; innovations minutely setose, clothed with short, reddish, furfuraceous indument, soon becoming glabrescent; leaf axils densely matted with appressed and rigid bristles up to 7 mm long; bark yellowish. Leaves opposite; sessile to subsessile with a short 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. Inflorescence 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 spaced between 1.5-2 cm intervals; 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; pedicel pink, ca 2-6 mm long, bracteolate. Hypanthium shortly campanulate, white or cream, 4 mm long, glabrous. Petals 4, pink to purple, widely ovate, obtuse, shortly acuminate, 8 mm long. Stamens 8, equal in size; anthers lanceolate, 4 mm long. Ovary one-half the length of hypanthium, 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: Mount Kinabalu (29 collections), endemic.

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

Notes. 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 Mount Kinabalu.

43. Medinilla alternifolia Blume

Medinilla alternifolia Blume, Mus. Bot. Lugd.-Bat. 1 (1849) 19; Bakhuizen van den Brink, Jr., Rec. Trav. Bot. Neerl. 40 (1943) 176; Maxwell, Gard. Bull. Sing. 31 (1978) 149. - Type: 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 cylindric, 0.8-1 cm in diameter, glabrous; bark rugose, brown; xylem lobed in cross section. Leaves alternate; petiole 6-15 cm long; blade subcoriaceous, elliptic, 14-24 cm long, 7-12 cm wide; margin entire; apex acute; base acute to rounded; 5- (rarely 6-) plinerved, the marginal pair of nerves from just above the base, the inner pair of nerves arising 0.5 cm above the base; transverse veins distinct, ca. 20-24 pairs; nerves and veins sunken adaxially, raised abaxially. Flowers in densely crowded

glomerules or 3-flowered cymes from raised tubercles on leaf axils or leafless nodes; pedicel 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 apically, 5-7 mm long, 3-4 mm wide, reportedly pink in color. Stamens 8, equal in size; filaments ligulate, 2 mm long; anthers linear-oblong, 4.5-5 mm long, 1 mm across; dorsal spur deltoid; ventral appendages obsolete. Ovary one-half the length of hypanthium, 4-celled; extraovarian chambers extending to the bottom of the ovary; ovary wall 0.25 mm thick; style 7 mm long, cylindric, thick; stigma minute, punctiform. Fruit globose, sometimes ribbed or angled, cupped with persistent calyx lobes, 4-5 (-7) mm across, orange to red when ripe; seeds numerous, 0.5-0.6 mm long, light yellow with bright orange hilum.

Distribution. Malay Peninsula, Sumatra, Borneo: Kalimantan (11 collections), Sabah (23 collections), Sarawak (15 collections). Surprisingly, this species does not occur in Java. - Figure 17.

Notes. 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.

Vernacular. Tingkut (Malay).

