

**THE GENUS *AGALMYLA***  
**(*GESNERIACEAE-CYRTANDROIDEAE*)**

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*Agalmyla* Blume (including *Dichrotrichum* de Vriese and *Tetradema* Schltr.) (*Gesneriaceae-Cyrtandroideae*) is revised. Ninety-seven species are recognized, 62 of them newly described, and these are divided into three sections with distinct geographical ranges. Sect. *Agalmyla* (24 species) is restricted to the Malay Peninsula, Sumatra, Java, Borneo and Palawan; sect. *Exannularia* (19 species) is the only section on Sulawesi and has a few species nearby; sect. *Dichrotrichum* (54 species) is represented in the Philippine Islands (excluding Palawan) by 13 species, in the Moluccas by two species, and in New Guinea by 39 species. No species is found in more than one of these areas and the key to sect. *Dichrotrichum* is therefore split between the Philippine species and those on the Moluccas and New Guinea. There are thus four keys altogether. The affinity and geographical distribution, both of the whole genus and of the sections, are discussed, and special attention is given to distribution of species in relation to the geological terranes of New Guinea. Points of interest and taxonomic importance in the morphological features are noted in a separate section.

*Keywords.* Malesia, phytogeography, taxonomy.

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## INTRODUCTION

*Agalmyla* is a genus, now comprising nearly 100 species, that is found in rain forest areas from the Malay Peninsula and Sumatra eastwards to the Louisiade Archipelago at the eastern end of New Guinea. It very neatly maps out Malesia, the area covered by *Flora Malesiana*. The genus is treated here in the broad concept, including *Dichrotrichum* and *Tetradema*, established in earlier work (Burtt, 1968). Nothing has been discovered in the present study to suggest that either of these two genera should be restored to independent status, and the coherence of the enlarged *Agalmyla* has been strengthened by biochemical data (Kvist & Pedersen, 1986 – see below under ‘The affinity of *Agalmyla*’, p. 6, for further details).

This paper is not a monograph of *Agalmyla*: it is an analysis and a tentative interpretation of the material to which we have had access. It aims to show the present state of knowledge and to provide a groundwork for future research. There can be little doubt that future field-work, especially in the vast, little-explored areas east of Borneo, will uncover further new species and will extend the ranges of those already recognized; field-work, however, is also needed over the whole range of the genus to observe pollination and pollinators, and to discover more about the ecology of the plants. Sometimes the seed certainly germinates on the ground and the plants sprawl unless they come into contact with a trunk suitable for climbing by their internodal roots; but does epiphytic germination also take place? Such questions cannot be answered in the herbarium.

The descriptions of the species may, at first sight, seem unduly long; however, material of most species (and particularly of type specimens) is scanty, in both quantity and quality, and it is highly undesirable that anyone who studies *Agalmyla* should feel the need to re-dissect it. Thus the descriptions presented here (uniformly carried out by O.M.H., whose original sketches and measurements are preserved at the Royal Botanic Garden Edinburgh) serve an important conservational function.

With field-work in mind we have paid special attention to geographical patterns, for it is in one or other of the areas where *Agalmyla* is richly developed that field studies must be made. Thus we give four separate, geographically based keys. These will almost certainly be found more useful than a single key. Fortunately the sections we have recognized have largely distinct geographies.

‘Wallace’s Line’ is mentioned several times in this paper, and it is necessary to clarify how we have used this term. A.R. Wallace (1863) recognized, in the course of his extensive travels and collecting activities in the Malay archipelago, that in the west there was a predominance of animals and plants of Indian affinity, but that as

he moved eastwards the numbers that belonged to groups having closer relationships with Australia increased. He came to the conclusion that the main division lay between Borneo and Sulawesi, the deep trough of the Makassar strait forming a partial barrier. At its southern end this hypothetical dividing line passed between Bali and Lombok: north of Sulawesi it swept away north-eastwards, leaving the whole of the Philippines to the west (Fig. 2).

Very soon afterwards T.H. Huxley (1868) wrote on the classification and distribution of a group of gallinaceous birds. He recognized two major subgroups and drew a world-wide line separating the northern group from the southern. He pointed out that in SE Asia 'the boundary in question would coincide with what may be called "Wallace's Line" between the Indian and Papuan divisions of the Malay archipelago. But it would run northwards as far as the Philippines, and, passing between them and Formosa, would tend southward and eastward to the Samoan archipelago'.

Huxley's map (op. cit. p. 294) shows that he was proposing exactly the same modification of Wallace's Line as that suggested by Dickerson & Merrill (Merrill, 1923a, 1926) based on plant distributions, particularly those of *Dipterocarpaceae*. Huxley left Palawan, the south-westernmost of the Philippines, west of his version of the line, as did Dickerson & Merrill in theirs. We refer to this as the modified

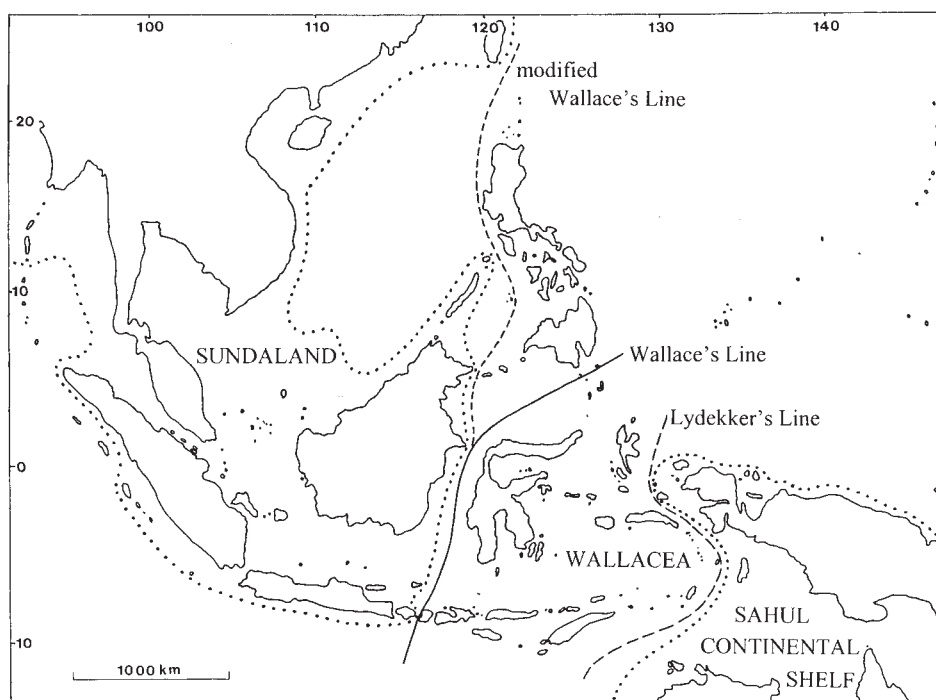


FIG. 2. Map of SE Asia showing Wallace's Line, modified Wallace's Line and Lydekker's Line.

Wallace's Line (Fig. 2), and that is the form of it used throughout this paper. It has been chosen simply because it provides the best fit with the classification of *Agalmyla*.

A recent study in *Cyrtandra* (another genus of *Gesneriaceae*) was designed to test the validity of Huxley's modification using molecular methods (Atkins *et al.*, 2001). It was found that only two of the nine species known from Palawan belonged to the clade including species from Borneo, the remaining seven belonging to a distinct clade of Philippine species. In *Cyrtandra*, therefore, it seems that the modification is not justified (always remembering that the samples of Bornean and Philippine species were small and random). In *Epithema*, a much smaller genus of *Gesneriaceae* that we have studied morphologically, the Palawan material seen belongs to a species from N Borneo, whereas elsewhere in the Philippines one of the species is *E. benthamii* whose distribution includes N Sulawesi and the Vogelkop Peninsula of westernmost New Guinea.

It seems likely that north of the Makassar strait the position of a 'line' will be found to vary from group to group. Wallace himself may have come to the same view, for in his later work *Island Life* (we quote from the second edition, Wallace, 1892: 387–388) he uses a list of Philippine mammals from which 'the Palawan group has been omitted as these islands contain so many Bornean species that if included they obscure the special features of the [Philippine] fauna'. Despite this treatment for mammals, Wallace may not have been convinced of the general validity of Huxley's modification, for he made no change in the position of the line in his map of the zoological regions (*op. cit.* p. 31).

#### THE TAXONOMIC HISTORY OF *AGALMYLA*

There is nothing in the taxonomic history of the genus that requires much discussion; we therefore detail the essential points in chronological order below.

**1768–91.** The first known specimen of *Agalmyla* was collected in Java by Commerson, naturalist on Bougainville's voyage round the world. He landed at Batavia (now Jakarta) in Java on 28 September 1768 and was on that island until 15 October 1768. Commerson subsequently left the ship at Mauritius and eventually died there in 1773. His collections went on to Paris where some of the specimens were studied by Lamarck, who published the specimen of *Agalmyla* under the name *Justicia parasitica* ('Caramantine parasitique' in French) although he had doubts about that being its correct genus (Lamarck, 1791).

**1804.** Vahl (1804: 105) transferred Lamarck's species to *Cyrtandra*, at the same time unfortunately, and illegitimately, changing the epithet to '*staminea*'.

**1823.** Blume (1823: 30) retained the name *Cyrtandra staminea*.

**1825.** Nees (1825) published a long commentary on Blume's *Catalogus* (1823), and erected the tribe *Trichosporeae* (based on *Trichosporum* D. Don, which is now a synonym of *Aeschynanthus* Jack nom. conserv.).

**1826.** Blume (1826: 767) established the genus *Agalmyla* with two species: *A. staminea* (Vahl) Blume [now *A. parasitica* (Lam.) Kuntze] and *A. asperifolia* Blume (see 1950, Bakhuizen below).

In the same paper Blume established the genus *Tromsdorffia* with two species: *T. speciosa* Blume [now *Chirita asperifolia* (Blume) B.L. Burtt sens. lat.], and *T. ? elongata* Blume [now *Agalmyla elongata* (Blume) B.L. Burtt]. The generic name *Tromsdorffia* was a later homonym of *Tromsdorffia* Mart.

**1841.** Endlicher (1841: 1407) replaced the illegitimate *Tromsdorffia* Blume by *Liebigia* Endl. [= *Chirita* sect. *Liebigia* (Endl.) C.B. Clarke].

**1845.** A.P. de Candolle (1845: 263) enumerated *Agalmyla* with Blume's two original species only: *A. staminea* and *A. asperifolia*.

**1852.** Publication of *Agalmyla tuberculata* Hook.f. (1852: tab. 897) collected on Mt Kinabalu, Sabah, by Hugh Low. Later misidentified with *A. asperifolia* Blume from Java (see 1950, Bakhuizen), but since reinstated as a good species.

**1856.** De Vriese (1856) published *Dichrotrichum* from Reinwardt's manuscript, with the single species *D. ternateum* de Vriese [now = *A. elongata* (Blume) B.L. Burtt].

**1876.** Bentham (1876) divided the family into two tribes, *Gesnerieae* and *Cyrtandreae*, the latter containing five subtribes, of which one was *Aeschynantheae*, containing *Aeschynanthus* (including *Trichosporum*) and *Dichrotrichum*, both with four perfect stamens, and *Agalmyla* and *Lysionotus* with only two. But he noted that *Dichrotrichum* should perhaps be ranked as a section of *Agalmyla* distinguished only by its four fertile stamens.

**1883.** C.B. Clarke retained *Agalmyla* and *Dichrotrichum* as separate genera, but repeated Bentham's reservation about the latter. At this date Clarke knew only seven species for the combined group: three from Sumatra, and one each from Java, Borneo, the Philippines and New Guinea (Clarke, 1883: 52–57). Clarke also described a new genus in tribe *Trichosporeae*, *Loxostigma*, with one species, *L. griffithii* (Wight) C.B. Clarke, which he had previously referred to *Dichrotrichum*.

**1893–94.** The account of *Gesneriaceae* for the monumental *Die natürlichen Pflanzenfamilien* (edited by A. Engler and K. Prantl) was contributed by K. Fritsch (1893–94). Although differing from Bentham's arrangement in other ways, his treatment of tribe *Trichosporeae* showed no innovations.

**1919.** Schlechter (1919) described the tetrandrous *Dichrotrichum borneense*; recognizing its similarity in general facies to *Agalmyla*, he created *Dichrotrichum* sect. *Agalmylopsis* for it.

**1920.** Schlechter (1920) described the genus *Tetradema* based (without designation of a type species) on *Dichrotrichum praelongum* Kraenzlin, *Trichosporum rubrum* Merr., *Agalmyla tuberculata* Hook.f. and *Agalmyla asperifolia* Blume. These plants, he said, differed from *Agalmyla* in having the enlarged funicle as the hilar appendage

of the seed. For reasons given by Burtt (1968) the genus has been absorbed in *Agalmyla* (see also below).

**1923.** Schlechter published his account of Papuanian *Gesneriaceae* recognizing 20 species of *Dichrotrichum* (1923: 286–297). Some of these are new species fully described, but two were cited ‘in Nova Guinea ined.’. However, the characters in the key and the annotations, although in German rather than Latin, are sufficient to validate the names from this date.

**1950.** Bakhuizen (1950) had hunted for, and found, the type specimen of *Agalmyla asperifolia* Blume in the Leiden herbarium: it was not an *Agalmyla*. For discussion on its correct position and its misuse in *Agalmyla* see under 2. *A. tuberculata*.

**1968.** Burtt (1968) greatly enlarged *Agalmyla* by including within it both *Dichrotrichum* and *Tetradema*, but owing to the uncertainty of specific limits few nomenclatural transfers were made.

**1970.** Anatomical studies in *Trichosporeae* by Dr E. Rosser, especially on *Aeschynanthus* and *Agalmyla*, showed up some marked differences between these two genera, but failed to indicate other affinities (Rosser & Burtt, 1969 – see further discussion below, p. 7).

**1999.** Hilliard & Burtt (1999), as a preliminary to the present paper, made a few necessary nomenclatural changes and described six new species whose status was not in doubt.

#### THE AFFINITY OF *AGALMYLA*

*Agalmyla* is traditionally placed in the tribe *Trichosporeae* Nees alongside *Aeschynanthus* Jack, which is the type genus of the tribe through its rejected synonym *Trichosporum* D. Don. The tribe is defined by a single character – the possession of one or more appendages at each end of the seed. The tribe originally included only *Aeschynanthus* and *Lysionotus* D. Don (Nees, 1825); Bentham (1876) added *Agalmyla* and *Dichrotrichum* pointing out that the latter differed from *Agalmyla* only in having four fertile stamens rather than two. These two genera are now amalgamated (Burtt, 1968). C.B. Clarke (1883) added the then monotypic *Loxostigma*, and pointed out that the ‘appendage’ at the hilar end of the seed in *Lysionotus* and *Loxostigma* is the elongated funicle.

When *Tetradema* was reduced to *Agalmyla* (Burtt, 1968) it was pointed out that the seed-appendages developed after fertilization. The hilar appendage develops close to the funicle and it requires only a minute morphogenetic displacement for funicular cells to become included in this post-fertilization growth. Thus the final appendage is partly hilar appendage and partly funicular. The hilar appendage frequently shows as a free tip to the composite structure. This was clearly observed in *Agalmyla tuberculata* (included by Schlechter in *Tetradema*) and C.B. Clarke had long before noted that the hilar hair in *Dichrotrichum ternateum* (= *Agalmyla elongata*) was

often deeply bifid, occasionally resulting in a seed with two hairs (Clarke, 1883: 53), and under *Agalmyla angustifolia* that the hilar hair was often divided to the base (Clarke, 1883: 57). We have not ourselves observed this. The situation in *Tetradema* does not provide any reason for its separation from *Agalmyla*. In *Aeschynanthus* there is no elongation of the funicle, and the seed-hairs are purely post-fertilization outgrowths (for details see Mendum *et al.*, 2001). The funicular appendages of *Loxostigma* and *Lysionotus* appear to be purely funicular, but the ontogeny of the funicle has not, to our knowledge, been investigated.

Thus, of the three additions to the tribe made by Schlechter, *Tetradema* (Schlechter, 1920) has been absorbed into *Agalmyla*, while *Euthamnus* and *Oxychlamys* (Schlechter, 1923) are reduced to *Aeschynanthus* (Burt, 1968).

The view that there was a close affinity between *Agalmyla* and *Aeschynanthus* probably arose because both genera have many species with predominantly red, strongly protandrous flowers with sequential positioning of anthers and stigmas in such a way as to suggest bird-pollination (Fig. 1). However, such floral similarities, especially in plants with showy corollas, are now often thought to be due to adaptation to similar pollinators, just as floral differences within a genus may be linked to change of pollinators. In both instances the taxonomic value of such characters is decreased.

Both genera have long, cylindrical, pendulous capsules, but here again this feature is just what would be expected in epiphytes or climbers, as is well shown in the neighbouring family *Bignoniaceae*. There is, however, a difference in the dehiscence of the capsules between *Agalmyla* and *Aeschynanthus*. In *Agalmyla* the first split is loculicidal, but this is followed by a septicial split, so the capsule eventually has four valves; furthermore the septicial splits free the two main lateral bundles, which are left as free-hanging fibres (Fig. 1). In *Aeschynanthus* the capsule dehisces loculicidally, but there is no subsequent septicial split: the old fruit is simply two-valved and there are, of course, no free-hanging fibres.

There is no difficulty in distinguishing *Agalmyla* from *Aeschynanthus* by vegetative characters. The stems of *Agalmyla* are hairy and slightly fleshy when young, becoming more or less glabrous with age and then developing a thin, papery, caducous 'bark'. Climbing stems usually produce numerous short roots along that side of the internodes in contact with the host tree. The stems of *Aeschynanthus* are stiffer and firmer, usually glabrous, not developing a caducous 'bark' and producing adventitious roots only at the nodes. *Agalmyla* often has strongly anisophyllous leaf-pairs and the major leaf has a large blade of normal herbaceous texture with well-marked veins; *Aeschynanthus* has more or less equal leaves which are usually thick and fleshy with scarcely discernible venation.

In anatomical studies on these two genera, Rosser (Rosser & Burt, 1969) found that the most important differences between them were in the structure of the stem. In *Agalmyla* there may be either cortical or medullary bundles, or both or neither: however, such bundles are never found in *Aeschynanthus*. On the other hand *Aeschynanthus* has a cortical sheath of cells with horse-shoe-shaped thickening: this

seems to be a constant character of the genus. Such a cortical sheath has not been found in *Agalmyla*. It has, in fact, so far been found elsewhere only in *Chirita* (sect. *Liebigia*) *asperifolia* (Blume) B.L. Burtt. Furthermore, cells with horse-shoe-shaped thickenings were found scattered in the outer cortex of a number of species of *Aeschynanthus*, but this type of cell appears to be altogether absent from *Agalmyla*.

Since the anatomical work was done, some very interesting differences in the dihydric phenolics of these two genera have been discovered by Kvist & Pedersen (1986). They made a survey of the family using electron paramagnetic resonance (EPR) methods and tested 590 species in 91 genera. They included five species of *Agalmyla*, covering the enlarged genus as recognized by Burtt (1968). All five showed the presence of a substance, homogentisic acid, found elsewhere in the family only in the N Indian subshrub *Leptoboea* Benth. and in the genus *Anna* Pellegrin found in N Vietnam and S China. The latter has been placed in the same tribe as *Agalmyla*, *Trichosporeae*, by Wang & Pan (1982) because its seeds are drawn out to a sharp, subulate point: in our view this is not an appendage and the transfer is not yet justified.

The discovery of homogentisic acid in *Agalmyla* and its absence from *Aeschynanthus*, *Lysionotus* and *Loxostigma* emphasizes the isolated position of *Agalmyla*, without indicating any other particular affinity.

Of the three sections recognized in the genus, sect. *Agalmyla* alone includes species with only two fertile stamens. There are seven of these, three on Sumatra and two each on Java and Borneo. Of the two on the Malay Peninsula one is also found on Java, and the other is also on Sumatra. The Bornean diandrous species are in the southern part of the island, and there, as on Sumatra, species with two stamens and species with four overlap.

It is difficult to believe that corolla form and colour in *Agalmyla* were not, originally at least, connected with bird-pollination; the reduction to two fertile stamens is therefore very unexpected as copious pollen production is usually a feature of bird-pollinated flowers. Among the tropical American subfamily *Gesnerioideae*, bird-pollination is very frequent, and four fertile stamens are the general rule. The seemingly improbable possibility that *Agalmyla* was actually derived from a diandrous stock and that these few diandrous species found near the presumed core area of the genus are relictual must not be too swiftly discarded. Tetrandry would then have been regained in response to pollination requirements; it is universal in sects. *Exannularia* and *Dichrotrichum*.

Cladistic studies in the tribal classification of *Cyrtandroideae* have so far used morphological characters and the *ndhF* and *rbcL* chloroplast genes. Only in the morphological cladogram (Smith, 1996 [1997]) did *Agalmyla* and *Aeschynanthus*, the two representatives of the tribe *Trichosporeae*, form a clade together; but the morphological characters used were probably inadequate for a critical study. When the genes *ndhF* (Smith *et al.*, 1997) and *rbcL* were used, separately and together (Smith, 2000), *Agalmyla* and *Aeschynanthus* were separated by genera of *Didymocarpeae*. *Lysionotus* was included only in the *ndhF* study (Smith *et al.*, 1997),



but then paired up with *Hemiboea* (*Didymocarpeae*) not with either *Agalmyla* or *Aeschynanthus*. It may be noted that *Agalmyla* not only comes out with genera of *Didymocarpeae*, but also is associated with diandrous genera in that tribe. Although these studies are not yet on a sufficiently wide base to give a meaningful picture of *Cyrtandroideae* as a whole, the failure of the genera of *Trichosporeae* to associate as a distinct clade cannot be ignored. These results, taken together with the difficulty of a precise morphological definition of an appendaged seed, suggest that the tribe *Trichosporeae* is of doubtful value.

*Cyrtandra*, the main genus of tribe *Cyrtandreae*, also comes out in these molecular cladograms amongst genera of *Didymocarpeae*, increasing doubts about the value of the tribal classification of *Cyrtandroideae*.

The same conclusion has been reached by Wang Xiao-Quan & Li Zhen-Yu (1998); however, their suggestion that *Trichosporeae* and *Cyrtandreae* be absorbed in *Didymocarpeae* is untenable, for nomenclatural reasons. The oldest of the tribal names is *Trichosporeae* Nees (1825), antedating both *Didymocarpeae* (D. Don) Endl. (1839) and *Cyrtandreae* (Jack) Bartling (1830). To attempt a redefinition of *Trichosporeae* to include all or part of the other two tribes would, in the current shifting state of knowledge, be highly injudicious. It seems best, for the present, to abandon tribal classification within the subfamily *Cyrtandroideae*.

As far as this revision is concerned we can only treat *Agalmyla* (as defined here) as an isolated, self-contained unit – clearly a member of subfamily *Cyrtandroideae*, but of uncertain affinity within it.

## MORPHOLOGICAL CHARACTERS

### *Habit*

Most species of *Agalmyla* are climbers in rain forest, often eventually becoming wholly epiphytic. The climbing stems develop roots along one side of the internodes (perhaps as the result of a contact stimulus); such climbing stems are paralleled in the temperate ivy (*Hedera*) and a number of tropical epiphytes, such as the aroid *Pothos*. However, both *Hedera* and *Pothos* show sharp heterophylly between leaves of the climbing stems and non-climbing, non-clinging, flowering branches. This does not occur in *Agalmyla*; leaves on climbing stems may subtend axillary inflorescences, and if the stems do branch to form a bushy clump of flowering branches without internodal roots, these do not show heterophylly in comparison with the climbing stems. (For heterophylly on side shoots, see under 'Leaves'.)

There are just six species of *Agalmyla* with more or less erect habit known at present: *A. erecta* (no. 1) and *A. tuberculata* (no. 2) in sect. *Agalmyla*, *A. singularis* (no. 42) in sect. *Exannularia*, and *A. clarkei* (no. 43), *A. manuselae* (no. 44) and *A. rubra* (no. 45) in sect. *Dichrotrichum*. Thus the change of habit seems to have taken place in each of the three sections. Although the species are not all closely related

to one another, they can usefully be considered together to see what other changes of character are associated with the erect habit.

It seems certain that these species are the few that have moved out of the dense rain forest habitat and thus escaped from the worst, at least, of the low light regime that prevails there. Apart from the terrestrial habit and loss of pronounced anisophylly, there are no special features associated with this shift of habitat. For instance, *A. erecta* and *A. tuberculata* have stamens scarcely longer than the upper corolla lobes, but belong to sect. *Agalmyla* which normally has far-exserted stamens. In contrast *A. clarkei* and *A. manuselae* in sect. *Dichrotrichum* have far-exserted stamens though this section normally has them scarcely exceeding the upper corolla lobes. *Agalmyla singularis* stands alone in the genus in having an actinomorphic corolla limb. Thus all these erect species have floral characters different from those of their nearest relatives. Change of habitat therefore seems to have been accompanied by a change, but not the same change, in characters affecting pollination.

#### *Leaves*

The leaves of most *Gesneriaceae* are arranged in decussate pairs, and there is a very strong tendency throughout the family for the two leaves of a pair to be unequal in size. This anisophylly is not connected with the unequal cotyledons (anisocotily) characteristic of the Old World subfamily *Cyrtandroideae*: many members of the New World subfamily *Gesnerioideae* show marked anisophylly, but they are not anisocotylous. Anisophylly is a special form of the more widespread condition of differently shaped leaves on different parts of a plant known as heterophylly. Some species of *Agalmyla* are heterophyllous as well as being anisophyllous (e.g. *A. brownii*, Fig. 3). In this paper heterophylly and anisophylly (Figs 4 and 5) are always differentiated in this way. Anisophylly may be virtually absent in the few non-climbing species of *Agalmyla*. These are dealt with separately above under 'Habit'.

The most extreme form of anisophylly is restricted to sect. *Agalmyla*. Here the reduced leaf is usually represented by a scale-like structure, only about 10–30mm long and up to 7mm wide at the base, and frequently it is quite soon caducous (Fig. 4). Elsewhere in the genus anisophylly occasionally appears as only a slight difference in the size of the two leaves, but generally as a great reduction in one of them to a miniature condition, with an overall length sometimes as short as 10mm but with a complete differentiation into petiole and lamina (Fig. 5). Sometimes one leaf of a pair is completely absent; this may happen on young shoots that have leaves shaped differently from those on the older shoots.

It is these young shoots that provide the most marked examples of heterophylly in *Agalmyla* (Fig. 3), and their occurrence in the wild needs to be investigated. They seem to be characterized by the tendency to be trilobed, the lobes being broadly triangular. In *A. brownii* they appear to be on definite side shoots; the sheet illustrated is the most extreme example we have seen, for the leaves are practically glabrous and the second leaf of a pair is completely absent. In other cases they seem to be at



FIG. 3. *Agalmyla brownii* (Balgooy 3203, Sulawesi, Mt Roroka Timbu), a careful collection demonstrating heterophylly.



FIG. 4. *Agalmyla biflora* (sect. *Agalmyla*) to show scale-like reduced leaves (*Mendum et al.* 25435, Palawan).

the tips of normal shoots, are hairy and may even bear an axillary flower. Whether these are a juvenile stage in the development of the normal large foliage leaves can be decided only from examination of growing plants. At least one species, *A. angiensis* (no. 73), was described from a specimen in which only the tips of the shoot seem to have been collected.

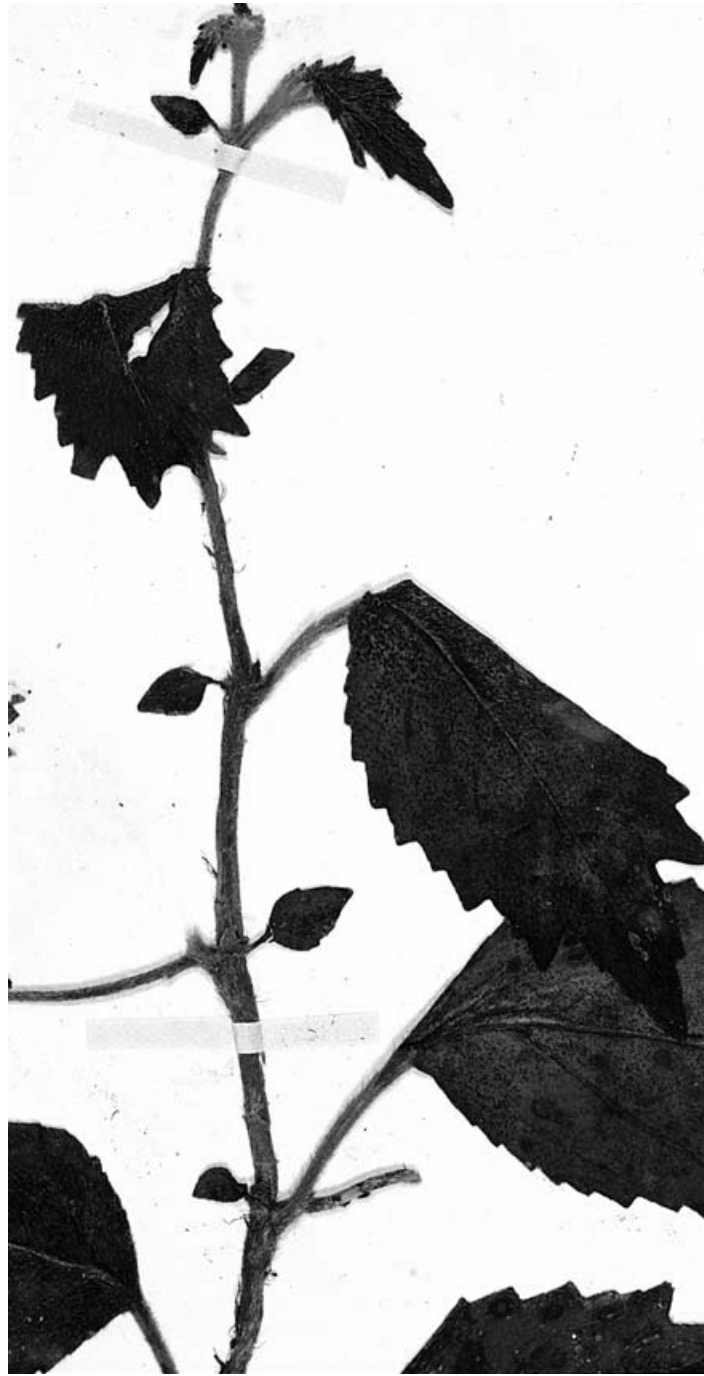


FIG. 5. *Agalmyla lobata* (sect. *Dichrotrichum*) to show leaf-like reduced leaves (Ledermann 8484, Papua New Guinea, isotype).

Section *Agalmyla* is also distinctive in another feature of its leaves: they have a marginal fringe of somewhat incurved hairs. Wood (1970) has shown that hydathodes at the tips of the marginal leaf-teeth have the power of absorbing water, and also that the marginal fringe of hairs can act as a small reservoir that prolongs the period of absorption. In the species with leaves that are densely hairy on the upper surface this fringe of hairs may be difficult to distinguish.

#### *Characters of inflorescence and flowers*

The reason for dealing with all features of the flowering phase under one heading is that the generic range of variation is given individually for these features in the sectional descriptions; here we are especially concerned with possible correlations. Important characters are (i) relative length of calyx tube and lobes, (ii) shape of corolla, particularly of the corolla limb and of the mouth, and (iii) exertion of anthers. It will be obvious that our complete ignorance of pollen-vectors makes any interpretation of the features of the flowering phase speculative.

The basic inflorescence in *Agalmyla*, as in many other genera of *Gesneriaceae*, is a pair-flowered cyme; its structure was elucidated by A. Weber (1973), while its radiation into different forms was discussed later by the same author (Weber, 1982). Variation is there recognized as being chiefly due to differences in the development of peduncle and pedicel – the former being the hypopodium, the latter the epipodium of Weber's analysis. The shortly pedunculate inflorescence is illustrated by *Agalmyla tuberculata* (Weber, 1982: fig. 5b) and represented diagrammatically by the pattern of fig. 3e. (Note: pattern b is unfortunately not labelled on the figure, so that b–e need to be moved one pattern to the left, then the right-hand pattern becomes 'f'; so corrected they match the text on the opposite page.) The long peduncles usually found in sect. *Dichrotrichum* are represented by pattern c (as corrected) in Weber's fig. 3.

These long inflorescences are sometimes deflexed with the terminal cluster of flowers turned up so that the flowers themselves are in the normal erect poise. This feature is rarely mentioned by collectors and cannot be safely diagnosed from dried specimens. Weber also noted (1982: 35) that there is pervasive bract displacement in *Agalmyla tuberculata*; this doubtless occurs also in other species and is not uncommon in *Gesneriaceae*. We have not attempted to carry analysis of the inflorescences any further.

Variations in the length of the peduncle obviously affect the position of the flowers, especially, perhaps, in their relation to the surrounding foliage. Held out in the open they could be visited by large hovering pollinators, whereas when the inflorescence is subsessile the pollen-vector would have to be of the settling type or one of the small hovering types. That may sound all right in theory, but the enormous range of peduncle length within a species, for example 15–400mm in *A. longiattenuata*, 10–190mm in *A. similis*, must raise doubts and suggests that only field observations can be relied upon. Nevertheless, it must be noted that such wide variation within

a species is not usual and there are many species, for instance all those of sect. *Agalmyla*, where short peduncles are the rule, but others (especially in sect. *Dichrotrichum* in New Guinea) where the reverse position is normal.

The calyx provides useful taxonomic characters in the length of the tube, shape of the lobes and indumentum. It is divided into five teeth or lobes in the upper half or it may be deeply divided almost to the base. The divisions are often somewhat unequal as the three upper ones are rather more deeply separated from the two lower ones than they are amongst themselves. This condition gives a hint of the 'trise-paly' that is not rare in *Gesneriaceae*, for instance in the genus *Trisepalum* C.B. Clarke, in several species of *Didymocarpus* Wall., and in *Cyrtandra trisepala* C.B. Clarke and its relatives in *Cyrtandra* sect. *Dissimiles* C.B. Clarke (Burt, 1990: 201).

A wide range of division and of shape is shown in the floral illustrations (Figs 8–26). It will be noticed that in New Guinea a few species have blunt shallow teeth on the margins of the calyx lobes, while the filiform divisions with long slender brown hairs of *A. samarica* are unique. Sometimes the indumentum on the outside of the lobes is not evenly distributed; the best example of this is where the centre of the lobe is hairy and the margins glabrous, giving a stellate effect to the spread calyx and inspiring the epithet *stellifera* (no. 25).

There is a distinct tendency for a deeply divided calyx to be found in species having a short peduncle, and in sect. *Agalmyla* both characters are constant and are also associated with far-exserted stamens. These associations may occur in sect. *Exannularia* and sect. *Dichrotrichum*, but the characters also occur independently or just two together.

The shape of the corolla shows subtle variation that cannot be divided very easily into clear-cut classes. Sect. *Agalmyla* usually has the topmost part of the tube slightly curved, the upper lobes forming a little hood (subgaleate), and the open mouth somewhat compressed (elliptic), but the mouth may be so compressed (e.g. in *A. biflora* or *A. serrata*) as to suggest that the nectar would be inaccessible except to long-tongued insects. There is no doubt that all species would well repay careful study from living material, but the subgaleate corolla may be restricted to sect. *Agalmyla*, where the peduncles are always short. In sect. *Dichrotrichum* long peduncles are frequent and the flowers usually have spreading corolla lobes (subequal in size) and a more or less circular mouth (Fig. 6).