44. Medinilla formanii Regalado, sp. 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

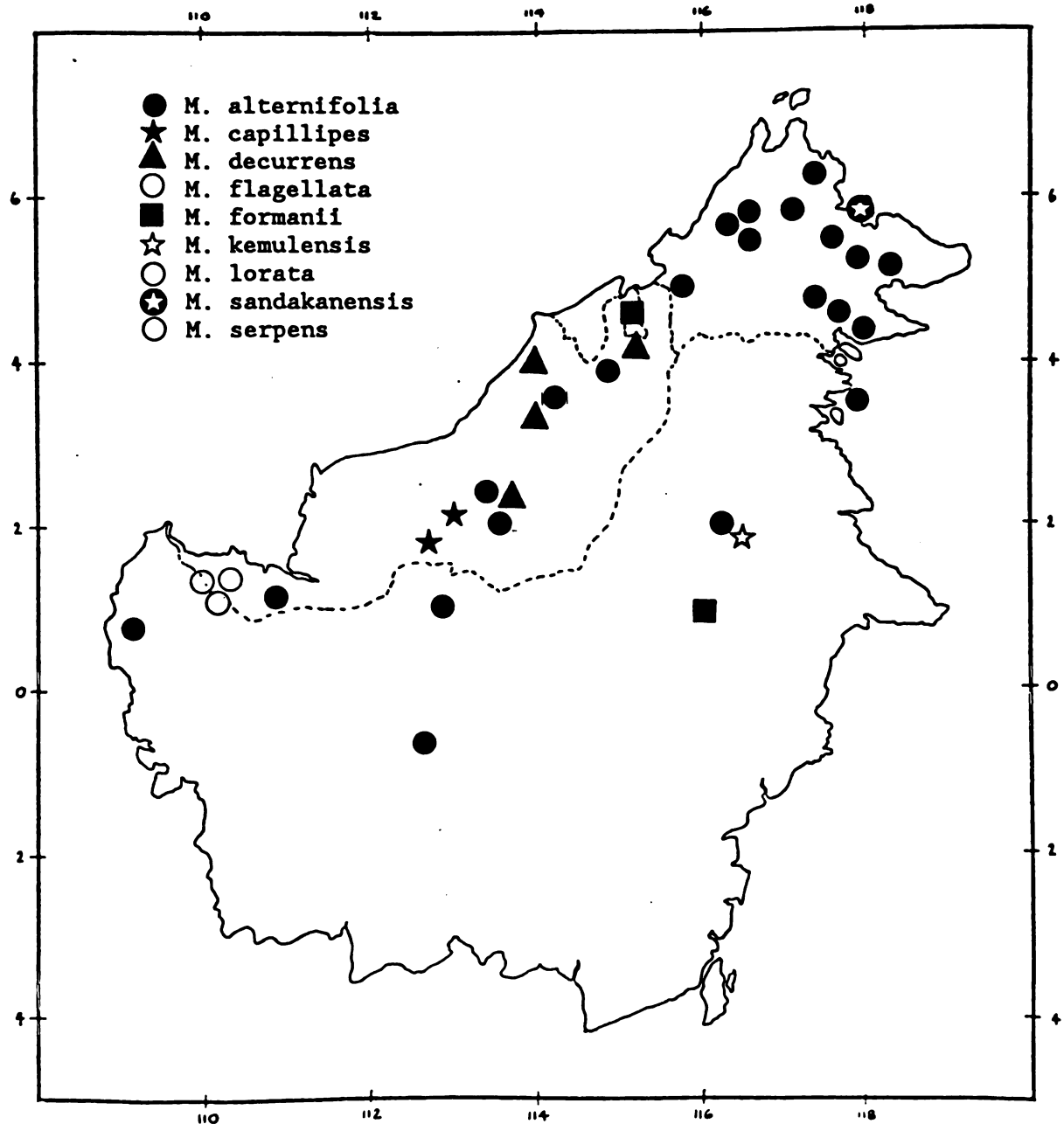

Figure 17. Distribution of species of Medinilla section Heteroblemma excluding M. brevipedicellata, for which there is no definite locality

attenuata; venis reticulatis; inflorescentiis axillaribus ex axillis defoliatis, fasciculatis, aggregatis, pedicellis ad 2.5 cm longis. - Typus: Forman 521 (K, iso BO, L, US), East 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; 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 ca 4 cm above the base, midrib and lateral nerves impressed adaxially, raised abaxially, secondary and tertiary veins reticulate. Inflorescences 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, glabrous, entire, 5 mm long, 3 mm wide. Stamens 8, equal in size; filaments ligulate, 2 mm long; anthers narrowly oblong, rostrate, rounded at the base of locules, 4-5 mm long, dorsal spur triangular-hastate, fringed. Ovary one-half the length of hypanthium, 4-celled; style 16 mm long; stigma minute, punctiform. Fruit ovoid, red, 5 mm across, 4-celled; stalk up to 3 cm long; seeds ovoid, 0.5 mm long, bright yellow.

Distribution. Brunei (1 collection), East Kalimantan (2 collections), endemic. - Figure 17.

Ecology. 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 M. alternifolia Blume but with different nervation.

45. Medinilla decurrens Cogn.

Medinilla decurrens Cogn., DC. Monogr. phan. 7 (1891) 591; Stapf, Hook. Ic. pl. 4 (1895) t. 2411. - Type: Beccari 4016 (FI?, n.v.; iso BR), Sarawak.

Climber, reportedly to a height of ca 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, ca 10 mm in diameter; xylem distinctly lobed in cross section. Leaves alternate; petiole brown-ciliolate, appearing winged with decurrent leaf base, soon becoming tough and flexible as wings exfoliate, 10-15 cm long; blade narrowly ovate to oblong, 25-30 cm long, (8-) 12-14 cm wide; apex acute to shortly acuminate; base attenuate, decurrent into the petiole; 5-plinerved with an additional inconspicuous pair of nerves; transverse veins distinct on lower and upper surfaces, ca 25-35 pairs; secondary and tertiary veins developed into a reticulate network; leaf surface drying olive green above, reddish brown below, brittle, pergamentaceous. Flowers fascicled in dense clusters along the length of old wood, borne singly, rarely cymose; peduncle terete, smooth, 10 mm long; pedicel 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 color. Petals 4, ovate, apex acute, base clawed, 6 mm long, 4 mm wide, reportedly yellow in color. Stamens 8, equal in size; filaments ligulate, glabrous, 2 mm long; anthers 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 one-half the length of hypanthium, 4-celled; extraovarian chambers extending to the bottom of the ovary; ovary wall 0.25 mm thick; style cylindric, thick, 5 mm long, tapered distally; stigma minute, punctiform. Fruit globose, 5-6 mm across, glabrous, cupped with persistent calyx lobes, pale yellow to orange when ripe; stalk 20-30 mm long; seeds flattened, 0.5 mm long, light yellow.

Distribution. Sarawak (5 collections), endemic. - Figure 17.

Ecology. Apparently a rheophyte occuring along river banks and streams.

Notes. Likely to be confused with M. alternifolia Blume but differs in having decurrent leaf bases, widely spaced lateral pairs of nerves, and dense inflorescences.

46. Medinilla kemulensis Regalado, sp. nov. - Figure 18.

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. - Typus: Endert 4330 (K, iso L, BO), East 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; petiole glabrous, rather smooth, woody, yellowish, 15-17 cm long. Blade papyraceous when dry, broadly elliptic to rotund, 20-25 cm long, 14-16 cm wide; margin slight erose, serrulate near the apex, ends of the teeth minutely ciliate; apex obtuse, terminating abruptly in a round end; base obtuse to broadly rounded; 9-plinerved, outermost pair inconspicuous and marginal, the three inner pairs departing from the midrib at ca 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. Fruit ellipsoid, glabrous, smooth, slightly ribbed, 10-13 mm in diameter, 4-loculed, borne on a thick, glabrous stalk 10 mm 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 Mount Kemul (= Kongkemul). - Figure 17.

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

Notes. Recognizable by the large, rotund leaves and the rather stoutly pedicelled fruits.

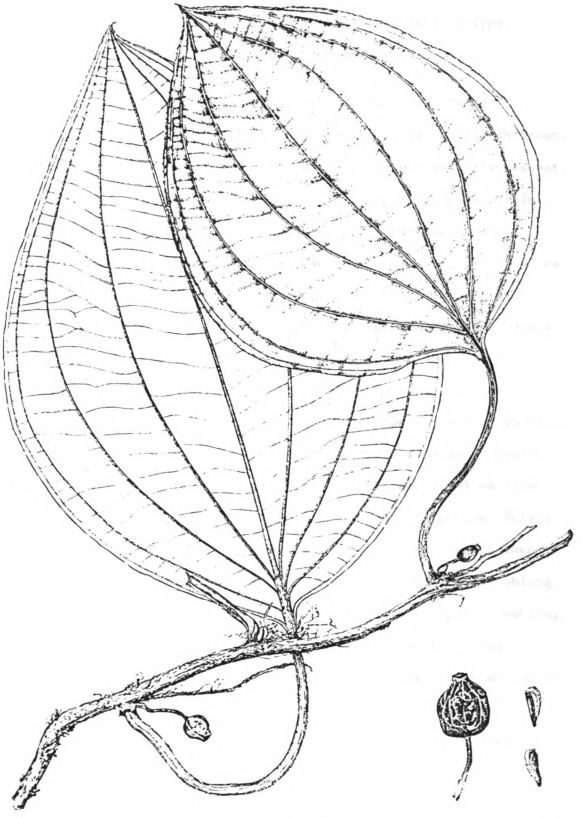

Figure 18. Medinilla kemulensis Regalado - a. habit, x 0.66; b. fruit, x 1.5; c. seeds, x 13.