Although we have no reliable information on pollination in *Agalmyla*, one bird visitation is recorded under *A. macrocalyx* (no. 13).

#### PHYTOGEOGRAPHY

##### *Generic range of Agalmyla, with notes on other genera east of Wallace's Line*

*Agalmyla* is essentially a genus of rain forest climbers. The SE Asian tropical rain forest is not old in geological terms; Morley (2000) places its origin in the Miocene, so that *Agalmyla* itself is likely to be of even more recent origin.

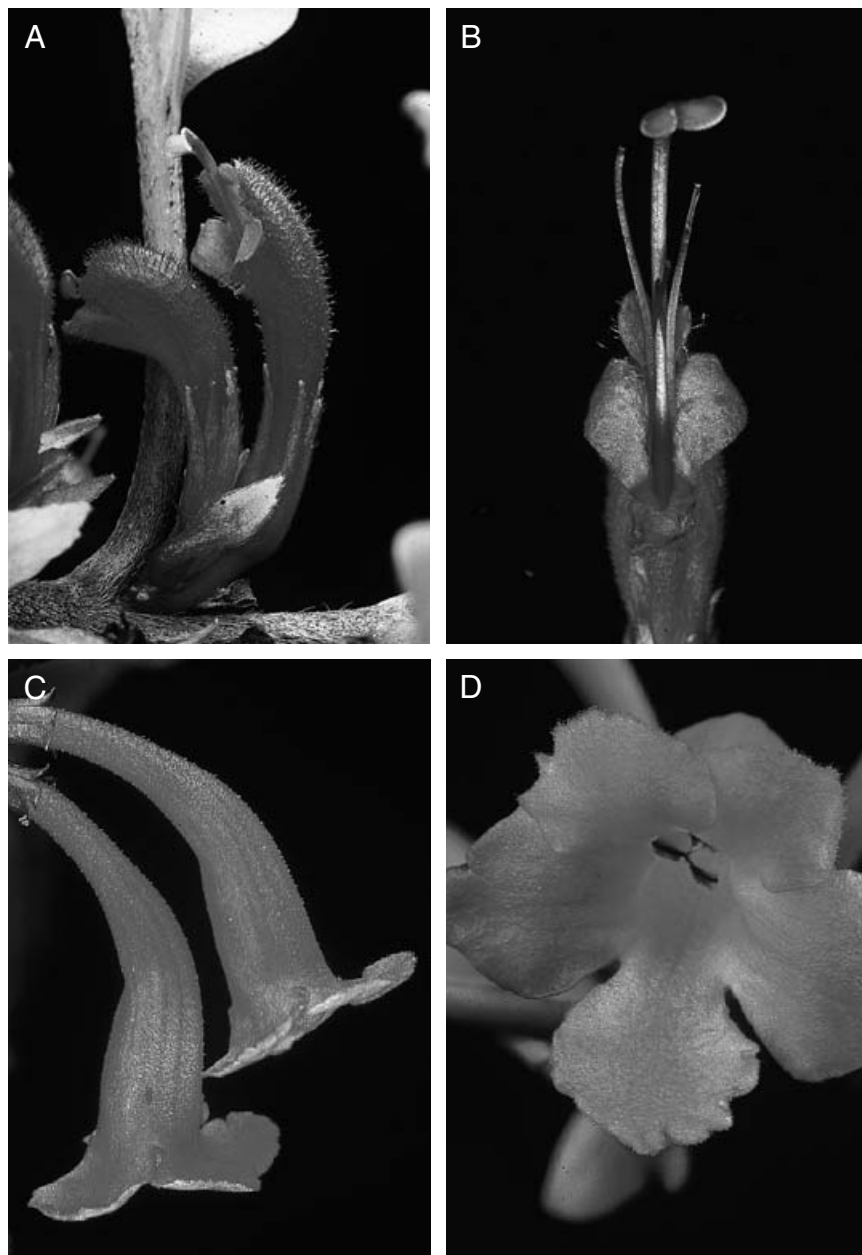


FIG. 6. Shape of corolla mouth and tube in A, B, *Agalmyla biflora* (sect. *Agalmyla*) (Argent *et al.* 23435 and 25517, Philippines, Palawan); C, D, *A. chorisepala* (sect. *Dichrotrichum*) (Argent *et al.* 29046, Philippines, Mindoro).



In a highly speculative article on the distribution of Old World *Gesneriaceae* (Burt, 1998) it was pointed out that there are no endemic genera of the subfamily *Cyrtandroideae* east of Wallace's Line, nor is there any evidence for the type of bicentric distribution (with a centre in the west originating from the Indian tectonic plate and another in the east derived from the Australian plate) that has been suggested for such families as *Palmae* (Dransfield, 1987) or *Loranthaceae* (Barlow, 1990). The distribution of *Cyrtandroideae* (which also has a distinct African element) was therefore interpreted in terms of a Gondwanan origin with the ancestors of the group reaching Asia wholly via the Indian plate.

Only 10 genera of Asiatic *Cyrtandroideae* (out of about 70) range eastwards across Wallace's Line, and it is therefore interesting to compare them with *Agalmyla*. Alphabetically they are (with recent generic synonyms and a very brief indication of their overall distributions and size):

**Aeschynanthus** Jack (*Trichosporum* D. Don; *Euthamnus* Schltr.; *Oxychlamys* Schltr.). India, S China, Taiwan, through SE Asia to Solomon Islands: c.150 species.

**Boea** Lam. N China, N Burma, Philippines south-east to New Guinea, Rossel Island and mountains of E Queensland: c.14 species.

**Cyrtandra** J.R. & G. Forster (*Cyrtandropsis* Lauterb.; *Sepikea* Schltr.). Nicobar Islands through Malesia to S Pacific and north to Hawaii: 500 + species.

**Epithema** Blume. Tropical Africa, Sri Lanka, India, S China, Taiwan, south-east to westernmost New Guinea, Aru Island and Rennell Island. Not yet known in Central and E New Guinea: c.20 species.

**Henckelia** Spreng. S India, Sri Lanka, S Thailand, east through Malesia to Sulawesi (1 or 2 species) with a single record from W New Guinea (Wissel Lakes): c.180 species.

**Monophyllaea** R. Br. (*Moultonia* Balf.f. & W.W. Sm.). S Thailand to Sulawesi and New Guinea: c.34 species.

**Paraboea** (C.B. Clarke) Ridley. NE India, S China south through Vietnam, Thailand and Malesia to Sulawesi: c.90 species. This is the only genus of this group not yet known from New Guinea.

**Rhynchoglossum** Blume (*Klugia* Schltdl.). India, Sri Lanka and SW China through Malesia to New Guinea: c.12 species.

**Rhynchotechum** Blume (*Isanthera* Nees). N India, SW China, Sri Lanka, Thailand, Vietnam, Philippines, south-east through Malesia to New Guinea: c.12 species.

**Stauranthera** Benth. N India south-east to New Guinea. Not yet known from Sulawesi or Moluccas: c.8 species.

Of these genera only two, *Aeschynanthus* and *Cyrtandra*, equal or exceed *Agalmyla* in their eastern development. *Aeschynanthus* has about 35 species in New Guinea

and about 150 in all (M. Mendum, pers. comm.) while *Agalmyla* has, in this revision, 39 in New Guinea and a total of about 97. *Aeschynanthus* reaches as far as San Christabel at the eastern end of the Solomon Islands (Woods, 1977), apparently as an extension from New Britain and Bougainville. *Agalmyla* reaches the D'Entrecasteaux and the Louisiade Archipelago (Rossel Island), apparently as an eastward extension from the New Guinea mainland. The development and the ranges of these two genera in this part of the world are thus effectively the same. There are also two minor parallelisms between them. Firstly, both show a tendency to have far-exserted stamens in the west, but stamens not, or scarcely, exceeding the upper lip of the corolla in the east; however, there is no sharp division nor is it possible at present to give percentage figures for comparison. Secondly, *Aeschynanthus* sometimes has the type of corolla described above for sect. *Agalmyla* as subgaleate, and, as in *Agalmyla*, this is found in the western part of its range. Among the New Guinea species, mostly in *Aeschynanthus* sect. *Microtrichium*, the corolla lobes are more spreading and the anthers scarcely exceed the upper lobes; this again parallels what is found in *Agalmyla*.

Of *Cyrtandra* it is more difficult to speak. This huge genus is much more complex than either *Aeschynanthus* or *Agalmyla* and there is, as yet, no satisfactory infrageneric classification. Its full area extends far beyond New Guinea, right through the southern Pacific and north to Hawaii. This contrasts strongly with that of both *Agalmyla* and *Aeschynanthus*, whose ranges stop in the islands just east of New Guinea. The two latter genera are dependent on wind dispersal. *Cyrtandra* is marked by an 'indehiscent' fruit; however, this description covers two different types of fruit. In the west the fruits are hard and coriaceous; nothing is known of their dispersal, but the most probable agent may be small forest mammals. In New Guinea many species have soft white berries, and these are probably the only fruits found further east (see Guppy, 1906: 316). This change in fruit morphology must represent a switch to dispersal by birds, and it may well be this that has permitted the wide spread of *Cyrtandra* across the Pacific region. The extended range of *Cyrtandra* tells us nothing about the age of the genus, only about its efficiency in transoceanic dispersal.

Seven of the remaining eight genera show a marked decline to the east of Wallace's Line, and six of them have capsules with small seeds lacking any special device for dispersal. Only *Rhynchotechum* has a white fleshy berry, and it is noteworthy that a single species, *R. discolor* (Maxim.) B.L. Burtt, ranges from coastal areas of mainland China through the Philippines to New Guinea.

Barlow has drawn attention to a similar eastward decline in the family *Loranthaceae* (Barlow, 1990: 283–285). For instance *Lepeostegeres* has 15 species centred in Borneo and the Philippines, one in New Guinea; *Macrosolen* has 40 species in SE Asia and W Malesia and, again, just one in New Guinea. Genera in families of southern origin that are believed to have entered SE Asia via the Indian plate are termed by Barlow 'Indogondwanan'; *Agalmyla*, in common with all the genera of *Gesneriaceae* discussed here, would merit that term.

The eighth genus in this group is *Boea*. It has the typical small seeds falling from

a dehiscent capsule. Not only has it reached New Guinea, it has also produced a small cluster of seven species in eastern New Guinea and the Solomon Islands and has two species in the mountains of E Queensland. *Boea* can withstand periods of drought: a Chinese species is named *B. hygrometrica* (Bunge) C.B. Clarke, an Australian one *B. hygrosopica* F. Muell. – they are poikilohydric (Gaff, 1981). Barlow (1990: 275–276) came to the conclusion that there might have been a continuous overland migration route from Sulawesi to Australia via New Guinea in the late Miocene or early Pliocene and that at this time the predominant vegetation in the corridor was monsoon forest type. Do poikilohydry and a period of monsoon climate, which is widely accepted (Morley, 2000), add up to an explanation for *Boea* not fitting into the rain forest distribution pattern?

#### *Distribution within Agalmyla*

As already mentioned, the three sections of *Agalmyla* have distinct geographies; they will therefore be considered separately. However, one general point must be emphasized. Collecting in SE Asia has been irregularly and thinly spread. Not a few of the species recognized here are represented by a single or very few specimens. They scarcely have a ‘distribution’. Furthermore, if all the specimens were mapped, areas where the genus has not yet been found would be numerous. Of course not all these would be suitable for *Agalmyla*, but there can be no doubt that further new species, and extensions of range, are inevitable.

Section *Agalmyla* is restricted to the Malay Peninsula (2 species), Sumatra (7), Java (2), Borneo (14) and Palawan (1); these areas are collectively termed Sundaland, all lying west of the modified version of Wallace’s Line (Fig. 2). Details of distribution are given under each species, but it is noteworthy that only two species occur in more than one of these areas: *A. parasitica* occurs both in Java and on the Malay Peninsula, while *A. glabrisepala* is shared between Sumatra and the Peninsula. All the other species are endemic to their areas.

Borneo is the largest area and has the greatest number of species, distributed along the north-east–south-west trending mountains. There are five species on Mt Kinabalu in Sabah, a mountain that reaches 4400m, the highest point in SE Asia outside New Guinea. Two of the five are endemic to Kinabalu; one of these, *A. tuberculata*, is a shrubby plant, often branched from the base, terrestrial or epiphytic, and reaches an altitude of 3400m, the highest known for the genus.

There is a single species of sect. *Agalmyla* on the island of Palawan, *A. biflora*, and its closest ally is probably *A. bracteata* on Mt Kinabalu. It certainly belongs to sect. *Agalmyla*, which is not otherwise represented in the Philippine Islands, a fact that has induced us to draw the northern end of Wallace’s Line in the modified position suggested by Huxley (1868) and by Dickerson & Merrill (Merrill, 1923a, 1926).

Section *Exannularia* is the only one to occur on Sulawesi (12 species). Four other species are endemic to the Moluccas, and two in westernmost New Guinea. The only

other species outside Sulawesi is *A. stellifera* from the Lesser Sunda Islands. Interestingly it occurs both on Flores and Lombok, to the east of Wallace's Line, and on Bali, to the west of it. It is the only species of *Agalmyla* that occurs on both sides of the line. Does this suggest that the section has been derived from sect. *Agalmyla* by a southerly route?

Section *Dichrotrichum* is both the largest section of the genus (54 species) and has the widest distribution. There are 13 species in the Philippine Islands, rather surprisingly only two in the Moluccas and 39 in New Guinea. It does not occur on Sulawesi, and if we subdivide the area of the section into Philippines, Moluccas and New Guinea all the species are endemic to one of these.

In recent years much progress has been made in elucidating the geological history of New Guinea. For information on this we have relied on Pigram & Davies (1987) and Hall (1998). It is now recognized that New Guinea consists of the northern edge of the Australian craton to which there has been a long succession of accretions, while the collisions which have brought about these accretions have powered the elevation of the central range of mountains that is now such a dominant feature of the country. Pigram & Davies (1987) have recognized 33 accreted terranes (Fig. 7); P. van Welzen (1997) has studied the geographical distribution of a whole range of New Guinea plants in relation to their occurrence on these terranes, and has found correlations, not so much between distribution and individual terranes, but with the phases in which the terranes accreted. As the matter is clearly of current interest, we give here a list of terranes and the species found on them. In the present stage of our own knowledge (or ignorance) we do not feel qualified to attempt to carry the analysis any further.

## WEST NEW GUINEA

### VOGELKOP (BIRD'S HEAD) PENINSULA

#### Waigeo terrane

78. *A. tamrauana*: differs slightly from type on mainland

#### Tamrau terrane

78. *A. tamrauana*

79. *A. dentatisepala*

96. *A. similis*; also Kemum terrane

#### Netoni terrane

75. *A. dentatisepala*

77. *A. wekariensis*

#### Kemum terrane

42. *A. singularis*

59. *A. aitinyuensis*

96. *A. similis*

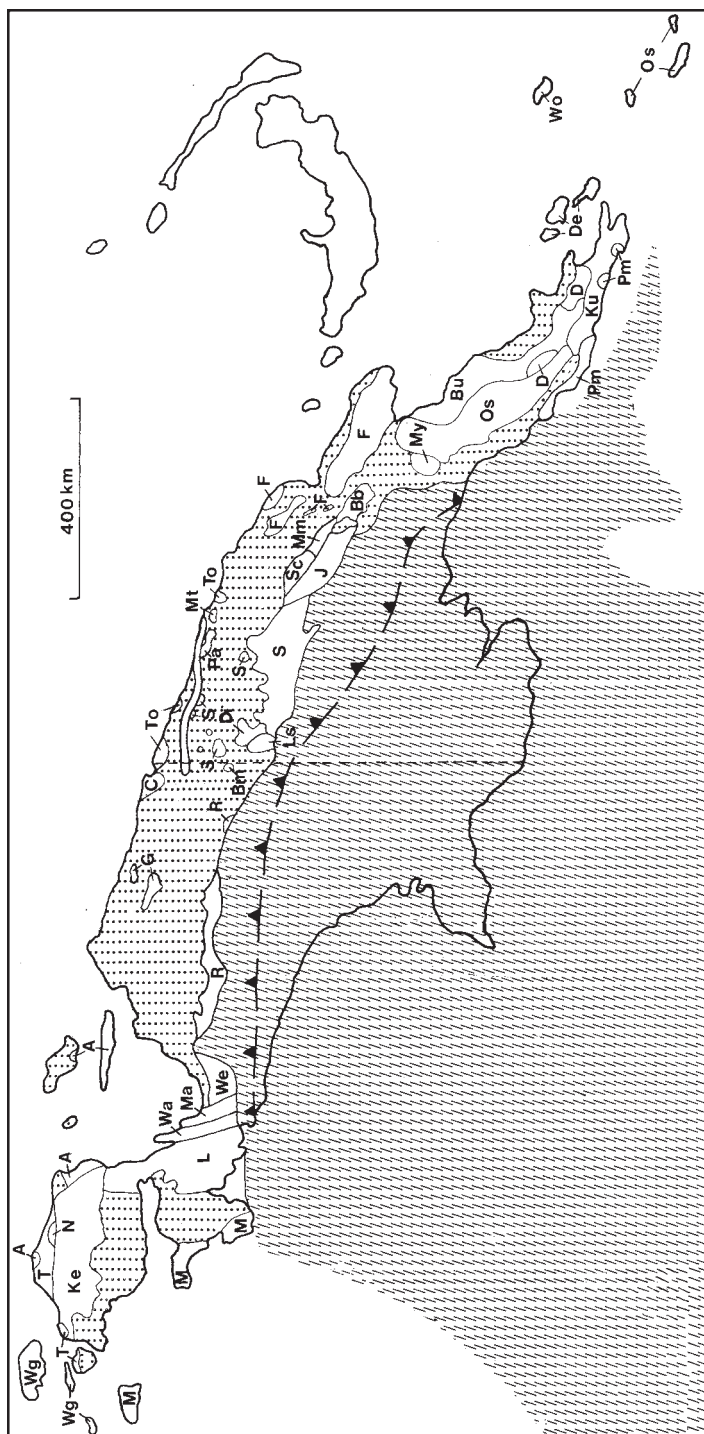


FIG. 7. New Guinea terranes, after Pigram & Davies (1987), with permission from Geoscience Australia. Barred area: part of Australian craton; dotted area: onshore areas of successor basins. From west to east: Wg, Waigeo; M, Misool; T, Tamrau; A, Arfak; Ke, Kenum; N, Netoni; L, Lengguru; Wa, Wandammen; Ma, Maransabadi; We, Weyland; R, Rouffaer; G, Gautier; C, Cyclops; BM, Border Mountains; To, Torricelli; S, Sepik; LS, Landslip; Di, Dimatic; Pa, Prince Alexander; Tu, Mount Turu; J, Jimi; Sc, Schradar; Mm, Marum; Bb, Bena Bena; F, Finisterre; My, Menyamya; Os, Owen Stanley; Bo, Bowutu; D, Dayman; Pm, Port Moresby; Ku, Kutu; De, D'Entrecasteaux; Wo, Woodlark.

**Arfak terrane** (Arfak Mts only)73. *A. angiensis*76. *A. hirta*80. *A. brevipes***BIRD'S NECK****Misool terrane**88. *A. kowapiana* (mainland only)**Wandammen terrane**36. *A. roseoflava*58. *A. wondiwoiana***Weyland terrane**91. *A. multiflora***EASTERN PART OF WEST NEW GUINEA****Gautier terrane**92. *A. gjellerupii***Rouffaer terrane**86. *A. glandulosa***Cyclops terrane**84. *A. triflora***Deformed Australian miogeocline**74. *A. paromoia*81. *A. parvifolia*82. *A. stenosiphon*87. *A. valetoniana*90. *A. elegans*: see also Papua New Guinea**PAPUA NEW GUINEA****Torricelli terrane**90. *A. elegans*; also Prince Alexander and Sepik terranes, Deformed Australian miogeocline**Prince Alexander terrane**90. *A. elegans***Sepik terrane** (composite)71. *A. lavandulacea*83. *A. lobata*90. *A. elegans*93. *A. chrysostyla*; also Deformed Australian miogeocline

**Deformed Australian miogeocline**

- 62. *A. hooglenii*
- 63. *A. aurantiaca*
- 72. *A. centralis*
- 85. *A. gracilis*
- 90. *A. elegans*
- 93. *A. chrysostyla*
- 94. *A. nervosa*
- 95. *A. formosa*

**Jimi terrane**

- 61. *A. minor*; also Bena Bena terrane
- 89. *A. chalmersii*; also Bena Bena, Marum, Finisterre, Owen Stanley, Port Moresby, Kutu and Dayman terranes

**Marum terrane**

- 89. *A. chalmersii*

**Bena Bena terrane**

- 60. *A. porrectiloba*; also Finisterre terrane
- 61. *A. minor*; also Jimi terrane
- 64. *A. schlechteri*; also Owen Stanley and Menyamyia terranes
- 89. *A. chalmersii*; see Jimi terrane

**Finisterre terrane**

- 60. *A. porrectiloba*; also Bena Bena terrane
- 69. *A. keysseri*
- 89. *A. chalmersii*; see Jimi terrane

**Menyamyia terrane**

- 64. *A. schlechteri*; see Bena Bena terrane

**Bowutu terrane**

- 65. *A. villosa*; also onshore successor basin

**Owen Stanley terrane**; see also Jimi and Bena Bena terranes above

- 64. *A. schlechteri*
- 67. *A. pauciflora*
- 89. *A. chalmersii*

**Dayman terrane**

- 66. *Agalmyla* sp. nov.
- 67. *A. pauciflora*; also Owen Stanley terrane
- 89. *A. chalmersii*; see Jimi terrane

**Port Moresby terrane**89. *A. chalmersii*; see Jimi terrane**Kutu terrane**89. *A. chalmersii*; see Jimi terrane**D'Entrecasteaux terrane**68. *A. macrocolon***Island Arcs: Karkar, New Britain, New Ireland**70. *A. insularis***TAXONOMY**

**Agalmyla** Blume in Bijdr. Fl. Ned. Ind. 14: 766 (1826); Benth. & Hook.f., Gen. Pl. 2: 1014 (1876); Fritsch in Engl. & Prantl, Pflanzenfam. 4 (3B): 154 (1894); B.L. Burtt in Notes Roy. Bot. Gard. Edinb. 28: 223 (1968); Hilliard & B.L. Burtt in Blumea 44: 381 (1999).

Lectotype: *A. parasitica* (Lam.) Kuntze (Morton & Denham in Taxon 21: 669 (1972)).

Syn.: *Dichrotrichum* [Reinw. ex] de Vriese, Pl. Ind. Bat. Or. 7, tab. 1 (1856); Benth. & Hook.f., Gen. Pl. 2: 1014 (1876); Fritsch in Engl. & Prantl, Pflanzenfam. 4 (3B): 154 (1894); B.L. Burtt in Notes Roy. Bot. Gard. Edinb. 28: 219 (1968). Type: *D. ternateum* de Vriese [= *A. elongata* (Blume) B.L. Burtt].

*Orithalia* Blume, Fl. Java, Praef. vi (1828) nom. illegit.

*Orythia* [Blume ex] Endl., Gen. Suppl. 1: 1408 (1841) in syn. – sphalm. pro *Orithalia*.

*Tetradema* Schltr. in Notizbl. Bot. Gart. Mus. Berlin 7: 359–362 (errore 15–18) (1920); B.L. Burtt in Notes Roy. Bot. Gard. Edinb. 28: 219 (1968). Lectotype: *T. rubrum* (Merr.) Schltr. [= *Agalmyla rubra* (Merr.) B.L. Burtt].

Mostly epiphytic climbers with adventitious roots along internodes, a few species shrubby, terrestrial; stem hairy, bark pale, glossy, brittle. *Leaves* usually opposite, occasionally ternate, often anisophyllous, reduced leaf either scale-like and soon caducous, or leaf-like, more or less persistent, leaf margins entire, toothed, or lobed, one or both surfaces hairy or glabrous, texture herbaceous. *Inflorescence* axillary, cymose, congested, sessile or pedunculate, flowers few to many, pedicellate. *Bracts* solitary at base of each pedicel, conspicuous or not. *Calyx* subequally 5-lobed, tube long or short, wanting in 2 species. *Corolla* more or less funnel-shaped, usually arcuate, limb weakly to strongly bilabiate, lobes 5, mouth open to strongly compressed laterally, annulus of hairs inside tube near base present or absent, or represented as patches of hairs. *Stamens* either 4 or posticous pair reduced to staminodes in 7 species, filaments inserted roughly midway in tube, anthers syntheticous, cohering in pairs by apical ligature, either visible in mouth or shortly to well exerted.



*Disc* a shallow cupule. *Ovary* cylindrical, elongate, often stipitate, unilocular, placentation parietal. *Style* long or short in relation to length of ovary. *Stigma* bilobed, lobes lateral, relatively large, papillose on inner face. *Fruit* an elongated capsule splitting into 2 then 4 valves, with the two main carpellary vascular strands, sometimes accompanied by two minor ones, long persistent after disintegration of other tissue. *Seeds* fusiform, a hyaline appendage at upper (hilar) end, a brown appendage at lower end (Fig. 1).

#### THE GENUS AND ITS SUBDIVISION

We have divided *Agalmyla* into three broad sections. Although their morphological differences are somewhat weak, their geographical coherence is strong. Sect. *Agalmyla* is found only west of Wallace's Line, while sect. *Dichrotrichum* and sect. *Exannularia* are found only to the east of it; but to this statement there is one small exception: *A. stellifera* of sect. *Exannularia* is found on Flores and Lombok, east of Wallace's Line, but also on Bali, which is just west of it.

The reference above to 'broad sections' means, of course, that these sections contain one or two anomalous species. The most important ones are those that show a change from the normal climbing, strongly anisophyllous habit to an erect, almost isophyllous one. They have been fully discussed under 'Habit' in the section 'Morphological characters' above (see p. 9). This change occurs in all three sections, but in only six species altogether. As will be seen below, they considerably complicate the key to sections. Without them it would be possible to say that sect. *Agalmyla* is characterized by the reduction of one leaf to a scale-like form, by the presence of an annulus of upward-pointing hairs in the lower part of the corolla tube and by far-exserted anthers; sect. *Exannularia* by one leaf of each pair reduced to a miniature condition, but with petiolar and laminar regions fully distinguished, and the annulus being completely lacking; and sect. *Dichrotrichum* by a miniature reduced leaf, anthers not much exceeding the dorsal lip of the corolla, and the annulus being well developed or broken up into 5 discrete patches of hairs below the level of the filaments.

We have deemed it of more practical use to provide keys by geographical areas rather than by sections. Thus there are four keys to species: (i) west of Wallace's Line, (ii) the Philippines, (iii) Sulawesi (and all sect. *Exannularia*), and (iv) the Moluccas and New Guinea. However, the areas are treated with some latitude and there is some repetition: for example, *A. biflora* is found on Palawan, the one Philippine island west of Wallace's Line, and it is keyed out in both (i) and (ii). Sulawesi and the Lesser Sunda Islands have only species of sect. *Exannularia*, and the few that occur further east are included in (iii) as well as in (iv). In brief, all species are keyed out in their appropriate areas, but some are repeated in the area where most of their allies are found.

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*Key to sections*

- 1a. Annulus present inside corolla tube, either as a ring or as a broad band of hairs, either continuous or in 5 patches, rarely short sparse hairs arranged in longitudinal lines \_\_\_\_\_ 2
- 1b. Annulus wanting \_\_\_\_\_ Sect. **Exannularia** (p. 69)
- 2a. Stamens either 4 or 2, anthers always far exerted, inflorescence always sessile or subsessile (peduncle up to c.10mm), much reduced leaf, when present, scale-like, broad-based, leaves with a marginal band of appressed hairs (not easily seen when leaf densely pubescent on both surfaces) \_\_\_\_\_  
 \_\_\_\_\_ Sect. **Agalmyla** (p. 26)
- 2b. Stamens always 4, anthers usually not or scarcely exceeding posticous lobes (far exerted in *A. clarkei* and *A. manuselae*), inflorescence distinctly pedunculate in most species, sessile or subsessile in species nos. 43–49 (*A. clarkei*, *A. manuselae*, *A. rubra*, *A. sibuyanensis*, *A. montis-tomasii*, *A. samarica*, *A. urdanetensis*), much reduced leaf, when present, with a distinct blade and petiolar part, leaf margins without a distinct band of appressed hairs \_\_\_\_\_ Sect. **Dichrotrichum** (p. 100)

Sect. **AGALMYLA**

Type: *A. parasitica* (Lam.) Kuntze.

Syn.: *Dichrotrichum* sect. *Agalmylopsis* Schltr. in Fedde, Rep. 16: 212–213 (1919).

Type: *D. borneense* Schltr. [= *Agalmyla borneensis* (Schltr.) B.L. Burtt].

*Habit*: mostly epiphytic climbers, stems rooting along internodes, *A. tuberculata* and *A. ovata* climbing but flowering part of stem pendulous, not rooting; *A. erecta* (and sometimes *A. tuberculata*) shrubby, terrestrial. *Leaves* opposite (often ternate in *A. tuberculata*), those of a pair strongly anisophyllous (more or less equal in *A. erecta*), **reduced leaf scale-like**, broad-based, **leaf margins always banded with crowded hairs**, hairs straight or crisped, appressed; *inflorescence* an axillary cyme, sessile or nearly so; calyx 5-lobed nearly to base; corolla red, the two lateral lobes ascending to join the two posticous lobes to form a **subgaleate** upper lip, anticous lobe porrect, **mouth** very oblique, **more or less laterally compressed**, inside tube near base an annulus of either 5 discrete tufts or a ring of upward-pointing hairs; *fertile stamens* either 4, all four far exerted, anticous anthers larger than posticous ones (only shortly exerted in *A. erecta* and anthers subequal), or 2 (the anticous pair); *ovary* and *style* glabrous or with very minute globular glands, style long (c.15–45mm) except in *A. erecta* (c.4mm). **Figs 8–12.**

*Geographical distribution.* West of modified Wallace's Line: Malay Peninsula, Sumatra, Java, Borneo, Palawan, that is, the islands of the Sunda Continental Shelf (Sundaland). Species nos. 1–24.

*Key to species in Sundaland*  
(Section *Agalmyla*)

Note: Calyx tube measured *inside*; corolla length measured from top of posticous lobes to base, tube from sinus between posticous and lateral lobes to base, all on rehydrated material.

- 1a. Leaves ternate (either 3 leaves in each whorl, or one much reduced and bract-like), upper surface distinctly tuberculate. (Sabah, Mt Kinabalu) \_\_\_\_\_ **2. *A. tuberculata***
- 1b. Leaves opposite (either both developed or one much reduced and scale-like), upper surface hairy or glabrous, not tuberculate \_\_\_\_\_ 2
- 2a. Both leaves equally well developed, plant erect, terrestrial. (Sarawak) \_\_\_\_\_ **1. *A. erecta***
- 2b. One leaf reduced and scale-like, plant either epiphytic or, if terrestrial, creeping \_\_\_\_\_ 3
- 3a. Hairs on stem and petioles strongly retrorse. (Sabah, Mt Kinabalu) \_\_\_\_\_ **3. *A. bracteata***
- 3b. Hairs on stem and petioles upward-pointing to patent \_\_\_\_\_ 4
- 4a. Upper leaf surface glabrous except along margins (caution: examine lower part of midrib, which may be hairy when rest of blade is glabrous) \_\_\_\_\_ 5
- 4b. Upper leaf surface variously pubescent, hairs sometimes confined to margins and midline \_\_\_\_\_ 13
- 5a. Fertile stamens 4 \_\_\_\_\_ 6
- 5b. Fertile stamens 2 (caution: the staminodes can be very long, even exerted) \_\_\_\_\_ 11
- 6a. Calyx lobes c.23–28 × 10–15mm. (Sarawak) \_\_\_\_\_ **13. *A. macrocalyx***
- 6b. Calyx lobes up to c.15 × 6mm \_\_\_\_\_ 7
- 7a. Base of leaf remarkably long-attenuate down petiole, lateral veins 12–17 each side of midrib, outer bracts 25–50mm long. (Borneo) – **6. *A. johannis-winkleri***
- 7b. Base of leaf either rounded or cuneate, but not long-decurrent down petiole, lateral veins 8–12 each side of midrib, outer bracts c.7–17mm long \_\_\_\_\_ 8
- 8a. Corolla 19–22mm long, clad in acute hairs only. (Sarawak) – **7. *A. borneensis***
- 8b. Corolla 32–45mm long, clad in a mixture of acute and gland-tipped hairs – 9
- 9a. Filaments glandular-puberulous on lower half. (Borneo) \_\_\_\_\_ **8. *A. pseudoborneensis***
- 9b. Filaments either glabrous or with a few globular glands at base \_\_\_\_\_ 10
- 10a. Lateral veins of leaf looping near margin and linking to vein above, lowermost bracts mostly 2–6mm broad, 5 discrete tufts of glandular hairs to

- 
- 2–3mm long inserted shortly above base of corolla tube. (N Sumatra) \_\_\_\_\_ **20. A. wildeorum**
- 10b. Lateral veins of leaf fading out near margin, lowermost bracts c.13mm broad, ring of acute hairs to 1mm long inserted shortly above base of corolla tube. (Kalimantan) \_\_\_\_\_ **14. A. affinis**
- 11a. Hairs on stem and along midrib on lower leaf surface gland-tipped, 7–9 lateral veins each side of midrib. (Sumatra) \_\_\_\_\_ **21. A. beccarii**
- 11b. Hairs on stem and lower leaf surface acute, 11–15 lateral veins each side of midrib \_\_\_\_\_ 12
- 12a. Lowermost bracts 8–24 × 2–6mm, calyx lobes hairy. (E Sarawak, Kalimantan) \_\_\_\_\_ **9. A. diandra**
- 12b. Lowermost bracts 35–45 × 10–20mm, calyx lobes glabrous. (Sumatra, Malay Peninsula) \_\_\_\_\_ **22. A. glabrisepala**
- 13a. Fertile stamens 2 (caution: staminodes may be well developed, even exerted) \_\_\_\_\_ 14
- 13b. Fertile stamens 4 \_\_\_\_\_ 17
- 14a. Upper leaf surface hairy only along midrib, particularly lower part, and along margins \_\_\_\_\_ 15
- 14b. Upper leaf surface hairy all over \_\_\_\_\_ 16
- 15a. Lateral veins 7–8 each side of midrib, looping near margin and there fading out; lowermost bracts c.15 × 10mm, ovate, broad-based. (Sumatra) \_\_\_\_\_ **16. A. brevifolia**
- 15b. Lateral veins (9–)10–13 each side of midrib, looping near margin and linking to vein above; lowermost bracts 17–25 × 2–5mm, distinctly narrowed in lower part. (W Java, Malay Peninsula) \_\_\_\_\_ **23. A. parasitica**
- 16a. Hairs on stem 3–4mm long, lateral veins 8–10 each side of midrib, looping near margin and there fading out; lowermost bracts c.8 × 2–3mm; lateral staminodes c.23–28mm long. (Sarawak) \_\_\_\_\_ **10. A. decipiens**
- 16b. Hairs on stem 1.5–2mm long, lateral veins 10–14 each side of midrib, looping near margin and linking to vein above; lowermost bracts c.30–43 × 5–15mm; lateral staminodes either wanting or up to c.0.5mm long. (Java) \_\_\_\_\_ **24. A. javanica**
- 17a. Lateral veins 7–9, leaf base cuneate \_\_\_\_\_ 18
- 17b. Either lateral veins 7–9 each side of midrib, base of leaf rounded and very oblique, or lateral veins 9–17 each side of midrib, base of leaf various but not both sides rounded and very oblique \_\_\_\_\_ 19

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- 18a. Leaf margin obscurely serrulate; hairs on stem up to 3–5mm long. (Borneo) \_\_\_\_\_ **11. *A. murudiana***  
 18b. Leaf margin coarsely serrate; hairs on stem up to 2mm long. (Palawan) \_\_\_\_\_ **15. *A. biflora***
- 19a. Hairs fringing corolla lobes gland-tipped. (N Sumatra) \_\_\_\_\_ **19. *A. leuserensis***  
 19b. Hairs fringing corolla lobes acute \_\_\_\_\_ 20
- 20a. Corolla c.17–25mm long \_\_\_\_\_ 21  
 20b. Corolla at least 30mm long \_\_\_\_\_ 23
- 21a. Lateral veins 9–11 each side of midrib, base of leaf cuneate, hairs on outside of corolla all acute. (Sumatra) \_\_\_\_\_ **17. *A. angustifolia***  
 21b. Lateral veins 7–9 each side of midrib, base of leaf rounded, very oblique, hairs on outside of corolla either all gland-tipped or mixed gland-tipped and acute \_\_\_\_\_ 22
- 22a. Flowering part of stem without adventitious roots, petiole 28–45mm long, no immersed gland dots on lower surface of leaf, filaments sparsely and minutely glandular on lower part. (Sarawak) \_\_\_\_\_ **4. *A. ovata***  
 22b. Adventitious roots all along flowering part of stem, petiole 55–115mm long, yellowish to dark immersed gland dots on lower surface of leaf, filaments glabrous. (Sabah) \_\_\_\_\_ **5. *A. longipetiolata***
- 23a. Base of leaf cuneate, remarkably long-attenuate down the petiole; blade roughly 4–11 times as long as broad. (Borneo) \_\_\_\_\_ **6. *A. johannis-winkleri***  
 23b. Base of leaf either rounded or cuneate, but then only shortly decurrent on petiole; blade roughly 2–3 times as long as broad \_\_\_\_\_ 24
- 24a. Leaf margins coarsely and irregularly serrate, calyx lobes c.16mm long, hairs on outside of corolla to 0.8mm long, filaments glabrous. (Sarawak) \_\_\_\_\_ **12. *A. serrata***  
 24b. Leaf margins irregularly serrulate to subentire, calyx lobes mostly 20–27mm long, hairs on outside of corolla to 1.2–2mm long, filaments with minute globular glands on lower part. (Sumatra) \_\_\_\_\_ **18. *A. tobensis***

**1. *Agalmyla erecta*** B.L. Burtt in Bot. J. Linn. Soc. 85: 17 (1982).

Type: Borneo, Sarawak, Gunung Mulu National Park, Gunung Api, summit ridge, 1600m, 15 iv 1978, *Argent & Jermey* 997 (holo. E; iso. A, L, SAR).