47. 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 ca. 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; 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, nerves setulose on lower surface; 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; pedicel 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; filaments ligulate, 2-3 mm long; anthers linear-oblong, distally rostrate, basally lobed; dorsal spur deltoid, up to 1 mm long; ventral appendages obsolete. Ovary one-third the length of the hypanthium, 4-celled; extraovarian chambers extending to the bottom of the ovary; style 6-9 mm long, thick, minutely red-furfuraceous, tapering into a minute, punctiform stigma. Fruit ovoid, ca 5 mm across, ribbed, crowned with persistent calyx lobes, glabrescent, reportedly orange in color when ripe; stalk slender, 10-15 mm long,

hirsute; seeds numerous, 0.5-0.6 mm long, 0.2 mm across, light yellow.

Distribution. Borneo (extreme southwestern Sarawak, 7 collections), also found in Riau Archipelago (Tudjuh Island) as documented by Buennemeyer 5921 (BO). - Figure 17.

Ecology. In Sarawak restricted to limestone hills.

48. Medinilla capillipes Regalado, sp. nov. - Figure 19.

Habitu et characteribus foliorum Medinilla alternifoliae similis, sed fructibus pedicellisque setosis differt. 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, subcoriaceis, ellipticis, usque ad 18-22 cm longis, 7.5-9.5 cm latis, quintuplinervibus; apice abrupte acuminato ad acuto; basi obtusa ad plus minusve rotundata; supra complanatis subtus elevatis, venis transversis utrinque prominentibus. - Typus: 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

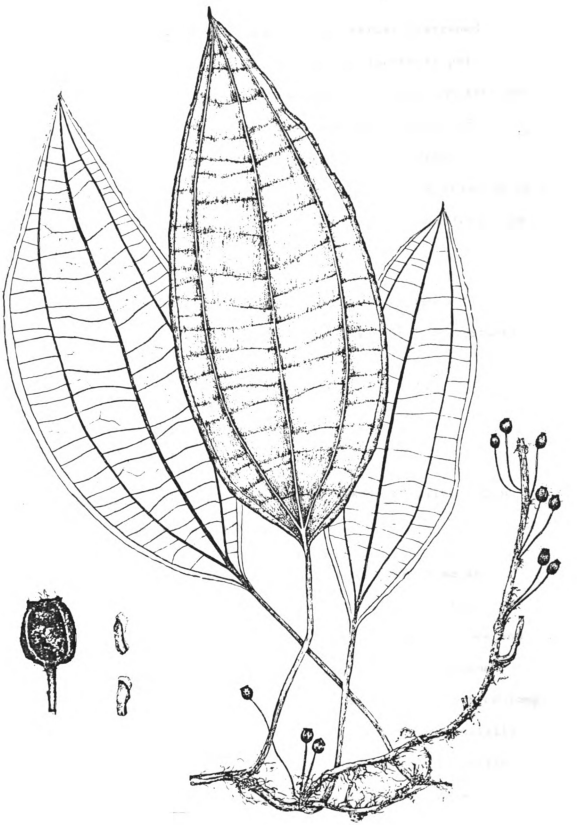

Figure 19. Medinilla capillipes Regalado - a. habit, x 0.66; b. fruit, x 2.5; c. seeds, x 2.5.

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 (2 collections), endemic. - Figure 17.

Ecology. Along river and stream banks in forests at low altitudes; fruits in March and April.

49. Medinilla flagellata Stapf

Medinilla flagellata Stapf, Hook. Ic. pl. 4 (1895) t. 2411. - Type: 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; 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, constricted at the top, orange when ripe, smooth, glabrous, 5-6 mm in diameter, fascicled on old branches, pedicel glabrous, slender, 2.5-5 cm long; seeds numerous, narrowly ovoid, minute, 0.3 mm long, faint yellow.

Distribution. Sarawak (2 collections), endemic. - Figure 17.

Ecology. On limestone hills at 300 m, fruits in March.

Notes. Allied to M. serpens Stapf 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.

50. 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; petiole subquadrangular, 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; margin entire; apex acute; base long acuminate; 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; pedicel 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, anthers 5 mm long, dorsal lobes minutely subulate, ventral spur linear-triangular, flattened. Ovary one-half the length of hypanthium; extra-ovarian chambers not reaching the middle of the ovary, 4-celled; style 6 mm long, minutely red-furfuraceous; stigma punctiform. Fruit globose, red, ribbed, glabrous, 5 mm across; stalk slender, glabrous, 2.5 cm long.

Distribution. Sarawak (5 collections), endemic. - Figure 17.

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

Notes. Banyeng ak Nudong S25080 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.

51. Medinilla sandakanensis Regalado, sp. nov. - Figure 20.

Frutex scandens, glaber; ramulis teretiusculis, radicantibus, ramis teretibus, sparsim pustulatis; foliis alternis, petiolatis, tenuiter subcoriaceis, ellipticis, usque ad 25-30 cm longis, 7.5-9 cm latis, quintuplinervibus; apice breviter acuminato; basi rotundata; nervis supra impressis subtus elevatis, venis transversis utrinque prominentibus; fructibus late ovoideis ad subglobosis, glabris, quadrilocularibus, ex axillis defoliatis, fasciculatis, pedicellis

filiformibus, glabris, ad 2.5-3 cm longis. - Typus: 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 sides; petiole 7-9 cm long, flexuous, slightly thickened and geniculate at the base. Blade thinly subcoriaceous, elliptic, 25-30 cm long, 7.5-9 cm wide; margin sinuate; apex shortly acuminate; base rounded; 5-plinerved, the outermost (marginal) pair inconspicuous, departing about 3 mm from the base and running parallel 2 mm from the margin, the central pair and midrib flattened or slightly impressed on adaxial surface, raised and thickened on abaxial surface, transverse veins conspicuous and prominent on both surfaces, running in pairs (20-25 pairs) at right angle to the midrib. Flowers unknown. Fruits broadly ovoid to subglobose, slightly constricted below the rim, truncate, glabrous, 5 mm across, 4-celled, borne on slender, terete, unbranched, glabrous pedicel, 2.5-3 cm long; seeds numerous, 0.7 mm long, yellow with bright orange hilum.

Distribution. Sandakan, known only from the type collection. - Figure 17.

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

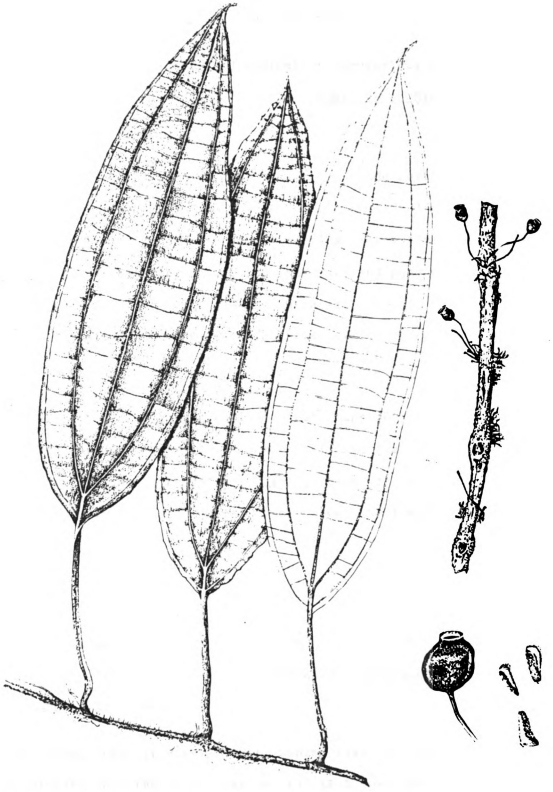

Figure 20. Medinilla sandakanensis Regalado - a. habit, x 0.66; b. fruiting branch, x 0.66; c. fruit, x 3; d. seeds, x 13.

Synonym: Triuranthera dispar (Cogn.) Nayar, Journ. Jap. Bot. 48 (1973) 50. = Driessenia dispar (Cogn.) C. Hansen, Nord. Journ. Bot. 5 (1985) 346.

Medinilla robusta Cogn., DC. Monog. phan. 7 (1891) 576. Type: Beccari 542, 573, 851, 4049 (FI?, n.v.), Sarawak. = Plethiandra robusta (Cogn.) Nayar.

Medinilla setigera (Blume) Miq., Fl. Ned. Indie 1 (1855) 550. Type: Korthals s.n. (L, n.v.), Sumatra. = Hypenanthe setigerum (Blume) Bakh. f.

Medinilla tawaensis Merrill, Univ. Calif. Publ. Bot. 15 (1929) 225. Type: Elmer 21490 (UC), Sabah, near Tawao. = Catanthera tawaensis (Merrill) 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).