Shrub 1–2m tall, erect or sprawling, stems 10–15mm in diam. on flowering part, densely clad in appressed acute upward-pointing hairs to 1mm long, glabrescent, bark then pale, glossy. *Leaves* opposite, subequal, blade 130–190 × 40–74mm, oblong-elliptic to oblanceolate, apex subacute to obtuse, base cuneate, margins serrate, each tooth tipped with a blunt gland, 14–16 lateral veins each side of midrib, ascending at angle of c.45°, looping near margin and uniting with vein above, upper surface densely pubescent, hairs to 1mm long, acute, lower surface with hairs less

dense on blade, dense over veins and along margins; petiole 20–38mm long, hairy as blade. *Inflorescence* an axillary cyme, flowers c.6–12, peduncle 10–18mm long, densely appressed-hairy. *Bracts*: one pair only, 20–34 × 10–15mm, elliptic, margins minutely denticulate, both surfaces densely hairy, hairs acute, to 1mm long. *Pedicels* 5–15mm long, hairy as peduncle. *Calyx* tube 0.5–1mm long, lobes 5, subequal, 5.5–9 × 1–2mm, oblong-lanceolate, acute, outside acute appressed hairs to 0.7–0.8mm long, inside shorter hairs near apex, otherwise glabrous. *Corolla* 16–20mm long, tube 13–16mm, obliquely funnel-shaped, slightly arcuate, mouth oblique, posticous lobes 2.5–3 × 2.5–3mm, erect, suborbicular, anticous lobe 3.5–4 × 3mm, elliptic, porrect, corolla red, whitish at base, pale yellowish inside tube, dark median line on 3 lower lobes, pubescent outside except near margins of lobes and near base of tube, hairs to 0.5mm long, acute, acute broad-based hairs less than 0.1mm long inside lobes and around mouth, broadly pyramidal trichomes less than 0.1mm long on 2 small solid keels running from sinuses of anticous lobes to insertion of anticous filaments, also between the keels, elsewhere glabrous except for 5 discrete tufts of gland-tipped hairs to 1.5mm long inserted c.4mm above base of tube. *Stamens* 4, anticous filaments inserted 9–10mm above base of tube, 7.5–11mm long, anticous anthers 2–2.2mm long; posticous filaments inserted c.10.5–12mm above base, 7–8.5mm long, posticous anthers 1.5–1.8mm long; all filaments glabrous; staminode 1–3mm long. *Disc* cupular, c.1 × 2mm. *Ovary* c.25 × 2mm (♀ phase), glabrous. *Style* c.4mm long, glabrous. *Stigma* of 2 equal lobes c.2.5 × 1mm, inner surfaces papillose. *Capsules* c.130–150 × 3mm. *Seeds* c.1 × 0.2mm, appendages c.2mm long. **Fig. 8: 1a, b.**

BORNEO. **Sarawak.** Gunung Mulu National Park, Gunung Api, north ridge, c.4°08'N, 114°54'E, c.1100m, 3 xi 1977, *Argent et al.* 657 (E); *ibid.*, 8 ix 1970, *Chai* S 30416 (E, K, SAR); *ibid.*, 2900ft, 1970, *Lehmann* PFL 568 (E); *ibid.*, NE flank of mountain, 4°07'N, 115°15'E, 3200ft, 2 x 1971, *Anderson* S 30890 (A, E, K, L, SAR).

*Agalmyla erecta* is a highly distinctive species, being a terrestrial shrub with opposite, subequal, spreading leaves, with tips more or less obtuse, in contrast to the drawn-out tips on the hanging leaves of epiphytic species. The flowers are small (corolla only 16–20mm long) and the appendages on the seeds are shorter than in many of the epiphytes.

It is known only from Gunung Api, but the limestone on the upper parts of neighbouring Gunung Benarat and Gunung Buda have not, to our knowledge, been botanized. The plants have been recorded on 'overhanging limestone cliff', 'rooted in peaty mats on limestone cliffs in fairly open situations', 'shrubbery on peaty accumulation on exposed limestone ridge', between c.880 and 1600m above sea level.

## 2. *Agalmyla tuberculata* Hook.f. in Hook. Ic. Pl.: tab. 897 (1852).

Type: Borneo, Sabah, Mt Kinabalu [Kina Balou], 8000ft, *Low* s.n. (holo. K).

Syn.: [*Agalmyla asperifolia* auctt. non Blume – see discussion below].

Epiphytic or terrestrial, stems often elongate, c.5–6mm in diam. at flowering apices, no adventitious roots present there, thickly clad in ± appressed hairs to c.1mm long,

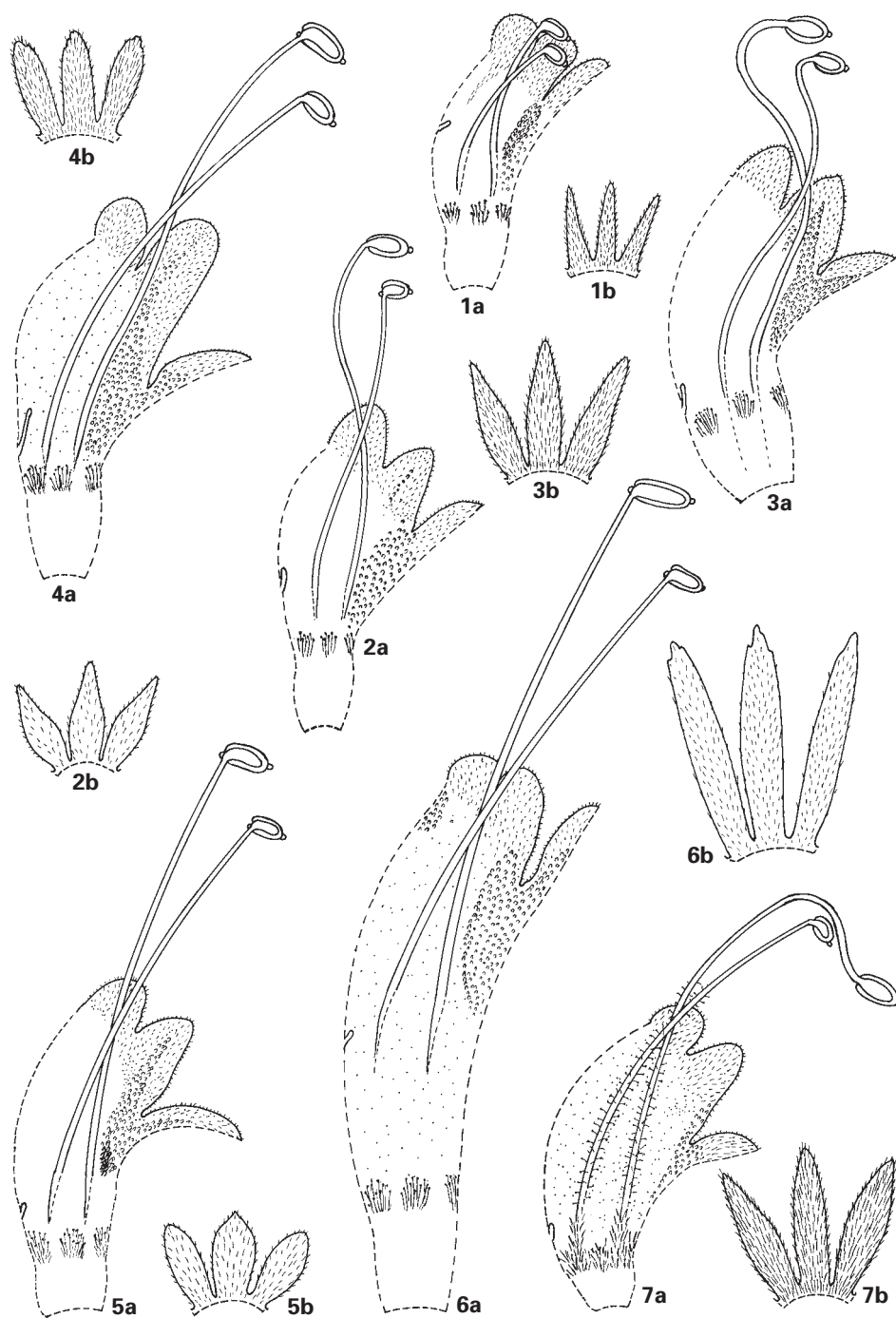


FIG. 8. Part of calyx and longitudinal section of corolla: 1a, b, *Agalmyla erecta*; 2a, b, *A. tuberculata*; 3a, b, *A. bracteata*; 4a, b, *A. ovata*; 5a, b, *A. longipetiolata*; 6a, b, *A. johannis-winkleri*; 7a, b, *A. borneensis*. All  $\times 2$ .

mostly acute, sometimes a few gland-tipped. *Leaves* ternate, whorls mostly strongly anisophyllous with 2 leaves fully developed, one scale-like, c.6–10 × 1–3mm, lanceolate, sessile, sometimes all 3 fully developed, blade of developed leaves 37–70 × 16–34mm, elliptic-ovate, apex acute, base cuneate, oblique or not, margins serrate to serrulate, sometimes very obscurely so, each tipped with a blunt gland, 5–6 lateral veins each side of midrib, ascending at angle of 45°, looping near margin and then briefly running parallel to margin before merging into it, upper surface tuberculate, each tubercle crowned with an acute hair to 0.2–0.3mm long, appressed acute hairs to 1mm along midrib, lower surface with acute appressed hairs to 0.8mm long confined to margins and veins, acute hairs to 0.3–0.5mm long scattered on blade; petiole 20–60mm long, clad in ± upward-pointing hairs to 0.8mm long, mostly acute, some occasionally gland-tipped. *Inflorescence* a few-flowered axillary cyme, peduncle 5–10mm long, appressed-hairy. *Bracts* (lowermost) 6–10 × 2–4.3mm, lanceolate, acute, acute hairs to 0.7mm long on margins and outside, few to c.0.5mm inside, mainly over veins. *Pedicels* 8–25mm long, clad in acute hairs to 0.8mm long. *Calyx* divided to within 1mm of base, lobes 5, subequal, 5.5–8 × 1.6–3.7mm, lanceolate, acute, tipped with a small blunt gland, usually entire, rarely with 2–3 small callose teeth near apex, upward-pointing acute hairs to 0.6mm outside and on margins, inside glabrous. *Corolla* 19–25mm long, tube 16–21mm, obliquely funnel-shaped, somewhat gibbous below posticous lip, mouth oblique, posticous lobes (and lateral ones) erect, posticous lobes 3–5 × 3.2–5mm, suborbicular, anticous lobe 5–7 × 3–4.5mm, elliptic, porrect, corolla scarlet to bright blood red, dark median line on 3 lower lobes, inside tube yellowish, pubescent outside except near margins of lobes and near base of tube, hairs to 0.8mm long, gland-tipped, very minute acute hairs fringing lobes, all lobes very minutely hairy inside, minute globular glands (less than 0.1mm diam.) at base of anticous lobe extending down floor of tube and out to inner margins of lateral lobes, 5 tufts of glandular hairs to c.2.5mm long inserted 4–5mm above base. *Stamens* 4, the 5th staminodal, but sometimes with a small (1mm long) anther containing pollen, anticous filaments inserted c.10mm above base of tube, c.26mm long, glabrous, anticous anthers c.2.8–3.2mm long; posticous filaments c.21–24mm long, glabrous, posticous anthers c.2–2.5mm long. *Disc* cupular, 2.2 × 3mm. *Ovary* c.22 × 2mm during ♀ phase (c.9 × 1.2mm in ♂ phase), glabrous. *Style* c.20mm long (c.9mm in ♂ phase), glabrous, tapering into ovary. *Stigma* of 2 equal lobes c.2.5 × 1.5mm during ♀ phase, inner surfaces papillose. *Capsules* c.85–200 × 2–3mm, tipped with persistent style. *Seeds* c.1 × 0.2mm, appendages c.3mm long. **Fig. 8: 2a, b.**

BORNEO. **Sabah.** Mt Kinabalu: *Argent et al.* 1399 (E); *Chew et al.* 769 (E, K) and 1127 (A, E, K); *Clemens* 27927–29132 (L); *Fuchs* 21458 (K, L); *Hotta* 3917 (L); *Ogata* 11265 (L); *Sinclair et al.* 9173 (E, L); sine coll., S 10638 (L).

A word of explanation is needed about the long misused name *Agalmyla asperifolia* Blume. Bentham (1876) thought that Blume's plant and *Agalmyla tuberculata* Hook.f., perhaps because of the like-meaning epithets and because of the lack of



detail in Blume's description, represented the same species. Both have four fertile stamens and Bentham dealt with them under the genus *Dichrotrichum*, but he did not make any nomenclatural transfer. This was left to C.B. Clarke (1883) who followed Bentham's view, and the name *D. asperifolia* (Blume) C.B. Clarke was used for the Bornean plant for many years (although it was never applied to plants from Java). Only when R.C. Bakhuizen van den Brink was working up the family for Backer & Bakhuizen's *Flora of Java* did anyone seek the type specimen of *A. asperifolia* Blume; Bakhuizen found it in the Leiden herbarium and it proved to belong to *Chirita blumei* C.B. Clarke. Backer & Bakhuizen did not accept *Chirita* as a genus distinct from *Didymocarpus* and Bakhuizen (1950) accordingly published the combination *D. asperifolius* (Blume) Bakh.f., which later became *Chirita asperifolia* (Blume) B.L. Burt (Burt, 1962). All combinations using the epithet *asperifolia* have the same type, Blume's specimen in Leiden; this shows how Blume's mistake arose, for on the sheet with the flowering and leafy specimen of *Chirita asperifolia* is an old dehiscent fruit of *Agalmyla* by which Blume was clearly misled. However, apart from its use in *Didymocarpus* and *Chirita* subsequent to the discovery of the type, it has almost always been applied to *Agalmyla tuberculata* Hook.f.

*Agalmyla tuberculata* is easily recognized by its leaves, either in whorls of three similar leaves, or one leaf in each whorl reduced and scale-like, the upper surface with hairs arising from tubercles. Also, at least the flowering part of the stem lacks adventitious roots and the flowers are only c.20–25mm long. It seems that the species may be a terrestrial shrublet (recorded from 'rocky wooded banks of stream' and 'in shady crevices in the granitic rock in moss cushions') or an epiphytic climber ('climbing and hanging from trees').

This species is endemic to Mount Kinabalu, between 2700 and 3400m above sea level; there are several records from the vicinity of Paka Cave on the main route up, but it has also been recorded on the northern face and on the eastern shoulder.

**3. *Agalmyla bracteata*** (Stapf) B.L. Burt in Notes Roy. Bot. Gard. Edinb. 28: 224 (1968).

Type: Borneo, Sabah, Mt Kinabalu, Maripari, 5000ft, *Haviland* 1289 (K).

Syn.: *Dichrotrichum bracteatum* Stapf in Trans. Linn. Soc. ser. 2, Bot. 4: 212 (1894).

Epiphytic climber or creeping on ground, stems elongate, c.6–8mm in diam. on flowering part, rooting along internodes, densely appressed-hairy, hairs retrorse, acute, up to c.0.8mm long. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.7–11 × 2–3mm, lanceolate, sessile, densely hairy, soon caducous; blade of developed leaves 85–140 × 60–75mm, ovate, apex broadly acute to acute, base rounded to subcuneate, slightly oblique, margins denticulate, sometimes obscurely so, each tooth comprising a blunt gland, 7–9 lateral veins each side of midrib, ascending at angle of c.45°, looping near margin and linking with vein above (this sometimes obscure), upper surface densely clad in acute hairs to 0.8mm long, closely

glandular-punctate (strong magnification needed), lower surface similarly hairy, hairs on midrib retrorse, blade distinctly bullate; petiole c.40–87mm long, clad in retrorse acute hairs up to 1mm long. *Inflorescence* a few-flowered, crowded axillary cyme, peduncle c.5mm long, very stout, clad in retrorse hairs. *Bracts* (lowermost) c.35–45 × 10–12mm, lanceolate, acute, margins very minutely remotely denticulate, both surfaces densely clad in acute appressed hairs to 0.8mm long. *Pedicels* c.10–12mm long, thickly clad in patent acute hairs up to 1mm long. *Calyx* reddish, tube c.0.5mm long, lobes 5, subequal, 8.5–10 × 2–2.5mm, oblong, acute, margins entire, densely pubescent outside, hairs to 0.5mm long, acute, inside few short acute hairs near apex, elsewhere minute scattered globular glands. *Corolla* c.22–25mm long, tube c.17–20mm, obliquely funnel-shaped, arcuate and somewhat swollen on posticous side, mouth oblique, posticous lobes erect, 4–4.5 × 3–4mm, suborbicular, anticous lobe 5–6.5 × 3–4.5mm, elliptic, porrect, corolla red, dark median line on 3 lower lobes, pubescent outside except near margins of lobes and lower part of tube, hairs acute, to c.0.5mm long or mixed gland-tipped to 1.2mm long and few acute, very minute acute hairs fringing lobes and inside lobes, globular papillae less than 0.1mm in diam. on palate and down floor of tube to point of insertion of stamens and out on to inner half of lateral lobes, elsewhere glabrous except for 5 discrete tufts of gland-tipped hairs to 2.5mm long inserted c.5mm above base of tube. *Stamens* 4, anticous filaments inserted c.9–10mm above base of tube, c.28mm long, anticous anthers 3mm long; posticous filaments inserted 10–12mm above base of tube, c.22mm long, posticous anthers 2mm long; all filaments glabrous; staminode c.1mm long. *Disc* cupular, c.1.5 × 2.5mm. *Ovary* c.14 × 2mm, glabrous. *Style* c.15mm long, glabrous, tapering into ovary. *Stigma* of 2 equal lobes c.3.5 × 3mm, papillose on inner face. *Capsules* c.180–230 × 2.5mm. *Seeds* c.1.2 × 0.2mm, appendages c.3.5mm long. **Fig. 8: 3a, b.**

BORNEO. **Sabah.** Mount Kinabalu Park, Gunung Tambuyukon, 6000ft, flowered in hort. Edinb. v 1982, *Argent* C 801360 (E). Mt Kinabalu, Marai Parai, 5200ft, 19 ix 1993, *Wong K. M., Berhaman & Leipold* SAN 134770 (SAN); *ibid.*, 5000ft, 22 v 1933, *Clemens* 33198 (GH, L); *ibid.*, 5000ft, 4 iv 1933, *Clemens* 32596 (GH, L); *ibid.*, 6 iii 1933, *Clemens* 35026 (GH). Mount Kinabalu, Bambang Ridge, 1800–2000m, 26 iii 1995, *Beaman et al.* 11389 (K).

*Agalmyla bracteata* is distinctive by virtue of the hairs clothing stems, petioles and midrib being strongly retrorse. It is known only from Mount Kinabalu at Marai Parai and Bambang Ridge, and from Gunung Tambuyukon to the north of Kinabalu, confined to ultrabasic soils, between c.1550 and 1800m above sea level.

**4. *Agalmyla ovata* (B.L. Burtt) Hilliard & B.L. Burtt, *stat. nov.* ab *A. tuberculata* Hook.f. foliis oppositis (nec ternatis), basi rotundatis (nec cuneatis), venis lateralibus utrinsecus 7–8(–9) (nec 5–6), pagina superiore pilis acutis ad 1.5mm longis indutis (nec tuberculis pilo acuto 0.2–0.3mm longo coronatis), filamentis inferne parce glandulosis (nec glabris) differt.**

Type: Borneo, Sarawak, c.3°56'N, 115°32'E, route from Bakelalan to G. Murud, above Camp III, c.6000ft, 21 ix 1967, *Burtt & Martin* B 5249 (holo. E).

Syn.: *A. tuberculata* var. *ovata* B.L. Burtt in Edinb. J. Bot. 49(3): 285 (1992), as to type only. Type as above.

Terrestrial or epiphytic, stem elongate, c.6–10mm in diam. at flowering tips, no adventitious roots seen there, thickly clad in acute hairs c.0.5–0.8mm long. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.7–10 × 1–2mm, lanceolate, sessile, strongly appressed-hairy; blade of developed leaves 47–70 × 25–43mm, ovate, apex acute, base rounded, very oblique, margins serrulate, somewhat crisped, each tooth tipped with a blunt gland, 7–8(–9) lateral veins each side of midrib ascending at angle of c.45°, looping near margin and merging with it, upper surface and margins clad in acute hairs to 1.5mm long, on lower surface to 1mm long; petiole 28–45mm long, clad in acute hairs to 1mm. *Inflorescence* a few-flowered axillary cyme, peduncle 4–10mm long, clad in acute hairs to 1mm. *Bracts* (lowermost) 6–10 × 1–2mm, linear-lanceolate, acute, tipped with a blunt gland, margins entire or with a pair of small teeth near apex, acute upward-pointing hairs to 0.8mm long on margins and outside, sparsely hairy inside. *Pedicels* 9–15mm long, hairy as peduncle. *Calyx* tube 0.3–0.8mm long, lobes 5, subequal, 6–8.2 × 2–3.3mm, oblong-lanceolate, subacute, margins with 1–3 small teeth each side near apex or entire, all tipped with a blunt gland, acute hairs to 0.8mm outside and on margins, glabrous inside. *Corolla* c.25mm long, tube c.21–22mm, obliquely funnel-shaped, somewhat gibbous below posticous lip, mouth oblique, posticous lobes erect, c.3–3.5 × 3.5–4mm, suborbicular, anticous lobe c.6–7.5 × 3.2–4mm, elliptic, porrect, corolla ‘red’, pubescent outside except near margins of lobes and base of tube, hairs to 1mm long, mixed acute and gland-tipped, latter sometimes few, very minute acute hairs fringing lobes, all lobes very minutely hairy inside, minute globose glands less than 0.1mm in diam. on lower half of anticous lobe, extending down floor of tube and out to inner margins of lateral lobes, very minute glandular hairs sparsely scattered all over inside of rest of tube, band of coarse gland-tipped hairs to 2–2.5mm long inserted c.5mm above base of tube, either continuous or in 5 discrete tufts, lowermost hairs in band sometimes shorter, bluntly eglandular. *Stamens* 4, anticous filaments inserted c.10mm above base of tube, c.27–32mm long, gland-tipped hairs to 0.1mm long scattered on included part, anticous anthers 3mm long; posticous filaments inserted c.12mm above base, c.21–25mm long, very sparsely glandular, posticous anthers 2.5mm long; staminode c.4mm long. *Disc* cupular, c.1.5 × 2mm. *Ovary* c.6.5 × 0.9mm during ♂ phase, glabrous. *Style* c.9mm long during ♂ phase, elongating during ♀ phase, tapering into ovary, glabrous. *Stigma* of 2 equal lobes c.3–3.2 × 2–2.5mm during ♀ phase, inner surface papillose. *Capsules* c.140 × 2.2mm, tipped with persistent style. *Seeds* c.1 × 0.25mm, appendages c.3mm long. **Fig. 8: 4a, b.**

BORNEO. **Sarawak.** c.3°55'N, 115°31'E, Gunung Murud, N side, c.7000ft, 11 x 1967, *Burtt & Martin* B 5459 (E, SAR); *ibid.*, 2400m, 7 iv 1970, *Nooteboom & Chai* 02007 (L, SAR).

*Agalmyla ovata* was originally described as a variety of *A. tuberculata*, but seems to warrant specific rank, differing as it does in its leaves, opposite (not ternate), base

rounded (not cuneate), lateral veins 7–8(–9) (not 5–6), upper surface clad in hairs to 1.5mm long (not 0.2–0.3mm from a tuberculate base), and filaments sparsely glandular on lower part (not glabrous). It is known only from Gunung Murud and its immediate environs in Sarawak, between 1800 and 2400m above sea level, where it has been recorded as both creeping in moss forest and climbing.

The type specimen consists of two pieces of stem. The obviously older, flowering stems (precisely matched by the other two specimens cited above) differ somewhat in indumentum from the younger, sterile, stem; the younger material has slightly longer hairs on stem, petioles and leaf blades and many of these are gland-tipped.

**5. *Agalmyla longipetiolata*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. ovata* radiculis adventivis in parte caulis florente praesentibus (nec absentibus), in folii pagina inferiore glandulis immersis punctatis (nec glandulis absentibus), petiolo 55–115mm longis (nec 28–45mm), filamentis glabris (nec in dimidio inferiore parce et minute glandulosis) differt.

Type: Borneo, Sabah, Kinabalu N.P., *Leptospermum* forest, c.9500ft, 29 iii 1982, *Sinclair* 242 (holo. E).

Epiphytic climber, stem elongate, c.6–12mm in diam., simple or sparingly branched, rooting along internodes, young parts thickly clad in acute, upward-pointing appressed hairs to 1mm long, sometimes a few gland-tipped hairs as well, eventually glabrescent, bark then papery, shining, pale. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, 9–17 × 2mm, linear-lanceolate, sessile, soon caducous; blade of developed leaves 55–105 × 34–62mm, ovate, apex acute, base rounded, very oblique, margins serrulate, each tooth tipped with a blunt gland, 8(–9) lateral veins each side of midrib ascending at angle of c.45°, looping near margin and merging with it, upper surface clad in rather scattered acute hairs to 0.5–1mm long, denser on margins, lower surface similar, hairs dense over veins and there strongly appressed, yellowish to dark immersed gland-dots less than 0.1mm in diam. all over blade on lower surface; petiole 55–115mm long, clad in acute, upward-pointing hairs to 1mm long. *Inflorescence* a several-flowered axillary cyme, peduncle 5–8mm long, clad in acute hairs to 1mm. *Bracts* (lowermost, very few seen) c.11 × 6mm, lanceolate, acute, margins usually entire, occasionally 1 or 2 teeth near apex, acute hairs to 0.8mm on margins and outside, few hairs inside mostly near apex. *Pedicels* 10–20mm long, acute upward-pointing hairs to 1mm long. *Calyx* tube c.0.5mm long, lobes 5, subequal, 3.5–6.5 × 2–3.3mm, lanceolate, subacute, blunt gland at tip, margins entire or occasionally 2 very small teeth near apex, acute hairs to 1mm outside, to 0.5mm on margins, glabrous inside. *Corolla* 17–24mm long, tube 15–19mm, obliquely funnel-shaped, somewhat gibbous below posticous lip, mouth oblique, laterally compressed, posticous lobes erect, 3–5 × 2.7–4mm, suborbicular, anticous lobe 3.5–7.5 × 2.5–4mm, elliptic, porrect, corolla bright scarlet, dark median line on 3 lower lobes, pubescent outside except near margins of lobes and near base of tube, hairs to 0.8mm long, gland-tipped, very minute acute hairs fringing

lobes, all lobes very minutely hairy inside, minute globular papillae extending from median line of anticous lobe down floor of tube to point of insertion of filaments (and there raised into 2 small longitudinal flaps) and out to inner margins of lateral lobes, glabrous elsewhere inside tube, band of coarse gland-tipped hairs to c.1.5mm long inserted c.3mm above base of tube, either continuous or in 5 discrete tufts, sometimes interspersed with shorter bluntly eglandular hairs. *Stamens* 4, anticous filaments inserted c.9mm above base of tube, 27–32mm long, glabrous, anticous anthers 2.5–3mm long; posticous filaments inserted c.10mm above base, 24–29mm long, glabrous, posticous anthers 2mm long; staminode 1.5–3mm long. *Disc* cupular, c.2 × 3mm. *Ovary* c.14–17 × 1.2–1.8mm, glabrous. *Style* c.16mm long at end of ♀ phase, tapering into ovary, glabrous. *Stigma* of 2 equal lobes c.3 × 2.5mm during ♀ phase, inner surface papillose. *Capsules* c.130–155 × 2mm, tipped with persistent style. *Seeds* c.1.2 × 0.3mm, appendages c.3mm long. **Fig. 8: 5a, b.**

BORNEO. **Sabah.** Southern slope of Mt Kinabalu, under Mesilau Cave, 1960m, 6 ix 1963, *Collenette* 21581 (A, K, L); Mesilau river, c.7000ft, vii 1998, *Cronk et al.* 12 (E). [Summit] trail, between power station and first lookout point, 6300ft, 19 ix 1979, *Collenette* 81/79 (E). Eastern shoulder, 9500ft, 18 vii 1961, *Chew et al.* 865 (A, E, K, L); *ibid.*, 8000ft, 22 vi 1961, *Chew et al.* 1075 (E, K, L); Marai Parai spur, xii 1915, *Clemens* 11004 (A); head of Liwagu river trail, 1800–1900m, 23 iii 1995, *Beaman et al.* 11274 (K). Crocker Range, Kimanis road, 1989, *Lamb* s.n. (E).

*Agalmyla longipetiolata* is allied to *A. ovata* from which it is distinguished by producing adventitious roots along the flowering part of the stem, lower leaf surfaces distinctly glandular-punctate, petioles 55–115mm long (not 28–45mm), and filaments glabrous (not minutely glandular on lower part).

It is known only from Mount Kinabalu and the Crocker Range, Sabah, between c.1800 and 2900m above sea level.

**6. *Agalmyla johannis-winkleri* (Kraenzlin) B.L. Burt** in *Notes Roy. Bot. Gard. Edinb.* 28: 224 (1968).

Type: Borneo, Kalimantan, Serawai distr., Bidang Menabai, c.700m, 12 xii 1924, *Winkler* 795 (holo. HBG, iso. E).

Syn.: *Dichrotrichum johannis-winkleri* Kraenzlin in *Mitt. Inst. Allg. Bot. Hamburg* 7: 84 (1927).

*D. stenophyllum* Merr. in *Sarawak Mus. J.* 3: 551 (1928). Type: Sarawak, Mt Dulit, above 1200m, i 1923, *Mjöberg* 18 (BM).

Perennial herb, stem elongate, c.3–7mm in diam. on flowering part, either epiphytic, climbing up tree trunks, or sprawling on ground, at least flowering part simple to sparingly branched, rooting all along internodes on side pressed to substrate, very young stems with acute upward-pointing appressed hairs to 0.8mm long, sometimes glandular as well, later hairs 1–2mm long, patent, acute hairs few when glandular ones plentiful, glabrescent, bark then papery, pale, glossy. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.15–25 × 2.5–3mm, lanceolate, sessile, hairy, soon caducous; blade of developed leaves 150–470 × 35–90mm, elliptic or

oblanceolate, apex acuminate, base cuneate, remarkably long-attenuate into petiole, margins remotely serrate to serrulate, each tooth tipped with a large blunt gland, 12–17 lateral veins each side of midrib, looping near margin and linking to vein above, a short subsidiary vein running straight out to adjacent tooth, very young leaves with both surfaces clad in acute appressed hairs to 1mm long together with minute closely packed globular glands, fully mature leaves glabrescent, both surfaces then glabrous except for innumerable immersed gland dots, margins only persistently hairy, hairs c.0.5–0.8mm long, upward-pointing, appressed; petiole 50–100mm long (often looks longer because of long-attenuate leaf blade), clad in scattered acute upward-pointing hairs c.0.3–0.8mm long, sometimes a few gland-tipped hairs to 2mm long near base. *Inflorescence* a several-flowered (c.20 flowers) crowded axillary cyme, peduncle 5–10mm long, very stout, few appressed acute hairs to 0.3mm long, sometimes a few gland-tipped ones to 1.5mm long. *Bracts* (lowermost) c.25–50 × (6–)10–18mm, elliptic-lanceolate, very acute, either entire or a few teeth on upper margins, mostly obscure, discernible only by their glandular tips, scattered acute appressed hairs to c.0.2mm long outside and on margins, sometimes a few gland-tipped hairs as well, inside glabrous, dull red or purplish-red. *Pedicels* c.11–17mm long, clad in acute hairs up to 0.2–0.8mm long, upward-pointing to patent. *Calyx* tube 0.5–1mm long, lobes 5, subequal, 10–15.5 × 2–3.5mm, oblong, subacute, bluntly gland-tipped, margins entire or with 1–2 minute gland-tipped teeth near apex, outside scattered acute hairs to 0.2–0.8mm long, patent to more or less appressed, inside scattered very minute gland-tipped hairs, dark red. *Corolla* 38–44mm long, tube 35–37mm, narrowly funnel-shaped, somewhat arcuate, mouth oblique, posticous lobes erect, 3–4 × 3–4.2mm, suborbicular, anticous lobe 5–7 × 3–4mm, elliptic, porrect, corolla bright red, dark median line on 3 lower lobes, pubescent outside, hairs a mixture of acute to c.0.2mm long and gland-tipped to 1.2–2mm long, these mostly on upper part, particularly backs of lobes, lowermost 12–20mm of tube glabrous or with scattered very minute globular glands, very minute acute hairs fringing lobes, all lobes very minutely hairy inside, hairs acute, globular papillae less than 0.1mm in diam. on lower part of anticous lip and down floor of tube to point of insertion of anticous filaments, also a patch below posticous sinus, gland-tipped hairs less than 0.1–0.2mm long elsewhere inside tube, 5 discrete tufts of gland-tipped hairs c.2mm long inserted 5–7mm above base of tube. *Stamens* 4, anticous filaments inserted 23–27mm above base of tube, 34–44mm long, glabrous, anticous anthers 3.5–4mm long; posticous filaments inserted 23–27mm above base of tube, 30–38mm long, glabrous, posticous anthers 2–2.5mm long; staminode c.1mm long. *Disc* cupular, c.1.2 × 2.2mm. *Ovary* c.33 × 2mm in ♀ phase, glabrous. *Style* c.30mm long in ♀ phase, glabrous. *Stigma* of 2 equal lobes c.5.4 × 4mm in ♀ phase, inner surface papillose. *Capsules*: ripe ones not seen, immature c.135 × 2mm. *Seeds* not seen. **Fig. 8: 6a, b.**

BORNEO. **Sarawak.** Limbang, Bukit Pagon, Sg. Sipayan, 3 viii 1984, *Awa & Lee* S 47641 (K, SAR); Kelabit Highlands, Mt Murud east, Sg. Belapan–Sg. Dapo, 1100m, 2 ix 1970, *Nooteboom & Chai* 01858 (CANB, L, SAR). Gunung Mulu National Park, G. Mulu, 4500ft,

15 vi 1962, *Burt & Woods* B 2104 (E); *ibid.*, near Sg. Trekan, c.400ft, 15 vi 1975, *Burt* B 8278 (E); *ibid.*, between Transit camp and Hidden Valley, 4 iv 1978, *Stone* 13608 (SAR); *ibid.*, W of Sg. Berar camp, 150m, 16 iii 1978, *Jermy* 13680 (SAR); *ibid.*, base of Bukit Berat, 15 iii 1981, *Collenette* 2342 (E). Belaga distr., Linau-Balui divide, ridge NW of Sg. Jellini camp, c.2°26'N, 114°10'E, 2800ft, 4 ix 1978, *Burt* 11441 (E); Ulu Belaga, Sg. Sernawat, 15 x 1981, *Hansen* 644 (E, SAR); *ibid.*, 15 x 1981, *Othman et al.* S 43640 (K, L, SAR); *ibid.*, 21 x 1981, *Hansen* 742 (E, SAR); S Hose Mts, c.4500ft, 13 iv 1980, *Burt* 12876 (SAR). Lubok Antu distr., Bukit Lanjak, 4200ft, 14 iii 1974, *Chai* S 33829 (E); Simanggang distr., Ulu Sekarang, below Bukit Sadok, 17 x 1982, *Paie* S 44946 (E, SAR). **Brunei.** Temburong, Gunung Retak, 4°21'N, 115°17'E, 1300–1350m, 9 iii 1991, *Johns* 6553 (E, K). **Kalimantan.** Gunung Raja, 900m [or 200?], 7 iv 1965, *Elsener* H 110 (L); *ibid.*, 1600m, 19 x 1995, *Church et al.* 2589 (A, E).

The leaves are the most distinctive character of *A. johannis-winkleri*: narrow in relation to their length, tapering at both ends, the base remarkably long-attenuate down the petiole, 12–17 lateral veins each side of midrib, hairy on both surfaces only when very young, the upper surface rapidly glabrous except along the margins, the lower surface becoming glabrous more slowly.

The species has been recorded from Brunei, Sarawak and Kalimantan, between c.850 and 1350m above sea level, in forest as a climber or creeping on fallen trunks, or, in more open places, scrambling on the ground. It is possible that it also occurs on the Crocker Range in Sabah: *Nooteboom* 983 (L), from Gunung Alab, 5°50'N, 116°15'E, at 1500m, is in poor condition, but appears to be *A. johannis-winkleri*.

**7. *Agalmyla borneensis*** (Schltr.) B.L. Burt in Notes Roy. Bot. Gard. Edinb. 28: 224 (1968).

Types: Borneo, Sarawak, without locality, native collector distr. sub no. 1613 and 1646 ex Manila (B<sup>†</sup>). Neotype (chosen here): Sarawak, Serian distr., Gunung Penrissen, 28 iv 1962, *Ilias Paie* S 16359 (E).

Syn.: *Dichrotrichum borneense* Schltr. in Fedde, Repert. Sp. Nov. 16: 213 (31 Dec. 1919).

Epiphytic climber, stems elongate, simple or sparingly branched, c.4–7mm in diam. on flowering part, rooting along internodes, densely hairy, hairs acute, to 2–4mm long. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.10 × 2mm, lanceolate, sessile, glabrous above, hairy below, soon caducous; blade of developed leaves 110–150 × 45–75mm, elliptic or ovate-elliptic, apex shortly acuminate, base rounded to cuneate, slightly oblique or not, margins serrulate, each tooth tipped with a dark blunt gland, 8–9 lateral veins each side of midrib, ascending at angle of c.45°, looping near margin and fading out, upper surface of very young leaves thickly clad in minute globular glands, mature leaves glandular-punctate otherwise glabrous except along margins, lower surface clad in acute hairs to 1.5–2mm long, these denser over veins and along margins, very minutely glandular-punctate as well; petiole 55–70mm (to 130–150mm on old woody parts) thickly clad in acute hairs up to 2–3mm long. *Inflorescence* a several-flowered very congested axillary cyme, peduncle c.5mm long. *Bracts* (lowermost) c.10–14 × 3–5mm, lanceolate, acute, margins with

about 4 minute teeth near apex, outside and margins acute hairs to 1mm long, inside glabrous. *Pedicels* 11–25mm long, thickly clad in acute hairs to 1–1.5mm long. *Calyx* reddish, tube 0.2–0.5mm long, lobes 5, subequal, 7–11 × 1.8–3mm, oblong-elliptic, subacute, either entire or with 2 minute teeth near apex, densely hairy outside and on margins, hairs acute, to 1mm long, inside glabrous. *Corolla* c.19–22mm long, tube 17–20mm, more or less funnel-shaped but strongly ventricose on posticous side, mouth oblique, posticous lobes 2.5–3 × 2.5–3mm, suborbicular, erect, anticous lobe 3.5–5 × 2.8–3mm, elliptic, porrect, corolla red, hairy outside except near margins of lobes, hairs to 1.5–2mm long, acute, very minute acute hairs fringing lobes, globular papillae less than 0.1mm in diam. in a band from base of anticous lobe down floor of tube to point of insertion of stamens and extending round sinuses, elsewhere glabrous inside except around zone of adnation of filaments, there gland-tipped and acute hairs as on filaments, and a ring of acute hairs up to 2mm long inserted c.1.2mm above base of tube. *Stamens* 4, anticous filaments inserted 6.5–10mm above base of tube, 26–28mm long, anticous anthers 3.2–3.5mm long; posticous filaments inserted 7.5–10mm above base of tube, 24–26mm long, anthers 1.5–2.2mm long; all filaments clad in glandular and acute hairs up to 0.5–1mm long along much of their length, glabrous in upper part; staminode c.4.5–6.5mm long. *Gynoeceium* seen only during ♂ phase and then undeveloped, *disc* then c.1 × 2mm, cupular. *Capsules* c.320 × 2.5mm. *Seeds* c.1 × 1.2mm, appendages c.4.5mm long. **Fig. 8: 7a, b.**

BORNEO. **Sarawak.** Gunung Penrissen, 1250m, 25 ix 1987, *Yii* S 61313 (E, K). Proposed Matang National Park, near Kuching, Ulu Sg. Rayu, 15 iv 1987, *Lee* S 54073 (E).

The type specimens were presumably destroyed in the Berlin and Manila fires and no duplicates have been found. The collector was employed by Sarawak Forest Department, Kuching on behalf of Dr E.D. Merrill so it is likely that the material came from the vicinity of Kuching. The specimens quoted above fit Schlechter's description well and are accepted as the true *A. borneensis* (the name has hitherto been used in a very wide sense), and *Paie* S 16359 is chosen as a neotype. See under 8. *A. pseudoborneensis* for the plant hitherto included under *A. borneensis*.

Important characteristics of *A. borneensis* are the leaves, glabrous above except for hairs along margins and conspicuous punctate glands, rather thinly hairy on lower surface, and the short corolla (c.19–22mm long) clad outside in acute hairs only. It appears to be confined to the extreme SE part of Sarawak, but may well occur in neighbouring parts of Kalimantan. The only altitudinal record given is 1250m; all three collections record the plant as climbing up trees.

**8. *Agalmyla pseudoborneensis* Hilliard & B.L. Burtt, sp. nov.** ab *A. borneensi* foliis subtus in pagina venisque parce pilosis (nec densiuscule pilosis), bracteis infimis saepe longioribus (12–17 × (4–)8–18mm, nec 10–14 × 3–5mm), corolla 32–45mm longa (nec 19–22mm), externe pilis et acutis et glanduliferis usque ad 1.2mm longis (nec tantum pilis acutis ad 2mm longis) distinguenda.

Type: Borneo, Sabah, Mt Kinabalu, Mesilau river, 5000ft, 20 i 1964, *Chew & Corner* RSNB 4020 (holo. E; iso. A, L).



Epiphytic climber, or sometimes terrestrial, stem elongate, c.3–5mm in diam. on flowering part, rooting along internodes, densely hairy, hairs acute, 2–3(–4)mm long, glabrescent, bark glossy, pale. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.10–17 × 2–2.5mm, lanceolate, sessile, glabrous above, hairy below, soon caducous; blade of developed leaves 90–150(–240) × 25–50(–115)mm, elliptic or obovate-elliptic, apex shortly acuminate, base cuneate, equal or very slightly oblique, margins obscurely serrulate, each tooth a dark blunt gland, 8–10 lateral veins each side of midrib, looping near margins and fading out, very minute globular glands on both surfaces of very young leaves, mature leaves glandular-punctate, upper surface glabrous except along margins, lower surface with acute hairs 1–1.5(–2)mm long thinly scattered on blade and over veins, denser on margins; petiole 37–90(–150)mm long, clad in acute hairs to 1mm long. *Inflorescence* a few- to several-flowered congested axillary cyme, peduncle c.3mm long. *Bracts* (lowermost) 12–17 × (4–)8–18mm, ovate (bracteoles oblanceolate), margins more or less undulate with few very minute dark teeth, outside and margins with acute hairs to 1mm long, inside glabrous. *Pedicels* 6–13mm long, clad in acute hairs to 1mm long. *Calyx* red, tube 0.3–1mm long, lobes 5, subequal, 9–14 × 1.5–3(–4)mm, oblong to oblong-elliptic, apex subacute, outside with acute hairs to c.1.2mm long, glabrous inside, margins usually glabrous except for few hairs near apex. *Corolla* 32–45mm long, tube 28–40mm, narrowly funnel-shaped, arcuate, mouth oblique, posticous lobes 3–4.5 × 3–4mm, suborbicular, anticous lobe 6–8 × 3–4mm, elliptic, porrect, corolla bright red, median dark line on 3 lower lobes, hairy outside except near margins of lobes and at base, hairs up to c.1.2mm long, acute mixed with gland-tipped, these mostly on upper part, very minute acute hairs inside lobes and fringing margins, globose papillae less than 0.1mm in diam. in a band from base of anticous lobe to insertion of filaments, below insertion of filaments glandular-puberulous, hairs to 0.2mm long, very minutely and sparsely glandular-puberulous elsewhere, ring of acute hairs to 2.5mm long inserted c.3mm above base of tube. *Stamens* 4, anticous filaments inserted 18–24mm above base of tube, 33–38mm long, anticous anthers 3.5–4mm long; posticous filaments inserted 19–25mm above base, 29–35mm long, anthers 1.8–2.2mm long; all filaments glandular-puberulous except on upper part, hairs up to 0.1–0.2mm long; staminode 1–2mm long. *Disc* c.1 × 2.5mm, cupular, rim crenulate. *Ovary* c.33 × 2mm, glabrous. *Style* c.27mm long, glabrous. *Stigmatic lobes* c.3.5 × 3mm, papillose above. *Capsules* (few seen) c.150–300mm long. *Seeds* c.1 × 0.2mm, appendages c.5mm long. **Figs 1 and 9: 8a, b.**

BORNEO. **Sabah.** Mt Kinabalu, Mesilau river, 5000ft, 9 ii 1964, RSNB 4315 (E, K); *ibid.*, 12 ii 1964, RSNB 4344 (A, E, K); *ibid.*, 28 vi 1961, *Chew et al.* 1336 (K); *ibid.*, c.5000ft, vi 1964, *Mikil* SAN 41292 (K). Bukit Burong and Liwagu Cave track junctions, 21 i 1976, 1646m, *Stevens et al.* 588 (A, E, L); without precise locality, c.5200ft, 24 iii 1982, *Sinclair* 179 (E); roadside to power station, *Amin & Thomas* SAN 117308 (K, SAN); along the road between H.Q. and Tenompok, 1500–1650m, 4 i 1969, *Kokawa & Hotta* 3013 (L); Liwagu and Bt. Burong trail near H.Q., 3 i 1969, *Kokawa & Hotta* 2922 (L); *ibid.*, 26 i 1996, *Beaman et al.* 11924 (K); Mount Kinabalu, 20 i 1932, *Clemens* 27882 (K, L); Gurulau spur, 6000ft,

22 xi 1933, *Clemens* 50399 (A, L); Penibukan, 4000–5000ft, 28 xii 1932, *Clemens* 30510 (G, H, K, L); *ibid.*, Pinokok Falls, 28 x 1933, *Clemens* 40897 (G, H, K) and 40775 (G, H); Melangkap Kappa on NW side of Mt Kinabalu, 600–700m, *Beaman* 8568 (E, G, H); Mt Kinabalu, 5500ft, 3 vii 1937, *Griswold* 85 (A); *ibid.*, 12 vi 1937, *Griswold* 14 (A). Kampung Melangkap Tumis, 3 xi 1995, *Lugas* 1169 (K). Panampang distr., Tunggol F.R. km 45, 22 vii 1986, *Fidilis Krispinus* SAN 114635 (E, K, SAN); Keningau–Kimanis road, on watershed

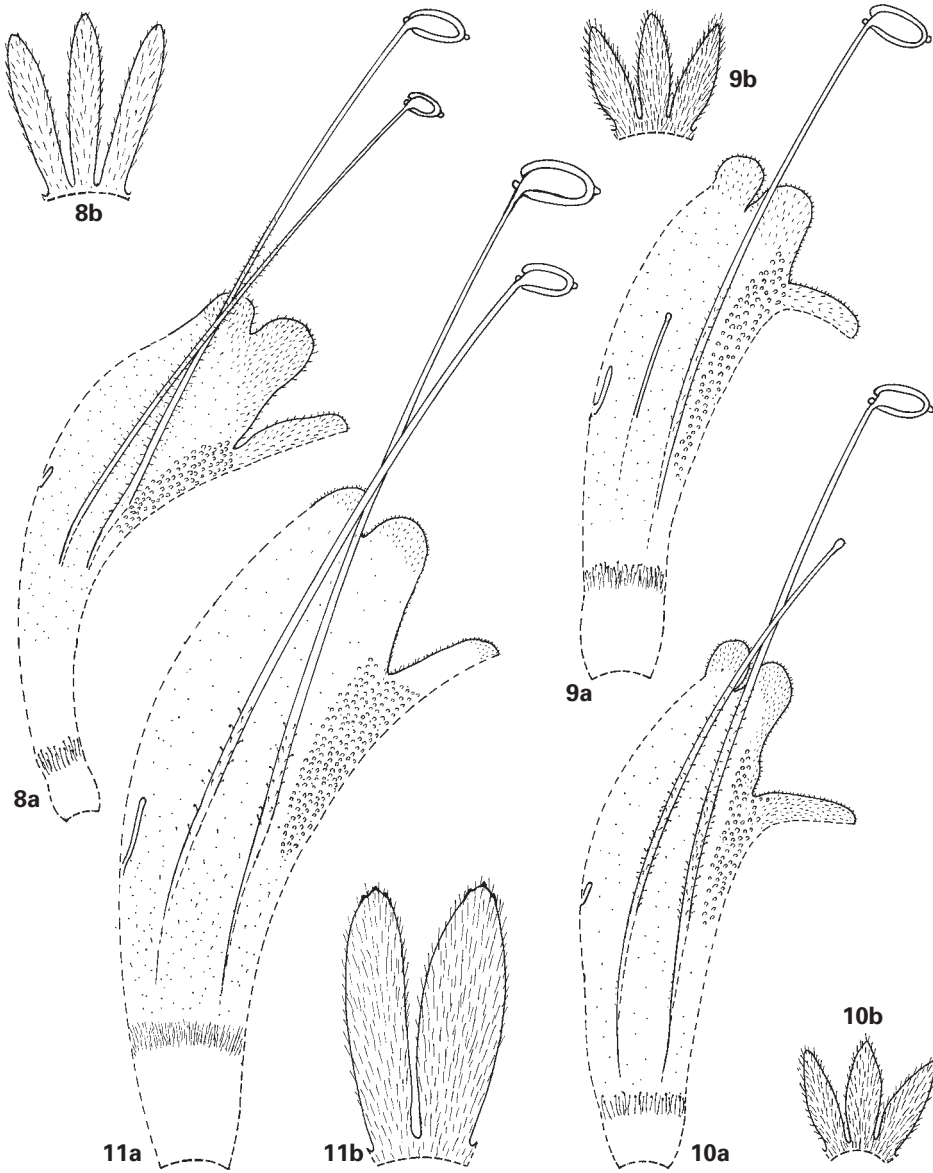


FIG. 9. Part of calyx and longitudinal section of corolla: 8a, b, *Agalmyla pseudoborneensis*; 9a, b, *A. diandra*; 10a, b, *A. decipiens*; 11a, b, *A. murudiana*. All  $\times 2$ .

of Crocker Range, 1500–1600m, xii 1986, *Vermeulen & Duistermaat* 678 (L); Crocker Range near Telupid, Gunung Monkabo, 3700ft, 19 viii 1987, *Warwick* 91 (E); Keningau distr., Crocker Range, Kimanis, Batu 19 Jalan, 4000ft, 10 viii 1978, *Ag. Nordin Abas* SAN 85944 (K, L); Tambunan distr., Crocker Range, Sinsuran waterfall, c.1500m, 1 iii 1995, *Pereira* 89 (E); *ibid.*, ii 1991, *Lamb* 299/91 (E); Keningau to Kimanis road, 5°50'N, 115°50'E, 100m, 17 vii 2000, *Mendum* 55 (E); km 64 on Kota Kinabalu–Tambunan road, 1300–1600m, 25 i 1984, *Beaman* 8376 (E); Lahad Datu, summit trail to Gunung Tribulation, Sg. Segama, 670m, 18 vi 1976, *Cockburn* SAN 84943 (L, SAN). **Sarawak.** Gunung Mulu National Park, north of Gua Angin, c.4°04'N, 114°50'E, 17 xi 1977, *Argent* 775 (E); Gunung Api, c.3000ft, 12 vi 1975, *Burt* 8247 (E, SAR); *ibid.*, c.600m, 12 xi 1977, *Argent* 718 a, b (E); Gunung Api, ulu Melinau, 2250ft, 29 ix 1971, *Anderson* S 29866 (A, E, K, L); *ibid.*, 3000ft, 5 ix 1970, *Chai* S 30070 (E, L); *ibid.*, 2700ft, 6 vii 1961, *Anderson* 4292 (E); *ibid.*, 2900ft, 11 vii 1971, *Anderson* 4702 (E, K); *ibid.*, The Pinnacles, 1250m, 17 vi 1995, *Beaman* 11710 (K).

*Agalmyla pseudoborneensis*, hitherto much confused with *A. borneensis*, is distinguished from that species by its leaves, much less hairy on lower surface (but see below), lowermost bracts mostly larger (12–17 × (4–)8–18mm, not 10–14 × 3–5mm), corolla 32–45mm long (not 19–22mm), the hairs outside mixed gland-tipped and acute (not acute only).

*Argent & Lamb* 1547 (E), from Gunung Lumaku at the southern end of the Crocker Range near Sipitang, along the Mengalom to Milligan path, differs from typical *A. pseudoborneensis* by having leaves more densely hairy below and, perhaps more importantly, the corolla is distinctly ventricose in the upper part. On the limestone of Gunung Api in the Mulu National Park, in Sarawak SW of the Crocker Range but in a direct line with it, specimens are indistinguishable in foliage from specimens from Mt Kinabalu (type locality), but the corolla again seems to be more ventricose in the upper part than is typical. Precise shape of the corolla is often difficult to judge in dried material, and field observations are much needed to test its worth as a discriminatory character.

One collection seen from Mulu National Park (*Nielsen* 952, E) has the lower leaf surface slightly hairier than usual, but to the east of Gunung Mulu, near Bukit Lawi and in the proposed Gunung Murud National Park, the leaves are much hairier below than is usual in *A. pseudoborneensis* (*Awa & Lee* S 50631, route to Bukit Lawi, SAR; *Nooteboom & Chai* 01702, Kelabit Highlands, L, SAR; *Yii* S 44415, proposed G. Murud National Park, E, K).

The overall range of the species is from Mt Kinabalu and the Crocker Range in Sabah to northern Sarawak, in Mulu National Park and, slightly doubtfully, the environs of Gunung Murud, between c.450 and 1600m above sea level, on a variety of soil types, including limestone. In Mulu National Park, it has been found only in the limestone areas, not on Gunung Mulu itself, which is sandstone.

There is clearly much of interest on the headwaters of the Limbang and Baram rivers, centering on Gunung Murud. *Agalmyla murudiana*, *A. macrocalyx*, *A. ovata* and *A. serrata* are known only from there (B.L.B. collected the types of all four names while walking from Bakelalan to G. Murud); *A. johannis-winkleri* also occurs there, as well as the form of *A. pseudoborneensis* mentioned above. A seventh species

may be represented by *Yii* S 55945 (SAR, unicate), but the specimen is now too poor for determination: leaves glabrous above, hairy below, 11 lateral veins each side of midrib, corolla c.37mm long, number of stamens unknown. The locality is given as Apad Kuruma, Kelabit Highlands, 1450m above sea level; creeping on fallen tree.

**9. *Agalmyla diandra* Hilliard & B.L. Burtt, sp. nov.** ab *A. decipiente* (specie sequente), foliis triplo vel quadruplo longioribus quam latis (nec duplo longioribus quam latis), lamina superne glabra (nec pilosa), venis utrinsecus costae 11–15 (nec 8–10), staminodiis lateralibus 7–26mm longis inclusis vel absentibus (nec 24–29mm longis semper praesentibus exsertis) distinguitur.

Type: Borneo, Sarawak, SE end of Hose Mts, below Bukit Nibong, c.2°6'N, 113°42'E, 9 viii 1967, *Burtt & Martin* B 4863 (holo. E).

Syn.: *Cyrtandra dolichocarpa* Kraenzlin in Mitt. Inst. Allg. Bot. Hamburg 7: 102 (1927) nom. illegit., non Asa Gray (1862).

Epiphytic climber, stem elongate, loosely branched, c.5–10mm in diam. on flowering part, rooting along internodes, densely hairy, hairs acute, c.2–4mm long, glabrescent, bark pale, glossy, papery. *Leaves* strongly anisophyllous, reduced leaves c.7–18 × 2–3mm, lanceolate, acute, broad-based, glabrous above, hairy below, soon caducous; blade of developed leaves 100–250 × 36–82mm, oblong-elliptic or elliptic, apex acute to shortly acuminate, base cuneate, equal, margins obscurely to distinctly serrulate, each tooth tipped with a dark blunt gland, 11–15 lateral veins each side of midrib, looping near margins and linking to vein above, blade glabrous above except along margins, lower surface with acute hairs to 1.5–2mm long over main veins and along margin, mostly shorter on blade; petiole 50–200mm long, thickly clad in acute hairs up to 2–3mm long. *Inflorescence* a few- to several-flowered congested axillary cyme, peduncle c.3–4mm long. *Bracts* (lowermost pair) 8–24 × 2–6mm, ovate or elliptic, acute hairs to 1mm long outside, glabrous inside. *Pedicels* c.10–15mm long, clad in acute hairs up to c.1mm long. *Calyx* reddish, tube 0.5–1mm long, lobes 5, subequal, 6.5–16 × 1.5–3.1mm, elliptic to oblong-elliptic, subacute, with acute hairs to 0.5–1mm long on margins and outside, very minute scattered glands inside. *Corolla* 31–42mm long, tube 29–38mm, funnel-shaped, slightly arcuate, mouth oblique, posticous lobes 2–5 × 3–4mm, suborbicular, anticous lobe 5–7 × 3–5mm, elliptic, porrect, corolla bright red, dark median lines on 3 lower lobes, hairy outside except near base, hairs acute, up to 1–1.5mm long, c.0.1mm long fringing lobes, ± globose papillae less than 0.1mm in diam. in a narrow band near inner margins of lateral lobes then joining a broader band extending from base of anticous lobe down floor of tube to insertion of stamens, elsewhere glandular hairs less than 0.1mm long scattered all over inside of tube, ring of hairs c.2mm long inserted 3.5–6.5mm above base of tube, either all acute or some gland-tipped. *Stamens* 2, the anticous pair, filaments 30–45mm long, inserted c.16–20mm above base of tube, included part glandular-puberulous, hairs to 0.1–0.2mm long, anthers

4–5mm long; lateral staminodes 7–26mm long, occasionally bearing an anther less than 1mm long containing a few pollen grains, or sometimes wanting, posticous staminode c.1–3mm long, or wanting. *Disc* c.1 × 2mm, cupular, rim crenulate. *Ovary* c.24–33 × 2mm, glabrous. *Style* c.23–45mm long, glabrous. *Stigmatic lobes* 3–5 × 3–4mm, inner surface papillose. *Capsules* c.200–280 × 3mm. *Seeds* 1 × 0.2mm, appendages c.4mm long. **Fig. 9: 9a, b.**

BORNEO. **Sarawak.** 7th Div., Ulu Balleh, Bukit Batu Tiban, 1000m, 25 ix 1987, *Yii et al.* S 52285 (K, SAR). Kapit, Ulu Sg. Kapit, Bukit Goram, 25 ii 1975, *Chai* S 36058 (E, K, L). Kapit, Balleh–Balang watershed ridge, foothills of Bukit Batu Tibang, 5 v 1969, *Anderson* S 28393 (A, E, K, L); Bukit Tibang, Balleh/Balang ridge, Ulu Balleh, c.3000ft, 10 vii 1969, *Ilias bin Paie* S 28572 (E, SAR); Anap, Bukit Mersing, 5 x 1963, *Banying ak Nyudong* S 19182 (E, K, L). Upper Baram, G. Teurabok, 6000ft, 10 xi 1920, *Moulton* 6786 (K). 1st/2nd div. boundary, 75th mile, Gunung Buri, 20 ix 1975, *Martin & Ismawi* S 36895 (K, L [sterile], SAR). Mount Dulit, c.900m, 7 xi 1932, *Richards* 2489 (K). **Kalimantan.** Central Kalimantan, Bukit Raya and upper Katingan (Mendawai) River area, upper Samba river, 60–80km NNW of Tumbang Samba, Tumbang Tosah, 9 xii 1982, *Mogea* 4066 (BO, K, L); *ibid.*, 8 xii 1982, *Mogea* 4021 (BO, K, L). Bukit Obat, 31 i 1925, *Winkler* 1400 (HBG). W Koetai, no. 39, Mt Kemoel, 1800m, 20 x 1925, *Endert* 4421 (BO, K, L); *ibid.*, 13 x 1925, *Endert* 3984 (BO, K, L); *ibid.*, 22 x 1925, *Endert* 4497 (BO, L).

*Agalmyla diandra*, like *A. pseudoborneensis*, is sometimes confused with *A. borneensis*, all three species having leaves glabrous on the upper surface (except for hairs along the margins, a constant feature of all species of sect. *Agalmyla*). However, it differs from both *A. borneensis* and *A. pseudoborneensis* by its possession of only two fertile stamens, the other three either reduced to staminodes or wanting. It differs further in having 11–15 lateral veins each side of the midrib. *Agalmyla decipiens* also has only two stamens, but is distinguished by its leaves, about twice as long as broad (not 3–4 times), hairy above, and with only 8–10 lateral veins each side of the midrib; also, the lateral staminodes are well exerted (not included as in *A. diandra*).

*Agalmyla diandra* has been recorded on the mountains of south central Sarawak (Bukit Mersing), and near its southern and eastern border with Kalimantan (Hose Mts, Bukit Batu Tibang, Bukit Goram, Gunung Buri) and from several localities in Kalimantan (Long Bawan, Mt Kemoel, Upper Samba river, Bukit Obat), between c.400 and 1800m above sea level. It is usually epiphytic on tree trunks, but there is one record of its creeping over mossy stones in very shaded places.

**10. *Agalmyla decipiens* Hilliard & B.L. Burtt, sp. nov.** ab *A. pseudoborneensi* bracteis infimis c.8 × 2–3mm (nec 12–17 × 8–18mm), calycis lobis 6–9.5mm (nec 9–14mm) et in dorsis et in marginibus pilosis (nec marginibus plerumque glabris praeter ad apicem), corolla extra pilis omnibus acutis (nec pilis glandulosis et acutis intermixtis), staminibus fertilibus duobus cum staminodiis duobus longissimis exertis (nec staminibus quattuor fertilibus) differt.

Type: Borneo, Sarawak, Bintulu distr., NE slope of Bukit Kana, 600m, 19 xi 1963, *Hirano & Hotta* 1386 (holo. KYO, iso. E).

Epiphytic climber, stems elongate, c.4–8mm in diam. on flowering part, rooting along internodes, densely hairy, hairs acute, up to 3–4mm long, glabrescent, bark

pale, glossy. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.13–15 × 2–3mm, lanceolate, sessile, glabrous above, hairy below, soon caducous; blade of developed leaves 105–185 × 45–85mm, elliptic to ovate-elliptic, apex shortly acuminate, base cuneate, margins obscurely to distinctly serrulate, each tooth a dark blunt gland, 8–10 lateral veins each side of midrib, looping near margins and fading out, upper surface somewhat sparsely clad in acute hairs up to 2mm long, lower surface more densely hairy; petiole 60–120mm long, thickly clad in acute hairs up to 2–3mm long. *Inflorescence* a few-flowered congested axillary cyme, peduncle c.3mm long. *Bracts* (lowermost, few seen) c.8 × 2–3.5mm, more or less elliptic, acute hairs to 1mm long outside, glabrous inside. *Pedicels* 7–20mm long, clad in acute hairs up to 1–1.8mm long. *Calyx* tube 0.5–1mm long, lobes 5, subequal, 6–9.5 × 1.8–3.5mm, elliptic to oblong-elliptic, subacute, often with 2 or 3 minute dark teeth near apex, outside and on margins acute hairs to 1–1.3mm long, very minute scattered glands inside. *Corolla* 31–34mm long, tube 28–30.5mm, funnel-shaped, slightly arcuate, mouth oblique, posticous lobes 3–4 × 2.5–3.5mm, suborbicular, anticous lobe 4.5–6.5 × 2–4mm, elliptic, porrect, corolla scarlet with a dark median line on each of the 3 lower lobes, hairy outside except near margins of lobes and near base, hairs acute, up to 1–1.5mm long, very small (c.0.1mm long) acute hairs inside lobes and fringing margins, globose papillae less than 0.1mm in diam. on lower part of anticous lobe and along inner margins of lateral lobes, extending in a band down floor of tube to insertion of stamens, very minute glandular hairs scattered round inside of upper part of tube, gland-tipped hairs to 0.2mm long below point of insertion of filaments, ring of mixed acute and gland-tipped hairs to 2mm long inserted 3–4mm above base of tube. *Stamens* 2, the anticous pair, filaments 35–40mm long, inserted c.14–16mm above base of tube, the included part glandular-puberulous, hairs to 0.2mm long, anthers 3mm long; lateral staminodes 23–28mm long, inserted c.14mm above base of tube, glandular as anticous filaments, anthers reduced to a sterile head c.1mm long, well exserted; posticous staminode 0.5–1mm long. *Disc* c.1 × 2mm, cupular, rim crenulate. *Ovary* c.22 × 1.5mm, glabrous. *Style* c.15–22mm long, glabrous. *Stigmatic lobes* c.5 × 3mm, papillose above. *Capsules* (few seen) c.150–210mm long. *Seeds* c.1 × 0.2mm, appendages c.4–5mm long. **Fig. 9: 10a, b.**

BORNEO. **Sarawak.** Poi Range, Gunung Berumpit, c.3500ft, 11 viii 1962, *Burt & Woods* B 2774 (E). Bintulu distr., NE slope of Bukit Kana, 600–850m, 19 xi 1963, *Hirano & Hotta* 1289 (KYO); *ibid.*, *Hirano & Hotta* 1290 (KYO).

*Agalmyla decipiens* is easily recognized by its leaves, hairy on both surfaces, and by its possession of two well-exserted staminodes, deceptively similar to two stamens with greatly reduced anthers (see also 15. *A. brevifolia*, Sumatra). It has been recorded only from Sarawak, either as an epiphyte on tree trunks or in moss on rocks.

**11. *Agalmyla murudiana*** Hilliard & B.L. Burt, **sp. nov.** ab *A. borneensi* foliis supra pilosis (nec glabris), bracteis infimis 12–22 × 7–14mm (nec 10–14 × 3–5mm), corolla 35–50mm longa (nec 19–22mm) distinguenda. Ab *A. pseudoborneensi* foliis

supra pilosis (nec glabris), pilis in pagina inferiore plerumque 2–3mm longis (nec plerumque 1–1.5mm) et densius dispositis.

Type: Borneo, Sarawak, c.4°N, 115°38'E, route from Bakelalan to G. Murud, above S Konap, c.4400ft, 23 ix 1967, *Burt & Martin* B 5179 (holo. E).