Dubious species

Medinilla borneensis Blume, Mus. Bot. Lugd.-Bat. 1 (1849) 20. Type: Korthals s.n. (L), SE Borneo, Banjarmasin, G. Sakumbang. This species was reduced to M. verrucosa (Blume) Blume by Bakhuizen, Jr. (1943). The type consists of stem and leaf fragments that are inadequate for determination.

52. Medinilla brevipedicellata Regalado, sp. nov.

Medinilla sandakanensi affinis, sed pedicellis brevioribus et fructibus vestitis cum pilis rubris differt. - Typus: Jaheri (Exp. Nieuwenhuis) 18 (BO), Kalimantan, sine loc.

Climber. Leaves alternate; petiole 3 cm long; blade coriaceous, elliptic, 19-21 cm long, 6.5-8.5 cm wide; margin entire; 3-plinerved with an additional pair of inconspicuous marginal nerves, the inner pair of lateral nerves arising 1 cm from the base and percurrent to the apex; transverse veins distinct on both surfaces. Flowers unknown. Fruits subglobose, covered with soft red bristles; stalk (pedicel) 1 cm long or shorter.

Notes. Similar to M. sandakanensis in leaf shape but the much shorter pedicels and bristly fruits make it distinctive. The fruits are remarkably similar to those of M. barbata Bakh. f., a species endemic to New Guinea. Known only from the type. No field data available.

Excluded taxa

Medinilla beccariana Cogn., DC. Monog. phan. 7 (1891) 600. Type: Beccari 3439 (FI?, n.v.), Sarawak, Lamadgiam. = Plethiandra beccariana (Cogn.) Nayar.

Medinilla dispar Cogn. in Winkler, Bot. Jahrb. Syst. 48 (1912) 108. Type: Winkler 2812 (BR, n.v.; iso BM, K), SE Borneo, between Batu Babi and Lumowia.

Synonym: Triuranthera dispar (Cogn.) Nayar, Journ. Jap. Bot. 48 (1973) 50. = Driessenia dispar (Cogn.) C. Hansen, Nord. Journ. Bot. 5 (1985) 346.

Medinilla robusta Cogn., DC. Monog. phan. 7 (1891) 576. Type: Beccari 542, 573, 851, 4049 (FI?, n.v.), Sarawak. = Plethiandra robusta (Cogn.) Nayar.

Medinilla setigera (Blume) Miq., Fl. Ned. Indie 1 (1855) 550. Type: Korthals s.n. (L, n.v.), Sumatra. = Hypenanthe setigerum (Blume) Bakh. f.

Medinilla tawaensis Merrill, Univ. Calif. Publ. Bot. 15 (1929) 225. Type: Elmer 21490 (UC), Sabah, near Tawao. = Catanthera tawaensis (Merrill) 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).

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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. Teysmann 8148 (BO). Kalimantan. B. Singkadjang. - Close to M. 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 M. clarkei King but the leaves are opposite, not verticillate. Branchlets are 4-angled and slightly winged.

3. Kostermans 21499 (L). East Kalimantan. Berau, Mount Njapa on Kelai River. - Medinilla cauliflora Hemsley?

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New names are in boldface and synonyms are underlined. Numbers refer to species numbers as given in the text.

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ohwii Nayar: 35

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subauriculata Regalado: 26

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Ampuria 32819 (29)

Anderson 4327 (16), 4328 (1), 4338 (33), 4595 (16), S 12912 (47), S 20172 (16), S 20947 (23), S 20975 (19), S 25141 (47), S 28398 (7), S 28612 (33), S 29870, S 30076, S 30772 (16), S 30839, S 31760 (16), 43433 (32), S 28281 (26), S 28337 (43)

Asah ak Luang S 22694 (16)

Asah ak Unyong S 21135 (41), S 21139 (23), 21140 (13)

Ashton 263 (16), BRUN 491 (44), BRUN 3215, BRUN 5207 (18), S 12106 (41), S 12139 (45), S 16726 (16), S 17636 (23), S 18218 (36), S 19293 (37), S 19446 (16), S 19797 (36), S 19904, S 21121 (26)

Asik Mantor SAN 110386, SAN 110921, SAN 113114 (16)

Awang S 24081 (28)

Bakar SAN 18530 (16), SAN 18531 (23)

Banyeng & Sibat S 24489 (34), S 24491 (16)

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