Epiphytic climber, stem elongate, c.4–5mm diam. on flowering part, rooting along internodes, densely hairy, hairs acute, up to (2–)3–5mm long, glabrescent, bark glossy, pale. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.10–20 × 2–3mm, lanceolate, sessile, glabrous or with a few hairs above, hairy below, soon caducous; blade of developed leaves 90–165 × 30–68mm, elliptic or ovate-elliptic, apex shortly acuminate, base cuneate, margins obscurely serrulate, each tooth a dark blunt gland, 7–9 lateral veins each side of midrib, looping near margins and fading out, both surfaces clad in acute hairs up to 2–3mm long; petiole 35–100mm long, clad in acute hairs up to 2.5–4mm long. *Inflorescence* a several- to many-flowered congested axillary cyme, peduncle c.3–5mm long. *Bracts* (lowermost) 12–22 × 7–14mm, elliptic or ovate (bracteoles oblanceolate or elliptic-oblong), margins with a few very small dark teeth, acute hairs to 1.2mm long outside and on margins, glabrous inside. *Pedicels* 8–15mm long, clad in acute hairs. *Calyx* green to red, tube 0.5–1mm long, lobes 5, subequal, 9.5–15 × 2–5.2mm, oblong to oblong-elliptic, apex more or less obtuse, outside acute hairs to c.1.2mm long, on margins only near apex, inside glabrous. *Corolla* 35–50mm long, tube 32–46mm, funnel-shaped, slightly arcuate, mouth oblique, posticous lobes 3–5 × 3.5–5mm, suborbicular, anticus lobe 7–9 × 3–5mm, porrect, corolla bright red, median dark line on each of 3 lower lobes, hairy outside except near margins of lobes and at base, hairs up to 1.5–2.3mm long, mixed acute and gland-tipped, latter especially on upper part, acute hairs to 0.2mm fringing lobes and inside their tips, globose papillae to c.0.1mm in diam. in a band from base of anticus lobe to insertion of filaments, below insertion of filaments scattered gland-tipped hairs, very minute to 0.1(–0.5)mm long, very minutely and sparsely glandular elsewhere, ring of acute hairs 2–3mm long inserted c.7mm above base, occasionally a few hairs gland-tipped. *Stamens* 4, anticus filaments inserted 19–24mm above base of tube, 35–46mm long, anthers 3.5–5mm long; posticous filaments inserted 20–25mm above base, 32–40mm long, anthers 2–3mm long; all filaments very minutely to more distinctly glandular on lower half. *Disc* c.1–2 × 1.5–2mm, cupular, rim crenulate. *Ovary* c.35 × 2mm, glabrous. *Style* c.35mm long, glabrous. *Stigmatic lobes* c.4 × 3mm, papillose above. *Capsules* not seen. **Fig. 9: 11a, b.**

BORNEO. **Sabah.** Mt Kinabalu, Ulu Liwagu and Ulu Mesilau, 4800ft, 30 viii 1961, *Chew et al.* 2575 (E, K, L); *ibid.*, 28 viii 1961, *Chew et al.* 2520 (K); Tenompok, 20 viii 1931, *Clemens* 26173 (K); Ranau distr., near Kundasang, Sosopodon, 4600ft, 25 ix 1963, *Mikil* SAN 38726 (K, L, SAN). Mount Trusmadi, 5°37'N, 116°30'E, 1200m, 20 iii 1969, *Nooteboom* 1455 (L). Along trail Long Pa Sia to Long Semado, c.3.5km from Sarawak border, c.4°19'N, 115°42'E, 1400m, 23 x 1986, *de Vogel* 8477 (L). Long Semado (Sarawak) to Long Pasia track, Sabah side, c.3000–4000ft, 8 vii 1981, *Phillipps* AP3 (E). **Sarawak.** Route from Bakelalan to G. Murud, below Camp III, c.5400ft, 29 ix 1967, *Burt & Martin* B 5293 (E); G. Murud to

Bakelalan, at Long Rapata, 15 x 1967, *Burt & Martin* B 5512 (E). Kelabit Highlands, Batu Lawi, 115°23'E, 3°52'N, 1250m, 29 iv 1970, *Nooteboom & Chai* 02298 (L, SAR); Mt Murud east, path to top, 1700m, 4 iv 1970, *Nooteboom & Chai* 01907 (L, SAR).

*Agalmyla murudiana* is distinguished from *A. borneensis* by its leaves, hairy above (not glabrous), lowermost bracts 12–22 × 7–14mm (not 10–14 × 3–5mm), corolla 35–50mm long (not 19–22mm), and from *A. pseudoborneensis*, not only by its leaves hairy above, but hairs on the lower surface mostly 2–3mm long (not mostly up to 1–1.5mm) and on mature leaves still overlapping each other, while in *A. pseudoborneensis* (except on G. Murud) they are at least their own length distant from neighbours. The relationship of these two species is undoubtedly close, and they have similar geographical ranges: on Mt Kinabalu and southward along the Crocker Range towards the Sarawak border. However, in Sarawak, *A. murudiana* has not been recorded from the Gunung Mulu area (where *A. pseudoborneensis* has been recorded only on limestone), while what seems to be an atypical form of *A. pseudoborneensis* occurs in the Gunung Murud area, which is sandstone. Though their geographical ranges in Sabah agree, we have no information on whether they grow together in close proximity, and we have not seen any mixed collections.

*Agalmyla murudiana* is often found climbing up tree trunks, but will also creep on the ground, in forest between c.1400 and 1700m above sea level.

**12. *Agalmyla serrata* Hilliard & B.L. Burtt, sp. nov.** ab *A. macrocalyce* foliis supra pilosis (nec glabris), basi laminae valde obliqua, uno latere rotundato altero cuneato (nec aequilateraliter cuneata), bracteis infimis c.25 × 10mm (nec 33–50 × 22–40mm), calycis lobis c.16 × 4.5mm (nec 23–28 × 10–15mm), corollae c.35mm longo (nec 45–50mm) distinguitur.

Type: Borneo, Sarawak, c.3°56'N, 115°32'E, route from Bakelalan to Gunung Murud, ridge above Camp IV, c.6400ft, 2 x 1967, *Burt & Martin* B 5344 (holo. E, iso. SAR).

Herb rooted in ground but climbing by adventitious roots developed from under-surface of stem, stem elongate, c.10mm in diam. on flowering part, acute appressed retrorse hairs less than 1mm long still clinging to bark (no young parts seen). *Leaves* probably opposite and strongly anisophyllous but only old stem seen, blade of developed leaves c.130–200 × 50–75mm, ovate-elliptic, apex abruptly and shortly acuminate, base very oblique, rounded on one side, cuneate on other, margins coarsely and irregularly serrate, each tooth tipped with a dark blunt gland, c.13 pairs of lateral veins ascending at angle of c.45°, looping near margin and linking to vein above, midrib on upper surface appressed-pubescent with coarse acute upward-pointing hairs to 1.25mm long, elsewhere hairs well scattered but dense along margins; lower surface similar but lateral veins hairy as midrib, hairs on blade mostly less than 1mm long; petiole c.85–100mm long, densely appressed-pubescent. *Inflorescence* a crowded axillary cyme, peduncle c.7mm long. *Bract* (lowermost) c.25 × 10mm (others slightly smaller), broadly elliptic, apex very acute, base narrowed



to c.5mm, appressed-pubescent outside, hairs coarse, to c.1mm long, few scattered hairs inside. *Pedicels* up to 20mm long, appressed-pubescent, hairs coarse, acute, to 1.3mm long. *Calyx* tube c.1mm long, lobes 5, subequal, c.16 × 4.5mm, elliptic, apex obtuse, abruptly callose-apiculate, base scarcely narrowed, outside and margins appressed-pubescent, hairs to 1mm long, on back nearly confined to median band, except for few small hairs near tip. *Corolla* c.35mm long, tube 28mm long, funnel-shaped, arcuate, mouth oblique, strongly compressed, posticous lobes erect, 7 × 5.2mm, oblong, apex broadly rounded, anticous lobe 10.5 × 5mm, elliptic, apex rounded, porrect, outside of corolla scarlet, darker median lines on anticous and lateral lobes inside, outside pubescent with coarse upward-pointing papillae near tips of all lobes, median patches of globose papillae less than 0.1mm in diam. on lower half of anticous and lateral lobes, coalescing to form a palate running down tube to point of insertion of anticous filaments, ring of stout upward-pointing hairs to 2.5mm long inserted 4mm above base of tube, most hairs acute, very occasionally gland-tipped. *Stamens* 4, inserted c.15mm above base of tube, anthers 4mm long, posticous filaments 33mm, anthers 3mm, all filaments glabrous; staminode 0.5mm long. *Disc* cupular, fleshy, c.1 × 2.5mm, apex crenulate. *Ovary* c.3 × 0.8mm, glabrous, sessile. *Style* (in ♂ stage of flower) c.1mm long, tapering into ovary, glabrous. *Stigma* of 2 equal lobes c.0.5 × 0.8mm (♂ stage). *Fruit* not seen. **Fig. 10: 12a, b.**

*Agalmyla serrata* is known only from the type collection, made in the vicinity of Gunung Murud at an altitude of c.1950m above sea level. It is distinguished from *A. macrocalyx* (the type of which was collected in the same area) by its leaves, hairy above (not glabrous), base very oblique, cuneate on one side, rounded on the other (not equal, both sides cuneate), lowermost bracts c.25 × 10mm (not 33–50 × 22–40mm), calyx lobes c.16 × 4.5mm (not 23–28 × 10–15mm), corolla c.35mm long (not 45–50mm).

The coarsely and irregularly toothed leaves, with markedly oblique base and hairy on both surfaces, are distinctive.

**13. *Agalmyla macrocalyx*** Hilliard & B.L. Burtt in *Blumea* 44: 385 (1999).

Type: Borneo, Sarawak, route from Bakelalan to G. Murud, below Camp IV, c.6000ft, 4 x 1967, *Burtt* 5370 (holo. E, iso. SAR).

Epiphytic climber, stem elongate, creeping, rooting along internodes, c.10mm diam. on flowering part, appressed-pubescent, hairs up to c.2mm long, coarse, acute, eventually glabrescent, bark then papery, pale, glossy. *Leaves* opposite, one of each pair greatly reduced, c.23–30 × 10mm, broadly lanceolate, acute, base broad, appressed-pubescent outside, glabrous inside; blade of developed leaves c.110–250 × 27–70mm, elliptic, apex shortly acuminate, base cuneate, margins serrulate, each tooth tipped with a dark blunt gland, c.12–16 pairs of lateral veins ascending at angle of c.45°, running out to margins, there looping and fading out, upper surface glandular-punctate (these superficial globular glands on very young leaves), appressed hairs confined to margins, lower surface thinly appressed-pubescent

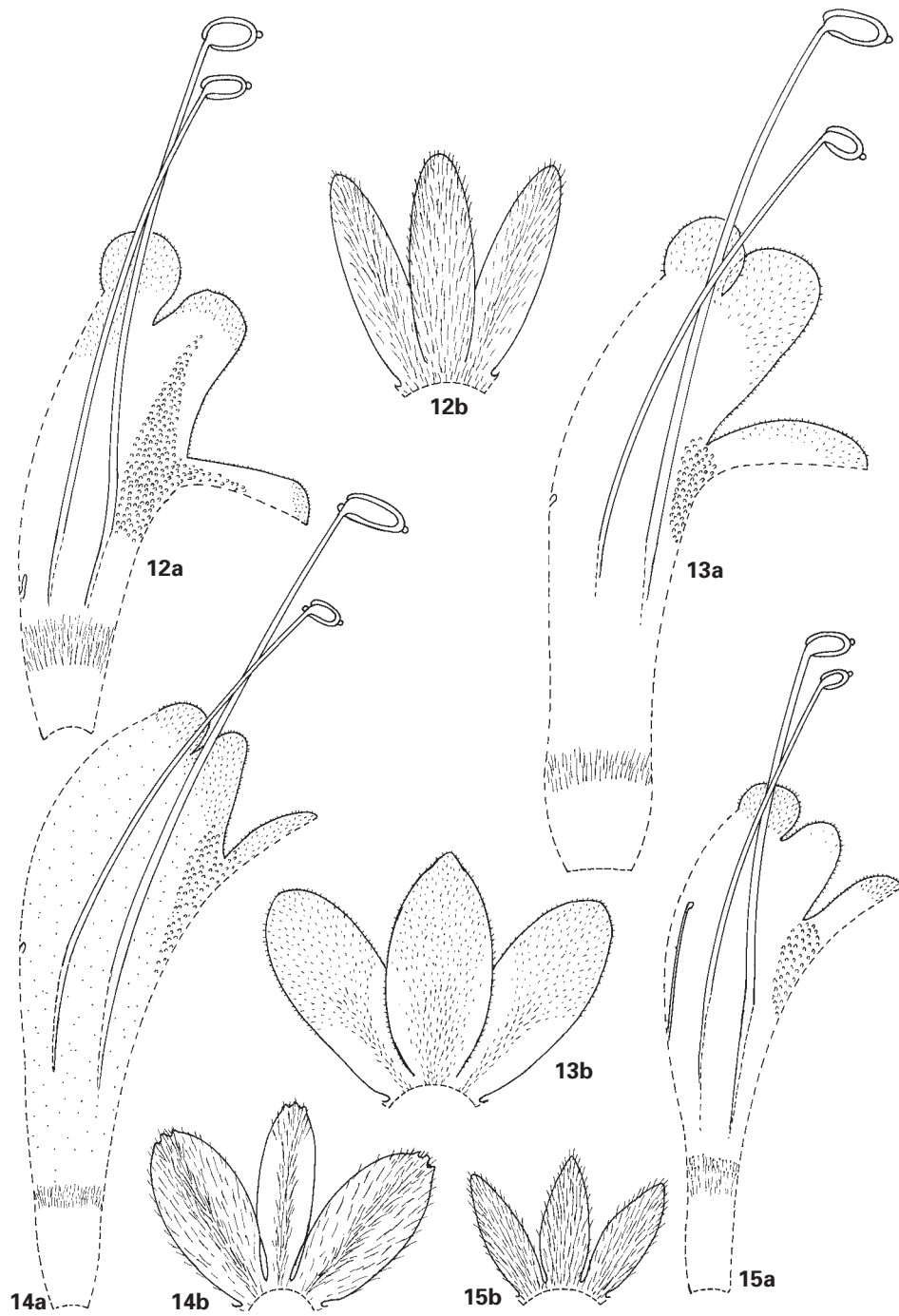


FIG. 10. Part of calyx and longitudinal section of corolla: 12a, b, *Agalmyla serrata*; 13a, b, *A. macrocalyx*; 14a, b, *A. affinis*; 15a, b, *A. biflora*. All  $\times 2$ .

(densely pubescent over veins), hairs up to 2mm long, coarse, acute, glandular-punctate as well; petiole c.50–110mm long, stout, appressed-pubescent. *Inflorescence* a crowded axillary almost sessile cyme surrounded by an involucre of c.10 big bracts. *Bracts* c.33–50 × 22–40mm, outer broadly ovate, inner broadly elliptic tapering to a broad base, margins coarsely toothed to entire, red, glabrous inside except at tips, outside appressed-pubescent, hairs up to 1mm long, stout. *Pedicels* up to 10mm long, very stout, warted, appressed-pubescent, hairs to c.0.5mm long. *Calyx* lobed to within 1mm of base, lobes 5, subequal, c.23–28 × 10–15mm, thick-textured, broadly elliptic, apex ± rounded, base slightly narrowed, appressed-pubescent outside, hairs up to 0.2–0.8mm long, margins similarly hairy, inside very minutely puberulous. *Corolla* c.45–50mm long, tube 38–42mm long, broadly funnel-shaped, slightly arcuate, mouth oblique, posticous lobes erect, c.6–7 × 6–6.5mm, oblong, anticous lobe porrect, c.13–15 × 7–8mm, oblong-elliptic, corolla bright red, median dark stripe on lateral and anticous lobes, the tissue slightly raised, more strongly so on anticous lobe, appressed-pubescent outside, hairs stout, acute, up to c.1mm long, inside of all lobes minutely puberulous, stoutest hairs on anticous lobe, minute sessile globose papillae at base of anticous lobe and descending down tube to point of insertion of anticous filaments, also a patch below posticous sinus, ring of stout, acute, upward-pointing hairs c.2–2.5mm long inserted c.7mm above base of tube. *Stamens* 4, inserted c.22mm above base of tube, anticous filaments c.40mm long, anthers c.4.5mm; posticous filaments c.32mm long, anthers c.3mm, all filaments blue, glabrous; staminode c.1mm long. *Disc* cupular, 1.5 × 5mm, fleshy, rim crenulate. *Ovary* c.38 × 3.5mm, sessile, glabrous. *Style* c.25mm long, tapering into ovary, glabrous. *Stigma* of 2 equal fleshy lobes c.7 × 5.3mm, minute stigmatic papillae all over inner face. *Capsule* c.300mm long. *Seeds* c.1 × 0.25mm, ellipsoid, brown, papillate (from raised epidermal cells?), appendages c.4mm long. **Fig. 10: 13a, b.**

BORNEO. **Sarawak.** Route from Bakelalan to G. Murud, near Camp III, c.5800ft, 28 ix 1967, *Burt & Martin* B 5286 (E, SAR). Kelabit Highlands, Mt Murud east, path to the top, 1800m, 5 iv 1970, *Nooteboom & Chai* 1942 (L).

The most striking feature of *A. macrocalyx* is the extraordinarily large calyx lobes; these, together with the leaves, glabrous above, hairy below, and with 12–16 lateral veins each side of the midrib, make recognition easy. The species is known only from Mt Murud and its environs at roughly 1800m above sea level.

A splendid clump of *A. macrocalyx*, from which the type material was collected, was seen by B.L.B. on a forest tree at about 30ft (10m) above the ground. Flowering branches were clustered in the crotch of a branch and the flowers were being attacked (there is no other word for it) by a bird later identified, with the aid of Bill Smythies' invaluable book (Smythies, 1960), as a Scimitar Babbler, the only one of this group found in Borneo. Considerable damage was done to the flowers, but whether incidental pollination took place as the bird moved from flower to flower it is not possible to say. If this was not the first visit by such a bird to these clumps it certainly seems

that no serious damage was done as the earlier-flowering inflorescences were fruiting freely.

**14. *Agalmyla affinis* Hilliard & B.L. Burtt, sp. nov.** ab *A. macrocalyce* pilis in caule patentibus (nec appressis), foliis venis lateralibus utrinque 10 (nec 12–16), bracteis c.15 × 3mm involucrum circa inflorescentiam haud formantibus (nec 33–50 × 22–40mm, involucrum formantibus), calycis lobis 12–13 × 3.5–6mm externe pilis acutis ad 1.5mm longis indutis (nec 23–28 × 10–15mm externe pilis acutis ad 0.8mm tantum), corolla externe pilis acutis aliis glanduloso-apiculatis ad 1–1.5mm longis (nec tantum pilis acutis ad 1mm longis) differt.

Type: East Kalimantan, Bulungan: Long Bawan [3°48'N, 115°34'E], Tador Bangar, 1000–1200m, 21 ix 1990, *Okada et al.* 23930 (holo. TI, iso. A).

Epiphytic climber, stem of indeterminate length, sparingly branched, c.5–6mm in diam. on flowering part, rooting along internodes, clad in patent acute hairs to 3mm long, glabrescent, bark pale, glossy, papery. *Leaves* opposite, strongly anisophyllous, reduced leaves not seen; blade of developed leaves 120–177 × 45–63mm, oblong to elliptic, apex acute to shortly acuminate, base cuneate, shortly decurrent, margins subentire to serrulate, each toothlet a dark blunt gland, c.10 lateral veins each side of midrib, ascending at angle of c.45°, running towards margin and fading out, upper surface glandular-punctate, otherwise glabrous except for band of hairs along margin, lower surface thinly pubescent (more densely so over veins), hairs very slightly overlapping, acute, to 2mm long; petiole c.85–145mm long, well clad in acute appressed hairs to 2–3mm long. *Inflorescence* a few-flowered almost sessile axillary cyme. *Bracts* (outermost) c.15–20 × 12–13mm, broadly ovate, margins entire, glabrous inside except at tips, outside well clad in acute hairs to 1mm long. *Pedicels* 10–20mm long, well clad in acute hairs to 1.5mm long. *Calyx* lobed to within 0.5mm of base, lobes 5, subequal, 12–13 × 3.5–6mm, broadly elliptic, apex ± rounded with 3 minute teeth, outside spreading acute hairs to 1.5mm long, inside glabrous. *Corolla* c.40–43mm long, tube 37–39mm, funnel-shaped, slightly arcuate, mouth oblique, posticous lobes erect, c.3 × 3.8mm, oblong, anticous lobe porrect, c.6–7 × 3–3.8mm, elliptic, colour of corolla unknown, outside with plentiful spreading hairs, mostly acute to 1.5mm long, gland-tipped to 1–1.5mm long on upper part of posticous side, very minute acute hairs fringing lobes and inside them, elsewhere inside tube scattered minute globose glands, palate of rounded papillae extending from base of anticous lobe nearly to point of insertion of anticous filaments, ring of stout acute hairs to 1mm long inserted c.7mm above base of tube. *Stamens* 4, anticous filaments inserted 23mm above base of tube, c.36mm long, anthers 4mm long; posticous filaments inserted 24mm above base of tube, c.36mm long, anthers 2mm long, all filaments glabrous, all anthers far exserted; staminode minute. *Disc* c.1 × 2mm, cupular, rim crenulate. *Style* (♂ stage) c.5mm, (♀ stage) c.30mm long, glabrous. *Ovary* (♂ stage) c.10 × 2mm, (♀ stage) 120mm. *Stigmatic lobes* (♀ stage) c.5 ×

2.5mm, minutely papillose on inner face. *Capsules* not seen, but will be at least 200mm long. **Fig. 10: 14a, b.**

*Agalmyla affinis* is known only from the type collection. In its leaves and the shape of its bracts and calyx lobes it much resembles *A. macrocalyx*, with which its affinity surely lies and which suggested its trivial name. *Agalmyla macrocalyx* is known only from Mt Murud and its environs in NE Sarawak; *A. affinis* was found approximately due east of Mt Murud (3°52'N, 115°30'E) on the Kalimantan side of the border at roughly 3°48'N, 115°34'E. The collectors gave no information about the plant, but it will be an epiphyte climbing up the trunks of forest trees, and the flowers are almost certainly red.

*Agalmyla affinis* may be distinguished from *A. macrocalyx* by the patent (not appressed) hairs on the stem, leaves with only 10 (not 12–16) lateral veins each side of the midrib, smaller bracts that do not form an involucre around the inflorescence, smaller calyx lobes (c.12–13 × 3.5–6mm versus 23–28 × 10–15mm) clad in much longer hairs (to 1.5mm versus 0.8mm), and outside of corolla with conspicuous glandular hairs on the upper half on the posticous side (not relatively short acute hairs only).

**15. *Agalmyla biflora* (Elmer) Hilliard & B.L. Burtt, *comb. nov.***

Type: Philippine Islands, Palawan, Puerto Princesa (Mt Pulgar), 3750ft, v 1911, *Elmer* 13210 (n.v.). Neotype (chosen here): Palawan, near summit Cleopatra's Needle, 1550m, 10°7'N, 118°58'E, 22 i 1998, *Mendum et al.* 25435 (E).

Syn.: *Dichrotrichum biflorum* Elmer, *Leafl. Phil. Bot.* 5: 1785 (1913); Merr., *Enum. Phil. Fl. Pl.* 3: 453 (1923), *descr. emend.*

*D. pauciflorum* Merr. in *Philipp. J. Sci.* 10: 80 (1915). Type: Philippine Islands, Palawan, Malampaya Bay, Mount Capoas, c.950m, 21 iv 1913, *Merrill* 9497 (n.v.).

Epiphytic climber, stems elongate, creeping, rooting, c.4–10mm diam. on flowering part, appressed-pubescent, hairs c.0.5–2mm long, glabrescent, bark pale, glossy, papery. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.13–22 × 2.5–7mm, elliptic to oblong, acute, base broad, half-clasping, margins entire, both surfaces appressed-pubescent, hairs c.0.5mm long; blade of developed leaves c.90–150 × 48–90mm, broadly elliptic or ovate, apex acute, base more or less cuneate, oblique or not, margins coarsely serrate, each tooth tipped with a dark blunt gland, c.7–8 pairs of lateral veins ascending at angle of c.45°, looping near margins and there fading, upper surface closely glandular-punctate, thinly appressed-pubescent, hairs up to c.0.8–2mm long, lower surface thinly appressed-pubescent, hairs to c.1.4–3mm long; petiole 55–110mm long, appressed-pubescent, hairs up to 3mm long. *Flowers* few, in axillary cymes, peduncle c.3–7mm long. *Bracts* (lowermost) c.17–33 × 4–7mm, elliptic, apex acute, base broad, both surfaces appressed-pubescent or hairs few to wanting on inner face, hairs to c.1mm long, acute. *Pedicels* c.4–10mm long, appressed-pubescent. *Calyx* red, tube c.0.2–0.5mm long, lobes 5,

subequal, 11–19 × 2–4mm, elliptic or oblong, margins entire or with up to 7 minute teeth near apex, apex subacute, callose-tipped, all lobes appressed-pubescent outside, hairs acute, up to 1–2mm long, inside glabrous except for few hairs at extreme tip. *Corolla* 30–40mm long, tube 26–34mm long, funnel-shaped, arcuate, mouth oblique, posticous lobes 3–5 × 3.5–4mm, suborbicular, anticous lobe 8–10 × 4–6mm, elliptic, corolla red or pink, pubescent outside, hairs up to 2mm long, both acute and gland-tipped, lobes fringed with minute acute hairs, inside of posticous lobes and upper half of anticous lobe minutely papillose, papillae stout, very acute, c.0.2mm long, minute gland-tipped hairs scattered between insertion of filaments, 5 discrete tufts of gland-tipped hairs c.2mm long inserted 4–6mm above base of tube, sessile globose papillae less than 0.1mm in diam. forming a palate extending in a band down floor of tube from base of anticous lobe to insertion of filaments, 2 fleshy flaps of tissue c.2 × 0.5mm sometimes inserted 8mm below sinuses of anticous lobe, these also clad in globose papillae. *Stamens* 4, anticous filaments c.28–30mm long, inserted 12–16mm above base of tube, anthers 2.3–3.5mm long, posticous filaments c.25mm, inserted 14–18mm above base of tube, anthers 1.4–2.5mm; all filaments glabrous or with a few glandular hairs at base; staminode 2–3mm long, filiform. *Disc* cupular, fleshy, c.1 × 2.5mm, apex crenulate. *Ovary* c.20 × 1.5mm, sessile, glabrous. *Style* c.16mm long (but will elongate, as will the ovary), glabrous, tapering smoothly into ovary. *Stigmatic lobes* c.3 × 2mm, fleshy, stigmatic papillae all over inner face. *Capsule* c.190mm long (few very old ones seen). *Seeds* 1.2 × 0.2mm, upper (white) appendage c.3mm long, brown appendage c.5mm. **Fig. 10: 15a, b.**

PHILIPPINE ISLANDS. **Palawan.** Tagimburg, 1000–1200m, 11 ix 1961, *Sandermann Olsen* 1052 (C); on path towards summit of Thumb peak, 29 i 1998, *Mendum et al.* 25517 (E). Mt Mantaliñgahan, Brooke's Point, 5660ft, 13 v 1947, *Edaño* PNH 53 (A); *ibid.*, 5600ft, 13 v 1947, *Edaño* PNH 285 (A).

Elmer described this species as having two stamens only 'inserted at about the middle of the corolla; filaments 2.5–3cm long, glabrous, slender yet thickened at the curved portion above the middle, adnate to the corolla, much exerted'. However, in the *Enumeration* Merrill noted, 'In the type specimen the stamens are four, not two as described; a true *Dichrotrichum*'. Merrill did not comment upon Elmer's statement that the filaments were 'thickened at the curved portion above the middle'. Such thickening is alien to *Agalmyla*. As the type specimen was presumably destroyed in the Manila fire and no duplicate has been found, this discrepancy cannot be checked; it was possibly an artefact of drying: had Elmer hydrated a flower he would have seen that there were four, not two, stamens. The rest of his description is that of a species of *Agalmyla*. When Merrill described his *Dichrotrichum pauciflorum* in 1915, he made no mention of *D. biflorum*, published in 1913; it was only in 1923, in his *Enumeration*, that Merrill commented on a close relationship between the two species. Merrill's type too has been lost, but we are reasonably confident that only one species is involved, that now enumerated here as *Agalmyla biflora*.

The later collections, cited above, show that this species is widely distributed on

Palawan, from Malampaya Bay in the north to Mt Mantaliñgaban in the south. It is the only species of *Agalmyla* yet known from Palawan and is another instance showing that Palawan plants are often more closely related to those of north Borneo than to those of other Philippine islands.

**16. *Agalmyla brevifolia* S. Moore in J. Bot. 63, Suppl. 73 (1925).**

Type: Sumatra, Mt Tengamoes [Gunung Tanggamoos, c.5°30'S, 104°45'E], 4000ft, 1881–82, *Forbes* 1864 (holo. BM).

Epiphytic climber, stem elongate, c.6mm diam. on flowering part, rooting along internodes, densely hairy, hairs mostly acute, to 1mm long, a few gland-tipped, glabrescent, bark then pale, glossy, papery. *Leaves* opposite, strongly anisophyllous, reduced leaves soon caducous, not seen; blade of developed leaves c.110–135 × 50–70mm, ovate, apex abruptly and shortly acuminate, base cuneate, margins serrate, more or less crisped, each tooth tipped with a conspicuous blunt gland, 7–8 lateral veins each side of midrib, looping near margins and fading out, upper surface glabrous except for a few acute hairs to c.2mm long along midrib, shorter and denser along margins, lower surface well covered in acute hairs up to c.1.5mm long; petiole c.70–105mm long, clad in acute hairs to 1.5mm long, sometimes a very few gland-tipped hairs near base. *Inflorescence* a very congested axillary cyme, flowers c.10, peduncle almost wanting. *Bracts*: two c.15 × 10mm enfolding very young inflorescence, ovate, densely hairy outside, hairs acute, to c.1mm long, glabrous inside, bracteoles few. *Pedicels* c.10mm long, thickly clad in acute hairs to c.1.2mm long. *Calyx* tube c.0.2–0.5mm long, lobes 5, subequal, c.9.2–9.5 × 2.8–3.2mm, oblong, obtuse, a few minute teeth near apex, outside and on upper margins acute hairs to 1.2mm long, inside glabrous. *Corolla* c.30mm long, tube 26mm, funnel-shaped, slightly arcuate, mouth oblique, posticous lobes 3.5 × 3mm, suborbicular, anticous lobe 7 × 3.5mm, elliptic, porrect, corolla red, pubescent outside except near base, hairs to 1.5mm long, gland-tipped, lobes fringed with acute hairs c.0.1mm long, a few acute hairs to 0.2mm long along inner margins of lateral lobes, globular papillae less than 0.1mm in diam. in a band from base of anticous lobe to insertion of stamens, elsewhere glabrous except for 5 discrete tufts of mixed acute and gland-tipped hairs to 2mm long inserted 6mm above base of tube. *Stamens* 2, the anticous pair, filaments inserted 15mm above base of tube, c.32mm long, glabrous except for a few very minute glandular hairs near base, anthers 3mm long; lateral staminodes inserted 16mm above base of tube, c.23mm long, apex more or less capitate, sometimes containing a few pollen grains; posticous staminode c.0.5mm long. *Disc* cupular, 1 × 2mm. *Ovary* 17 × 1.5mm, glabrous. *Style* 12mm long, glabrous. *Stigmatic lobes* 2 × 1.8mm, but not fully developed. *Capsules* not seen. **Fig. 11: 16a, b.**

*Agalmyla brevifolia* is known only from the type collection: no ecological information is available, but the plant is clearly an epiphytic climber. The flowers have only two stamens, but there are two well-developed, exerted, staminodes, either completely

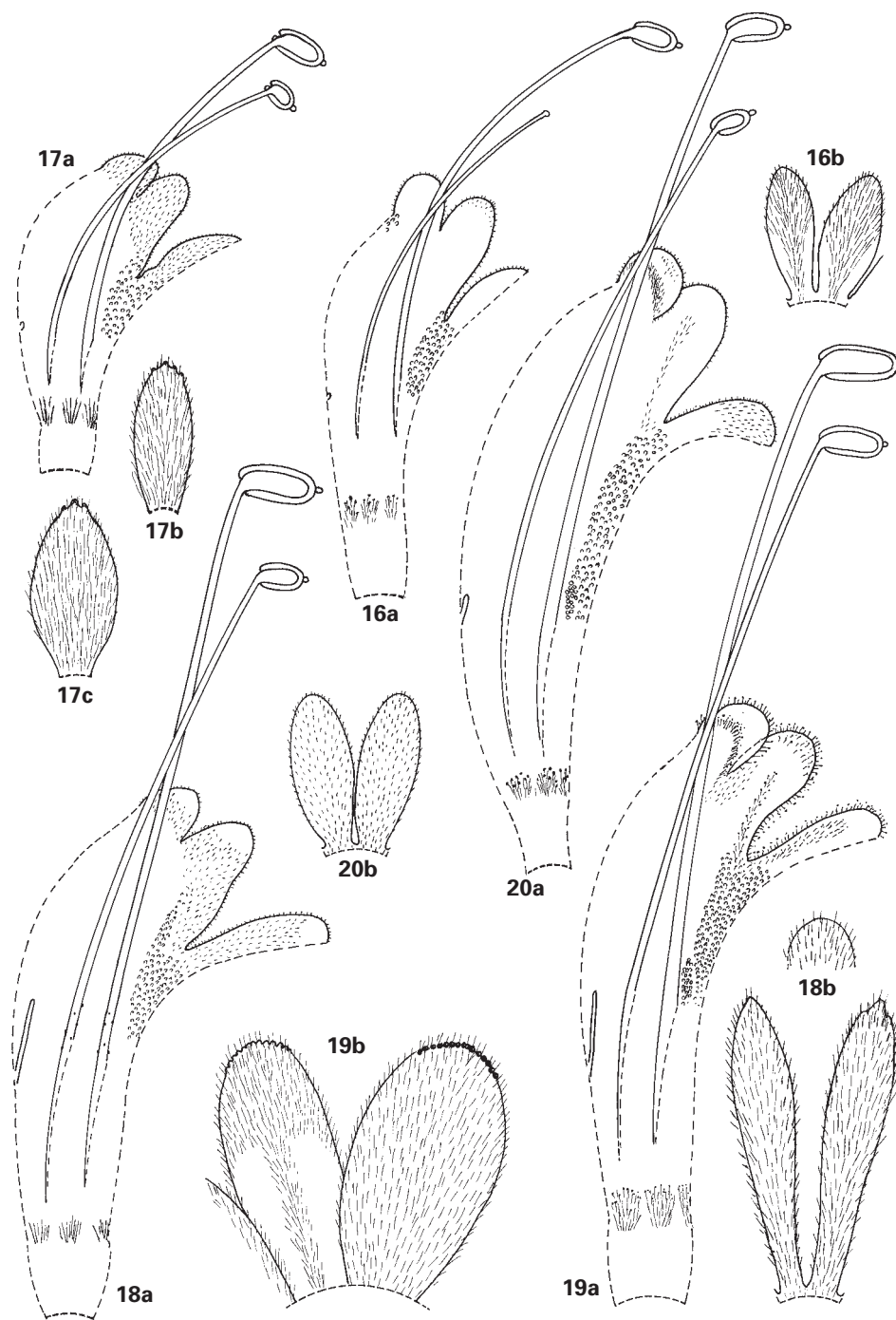


FIG. 11. Part of calyx and longitudinal section of corolla: 16a, b, *Agalmyla brevifolia*; 17a-c, *A. angustifolia*; 18a, b, *A. tobensis*; 19a, b, *A. leuserensis*; 20a, b, *A. wildeorum*. All  $\times 2$ .



sterile or with a few pollen grains in a much reduced 'head' (it can scarcely be called an anther).

Another Sumatran species, *A. glabrisepala* (long confused with *A. parasitica* of western Java and the Malay Peninsula), has three stamens reduced to staminodes, but these are all very short and included; further distinguishing characters are the glabrous calyx lobes and longer leaves with 11–15 lateral veins each side of the midrib (not 7–8). *Agalmyla parasitica* too has short staminodes and longer leaves with 10–13 lateral veins.

**17. *Agalmyla angustifolia*** Miq. in Fl. Ind. Bat. 2: 723 (1858).

Type: Sumatra, G. Talang near Solok, *Teysmann* 2005 (holo. U, iso. L, leaves and fruit only).

Syn.: *A. sericea* Ridley in J. Fed. Malay States Mus. 8(4): 67 (1917). Type: Sumatra, Barong baru [Barisan Range at 4000ft], 8 vi 1914, *Robinson & Kloss* 1.41 (BM).

Epiphytic climber, stems elongate, branching, c.5–10mm in diam. on flowering parts, rooting along the internodes, thickly clad in patent acute hairs up to 1mm long, glabrescent, bark then pale, glossy, papery. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.5 × 2mm (only 2 seen), lanceolate, sessile, densely hairy, soon caducous; blade of developed leaves 125–200 × 42–100mm, ovate to oblong, apex acute, base cuneate, slightly oblique or not, margins rather obscurely serrulate, crisped, each tooth tipped with a dark blunt gland, 9–11 lateral veins each side of midrib, ascending at angle of c.45°, looping near margin and fading out, both surfaces thickly clad in acute hairs c.1–1.2mm long; petiole 80–250mm long, hairy as blade. *Inflorescence* a many-flowered, very congested axillary cyme, peduncle c.4–7mm long, very stout, hairy. *Bracts* few forming an involucre around very young cyme, soon caducous, c.15–17 × 10–20mm, broadly ovate, acute, broad-based, densely hairy outside, hairs acute, to c.1mm long, glabrous inside. *Pedicels* 8–18mm long, thickly clad in acute patent hairs to 1–1.8mm long. *Calyx* red, tube 0–0.5mm long, lobes 5, subequal, 8–11 × 2.5–6mm, mostly oblong, obtuse, occasionally more or less elliptic, subacute, 5–11 very small dark teeth at apex, outside and on margins densely hairy, hairs acute, up to 1.2–1.5mm long, inside glabrous. *Corolla* 18–23mm long, tube 17–19mm long, funnel-shaped, slightly arcuate, mouth very oblique, posticous lobes erect, 3–4 × 3–3.8mm, suborbicular, anticous lobe 6–7 × 3–4mm, elliptic, porrect, corolla 'carmine red', densely hairy outside except near base, hairs acute, up to 1.5mm long, minute acute hairs inside lobes and fringing them, globular papillae less than 0.1mm in diam. extending in 5 lines down anticous lobe, spreading in a band up inner margins of lateral lobes and down floor of tube to insertion of filaments, very minute (less than 0.1mm long) gland-tipped hairs scattered round upper part of tube on inside, 5 discrete tufts of acute hairs to 2mm long inserted c.3–5mm above base of tube. *Stamens* 4, anticous filaments inserted 8–9mm above base of tube, 27–30mm long, anthers 3–3.2mm long, posticous filaments inserted

9–10mm above base of tube, 22–25mm long, anthers 1.5–1.8mm long, all filaments with minute globular glands scattered along lower part; staminode c.1–3mm long. *Disc* 1 × 2–3mm, cupular, rim crenulate. *Ovary* c.20–28 × 1.5–2mm, glabrous. *Style* c.13–16mm long, glabrous. *Stigmatic lobes* 4–5 × 2–2.5mm, papillose on inner surface. *Capsules* c.220–300 × 3mm (few seen). *Seeds* c.1.2 × 0.2mm, appendages c.4mm long. **Fig. 11: 17a, b.**

SUMATRA. West Coast, Gunung Koerintji [Barisan Range], c.1800m, 16 iv 1920, *Binnemeijer* 9506 (L); *ibid.* [as Mt Kerintji], c.1700m, 31 vii 1956, *Meijer* 6418 (L). Gunung Merapi [Barisan Range], c.1600m, 16 ix 1918, *Binnemeijer* 4629 (K, L, SING). Mt Sogo, 900–1200m, 4 vii 1957, *Maradjo* 440 (A, CANB, L). Allahan Padjang, 1640m, 25 ix 1939, *Batten Poole* sub SING 1606 (SING).

In the type specimen of *A. sericea*, bracts, calyx and corolla look silvery from the dense cover of hairs, which must have suggested the epithet *sericea*. In the other six sheets seen, the hairs have not dried silvery. The epithet *angustifolia* was given to a plant with leaves c.50mm broad; in the type of *A. sericea* they are c.90mm broad; width of leaf in this species is of no taxonomic significance.

The important characters of *A. angustifolia* are the densely hairy leaves, bracts, calyces and corollas, and the short corolla (18–23mm long). No ecological information other than ‘mountain forest’ is available, between c.900 and 1800m above sea level.

**18. *Agalmyla tobensis*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. angustifolia* bracteis externis 34–40mm longis (nec 15–17mm), calycis lobis (15–)19–29mm longis (nec 8–11mm), corolla (30–)38–42mm longa (nec 18–23mm) plerumque pilis nonnullis dorsalibus glanduloso-capitatis (nec omnibus acutis) recedit.

Type: N Sumatra, Toba, Dolok Sopo Raso (a mountain in the bend of the headwaters of Aek Mandosi, south of Taloen na Oeli), x–xii 1936, *Rahmat Si Boeea* 10757 (holo. L; iso. A, MICH).

Epiphytic climber, stem elongate, rooting along internodes, c.7–8mm in diam. on flowering part, densely clad in appressed acute hairs up to 1–1.5mm long, glabrescent, bark then pale, glossy, papery. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.10–18 × 1–2mm, lanceolate, hairy; blade of developed leaves 110–200 × 53–90mm, elliptic, narrowly ovate-elliptic or ovate, apex shortly acuminate, base often cuneate and equal or somewhat rounded and unequal, margins crisped, irregularly serrulate, sometimes somewhat obscurely so, each tooth tipped with a blunt gland, lateral veins (10–)11–14 each side of midrib, ascending at angle of c.45°, looping near margin and linking to vein above, this sometimes obscure, upper leaf surface with scattered acute hairs to 0.8–1.2mm long, similar below but dense over midrib, lateral veins and margins, blade glandular-punctate; petiole 90–180mm long, clad in acute appressed hairs up to c.1mm long. *Inflorescence* a several-flowered congested axillary cyme, almost sessile. *Bracts*: outermost 34–40 × 10–20mm, lanceolate to ovate, shortly acuminate to subacute, more or less

broad-based, outside closely appressed hairy, hairs acute, to c.0.6–1mm long, similar hairs inside, but well scattered or confined to uppermost part. *Pedicels* c.2–10mm long, clad in appressed acute hairs up to 0.5mm long. *Calyx* tube 0–1mm long, lobes 5, subequal, (15–)19–27 × 3–11mm, narrowly obovate to elliptic, apex obtuse or acute and there often a few minute teeth, outside acute hairs to c.0.2–1mm long, mainly along margins and in a median band thinning towards margins, inside more or less glabrous. *Corolla* (30–)38–42mm long, tube (26–)33–36mm long, funnel-shaped, slightly arcuate, mouth oblique, posticous lobes c.4–6 × 3.5–5.5mm, oblong to suborbicular, anticous lobe c.8–14 × 4–7mm, elliptic, porrect, corolla red, outside acute hairs to 1.2–2mm long, sometimes a few gland-tipped on posticous side, glabrous near base, inside stout acute hairs to 0.5–1.5mm long on inner faces of lobes, globular trichomes less than 0.1mm in diam. extending down floor of tube from base of anticous lobe to insertion of stamens, 5 discrete tufts of hairs to 2–3mm long inserted c.5–8mm above base of tube, usually acute, sometimes gland-tipped. *Stamens* 4, anticous filaments inserted c.15–17mm above base of tube, c.36–42mm long, anthers 4–5mm long; posticous filaments inserted c.17–19mm above base of tube, c.30–38mm long, anthers 2–3mm long; all filaments with minute globular glands scattered on lower part; staminode c.2–6mm long. *Disc* cupular, c.1 × 2.5mm, rim crenulate. *Ovary* c.30–40 × 2mm, glabrous. *Style* c.20–23mm long, glabrous. *Stigmatic lobes* c.5 × 3mm, papillose on inner face. *Capsule* c.290 × 3mm (only 1 seen). *Seeds* 1.3 × 0.25mm, ellipsoid, appendages c.4mm long. **Fig. 11: 18a, b.**

N SUMATRA. E of Sidikalang, Lae Pondon, 29 iii 1954, *Alston* 14959 (BO); S of Sidikalang, N of Hariarapitu, 3 iv 1954, *Alston* 15172 (BO). Kabupaten Tapanuli Utara Tele, road to Panguruan on high bank of Danau Toba, 1650m, 2 xii 1988, *Kessler* 35 (L). Zwischen Karohochebene und oberem Petanital, 1600–1700m, 7 x 1929, *Lörzing* 16035 (L). Lower slopes of Dolok Si Manoek-manoek, Asahan (NW from Taloen na Oeli), 5 x and 20 xi 1936, *Rahmat Si Boeea* 11040 (A, L, MICH). Karoland, Dëng Si Naboen [Dolok Sinaboeng] (ascent from Kampong Goeroe Kinajan), 25–26 vi 1927, *Bartlett* 8623 (US). Near Peso Peso, 4100–4500ft, 16 ii 1932, *Bangham* 1071 (A); *ibid.*, 19 ii 1932, *Bangham* 1125 (GH).

S SUMATRA. Gunung Tudjah, Korintji region [1°41'S, 101°26'E], 1500–2000m, vii 1956, *Meijer* 7284 (L), but see below.

*Agalmyla tobensis* is distinguished from *A. angustifolia* by its bracts, lowermost 34–40mm long (not 15–17mm), calyx lobes (15–)19–27mm long (not 8–11mm), and usually some hairs on the posticous side gland-tipped (not all acute).

The species is well recorded from the mountains around Lake Toba in NW Sumatra (which suggested the trivial name) in forest c.1350 to 1700m above sea level. A collection from SW Sumatra may also be this species (*Meijer* 7284, cited above) but it is in very poor condition, the flowers mostly eaten by insects, the leaves withered rather than pressed. It may differ from typical *A. tobensis* in the shape of the corolla tube, reflected in the length of the corolla mouth, c.13mm in *Meijer's* plant, c.10mm in the northern plant. The need for further collections is obvious; Gunung Tudjah forms part of the Barisan Range, whence have come collections of *A. angustifolia*, but not from that particular mountain.

**19. *Agalmyla leuserensis*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. angustifolia* bracteis extimis 22 × 9mm (nec 15–17 × 10–20mm), calycis lobis 16–18 × 8–10mm (nec 8–11 × 2.5–6mm), corolla c.40mm longa (nec 21–23mm), externe pilis plerumque glanduloso-capitatis 2mm longis induta et pilis brevioribus in lobis marginalibus glanduloso-capitatis induta (nec pilis et externis et marginalibus omnibus acutis), pilis glanduloso-capitatis 0.3–0.8mm longis varie in pagina interiore loborum dispositis (nec pilis acutis c.0.2mm longis), pilis fasciculatis prope basim tubi omnibus glanduloso-capitatis (nec omnibus acutis), margine disci minute papillosa (nec glabra) distinguenda.

Type: N Sumatra, Atjeh, Gunung Leuser Nature Reserves, Gunung Ketambe and vicinity, 8–15km SW from the mouth of Lau Ketambe, c.40km NNW of Kutatjane, 1700m, 7 viii 1972, *de Wilde & de Wilde-Duyfjes* 14118 (holo. L, iso. BO).

Epiphytic climber, stems elongate, c.8mm in diam. on flowering part, rooting along the internodes, thickly clad in acute hairs up to 1.5mm long, glabrescent, bark then pale, glossy, papery. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.15 × 2mm, lanceolate, sessile, densely hairy, soon caducous; blade of developed leaves 170–240 × 90–112mm, oblong, apex obtuse then abruptly shortly acuminate, base very oblique, cuneate on longer side, rounded on other, margins irregularly serrate-dentate, teeth largely composed of a dark peg-like gland, 10 lateral veins each side of midrib, ascending at angle of c.45°, looping near margin and linking to vein above with a short straight side vein running out into adjacent tooth, both surfaces well clad in acute hairs up to 1.5mm long; petiole 150–240mm long, thickly clad in acute hairs up to 1.2mm long. *Inflorescence* a few-flowered very congested axillary cyme, peduncle c.3mm long, very stout, hairy. *Bracts* few, surrounding cyme, outermost c.22 × 9mm, oblong, obtuse, very minutely serrulate near apex, densely hairy outside and on margins, hairs up to 1mm long, acute, inside glabrous. *Pedicels* c.5–10mm long, densely hairy, hairs acute, to c.1.2mm long. *Calyx* 'dark red', tube wanting, lobes 5, subequal, 16–18 × 8–10mm, more or less oblong to oblong-elliptic, obtuse, very minutely serrulate near apex, outside and upper margins thickly clad in acute hairs up to 1.5mm long, inside glabrous. *Corolla* c.40mm long, tube 34mm, funnel-shaped, arcuate, mouth very oblique, posticous lobes c.6 × 5mm, suborbicular, anticous lobe c.10 × 5mm, elliptic, porrect, corolla 'bright red', densely hairy outside except in lower part, hairs up to 2mm long, mostly gland-tipped, a few acute, glandular hairs to 0.5mm long fringing lobes and inside around upper margins of lateral lobes, glandular hairs to 0.3mm long in an arc across inside of posticous lobes some distance below margin, anticous lobe with a relatively broad band of glandular hairs inside along lower half of each margin, similar hairs up inner margins of lateral lobes, acute hairs to 0.15mm long in a median band on anticous lobe, minute globular papillae less than 0.1mm in diam. extending from base of anticous lobe and around adjacent sinuses down floor of tube to insertion of filaments, two small papillose keels at point of insertion, a few glandular hairs c.0.8mm long in a narrow band below sinus between posticous and lateral lobes, otherwise inside of tube glabrous

except for 5 discrete tufts of gland-tipped hairs up to 3mm long inserted 5mm above base of tube. *Stamens* 4, anticus filaments inserted 20mm above base of tube, c.47mm long, anthers c.5.5mm long; posticus filaments inserted c.22mm above base of tube, c.40mm long, anthers c.3.8mm long, all filaments glabrous; staminode c.8mm long. *Disc* c.1.5 × 3mm, cupular, rim crenulate, minutely papillose. *Ovary* 27 × 2.5mm, glabrous. *Style* 7mm (not fully developed), glabrous. *Stigmatic lobes* (immature) 4 × 2.8mm, papillose on inner surface. *Capsules* not seen. **Fig. 11: 19a, b.**

*Agalmyla leuserensis* bears a strong superficial resemblance to *A. angustifolia*, from which it is distinguished by its bracts (outermost c.22 × 9mm, not 15–17 × 10–20mm), calyx lobes 16–18 × 8–10mm (not 8–11 × 2.5–6mm), corolla c.40mm long (not 21–23mm) clad outside in mainly gland-tipped hairs to 2mm long, shorter gland-tipped hairs fringing lobes (not hairs outside and on margins all acute), gland-tipped hairs to 0.3–0.8mm long variously disposed on inner surface of lobes (not acute hairs to c.0.2mm), tufts of hairs inside near base of tube all gland-tipped (not all acute), and rim of disc minutely papillose (not glabrous).

*Agalmyla leuserensis* is known only from the type collection made in the Gunung Leuser Nature Reserves in northernmost Sumatra, in montane rain forest, 1700m above sea level; *A. angustifolia* has not been recorded there, but much further south, on the Barisan Range. It is possibly more closely related to *A. wildeorum* from the same area; see that species (below). The gland-tipped hairs both fringing and inside the corolla lobes have not been seen in any other species in sect. *Agalmyla*.

**20. *Agalmyla wildeorum* Hilliard & B.L. Burtt, sp. nov.** ab *A. leuserensi* foliis superne (marginibus fimbriatis exceptis) glabris (nec omnino pilosis), foliis bene evolutis 55–87mm latis (nec 90–112mm), basi cuneatis et plus minusve aequilateralibus (nec valde obliquis uno latere cuneato altero rotundato), calycis lobis 7–15 × 2–5mm (nec 16–18 × 8–10mm), corollae lobis pilis acutis (nec glanduloso-capitatis) fimbriatis et pilis acutis tantum in pagina interiore loborum differt.

Type: N Sumatra, Atjeh, Gunung Leuser Nature Reserves, Upper Mamas river valley expedition, c.15km W of Kutacane, Camp Pilar to Pawang, c.1500m, 22 vi 1979, *de Wilde & de Wilde-Duyfjes* 18582 (holo. L).

Epiphytic climber, stems elongate, c.4–10mm in diam. on flowering part, rooting along the internodes, thickly clad in acute hairs 1–2mm long, glabrescent, bark then pale, glossy, papery. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.10–15 × 1.2–1.5mm, lanceolate, sessile, hairy on lower surface, soon caducous; blade of developed leaves 120–250 × 55–87mm, elliptic, apex abruptly shortly acuminate, base cuneate, equal, margins serrulate, sometimes obscurely so, each tooth terminating in a large dark blunt gland, 9–12 lateral veins each side of midrib, ascending at angle of c.45°, looping near margin and linking to vein above, upper surface glabrous except along margins (when very young both surfaces thickly clad in very small globular glands), lower surfaces well clad in acute hairs up to 1–1.5mm long, densest over veins and along margins; petiole 75–150mm long, clad in acute

hairs c.1mm long. *Inflorescence* a few-flowered congested axillary cyme, peduncle c.3mm long, very stout, hairy. *Bracts*: a bract and 2 bracteoles subtending lowermost pedicels, bract c.7–15 × 1.8–6mm, (bracteoles narrower and sometimes longer), elliptic, ± obtuse, outside acute hairs 0.5–1mm long, inside glabrous, soon caducous. *Pedicels* 5–13mm long, densely hairy, hairs acute, c.1mm long. *Calyx* tube 0.2–1mm long, lobes 5, subequal, (6.5–)11–15 × 2–5mm, more or less oblong, obtuse, scarcely toothed but a few dark dots (glands?) at apex, outside and margins clad in acute hairs up to 0.5–1mm long, inside glabrous. *Corolla* 40–45mm long, tube 37–40mm, funnel-shaped, arcuate, mouth very oblique, posticous lobes 3–5 × 3.8–4mm, more or less suborbicular, anticous lobe 8–9 × 4–5mm, elliptic, corolla ‘bright red’, densely hairy outside except on lower part, hairs to 1–2mm long, most acute, some gland-tipped especially on posticous side, lobes fringed with minute acute hairs, inside of lobes also clad in acute hairs, the median ones up to 0.2–0.25mm long, others much shorter, minute globular papillae less than 0.1mm in diam. extending down floor of tube to insertion of filaments, 2 small papillose keels at that point, rest of tube glabrous inside except for 5 discrete tufts of gland-tipped hairs c.2–3mm long inserted 5–6mm above base of tube. *Stamens* 4, anticous filaments inserted 18–22mm above base of tube, 40–43mm long, glabrous except for a few globular glands at base and on decurrent part, anthers 3–3.8mm long; posticous filaments inserted 23–25mm above base of tube, 32–37mm long, glabrous, anthers 1–2mm long; staminode c.1–3mm long. *Disc* c.1–1.5 × 2–3mm, rim crenulate, smooth or with a few scattered papillae. *Ovary* c.26–38 × 2mm, glabrous. *Style* c.28–30mm long, glabrous. *Stigmatic lobes* 3 × 2–2.6mm, papillose on inner face. *Capsules* c.350 × 2.5mm, glabrous. *Seeds* c.1.8 × 0.2mm, appendages 4–5mm (not fully ripe).

**Fig. 11: 20a, b.**

N SUMATRA. Atjeh, Gunung Leuser Nature Reserves, Upper Mamas river valley expedition, c.15km W of Kutacane, Camp Pawang, c.1250m, 22 vi 1979, *de Wilde & de Wilde-Duyfjes* 18368 (BO, L); *ibid.*, Camp Aceh, c.1240m, 25 vi 1979, *de Wilde & de Wilde-Duyfjes* 19085 (L); *ibid.*, Kem Pawang, c.1250m, 29 vi 1979, *de Wilde & de Wilde-Duyfjes* 18205 (BO, K, L); *ibid.*, climbing to Camp Pilar, c.1200m, 21 vi 1979, *de Wilde & de Wilde-Duyfjes* 18294 (BO, K, L). Ten Wes van Bandabaroe [Bandarbaru], c.850m, 29 ix 1919, *Lörzing* 6855 (L); bei Bandarbaru, N Sibajak, 850–950m, 14 ii 1933, *Lörzing* 16676 (BO).

*Agalmyla wildeorum* is distinguished from *A. leuserensis* by its leaves, glabrous above except along the margins, fully developed ones c.55–87mm broad (not 90–112mm), base cuneate and more or less equal (not very oblique, one side rounded, the other cuneate), calyx lobes 7–15 × 2–5mm (not 16–18 × 8–10mm), corolla lobes fringed with acute hairs (not gland-tipped) and acute hairs only on inner surface of lobes (not bands of gland-tipped hairs on all lobes). Most collections were made by the de Wildes in the Gunung Leuser Reserve, but Lörzing’s must have come from the Van Heutz Mountains, N of Lake Toba and SE of Gunung Leuser, at approximately 3°15’N, 98°30’E. The plants grow in montane rain forest between c.850 and 1500m above sea level, climbing up tree trunks or creeping in moss at their bases.

**21. *Agalmyla beccarii*** C.B. Clarke in A. & C. DC., Mon. Phan. 5(1): 57 (1883).

Type: Sumatra, West Coast, Mt Singalan, c.1700m, vi–vii 1878, *Beccari* 184 (holo. FI; iso. BM, K, L).

Epiphytic climber, stems elongate, c.5–7mm in diam. on flowering part, rooting along the internodes, thickly clad in gland-tipped hairs up to 1.5–2mm long, glabrescent, bark then pale, glossy, papery. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.10–15 × 1.5mm, lanceolate, sessile, densely glandular-hairy, soon caducous; blade of developed leaves 90–155 × 32–60mm, elliptic, apex shortly acuminate, base cuneate, equal or unequal, margins remotely serrate or serrulate, each tooth terminating in a dark blunt gland, 7–9 lateral veins each side of midrib, very indistinct, looping and fading towards margins, upper surface glabrous except for acute hairs up to 0.8–1mm long on margins, on lower surface gland-tipped hairs up to 2mm long scattered on midrib, sometimes a few on blade as well, blade distinctly glandular-punctate; petiole 90–140mm long, thickly clad in gland-tipped hairs up to 2mm long. *Inflorescence* a congested axillary cyme, flowers c.10, peduncle c.3mm long. *Bracts* few, outermost 11–15 × 7–11mm, ovate to elliptic, acute, broad-based, outside clad in acute hairs 0.8–1mm long, a few gland-tipped ones on midline, inside glabrous. *Pedicels* c.8–15mm long, clad in acute hairs up to 1mm long. *Calyx* probably red, tube c.0.5–1mm long, lobes 5, subequal, 8–9.5 × 2.5–4.8mm, more or less oblong, obtuse, and then very minutely toothed near apex, or elliptic, acute, outside acute hairs to 1–1.5mm long, very occasionally one gland-tipped, glabrous inside. *Corolla* c.35mm long, tube 30–32mm long, funnel-shaped, slightly arcuate, mouth oblique, posticous lobes 3–4.5 × 3mm, suborbicular, anticous lobe c.8 × 4mm, elliptic, porrect, corolla red, densely glandular-hairy outside except in lower part, hairs to 1.5–2mm long, lobes fringed with acute hairs to 0.1–0.2mm long, these also inside tips of 3 anticous lobes, minute globular papillae less than 0.1mm in diam. extending in a band from base of anticous lobe down floor of tube to insertion of filaments, otherwise inside of tube glabrous except for 5 more or less discrete tufts of acute hairs 2–2.5mm long inserted c.5mm above base of tube. *Stamens* 2, the anticous pair, filaments inserted 14–15mm above base of tube, 40–42mm long, a few globular glands scattered on lower part, anthers 3.8–4mm long; lateral staminodes inserted 16–17mm above base of tube, c.8–22mm long, included or shortly exerted; posticous staminode c.1mm long. *Disc* c.2 × 3mm, cupular. *Ovary* c.37 × 2mm, glabrous. *Style* c.18mm, glabrous. *Stigmatic lobes* (immature) c.4 × 3mm. *Capsules* c.160–190 × 3mm. *Seeds* 1.2 × 0.5mm, appendages c.4.5mm long. **Fig. 12: 21a, b.**

SUMATRA. W Sumatra, near Bukittinggi, Mt Singalang, 2500m, 26 v 1957, *Meijer* 5857 (L); *ibid.*, c.2000m, 25 vii 1894, *Schiffner* 2552 (L). Gunung Malintang, c.2100m, 29 vii 1918, *Bünnemeijer* 4059 (L).

*Agalmyla beccarii* is recorded from two mountains near the west coast of Sumatra, Gunung Singalang at 0°24'S, 100°21'E, and Gunung Malintang at 0°28'N, 99°39'E, between 2000 and 2500m above sea level. The species is easily recognized by the

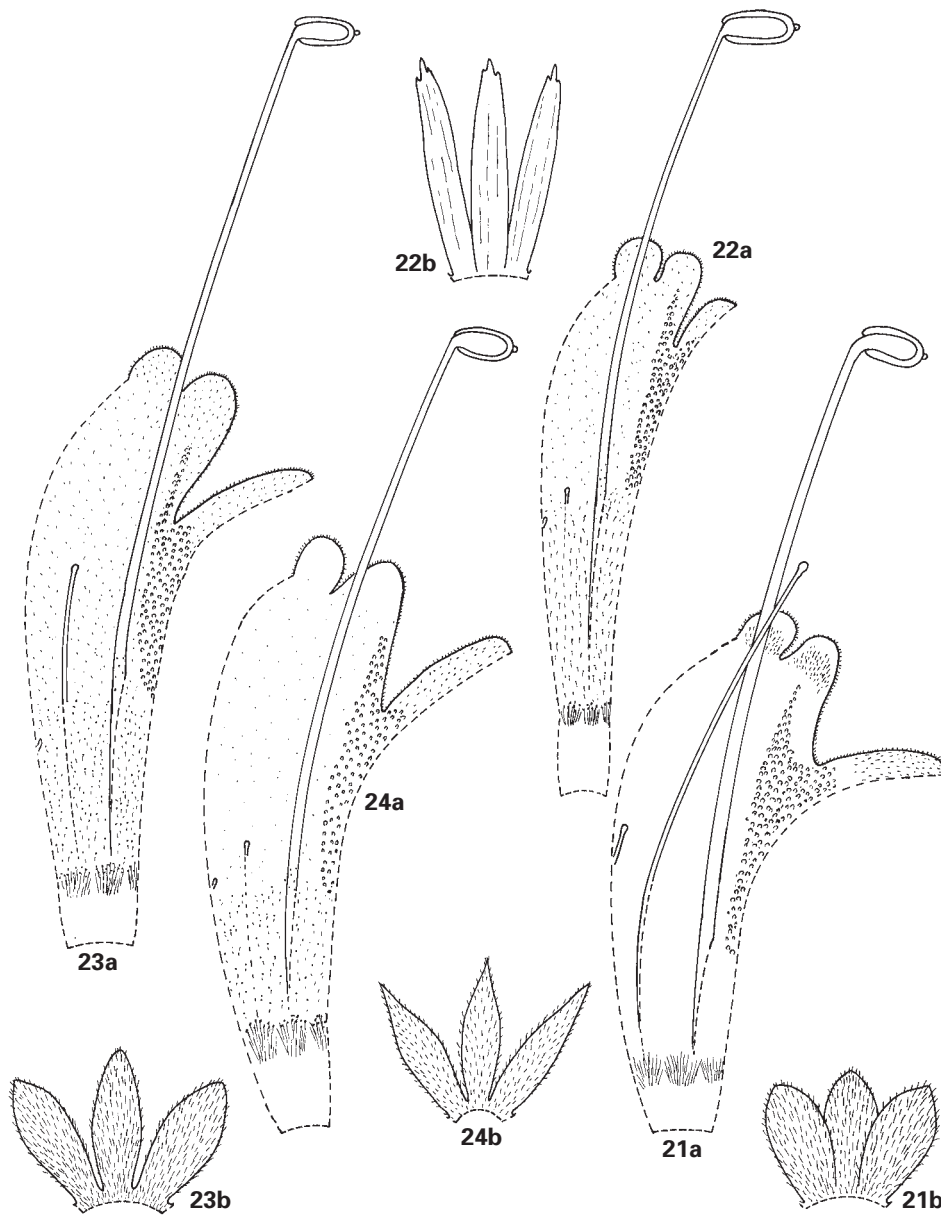


FIG. 12. Part of calyx and longitudinal section of corolla: 21a, b, *Agalmyla beccarii*; 22a, b, *A. glabrisepala*; 23a, b, *A. parasitica*; 24a, b, *A. javanica*. All  $\times 2$ .

conspicuous gland-tipped hairs on the stems, on the petioles, and along the midrib on the lower surface of the leaves; there are only two fertile stamens, but the stamino-odes are well developed and sometimes shortly exerted.



**22. *Agalmyla glabrisepala*** Hilliard & B.L. Burt, **sp. nov.** ab *A. parasitica* bracteis maximis 35–45 × 10–20mm (nec 17–25 × 2–5mm), pedicellis glabris vel pilis paucis praecipue prope basin (nec omnino pilosis), calycis lobis glabris (nec externe pilosis) differt.

Type: Sumatra, Benkoelen distr., Rimbopengaden [Rimbopengadang, 3°18'S, 102°25'E], 16 iii 1931, *De Voogd* 1075 (L).

Epiphytic climber, stem elongate, c.6–10mm in diam. on flowering part, rooting along internodes, clad in acute hairs up to 1.5–2mm long, glabrescent, bark pale, glossy, papery. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.15–20 × 2–2.5mm, lanceolate, sessile, hairy, soon caducous; blade of developed leaves 130–280 × 50–110mm, more or less elliptic, apex abruptly acuminate, base cuneate, equal, margins entire to obscurely serrulate, each tooth tipped with a blunt gland, 11–15 veins each side of midrib, ascending at angle of c.45°, looping near margin and linking to vein above, upper surface glabrous except along margins and sometimes hairs on lower part of midrib, lower surface with acute hairs up to c.1mm long, densest over veins and along margins, very minute globular glands as well on very young leaves, replaced by immersed glands at maturity; petiole 100–230mm long, clad in acute hairs up to 1.5–2mm long. *Inflorescence* a many-flowered congested axillary cyme, peduncle c.5mm long, very stout, hairy. *Bracts* red, several, each with 2 bracteoles, caducous, largest bracts 35–45 × 10–20mm, lanceolate, acute, narrowed to base, entire or with a few minute teeth near apex, outside acute hairs to 0.5–1mm long, inside glabrous. *Pedicels* c.10–15mm long, glabrous or very nearly so. *Calyx* red, tube 0.5–1mm long, lobes 5, subequal, 12–19 × 1.8–5mm, lanceolate to oblong, acute to obtuse, entire or with a few minute teeth near apex, glabrous. *Corolla* 36–47mm long, tube 34–40mm long, funnel-shaped, slightly arcuate, mouth oblique, posticous lobes 2–3.5 × 2.5–3.5mm, suborbicular, anticous lobe 5–8 × 3.2–6mm, elliptic, porrect, corolla bright red, hairy outside except near base, hairs mostly acute, up to 0.2–0.5mm long, gland-tipped hairs to 0.8–1mm long as well mainly on posticous side, acute hairs to 0.1mm long fringing lobes, globular papillae less than 0.1mm in diam. extending in a band from inner margins of lateral lobes and base of anticous lobe down floor of tube to insertion of stamens, gland-tipped hairs to 0.2mm long all round tube below insertion of filaments, 5 discrete tufts of gland-tipped hairs 2mm long inserted 5–7mm above base of tube. *Stamens* 2, the anticous pair, filaments inserted c.20mm above base of tube, c.35–50mm long, minute scattered glands near base, anthers 4–4.5mm long; lateral staminodes c.1mm long, posticous staminode c.0.5mm. *Disc* c.1.2 × 3mm, cupular, rim crenulate. *Ovary* 32–44 × 2mm, glabrous. *Style* c.30mm long, glabrous. *Stigmatic lobes* c.3 × 3mm, papillose on inner face. *Capsules* c.410 × 3mm (few seen). *Seeds* c.1.5 × 0.2mm (immature), appendages c.5mm long. **Fig. 12: 22a, b.**

SUMATRA. [Gunung] Singgalang [c.0°25'S, 100°20'E], *Korthals* s.n. (L). Hills at foot of Mt Dempo [Gunung Dempo, c.4°S, 103°E], 1881, *Forbes* 12238 (L).

MALAY PENINSULA. Terengganu, Gunung Padang [4°51'N, 102°52'E] Expedition, Camp 3

Ulu Brang, 21 ix 1969, *Whitmore* FRI 12738 (K, L). Perak, Gunung Bubu, 4°40'N, 100°50'E, 18 vii 1966, *Chew* 1222 (A, L, SING); Gunung Kerbau, 2000ft, 23 xi 1913, *Robinson* s.n. (K). Pahang, Frasers Hill [3°43'N, 101°45'E], 16 viii 1960, *Burkill* 2329 (K, L); *ibid.*, *Shah & Noor* M.S. 702 (A, E, L); *ibid.*, 22 xii 1979, *Bremer* 1814 (A, KLU, L, S); *ibid.*, 27 viii 1970, *Kochummen* FRI 16162 (L); *ibid.*, Tanglin, 4000ft, 3 viii 1972, *M. Shah* 2757 (A, SING); *ibid.*, 4000ft, 25 viii 1923, *Nur* 10522 (SING); Cameron Highlands, near Boh Tea Plantation, c.1550m, 22 iii 1992, *Klackenberg & Lundin* 794 (S). Selangor, Ulu Langat, iii 1912, *Kloss* s.n. (K). Sine loc., *Scortechini* (CAL).

*Agalmyla glabrisepala* has hitherto been confused with *A. parasitica* [= *A. staminea*] from which it is distinguished by its lowermost bracts 35–45 × 10–20mm (not 17–25 × 2–5mm), pedicels either glabrous or with a few hairs particularly near the base (not hairy all over) and calyx lobes glabrous (not hairy outside). Glabrous pedicels and calyx lobes appear to be unique to this species of *Agalmyla*. The leaves are usually glabrous above except along the margins (sometimes a few hairs occur along the lower part of the midrib), the lower surface becoming glabrescent with age.

*Agalmyla glabrisepala* is known from the Malay Peninsula and Sumatra, between c.600 and 1500m above sea level.

### 23. *Agalmyla parasitica* (Lam.) Kuntze, Rev. Gen. Pl. 2: 469 (1891).

Type: Java, *Commerson* (P).

Syn.: *Justicia parasitica* Lam., Ill. Gen.: 42 (1791).

*Cyrtandra staminea* Vahl, Enum. 1: 105 (1804) nom. illegit.

*Agalmyla staminea* Blume, Bijdr.: 767 (1826) nom. illegit.; Hook., Ic. Pl.: tab. 733 (1848); Lemaire in Fl. des Serres, ser. 1, 4: tab. 358 (1848); Paxt. Mag. 15: 73 cum ic. (1849); Hook.f. in Bot. Mag. 94: tab. 5747 (1868).

*A. longistyla* Carrière in Rev. Hort. 1873: 271 cum ic. (1873); Garden xi: 524 (1877). Lectotype: the plate, no specimen found.

Epiphytic climber, stem elongate, branching, c.5–8mm in diam. on flowering part, rooting along internodes, thickly clad in acute hairs up to 1.5–2mm long, glabrescent, bark pale, glossy, papery. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.15–24 × 1.5–3mm, lanceolate, sessile, hairy, soon caducous; blade of developed leaves 130–300 × 45–117mm, elliptic or oblong-elliptic, apex rather abruptly acuminate, base cuneate, equal, margins remotely serrulate, each tooth tipped with a large blunt gland, (9–)10–13 veins each side of midrib, ascending at angle of c.45°, looping near margin and linking to vein above, upper surface with acute hairs up to 1.5–2mm long scattered along midrib on lower half of blade, otherwise glabrous except for hairs along margins and occasionally a very few well scattered on blade particularly near margins, on lower surface acute hairs to 1.5mm long all over, densest over veins and along margins; petiole 90–220mm long, clad in acute hairs to 1.5–2mm long. *Inflorescence* a few- to many-flowered axillary cyme, peduncle up to c.6mm long, very stout, hairy. *Bracts*: 1 and 2 bracteoles subtending each pedicel, caducous outermost bracts 17–25 × 2–5mm (Malay Peninsula: 27–40 × 7–11mm), lanceolate, oblanceolate or oblong-lanceolate, acute, distinctly

narrowed in lower part, often a few very minute teeth near apex, outside acute hairs to 0.5–0.8mm long, inside hairs mainly on midline and scattered over upper half. *Pedicels* c.7–20mm long, clad in acute hairs to c.0.4mm long. *Calyx* red, tube 0.5–1.2mm long, lobes 5, subequal, 7–15 × 1.3–4mm, oblong or oblong-elliptic, acute or subacute, tipped with a small dark gland, outside acute hairs up to 0.5–0.8mm long, inside glabrous. *Corolla* 35–45mm long, tube 32–41mm, funnel-shaped, slightly arcuate, mouth oblique, posticous lobes 3–4 × 3–4mm, suborbicular, anticous lobe 7–10 × 3.5–5mm, elliptic, porrect, corolla bright red, dark median band on lower 3 lobes, hairy outside except near base, hairs mostly acute, up to 0.2–0.5mm long, together with gland-tipped hairs to 0.5–0.8mm long mainly on posticous side, acute hairs less than 0.1mm long inside lobes and fringing them, globular papillae less than 0.1mm in diam. extending in a band from inner margins of lateral lobes and base of anticous lobe down floor of tube to insertion of filaments, 2 small papillose keels at that point, minute gland-tipped hairs to c.0.2mm long all round inside of tube below insertion of filaments, above even smaller glandular hairs widely scattered, 5 discrete tufts of gland-tipped hairs to 2mm long inserted c.4.5–6mm above base of tube. *Stamens* 2, the anticous pair, filaments inserted 20–21mm above base of tube, 36–45mm long, glabrous, anthers 4–4.5mm long; lateral staminodes inserted c.21–25mm above base of tube, c.1–6mm long; posticous staminode c.0.5–1mm long. *Disc* 1–1.5 × 2–2.5mm, cupular, rim crenulate. *Ovary* c.35 × 2mm, glabrous. *Style* c.30mm long, glabrous. *Stigmatic lobes* c.4 × 2mm, papillose on inner surface. *Capsules* c.350–430 × 3mm. *Seeds* c.1 × 0.2mm, appendages c.5mm long. **Fig. 12: 23a, b.**

WEST JAVA. Jakarta distr.: G. Malang, *Backer* s.n. (L). G. Salak, *Koorders* 24229 $\beta$  (K, L); *ibid.*, *Bakhuizen van den Brink* 5535 (L); *ibid.*, *Raap* 265 (L); *ibid.*, *Schiffner* 2557 (L); *ibid.*, *Hochreutiner* 177 (L); *ibid.*, *Blume* (?) 2039 (L). Tjisaroea-Zuid, *van Oostroom* 12849 (CANB, L). Buitenzorg, *Hallier* 473b (L). Banten distr.: G. Karang, *Buwalda* 3648 (L); Tjidadap Tjibeber, *Winckel* 23 (L). Preanger distr.: G. Gedeh [G. Gede], Pangrango National Park, *Woods* 1008 (E); *ibid.*, *Arsin* sub BO 19608 (L); *ibid.*, *Koorders* 25093 $\beta$  (L). Tjibodas Forest Reserve, N side Gedeh–Pangrango massif, *Sands* 51 (K, L); Gunung Gedeh, 21 v 1922, *Heseltine* 8214 (SING); zwischen Tjibodas en Tjiburum, *Hallier* 473a (L); Tjibodas, *Boerlayer* s.n. (L); *ibid.*, *Hallier* 53 (L); *ibid.*, *Koorders* 26070 $\beta$  (L); *ibid.*, *Scheffer* s.n. (L); *ibid.*, *de Monchy* s.n. (L). G. Pangrango, *de Monchy* s.n. (L). Tjilaki, *Forbes* 885 (L). G. Halimun area, G. Botol, *van Balgooy & Wiradinata* 2846 (L). Takoka, *Koorders* 14958 $\beta$  (L); *ibid.*, *Koorders* 14969 $\beta$  (L). G. Patoeha, *Coert* 559 (L). G. Poeloesari, E of Lembang, *Coert* 40.7 (L). G. Lingkoeng above Lembang, *Coert* 38.4 (L). G. Papandajan, *Backer* sub B0 5477 (L). Garoet, *Burck* s.n. (L). Pangentjongan bei Talagabodas, *Backer* s.n. (L). G. Merapi, sine coll., 26909...143 (L). Not traced: G. Semboeng, *Backer* 12210 (L). G. Godehoomphen (?), W Preanger, *Kramer* 169 (L). G. Tjipoetih, *Bakhuizen van den Brink* 7179 (L). Sine loc., *Blume* (A, U).

MALAY PENINSULA. **Kelantan.** Sungei Aring, iii 1972, *Stone* 1605 (KLU). Perak: Maxwell's Hill, 2000ft, 5 xii 1965, *Md. Shah & Sidek* MS 1120 (E); *ibid.*, *Spare* 2050 (SING); *ibid.*, Birch's Hill, 3738–4101ft, 9 ix 1949, *Sinclair & Kiah* SING 38641 (E, K, SING). **Pahang.** Cameron Highlands, Robinson Falls, c.5000ft, 16 iv 1968, *Woods et al.* 620 (E, L). Sungei Lemoi, 9 ix 1931, *Jaamat* Forest dept. 28124 (SING).

The name *A. parasitica* (and its synonym *A. staminea*) has tended to be loosely used for plants in which the stamens are reduced to two fertile ones and three staminodes. However, several different species share this character. Typical *A. parasitica* is confined to western Java. There, the bracts are broadest in the upper part, narrowed below into a subpetiolar part, and do not exceed 5mm in breadth, and the pedicels are therefore clearly visible. Plants with broader (and longer) bracts, but otherwise indistinguishable from typical *A. parasitica*, occur on the Malay Peninsula (see formal description above). Too little really good material of the Malay Peninsula plant has been seen.

See also 24. *A. javanica*.

**24. *Agalmyla javanica*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. parasitica* foliis utrinque pilosis (nec superne, pilis prope basin costae et secus margines exceptis, glabris) bracteis majoribus (extimis 30–43 × 5–15mm nec 17–25 × 2–5mm) et densius pilosis, filamentis prope basin minute glandulosis (nec glabris), capsulis fortasse semper brevioribus (200–330mm longis, nec 350–430mm) distinguenda.

Type: Java, Gunung Ungarang [G. Oengaran], N slope near Medini, 4000ft, *Waitz* s.n. (L).

Epiphytic climber, stem elongate, loosely branched, c.6–8mm in diam. on flowering part, rooting along internodes, thickly clad in acute hairs up to 1.5–2mm long, occasionally a few gland-tipped, glabrescent, bark pale, glossy, papery. *Leaves* opposite, strongly anisophyllous, reduced leaves scale-like, c.10–18 × 1.5–3mm, lanceolate, sessile, hairy, soon caducous; blade of developed leaves 110–215 × 40–95mm, elliptic, oblong-elliptic or ovate, apex abruptly acuminate, base cuneate, margins remotely serrulate or occasionally serrate, each tooth tipped with a large blunt gland, 10–14 lateral veins each side of midrib, ascending at angle of c.45°, looping near margin and linking to vein above, upper surface clad in more or less scattered acute hairs up to 1.2mm long, occasionally subglabrescent, lower surface with acute hairs up to 1–1.5mm long, densest over veins and along margins; petiole 70–150mm long, clad in acute hairs to 1.5mm long. *Inflorescence* a many-flowered congested axillary cyme, peduncle up to c.6mm long, very stout, hairy. *Bracts*: 1 and 2 bracteoles subtending each pedicel, caducous, outermost bracts 30–43 × 5–15mm, lanceolate, acute to acuminate, narrowed to base, often a few minute teeth on upper margins, acute hairs to 1.2mm long on both surfaces, to c.0.6mm on margins. *Pedicels* 10–14mm long, clad in acute hairs to c.1mm long. *Calyx* tube 0.5–1mm long, lobes 5, subequal, 7–11 × 1.2–2.8mm, lanceolate or oblong-lanceolate, subacute to acute, tipped with a small dark gland, sometimes with a few small dark teeth near apex, outside acute hairs up to 0.8mm long, to c.0.3mm on margins, inside glabrous. *Corolla* 35–40mm long, tube 32–36mm, funnel-shaped, somewhat arcuate, mouth oblique, posticous lobes c.3 × 3mm, suborbicular, anticous lobe 7–8 × 5mm, elliptic, corolla red, hairy outside except near base, acute hairs to 0.3mm long all over, gland-tipped ones as well, to 0.5–0.8mm long, mainly on posticous side, acute hairs to

c.0.1mm fringing lobes, lobes glabrous inside, globular papillae less than 0.1mm in diam. extending in a band from inner margins of lateral lobes and base of anticous lobe down floor of tube to point of insertion of stamens, 2 narrow keels present or absent at that point, gland-tipped hairs to c.0.2mm long all round tube below insertion of stamens, above that point scattered very minute glandular hairs, 5 discrete tufts of gland-tipped hairs to c.2mm long inserted c.4–7mm above base of tube. *Stamens* 2, the anticous pair, filaments inserted 18–21mm above base of tube, c.32–38mm long, few minute globular glands on lower part; anthers 4mm long; staminodes either wanting or up to c.0.5mm long. *Disc* 1–1.5 × 2–2.8mm, cupular, rim crenulate. *Ovary* c.30 × 2mm, glabrous. *Style* c.25mm long, glabrous. *Stigmatic lobes* 3–4 × 1.8–2mm, papillose on inner surface. *Capsules* c.200–330 × 3mm. *Seeds* c.1 × 0.2mm, appendages c.5mm long. **Fig. 12: 24a, b.**

JAVA. Banjoemas distr., Baturaden to G. Slamet, c.1000–2000m, *Gen Murata et al.* J 969 (L). Pasoeroean distr., G. Mnerve [?] above Ranoe Daroenga, *Viets* s.n. (L). Semarang distr., G. Muria [G. Moerja], Mt Argodjembangan, 1000–1400m, *Kostermans* 6309 (K, L, SING). NE of Telomojo, *Leeuwen* 1116 (L); Telemojo, *Koorders* 27746β (K, L). Soerakarta distr., G. Merapi, *Waitz* s.n. (L). Kediri distr., G. Wilis above Kediri, 1600m, *Backer* 11507 (L). Besoeki distr., Petoeng Kriana [Petung], 1300m, *Backer* 16032 (L).

*Agalmyla javanica*, long confused with *A. parasitica*, is distinguished from that species by its leaves, hairy on both surfaces, outermost bracts 30–43 × 5–15mm (not 17–25 × 2–5mm as in *A. parasitica*) with hairs to 1.2mm long on both surfaces (not hairs to 0.5–0.8mm outside, inside hairs mainly on midline and scattered on upper half), hairs on pedicels c.1mm long (not to 0.4mm), filaments with globular glands on lower part (not glabrous) and possibly shorter capsules (to c.330mm long, not c.350–430mm); this last needs confirmation.

*Agalmyla javanica* is known only from Java, where its distribution appears to be more easterly than that of *A. parasitica*.

Sect. **EXANNULARIA** Hilliard & B.L. Burt, **sect. nov.** a sect. *Agalmyla* et sect. *Dichrotricho* annulo pilorum in parte inferiore corollae tubi deficiente statim distinguenda.

Type: *A. exannulata* Hilliard & B.L. Burt.

*Habit*: mostly epiphytic climbers with stems rooting along internodes, *A. singularis* terrestrial, erect. *Leaves* opposite, usually strongly anisophyllous (weakly so in *A. bicolor* and *A. singularis*), **reduced leaf** sometimes scale-like, broad-based (correlated with far-exserted anthers), **usually leaf-like** (anthers included or far exserted), leaf margins without a distinct band of appressed hairs; *inflorescence* an axillary cyme, sessile or subsessile in 8 species, pedunculate in 10 (peduncle may be very short to very long); *calyx* either with a well-developed tube (13 species) or 5-lobed nearly to base (5 species); *corolla* mostly shades of red (orange-red to maroon; possibly always yellow inside), red with yellow lobes (1 species, Sulawesi), yellow (2 species, Sulawesi, W New Guinea), light pinkish-yellow (1 species, W New Guinea), limb either more

or less regular or with a well-marked 4-lobed upper lip, mouth roundish to elliptic, **annulus wanting**; *stamens* normally 4 (posticous pair sometimes reduced to staminodes in *A. exannulata*), all anthers subequal except in species no. 40; *ovary* glabrous or clad in globular glands (13 species) or hairy (6 species); *style* glabrous or clad in globular glands (9 species) or hairy (10 species), generally short in relation to ovary when glabrous, long when hairy, but mature styles unknown in several species. **Figs 13–16.**

*Geographical distribution.* Wallacea, that is Lesser Sunda Islands (1 species), Moluccas (4 species), Sulawesi (11 species), together with 2 species from West New Guinea [Papua Barat]. Species nos. 25–42.

Section *Exannularia* is diagnosed by a single character, the absence of the annulus of hairs inside, near the base, of the corolla tube. The section is centred on Sulawesi, and the lack of the annulus in species from that island was noted by Schlechter (1923: 288), but merely as a difference from the Papuan species he was revising. Additional defining characters for the section have not yet been determined, but if a species has notably long leaves with a few, very widely spaced teeth it certainly belongs here. Another feature is that yellow plays a more dominant role in flower colour than it normally does in the other sections.

*Key to species in Lesser Sunda Islands, Moluccas, Sulawesi and  
West New Guinea (2 only)*

(Section *Exannularia* plus 2 species in section *Dichrotrichum*)

Note: Calyx tube measured *inside*; corolla length measured from top of posticous lobes to base, tube from sinus between posticous and lateral lobes to base, all on rehydrated material.

- 1a. Annulus (tufts or ring of hairs) present inside corolla tube near base (Sect. *Dichrotrichum*) \_\_\_\_\_ 2
- 1b. Annulus wanting (Sect. *Exannularia*) \_\_\_\_\_ 3
- 2a. Calyx lobed nearly to base, lobes c.9mm long. (Ceram [Seram]) \_\_\_\_\_  
\_\_\_\_\_ **44. A. manuselae**
- 2b. Calyx lobed roughly halfway, lobes c.2–5mm long. (Moluccas) \_\_\_\_\_  
\_\_\_\_\_ **57. A. elongata**
- 3a. Reduced leaf in each pair roughly one third or more the size of the other – 4
- 3b. Reduced leaf much smaller than the other \_\_\_\_\_ 5
- 4a. An erect plant, corolla regular. (West New Guinea) \_\_\_\_\_ **42. A. singularis**
- 4b. Epiphytic climber, corolla distinctly 2-lipped. (Sulawesi) \_\_\_\_\_ **37. A. bicolor**

- 
- 5a. Anticous anthers not or scarcely exceeding posticous lobes; filaments mostly glabrous or with minute globular glands, acute hairs in 2 species, glandular hairs in *A. columneoides* only; peduncle often, but not always, well developed \_\_\_\_\_ 6
- 5b. Anthers well exerted, filaments glandular-puberulous, peduncles wanting or nearly so \_\_\_\_\_ 17
- 6a. Ovary, style and stigma all densely glandular-pubescent, hairs to c.1.5mm long \_\_\_\_\_ 7
- 6b. Gynoecium not as described above: either glabrous, or with globular glands on all parts, or hairs restricted to style and stigma, or to upper part of ovary \_\_\_\_\_ 8
- 7a. Peduncle wanting, calyx tube c.0.5mm long, corolla red. (Sulawesi) \_\_\_\_\_ **34. *A. scabriflora***
- 7b. Peduncle c.35–65mm long, calyx tube c.5.5mm long, corolla light pinkish yellow. (West New Guinea) \_\_\_\_\_ **36. *A. roseoflava***
- 8a. Filaments hairy \_\_\_\_\_ 9
- 8b. Filaments glabrous \_\_\_\_\_ 11
- 9a. Filaments and connectives clad in gland-tipped hairs. (Halmahera) \_\_\_\_\_ **35. *A. columneoides***
- 9b. Filaments clad in acute hairs, connectives glabrous \_\_\_\_\_ 10
- 10a. Stems densely hairy, leaf margins distinctly serrate, ovary, style and stigma clad in globular glands only. (Sulawesi) \_\_\_\_\_ **28. *A. sojoliana***
- 10b. Stems very sparsely hairy, leaf margins subentire to obscurely serrate, ovary, style and stigma with scattered acute hairs as well as globular glands. (Sulawesi) \_\_\_\_\_ **29. *A. paucipilosa***
- 11a. Calyx lobes roughly as long as tube, hairs on outside of calyx 0.2–0.5mm long, strongly appressed, in median position only on lobes, thus forming a distinct 5-pointed star when the calyx is flattened out. (Lesser Sunda Islands) \_\_\_\_\_ **25. *A. stellifera***
- 11b. In most species, calyx lobes much longer than tube, in one (*A. brownii*) roughly equalling it, but then hairs on outside of lobes evenly distributed, to 0.8–1mm long, spreading \_\_\_\_\_ 12
- 12a. Lateral veins 7–8 each side of midrib, ovary glabrous. (Moluccas (Obi)) \_\_\_\_\_ **26. *A. obiana***
- 12b. Lateral veins 3–6 each side of midrib, ovary clad in minute globular glands, sometimes glandular hairs as well \_\_\_\_\_ 13

- 
- 13a. Glandular hairs to 0.3mm long on style and upper part of ovary. (Ambon) –  
 \_\_\_\_\_ **33. A. ambonica**
- 13b. Either minute globular glands only on ovary and style, or acute hairs as well  
 \_\_\_\_\_ 14
- 14a. Calyx lobes very roughly as long as tube. (Sulawesi) \_\_\_\_\_ **27. A. brownii**
- 14b. Calyx lobes decidedly longer than tube \_\_\_\_\_ 15
- 15a. Calyx tube c.4mm long, lobes 6–7.5mm. (Sulawesi) \_\_\_\_\_ **32. A. pulcherrima**
- 15b. Calyx tube 1–2.3mm long, lobes 5.5–9mm \_\_\_\_\_ 16
- 16a. Peduncle wanting, calyx with scattered patent hairs to 0.8mm long.  
 (Sulawesi) \_\_\_\_\_ **30. A. sp. nov.**
- 16b. Peduncle at least 80mm long, calyx with strongly appressed hairs to  
 0.2–0.25mm long. (Ceram) \_\_\_\_\_ **31. A. inaequidentata**
- 17a. Lateral veins 4–5 each side of midrib. (Sulawesi) \_\_\_\_\_ **40. A. sp. nov.?**
- 17b. Lateral veins at least 8 each side of midrib \_\_\_\_\_ 18
- 18a. Leaf blade 300–700mm long, petiole winged to base; corolla yellow.  
 (Sulawesi) \_\_\_\_\_ **41. A. remotidentata**
- 18b. Leaf blade to 250mm long, petiole not winged to base though blade may be  
 strongly decurrent; corolla red \_\_\_\_\_ 19
- 19a. Hairs on calyx to 1.2–1.5mm long, spreading; leaves decidedly hairy.  
 (Sulawesi) \_\_\_\_\_ **38. A. vogelii**
- 19b. Hairs on calyx to 0.25–0.6mm long, strongly appressed; leaves with well-  
 scattered hairs on blade, dense only over veins on lower surface. (Sulawesi) –  
 \_\_\_\_\_ **39. A. exannulata**

**25. *Agalmyla stellifera*** Hilliard & B.L. Burtt, **sp. nov.** interdum cum *A. elongata* (Blume) B.L. Burtt confusa sed statim distinguenda annulo vel fasciculis pilorum intra partem basalem tubi corollini absentibus, foliis subtus pilis paucis ad venas restrictis vel fere restrictis (nec dense pilosis), pilis in pedunculo omnibus similibus (nec pilis longis dispersis cum aliis multo brevioribus subdensis intermixtis), pilis in pagina exteriori loborum calycinorum in linea mediana restrictis (nec pilis plus minusve aequaliter dispersis).

Type: Bali, Tabanan, central Bali, Mt Lesung, c.6km WNW of Bedugul, above Kebun Raya, 25 vii 1994, *McDonald & Ismail* 4848 (holo. E; iso. A, CANB, K).

Epiphytic climber, stems of indeterminate length (to 10m recorded), branching, c.3–6mm in diam. on flowering part, rooting along internodes, sparsely pubescent, hairs acute, mostly 1–1.5mm long, patent, sometimes (particularly on Flores) to 0.5mm, appressed, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves soon caducous, c.14–20 × 4.5–10mm including well-marked petiolar part, hairy as developed leaves; blade of largest leaves 65–200 × 26–66mm, ovate or ovate-elliptic (Bali) or elliptic (Lombok, Flores), apex acute, base cuneate, shortly



decurent, margins subentire to coarsely serrate (Bali), entire or obscurely to more distinctly serrate (Lombok, Flores), 5–6(–7) lateral veins each side of midrib, looping near margin and eventually merging with it, upper surface with few well-scattered acute hairs to 0.8–1mm long (Bali, Lombok) or glabrous to few hairs 0.25–0.5mm long (Flores), lower surface with blade glabrous or nearly so, acute hairs to 1mm long over veins (Bali, Lombok) or hairs 0.25–0.5mm long mainly over veins (Flores); petiole 25–100mm long, clad in acute patent hairs to 1–2mm long (Bali, Lombok), to 0.5mm, upward-pointing (Flores). *Inflorescence* a few (to c.11)-flowered cyme, peduncle (50–)160–400mm long (length correlates with number of flowers), mostly clad in sparse acute patent hairs to 1–2.5mm long (sometimes 0.5–0.8mm,  $\pm$  appressed, chiefly Flores). *Bracts* (lowermost pair) 6–14  $\times$  2–5mm, more or less elliptic narrowed to a broad petiolar part, acute hairs to 0.8–1mm long mainly on margins and back (to 0.2mm on Flores). *Pedicels* 6–17mm long, clad in acute upward-pointing hairs 0.15–0.4mm long. *Calyx* tube 2–3mm long, lobes 5, subequal, 2.2–4.5  $\times$  2–3.5mm, very roughly as long as tube, more or less ovate, apex furnished with a broad blunt gland, minute globular glands both inside and out, acute hairs to 0.15–0.2mm long fringing lobes, elsewhere outside appressed acute hairs 0.15–0.25mm long, on the lobes these arranged in a median sharply deltoid patch, the whole thus forming a 5-rayed star. *Corolla* 22–33mm long, tube 16.5–26mm long, funnel-shaped, arcuate, mouth more or less round, posticous lobes 5.5–7  $\times$  4.5–7mm, oblong-elliptic to subrotund, anticous lobe 7.3–10  $\times$  4.2–6.5mm, oblong-elliptic, corolla ‘dark red-brown’, ‘dark beefy red’, ‘red-brown’, ‘red’ (Bali), not recorded (Lombok), ‘red’, ‘red, darker to apex’ (Flores), hairs, mostly gland-tipped, 0.25–0.7mm long fringing lobes, outside hairs to 0.7–1mm long, either all gland-tipped, or all acute, or mixed, extending almost to base, inside lobes minute acute hairs, rarely with some longer gland-tipped ones, patch of rounded papillae extending down floor of tube from base of anticous lobe to insertion of anticous filaments, there sometimes raised into two flaps, otherwise glabrous, annulus wanting. *Stamens* 4, anticous filaments 13–19mm long, inserted 8.5–14mm above base of corolla tube, anthers 2.5–4mm long, not or scarcely exceeding length of posticous corolla lobes; posticous filaments 10–16mm long, inserted 10–16mm above base, anthers 2.2–3.5mm long, scarcely exerted; all filaments glabrous; staminode 0.5–1.5mm long. *Disc* c.1  $\times$  2mm, cupular, rim crenulate. *Ovary* c.16–21  $\times$  1.5mm, glabrous. *Style* to c.8mm long, glabrous or with a few globular glands. *Stigmatic lobes* to c.2.2–3  $\times$  2mm, minutely papillose inside, glabrous or with few minute globular glands outside. *Capsules* c.130–300  $\times$  2mm, glabrous. *Seeds* (few immature seen) c.1.2  $\times$  0.2mm, appendages c.3mm long. **Fig. 13: 25a, b.**

BALI. Batoekaoe, i 1935, *De Voogd* 2135 (L); 48km N of Den Pasar, Nature Reserve near Bidugul, Mt Tapan, 1200m, 4 iv 1975, *Meijer & Noerta* 8046 (L); Bedugul forest region, Mt Batukau complex, 1300m, 23 vi 1958, *Kostermans et al.* 118 (K, L); Bedoegoel aan het Bratanmeer, 1300m, 11 iv 1936, *Steenis* 8084 (A, K); north of Tabanan, Mt Batukaru, 1800m, 20 vii 1964, *Nengah Wirawan* 495 (K, L); Gunung Bratan, 1500m, 20 vi 1938, *Jaag* 1779 (L); Gunung Pala, c.800m, 19 ix 1918, *Sarip* (exp. R. Maier) 334 (L).

LOMBOK. Rindjani-Vulkangebirge, south side, Kembang-Kerang, 1650–1900m, 25 vi 1909, *Elbert* 2162 (L); *ibid.*, south east side, Südabhang des Pussukberge, 900–1200m, 7 vi 1909, *Elbert* 1797 (L); *ibid.*, south west side, Sangkareang, 19 vi 1909, *Elbert* 2249 (L); *ibid.*, south side, 750–1250m, 25 vi 1909, *Elbert* 2122 (L); *ibid.*, north side, Teesighab nura, 1500–1750m, 4 v 1909, *Elbert* 1033 (L); *ibid.*, north north east side, Anjar river, 1400–1530m, 19 v 1909, *Elbert* 1393 (L).

FLORES. Rahong (Ruteng), 1400m, 8 ii 1972, *Verheijen* 3041 (L); Nggedeng, 1865m, 9 v 1964, *Verheijen* 01704/01705 (L); Hotju (Ruteng), 22 iii 1964, *Verheijen* 01462/01461 (L); Ruteng, Lusang Pass, 1600m, 16 vi 1975, *Veldkamp* 7017 (L); Mbengan, 600m, v 1965,

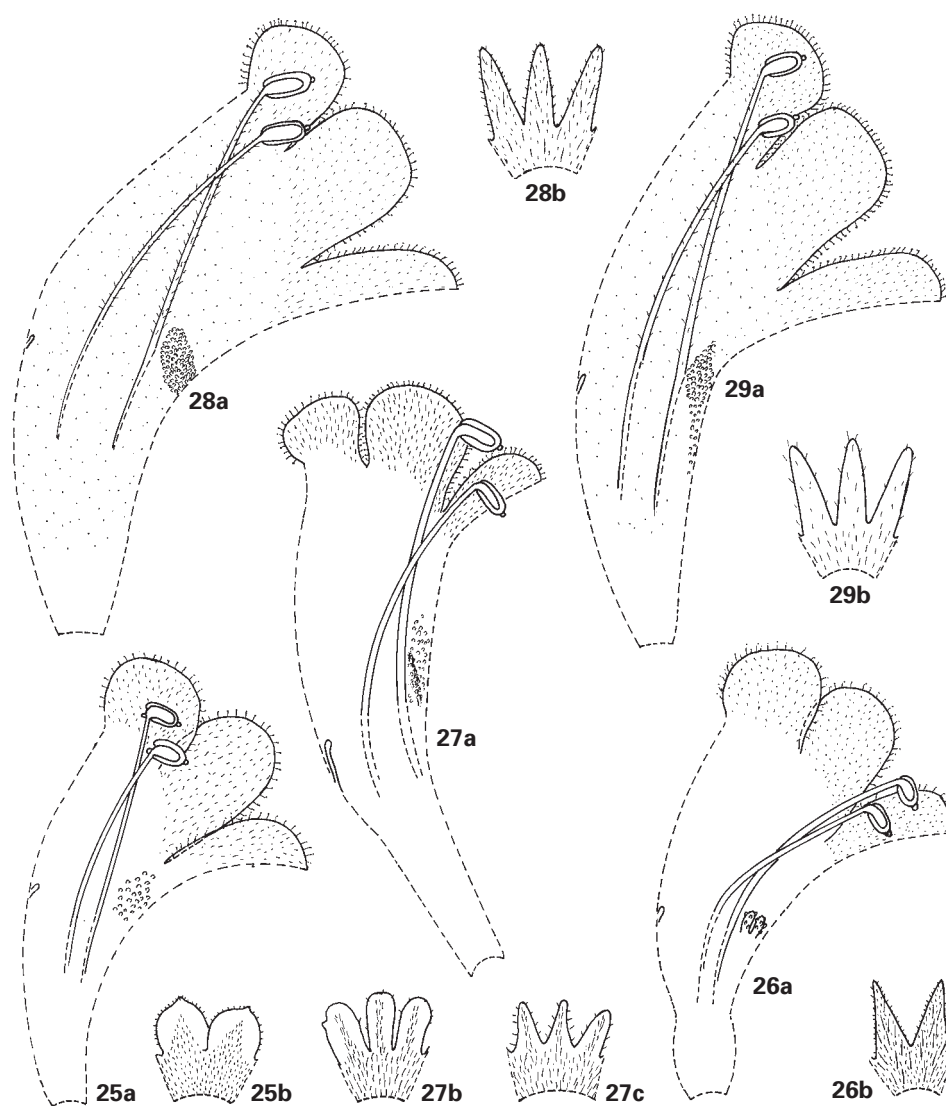


FIG. 13. Part of calyx and longitudinal section of corolla: 25a, b, *Agalmyla stellifera*; 26a, b, *A. obiana*; 27a–c, *A. brownii*; 28a, b, *A. sojoliana*; 29a, b, *A. paucipilosa*. All  $\times 2$ .

*Kostermans* 22170 (K, L); Ruteng, Potjo Ri i-Potjo Ngando Napu, 1700–1800m, 20 x 1967, *Schmutz* 1789 (L); Ruteng, 1500m, 20 vii 1966, *Schmutz* 468 (L).

In herbaria, *A. stellifera* is often confused with *A. elongata*, but it is at once distinguished by the absence of an annulus inside the corolla tube, leaves with very few hairs on the lower surface and these nearly confined to the veins, and the hairs on the outside of the calyx lobes strictly median, leaving broad glabrous margins; these strongly appressed hairs are seen to form a 5-lobed star when the calyx is viewed as a whole, which suggested the trivial name, *stellifera*. The closest ally of *A. stellifera* appears to be *A. obiana* (see below).

*Agalmyla stellifera* is known from Bali, Lombok and Flores in the Lesser Sunda Islands, the only species recorded there. Between the islands, there is some variation in indumentum on stems, petioles, peduncles and bracts, in leaf shape, and in length of peduncle (details in description above), but too little material has been seen to judge its importance, if any. Also, the areas botanized are probably very restricted: on Bali, all specimens have come from the east central part, where roads provide access; on Lombok, Elbert circled the Rindjani volcano; on Flores, all collections have come from the environs of Ruteng in the western part of the island.

The plants are epiphytic on tree trunks in forest between c.800 and 1900m above sea level.

**26. *Agalmyla obiana*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. stellifera* Hilliard & B.L. Burtt foliis utrinque pilosis, in pagina inferiore pilis densis (nec sparsissime pilosis pilis saepe ad venas limitatis), calycis lobis tubo longioribus, plus minusve duplo longioribus quam latis, dorso omnino pilosis (nec calycis lobis plus minusve tubo aequalibus vel brevioribus, plus minusve latis quam longis, pilis in dorso loborum ad aream medianam deltoideam limitatis) distinguenda.

Type: N Moluccas, Obi Island, Anggai, Gunung Batu Putiti, c.1°24'S, 127°48'E, 500m, 15 xi 1974, *de Vogel* 4059 (holo. L).

Epiphytic climber, stems of indeterminate length, branching, c.5mm in diam. on flowering part, rooting along internodes, well clad in hairs to 2mm long, mostly acute, some gland-tipped, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves soon caducous, c.14 × 7mm, ovate narrowed to a petiolar part, hairy as developed leaves; blade of largest leaves 80–110 × 40–50mm, ovate, apex acute, base cuneate, shortly decurrent, margins serrate or doubly serrate, lateral veins 7–8, looping near margin and merging with it, upper surface well clad in acute hairs to 1.2–2mm long, lower surface densely pubescent, hairs acute, to 1.5mm long over veins, mostly shorter on blade, finer than those on upper surface; petiole 33–50mm long, densely clad in acute spreading hairs to 2mm long. *Inflorescence* a crowded cyme, flowers c.19, peduncle 320–415mm long, pubescent, hairs acute, to c.0.2mm long together with scattered ones to 2mm, spreading. *Bracts* (lowermost pair) c.12 × 3.3mm, elliptic, acute hairs to 1.2mm long on margins and dorsal surface, to 0.8mm on ventral surface, minute globular glands on both surfaces.

*Pedicels* 4–6mm long, clad in short acute upward-pointing hairs together with scattered hairs to 1mm. *Calyx* tube c.2.3–3.2mm long, lobes 5, subequal, 4–5.2 × 2–2.2mm, longer than tube, narrowly deltoid, acute, tipped with short blunt gland, minute globular glands both inside and out, outside well clad in acute hairs c.0.1–0.5mm long together with scattered hairs c.1mm long, on margins c.0.2mm long. *Corolla* c.30mm long, tube c.24mm, funnel-shaped, arcuate, mouth more or less round, posticous lobes c.7 × 6.2mm, subrotund, anticous lobe c.7.5 × 5.3mm, broadly elliptic, corolla ‘reddish magenta, inside yellowish with purplish streaks’, lobes fringed with gland-tipped hairs c.0.3mm long together with shorter acute ones, outside pubescent to base, hairs gland-tipped, to 0.8mm long mainly on posticous side, acute hairs elsewhere, inside lobes minute acute hairs less than 0.1mm long, small patch of globose papillae between points of insertion of anticous filaments, raised into 2 or 4 small flaps, elsewhere glabrous, annulus wanting. *Stamens* 4, anticous filaments c.14mm long, inserted 12mm above base of tube, anthers 3mm long, not exceeding length of posticous lobes; posticous filaments c.12mm long, inserted 13mm above base of tube, anthers 2.5mm long, in mouth; staminode c.0.8mm long. *Disc* 1 × 1.6mm, glabrous. *Ovary* 13 × 1.2mm, glabrous. *Style* 2.5mm long, clad in minute globose glands. *Stigmatic lobes* (♂ phase) 1.2 × 1.2mm, backs clad in minute globose glands. *Capsules*: only shreds seen, longest 150mm. *Seeds* not seen. **Fig. 13: 26a, b.**

*Agalmyla obiana* is known only from the type collection made on Obi Island, lying south of Halmahera, and seldom visited. It was collected in ‘rather dense primary forest 40m high, with rather little undergrowth’.

It is distinguished from *A. stellifera* by its leaves, hairy on both surfaces, densely so on lower surface, and calyx lobes roughly twice as long as broad and hairy all over the backs (not roughly as long as broad, hairs on the backs confined to a median deltoid patch).

**27. *Agalmyla brownii* (Koorders) B.L. Burtt, *comb. nov.***

Lectotype (chosen here): Celebes, Province Minahasa, Gunung Lokon, *Koorders* 17177β (L, isolecto. BO). Syntypes: Celebes, *Koorders* 17205β (BO, L), 18896β (BO, L).

Syn.: *Didymocarpus brownii* [*brownei*] Koorders in *Meded. Lands Plantentuin* 19: 551, 628 (1898); *Suppl. Fl. N. O. Celebes*: tab. 121 (1922).

*Dichrotrichum brownii* (Koorders) B.L. Burtt in *Notes Roy. Bot. Gard. Edinb.* 24: 41 (1962) and in *Beiträge zur Biologie der Pflanzen* 70: 341 (1998).

Epiphytic climber, stems of indeterminate length, loosely branched, rooting along internodes, c.2mm in diam. at flowering tips, thickly clad in spreading hairs to 1–1.5mm long, mostly acute, sometimes mixed with gland-tipped ones, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves soon caducous, c.8–16 × 3.3–10mm, ovate or elliptic narrowing to a petiolar part, margins entire, hairy as developed leaves; blade of largest leaves variable in shape, when

ovate or obovate c.35–70 × 22–46mm, when elliptic c.26–45(–100) × 12–20(–27), apex subacute, base rounded, or cuneate particularly on elliptic leaves, margins coarsely serrate to almost lobed, mostly 3–5 teeth or lobes each side, rarely subentire (see discussion), lateral veins 4–5 each side of midrib, looping near margin and linking to vein above with side vein branching into adjacent tooth or lobe, upper surface with acute hairs 1–2mm long well scattered on blade, slightly more plentiful along midrib, lower surface with acute hairs 1–1.25mm long dense over midrib and lateral veins, eventually well scattered on blade, plentiful minute globular glands on very young leaves; petiole 10–44(–70)mm long, thickly clad in spreading acute hairs 1–2mm long. *Inflorescence*: flowers either solitary or up to 7 in a cymose cluster, peduncle 5–230mm long, clad in spreading acute hairs 1–2mm long. *Bracts* 3–8 × 1.2–3.5mm, elliptic or spatulate, apex rounded, acute hairs 0.2–0.25mm long on lower surface, few on upper. *Pedicels* 5–10mm long, clad in ± spreading acute hairs 0.4–0.5mm long. *Calyx* tube 2.2–3mm long, lobes 5, subequal, 2.5–4.3 × 1–1.8mm, mostly oblong, oblong-elliptic or more or less spatulate, apex rounded, sometimes more or less deltoid, apex more or less rounded, margins entire or with 1 or 2 incipient lobes, outside acute spreading hairs to 0.8–1mm long, dense over tube, tending to median position on lobes, shorter on margins of lobes. *Corolla* 34–42mm long, tube 29–34mm, narrowly funnel-shaped, arcuate, mouth more or less round, posticous lobes 4–9 × 5–7mm, subrotund, almost truncate, anticous lobe 7–12.3 × 4–6mm, broadly elliptic, corolla ‘scarlet lake’, ‘red’, ‘orange-red’, lobes fringed with gland-tipped hairs to 0.25–0.5mm long, outside pubescent almost to base, hairs mixed gland-tipped to 0.8mm, acute to 0.5–0.6mm, or gland-tipped ones sometimes wanting, inside lobes minute acute hairs to 0.1mm, elsewhere scattered minute globular glands, small patch of globose papillae at point of insertion of anticous filaments, raised into 2 elongated flaps adjacent to filaments, annulus wanting. *Stamens* 4, anticous filaments inserted 15–19mm above base of tube, 17–20mm long, anthers 3mm long, not exceeding posticous lobes; posticous filaments inserted 17–22mm above base, 15–18mm long, anthers 2.5–3mm long, in mouth; staminode c.1–3mm long. *Disc* c.1.2 × 2mm, cupular, glabrous. *Ovary* c.25–30 × 1–1.2mm, clad in scattered minute globular glands. *Style* c.7–10mm long, clad in minute globular glands. *Stigmatic lobes* c.2.5–3 × 2mm, minutely papillose inside, minute scattered globular glands outside. *Capsules* c.80–200mm long (only 3 seen, old). *Seeds* not seen. **Fig. 13: 27a, b.**

SULAWESI. Boolang Mongondow, Gunung Ambang Nature Reserve, Gunung Muajat, c.0°44'N, 124°26'E, *de Vogel & Vermeulen* 7254 (BO). Mt Nokilalaki, c.1°13'S, 120°08'E, c.1700m, 30 iv 1975, *Meijer* 9837 (L). Mt Roroka Timbu, west slope, 2000m, 8 v 1979, *Van Balgooy* 3202 (A, E, L); *ibid.*, west slope, c.1°16'S, 120°18'E, 1950m, 14 v 1979, *de Vogel* 5353 (L). Subdiv. Loewoek [Luwuk, 0°56'S, 122°47'E], between Pinapoeang – G. Loloa and G. Beabis, 27 ix 1938, *Eyma* 3836 (L). Subdiv. Masamba, between Tomadoe and Singkalong [2°19'S, 119°41'E], 2000–1400m [*sic*], 30 vii 1937, *Eyma* 1449 (K, L, U). Div. Palopo, subdiv. Makale, N of Makale [3°06'S, 119°51'E], 2000m, 1938, *Monod de Froideville* 198 (L, sterile).

The three syntypes of *A. brownii* have ovate coarsely toothed or sublobate leaves

and peduncles ranging in length from 40 to 100mm, flowers mostly solitary, paired on three pieces of stem. The specimens now associated with the type material have leaves ranging in shape from ovate to elliptic, mostly coarsely toothed or lobed, subentire on one stem, peduncles 5–230mm long with 1–7 flowers in an inflorescence. The unifying characters are the nervation of the leaves (always 4–5 lateral veins each side of the midrib) and their indumentum, together with spreading hairs on stems, petioles, peduncles and calyx. *Balgooy* 3202, from Mt Roroka Timbu, is a careful collection made to show variation in leaf shape; the sheet in Leiden (L) is particularly instructive (Fig. 3). It comprises three stems. The first is an old one c.5mm in diam. from which spring several long, very delicate, nearly glabrous stems c.1mm in diam. bearing 'juvenile' leaves (longest 30mm) ovate in outline with a deltoid acute apical lobe accounting for roughly half the blade, the lower half with 1 or 2 lobes or large teeth, lateral veins 1–2 each side of midrib, running straight out to the apex of the lobe, hairs scanty. A second stem c.2mm in diam. bears elliptic, coarsely toothed leaves and a 3-flowered inflorescence; indumentum as in the typical plant. The third stem is a piece of an old one c.5mm in diam. bearing several young leafy side branches; their leaves resemble those of the typical plant in all respects. A duplicate sheet sent to the Arnold Arboretum (A) bears ovate, obovate and elliptic leaves, together with several old peduncles (persistent peduncles seem to be a feature of the species); both leaf-lobing and indumentum are typical. The duplicate in Edinburgh (E) comprises an old stem bearing two elliptic subentire leaves (one 100 × 27mm, petiole 70mm; measurements in parentheses in formal description) and a peduncle 210mm long bearing a 7-flowered cyme, indumentum typical; there is also a small piece of leafy juvenile stem resembling that on the Leiden sheet.

*De Vogel* 5353 (L), also collected on Mt Roroka Timbu (*Balgooy* and *de Vogel* were together), bears only narrowly elliptic leaves larger than, but otherwise resembling, those described on stem number 2 of *Balgooy* 3203 (L). There are three inflorescences, two old ones each with a single old capsule c.80mm long, the third with a solitary bud. These very short capsules are at variance with Koorders' description and illustration, but such a range in size is not unknown (e.g. *A. tuberculata*).

*Agalmyla brownii* has been collected from several widely separated localities in Sulawesi, in montane forest between 1700 and 2500m above sea level.

**28. *Agalmyla sojoliana*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. brownii* foliorum marginibus c.7–9 dentibus brevibus in utroque latere praeditis (nec 3–5 dentibus grossis vel lobis), calycis lobis c.2–3-plo tubo longioribus (nec eum circa aequantibus), corolla externe pilis acutis c.0.2mm longis (nec 0.5–0.6mm, saepe aliis glandulosis ad 0.8mm etiam praesentibus), filamentis pilosis (nec glabris) distinguenda.

Type: Sulawesi, c.0°40'N, 120°10'E, Mt Sojol, c.1400m, 26 ii 2000, *Mendum*, *Argent* & *Hendrian* 162 (holo. E; iso. BO, K, L).

Epiphyte, stems of indeterminate length (c.3m), loosely branched, rooting along internodes, c.2–4mm in diam. on flowering part, thickly clad in spreading acute hairs

to 1.5–1.8mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 5–10 × 2.5–7mm, ovate, abruptly contracted to a petiolar part 2–5mm long, hairy as developed leaves; blade of largest developed leaves 90–135 × 36–55mm, ovate or elliptic, apex shortly acuminate, base cuneate, margins coarsely but shallowly serrate, teeth roughly 7–9 each side, lateral veins (4–)5–6 each side of midrib, looping near margin and fading out, upper surface very thinly clad in acute hairs to 1–1.2mm long, mostly over veins and near margins, more plentiful on lower surface but never dense even over veins; petiole 25–60mm long, thickly clad in spreading acute hairs to 1.5mm long. *Inflorescence* a small cymose cluster, flowers 2–7, peduncle purple, 45–145mm long, thickly clad in spreading acute hairs to 1.5mm long. *Bracts* 4–12 × 1–3mm, more or less spatulate, apex rounded, inside either glabrous or few small acute hairs at apex, plentiful acute hairs to 1.2mm long outside and along margins. *Pedicels* 7–12mm long, well clad in patent acute hairs to 1mm long. *Calyx* purple, tube 2.2–2.8mm long, lobes 5, subequal, 3.5–5.8 × 1.8–2.2mm, deltoid, obtuse, inside minute globular glands, outside acute spreading hairs to 0.8mm long, many much shorter, to 0.5mm along margins or nearly wanting there. *Corolla* 38–42mm long, tube 32–35mm, narrowly funnel-shaped, arcuate, mouth nearly round, posticous lobes 6–7 × 6mm, subrotund, anticus lobe 8–10 × 6–7mm, elliptic, corolla scarlet, inside throat yellow with dark red lines at the base of the 3 lower lobes, all lobes fringed with gland-tipped hairs to 0.4mm long, outside broad-based acute hairs to 0.2mm long, inside lobes minute acute hairs to 0.1mm long, elsewhere globular glands, conspicuous palate of globose papillae raised into 2 longitudinal flaps at insertion of anticus filaments, annulus wanting. *Stamens* 4, anticus filaments 17–18mm long, inserted 17–19mm above base of tube, anthers 2.8–3mm long, not exceeding posticous lip, posticous filaments 14–16mm, inserted 20–22mm above base, anthers 2.5–2.8mm, all filaments clad in short acute hairs; staminode 2–3.5mm long. *Disc* 1 × 2.5mm, cupular, rim crenulate. *Ovary* (nearly at ♀ stage) 22 × 1.2mm. *Style* c.5mm. *Stigmatic lobes* 2.5 × 2mm, whole gynoecium clad in minute globular glands. *Capsules* 130–150mm long (only 3 old shredded ones seen). *Seeds* not seen. **Fig. 13: 28a, b.**

*Agalmyla sojoliana* is known only from the type collection made at c.1400m on Mt Sojol, which lies towards the southern end of the northern ‘arm’ of Sulawesi, and has probably not previously been visited by botanists. The plant is an epiphytic climber in submontane ridge forest. One of its closest allies appears to be *A. brownii*, known from widely scattered localities throughout the northern and eastern ‘arms’ of Sulawesi, as well as the central part roughly as far south as Makale, between 1700 and 2500m above sea level. It is one of only two species yet known from Sulawesi that have acute hairs on the filaments (the other is *A. paucipilosa*); they are otherwise glabrous or glandular; *A. brownii* has glabrous filaments and is further distinguished by its leaf margins with 3–5 coarse teeth or lobes each side (not roughly 7–9 shallow teeth), calyx lobes roughly equalling the tube in length (not decidedly longer), and outside of corolla clad in acute hairs to 0.5–0.6mm long, often some gland-tipped (not acute hairs only, to 0.2mm long). See also 29. *A. paucipilosa*.

**29. *Agalmyla paucipilosa*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. sojoliana* caulibus parce (nec dense) pilosis, foliorum marginibus obscure dentatis (nec grosse serratis), inflorescentia 1–2-flora (nec 2–7-flora), pedunculo pilis paucioribus plus minusve retrorsis ad 1mm longis induto (nec pilis numerosis patentibus ad 1.5mm longis), bracteis externe et in marginibus pilis acutis 0.5–0.8mm longis tenuiter indutis (nec pilis ad 1.2mm bene indutis), gynoeccio pilis acutis 0.3–0.8mm longis praedito (nec glabro) distinguitur.

Type: Sulawesi, Rantemario above Rantelemo, c.3°30'S, 120°00'E, c.1750m, 5 iii 2000, *Mendum, Argent & Hendrian* 243 (holo. E).

Epiphyte, stems of indeterminate length, c.3mm in diam. on flowering part, loosely branched, rooting along internodes, sparsely clad in patent acute hairs to 1–1.5mm long, soon glabrescent, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves 1.5–8 × 1–3mm, narrowly elliptic, contracted to a petiolar part 1–1.5mm long, hairy as developed leaves; blade of largest developed leaves 40–90 × 30–60mm, ovate, apex acute to abruptly shortly acuminate, base rounded to abruptly cuneate, margins obscurely toothed, lateral veins 3–5 each side of midrib, looping near margin and either running into it or fading out, upper surface very thinly clad in acute hairs to 1.5–2mm long, most plentiful on or near margins, lower surface even more sparsely hairy; petiole 30–80mm long, clad in patent acute hairs to 1–2mm long. *Inflorescence*: flowers 1–2, peduncle (as pedicels) flushed purple, 7–67mm long, clad in more or less retrorse acute hairs to 1mm long, plentiful but not crowded. *Bracts* 4–6 × 0.8–1mm, spatulate, clad in few acute hairs to 0.5–0.8mm long, on margins and outside only. *Pedicels* c.7mm long, with plentiful acute hairs to 1mm. *Calyx* flushed purple, tube 3mm long, lobes 5, subequal, 5–6 × 1.5–2mm at base, deltoid, obtuse, inside minute globular glands, outside scattered acute hairs to 1mm, often few on margins. *Corolla* 38–42mm long, tube 31–33mm, narrowly funnel-shaped, arcuate, mouth nearly round, posticous lobes 7–8 × 7mm, upper part subrotund, anticous lobe 9–10 × 6.5–6.8mm, elliptic, corolla scarlet outside, yellow inside throat and tube, lobes fringed with gland-tipped hairs to 0.25–0.3mm long, outside broad-based acute hairs to 0.2mm long, inside lobes minute acute hairs to 0.1mm long, inside tube scattered minute globular glands, conspicuous palate of globose papillae raised into 2 longitudinal flaps at insertion of anticous filaments; annulus wanting. *Stamens* 4, anticous filaments 18–21mm long, inserted c.17mm above base of tube, anthers 2.2–3mm long, not exceeding posticous lobes; posticous filaments 12–17mm long, inserted 18–20mm above base, anthers 2–2.8mm long, all filaments clad in short acute hairs; staminode 1–2mm long. *Disc* 0.8 × 1.8mm, cupular, rim crenulate. *Ovary* (♀ phase) 22 × 1mm. *Style* 10mm. *Stigmatic lobes* 1.5 × 1mm, whole gynoeceium (excluding stipe) thinly clad in acute hairs to 0.3–0.8mm long, as well as globose glands. *Capsules* not seen. **Fig. 13: 29a, b.**

SULAWESI. [c.3°30'S, 120°00'E], Rante Lemo, 1600m, 7 vi 1929, *Kjellberg* 1607 (S).

*Agalmyla paucipilosa* and *A. sojoliana* have similar calyces, and corollas similar in



form, but their gynoecia are different: acute hairs on all parts in *A. paucipilosa*, these wanting in *A. sojoliana*. They differ further in their degree of hairiness, hairs on stem, leaf blades, peduncles, bracts and calyces being sparse in *A. paucipilosa* (whence the trivial name), more plentiful in *A. sojoliana*; also, the hairs on the peduncle of *A. paucipilosa* may always be more or less retrorse rather than patent (they are in both collections of the species made 70 years apart, so this may not be an artefact of drying). The leaf margins of *A. paucipilosa* are only obscurely toothed (not distinctly so) and the inflorescence possibly always carries fewer flowers than does its ally.

The plant grows in rain forest, at c.1600–1750m above sea level, either climbing over logs or up tree trunks.

### 30. *Agalmyla* sp. nov.

Epiphytic climber, stem of indeterminate length, loosely branched, rooting along internodes, 1.5mm in diam. on flowering part, very young and very small side branches densely pubescent with mixed acute and gland-tipped hairs to 1mm long, main stem glabrous, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, only immature reduced leaves seen; blade of largest developed leaves (only 2 seen) 62–64 × 17mm, elliptic, apex very acute, base narrowly cuneate, margins with 4 small teeth each side on upper half, lateral veins 3–4 each side of midrib, sharply ascending and running out to margin, upper surface glabrous at maturity (minute globular glands on both surfaces in extreme youth), few acute hairs to 1mm long scattered along margins, lower surface glabrous except for a very few appressed hairs along midrib; petiole 20–22mm long, clad in acute upward-pointing hairs to 1mm. *Inflorescence* 1-flowered, peduncle wanting. *Bracts* (1 seen) 4.2 × 0.8mm, spatulate, outside very few acute hairs to 0.2mm, inside glabrous. *Pedicel* 8mm, thickly clad in acute hairs to 0.8mm. *Calyx* tube 1.5mm long, lobes 5, subequal, c.9 × 1.5mm, oblong, obtuse, outside and on margins scattered patent acute hairs to 0.8mm, inside minute globular glands. *Corolla* 37mm long, tube 31mm, narrowly funnel-shaped, arcuate, mouth more or less round, posticous lobes 7 × 7mm, suborbicular, anticous lobe 8 × 4.8mm, elliptic, colour of corolla unknown, outside acute hairs to 0.25mm long together with few gland-tipped hairs to 0.5mm scattered down posticous side, lobes fringed with gland-tipped hairs to 0.3mm, inside lobes minute acute hairs to 0.1mm, inside tube scattered minute globular glands, annulus wanting, small palate of globose papillae at insertion of anticous filaments, strongly raised into 2 longitudinal keels. *Stamens* 4, anticous filaments inserted 16mm above base of tube, 15mm long, anthers not seen but will be c.2.5mm long, not exceeding posticous lobes; posticous filaments inserted 19mm above base, 11mm long, anthers 2.2mm; staminode 2mm. *Gynoecium* very young, all parts thickly clad in minute globular glands; disc cupular, glabrous. **Fig. 14: 30a, b.**

SULAWESI. Berg Mamboeliling [Mambuliling, 2°48'S, 119°08'E] ten N van Mamasa, c.2500m, 1938, *Monod de Froideville* 128 (L; possibly duplicate in BO).

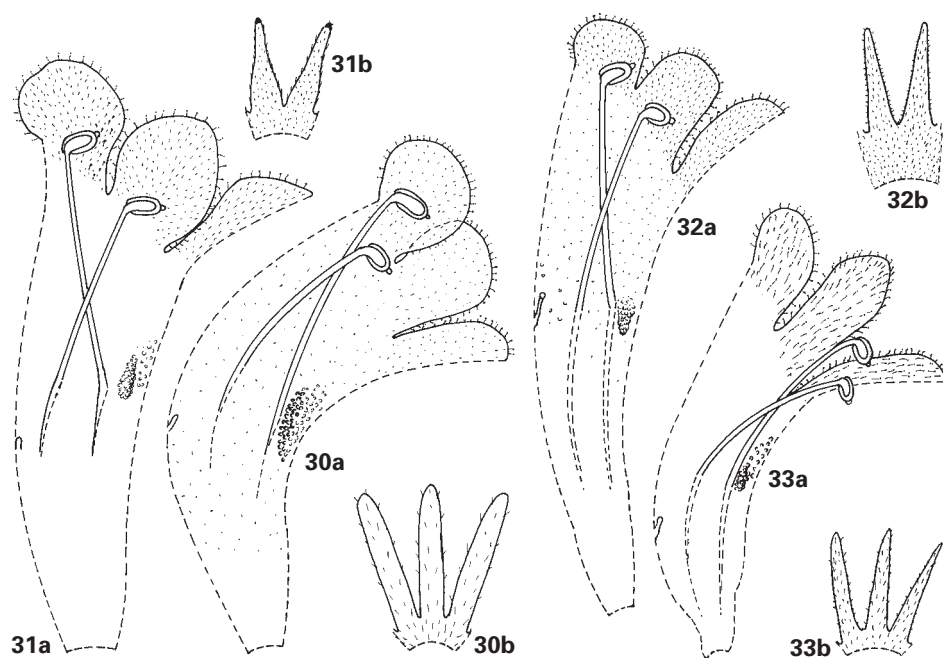


FIG. 14. Part of calyx and longitudinal section of corolla: 30a, b, *Agalmyla* sp. nov.; 31a, b, *A. inaequidentata*; 32a, b, *A. pulcherrima*; 33a, b, *A. ambonica*. All  $\times 2$ .

The specimen comprises a scrap of stem 90mm long with two side shoots c.20mm long and a solitary axillary pedicellate flower. The only information given by the collector (and here translated from the Dutch) is 'vegetation of small trees', 'not plentiful', and 'shrub'; the last term is misleading – many adventitious roots along the stem indicate that the plant is an epiphytic climber. It is clearly an undescribed species but the material is inadequate to typify a name. The calyx with its very short tube and long oblong lobes is distinctive, though reminiscent of that of *A. paucipilosa* (calyx tube longer, lobes shorter in that species). *Agalmyla paucipilosa* differs further in its ovate leaves, pedunculate inflorescence (though the peduncle can be very short), hairy filaments and gynoecium with hairs as well as globular glands.

**31. *Agalmyla inaequidentata* Hilliard & B.L. Burtt, sp. nov.** ab *A. brownii* (Koorders) B.L. Burtt caulibus pilis sparsis appressis mox glabrescentibus (nec dense pilis patentibus persistentibus indutis), calycis tubo 1–2.3mm longo (nec 2.2–3mm), lobis 5.5–7.8mm longis (nec 2.5–4.3mm).

Type: Seram, Manusela National Park, north side of Gunung Binaia, 2000m, 30 viii 1987, *Argent* C.87106 (holo. E).

Epiphytic climber, stems of indeterminate length, loosely branched, rooting along internodes, c.5mm in diam. on flowering part, sparsely clad in acute appressed hairs to 0.5–1mm long, soon glabrescent, bark pale, glossy, brittle. *Leaves* opposite,

strongly anisophyllous, reduced leaves soon caducous, c.8–14 × 3.5–6mm, sparsely hairy; blade of largest leaves 60–240 × 42–80mm, variable in shape and tothing, ovate, ovate-elliptic, obovate or elliptic, apex acute, base subcordate to subcuneate or cuneate and very shortly to more strongly decurrent, margins coarsely and irregularly toothed particularly near stem apices, varying to almost regularly to obscurely serrate or subentire on older stems, lateral veins 4–6 each side of midrib, looping near margins and linking to vein above, upper surface with acute hairs to 0.6–0.8mm long, well scattered on blade, more plentiful along midrib, strongly appressed, lower surface with acute hairs to 0.6mm long on midrib and lateral veins, fewer on blade, plentiful minute globular glands on very young leaves, sometimes visible on lower surface at maturity as immersed gland dots; petiole 40–120mm long, clad in acute upward-pointing hairs to 1mm long. *Inflorescence* a few- to many-flowered cymose cluster, peduncle 85–450mm long, clad in scattered acute hairs to 0.5–0.8mm long. *Bracts* c.7–9 × 2.2–3.5mm, elliptic or oblong-elliptic, acute hairs to 0.25–0.5mm long on lower surface, few on upper. *Pedicels* 7–20mm long, clad in acute, upward-pointing hairs to 0.25–0.4mm long. *Calyx* tube 1–2.3mm long, lobes 5, subequal, 5.5–7.8 × 1.2–2.3mm, narrowly deltoid, apex more or less attenuate, outside acute strongly appressed hairs to 0.2–0.25mm long, minute globular glands as well both inside and out. *Corolla* 36–45mm long, tube 28–38mm, funnel-shaped, mouth more or less round, posticous lobes 7–12 × 3–8mm, broadly spathulate to more or less oblong, anticus lobe 9–13 × 3.2–8mm, elliptic-oblong to oblong, corolla ‘bright orange-red’, ‘bright red’, ‘red’, lobes fringed with gland-tipped hairs to 0.2–0.4mm long, outside pubescent almost to base, hairs to 0.5–1mm long, mostly gland-tipped, acute hairs few or wanting, inside lobes minute acute hairs, sometimes gland-tipped to 0.2mm as well, elsewhere glabrous, annulus wanting, patch of small globose papillae at point of insertion of anticus filaments, partly raised into 2 small longitudinal flaps. *Stamens* 4, anticus filaments inserted 16.5–19.5mm above base of tube, 15–17mm long, anthers 2–2.8mm long, not exceeding posticous lobes, posticous filaments inserted 16–20mm above base of tube, 12–14mm long, anthers 1.7–2.7mm long, in mouth; staminode 1–5mm long. *Disc* 1 × 1.3–2mm, cupular, glabrous. *Ovary* c.22–27 × 1.2–1.5mm, partly or almost wholly clad in minute globular glands and acute hairs to 0.15–0.2mm long. *Style* c.6–10mm long, clad in globular glands, sometimes acute hairs as well to c.0.15mm long. *Stigmatic lobes* c.2–2.8 × 1.7–2mm, minutely papillose inside, outside a few minute globular glands, sometimes a few acute hairs as well. *Capsules* c.150–250 × 2mm, glabrous. *Seeds* c.1 × 0.2mm, appendages 4–4.5mm long. **Fig. 14: 31a, b.**

SERAM. Manusela National Park, N side Gunung Binaija [3°11'S, 129°26'E], 2100m, 11 viii 1987, *Edwards* 209 (E); *ibid.*, c.1400m, 1 viii 1986, *Kato et al.* C12210 (A); *ibid.*, c.1200m, viii 1911, *Stresemann* 338 (L); *ibid.*, 680–2400m, 29 x 1937, *Eyma* 1865 (A, K; L mixed with *Eyma* 3086). Kanike [= Kanikeh?, 3°06'S, 129°27'E], Biv. I Moemoea, 22 xi 1937, *Eyma* 2205 (K, L); *ibid.*, 600m, 24 xi 1917, *Kornassi* 536 (L, U). Mid Seran, Kamp Hatocolo, c.600m, 6 vii 1918, *Kornassi* 1549 (K, L, U). Central-gebirge, Gunung Hoale, 1500m, v–viii 1911, *Stresemann* 69 (L).

The closest ally of *A. inaequidentata* is probably *A. brownii*, from Sulawesi. It is distinguished from that species by the sparse, appressed and soon caducous hairs on the stem, calyx with lobes 5.5–7.8mm long (not 2.5–4.3mm), clad in closely appressed hairs, and ovary clad in a mixture of acute hairs and globular glands (not globular glands only).

Variation in the tothing of the leaves suggested the trivial name *inaequidentata*: leaves near the apex of the stem or on very young side shoots are jaggedly toothed; on older stems the leaves are more regularly toothed to subentire. This is nicely illustrated on a sheet of *Kornassi* 1549 (L). The mixture of globular glands and acute hairs on ovary and style has not been seen in any other species (globular glands and gland-tipped hairs in *A. ambonica*).

The plant climbs up tree trunks in forest between c.600 and 2400m above sea level.

**32. *Agalmyla pulcherrima* Hilliard & B.L. Burtt, sp. nov.** ab *A. inaequidentata* Hilliard & B.L. Burtt foliis subtus pilis costae et venarum lateralium arcte superpositis (nec sparsissimis et area interjacentae perspicua), bracteis extimis 10–22 × 5–11mm (nec 7–9 × 2.2–3.5mm), calycis tubo 4mm longo (nec 1–2.3mm), externe pilis leniter patentibus ad 0.3–0.5mm longis (nec 0.2–0.25mm valde appressis), corolla sanguinea (nec cinnabarina) pilis glandulosis ad dorsum limitatis (nec omnino dispersis), ovario glandulis minutis tantum (nec et glandulis et pilis acutis) induto distinguitur.

Type: Sulawesi, [Celebes], Roroka Timbu, Sopo valley, 1300m, 4 v 1979, *van Balgooy* 3150 (holo. L; iso. A, E, K).

Epiphytic climber, stems of indeterminate length, loosely branched, rooting along internodes, c.3–4mm in diam. on flowering part, well clad in acute hairs to 0.5–1.5mm long, strongly appressed to somewhat spreading, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 10–33 × 6–17mm, ovate, hairy as developed leaves, petiole 6–10mm long; blade of largest developed leaves 90–125 × 38–55mm, narrowly obovate, sometimes more or less elliptic, apex subacute, base markedly cuneate, strongly decurrent, margins coarsely and irregularly toothed, lateral veins 4–5 each side of midrib, looping near margin and linking to vein above, upper surface with few well-scattered acute hairs to 0.8–1mm long, similar and more plentiful hairs on lower surface, crowded over midrib and lateral veins; petiole 35–65mm long, well clad in acute upward-pointing hairs to 0.8–1mm long. *Inflorescence* a several-to many-flowered cymose cluster, peduncle 230–450mm long, well clad in acute more or less appressed hairs to 1–1.5mm long. *Bracts* (outermost pair) 10–22 × 5–11mm, more or less elliptic, apex acute or obtuse, margins entire or with two teeth, acute hairs to 0.5–0.8mm long mainly on lower surface along midrib and lateral veins. *Pedicels* 5–9mm long, clad in acute upward-pointing hairs to 0.5mm long. *Calyx* tube c.4mm long, lobes 5, subequal, 6–7.5 × 2–2.6mm, narrowly deltoid, apex attenuate and often rolled under, outside more or less spreading hairs to 0.3–0.5mm long, c.0.1mm on margins, minute globular glands both inside and out. *Corolla* c.38mm long, tube c.33–34mm, funnel-shaped, mouth roundish, posticous lobes 5 × 5mm, suborbicular,

anticous lobe  $8 \times 5$  mm, elliptic, corolla 'deep maroon' or 'deep red', lobes fringed with gland-tipped hairs to 0.5 mm long, outside pubescent almost to base, mixed gland-tipped and acute hairs to 0.5–0.8 mm long on posticous side, grading to acute only 0.2–0.25 mm long on anticous side, inside lobes minute globular glands together with acute hairs to c. 0.15 mm long, globular glands extending down tube to point of insertion of filaments, annulus wanting, patch of small globose papillae at point of insertion of anticous filaments strongly raised into 2 flaps. *Stamens* 4, anticous filaments inserted 19–21 mm above base, 15.5–19 mm long, anthers 3–3.2 mm long, not exceeding posticous lobes; posticous filaments inserted 20–23 mm above base, 13–14 mm long, anthers 2.8–3 mm long; staminode 2 mm long. *Disc* c.  $1 \times 2.2$  mm, cupular, glabrous. *Ovary* c.  $1.7 \times 1.2$  mm, well clad in globular glands. *Style* c. 1.5 mm long, well clad in globular glands. *Stigmatic lobes* c.  $2 \times 2$  mm ( $\sigma$  phase only), minutely papillose inside, outside plentiful globular glands. *Capsules* not seen. **Fig. 14: 32a, b.**

SULAWESI. Mt Roroka Timbu, W slope, c. 80 km SSE of Palu, c.  $1^{\circ}16'S$ ,  $120^{\circ}18'E$ , 1275 m, 13 v 1979, *de Vogel* 5329 (K, L). Menado, o.a. Paloe [Palu] tuschen Kp. Siadaoenta en Tomado (Lindoe-meer), 700–1300 m, 12 vii 1939 [sterile], *Bloembergen* 4170 (L).

*Agalmyla pulcherrima* is distinguished from *A. inaequidentata* by its leaves, in which the midrib and lateral veins on the lower surface are so thickly clad in appressed hairs that the underlying tissue is almost or quite invisible; in *A. inaequidentata* the hairs are so thinly distributed that the tissue is clearly visible. Also, the bracts are bigger, the calyx tube longer and clad in more or less spreading hairs, and the ovary is clad in minute globular glands only.

Van Balgooy noted 'flowers on c. 40 cm long pendent peduncles bent upward apically; flower buds deep purple, open flower deep maroon, of exquisite beauty'; the latter comment suggested the epithet *pulcherrima*. De Vogel described the flowers as 'dark red, inside the tube ochrish yellow'. The species is known only from a small area of central Sulawesi, in montane forest at c. 1300 m above sea level.

**33. *Agalmyla ambonica*** Hilliard & B.L. Burt, **sp. nov.** ab *A. brownii* (Koorders) B.L. Burt calycis tubo 1–2.2 mm long (nec 2.2–3 mm), lobis 6–8 mm longis, acutis (nec 2.5–4.3 mm, obtusis) parte superiore ovarii, stylo, lobis stigmaticis in dorso pilis glandulosis ad 0.3 mm longis et glandulis globosis (nec glandulis globosis tantum) indutis distinguenda. Ab *A. inaequidentata* Hilliard & B.L. Burt pedunculis 35–40 mm longis, dense pilosis (nec 85–450 mm longis, parcissime pilosis), calyce pilis ad 1 mm longis leniter patentibus (nec 0.2–0.25 mm longis, valde appressis), parte superiore ovarii, stylo, lobis stigmaticis in dorso pilis glandulosis ad 0.3 mm longis et glandulis globosis minutis indutis (nec glandulis globosis tantum vel pilis acutis 0.15–0.2 mm longis intermixtis) differt.

Type: Moluccas, W Ceram [Ambon Island], Salahoetoe [= Salahutu], Biv. III, 6–9 iii 1938, *Eyma* 3086 (holo. L).

Epiphytic climber, stem of indeterminate length (only flowering tips seen), rooting along internodes, c. 3 mm in diam., well clad in acute hairs to 1–1.5 mm long,

appressed, glabrescent, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves soon caducous, blade c.7–15 × 2.5–6mm, petiolar part 3–6mm, hairy as developed leaves; blade of largest leaves 60–75 × 30–45mm, ovate-elliptic, apex acute, base cuneate, very shortly decurrent, margins serrate to obscurely serrate or subentire, lateral veins 4–6 each side of midrib, looping near margins and linking to vein above, upper surface with acute hairs to 0.6–1mm long, plentiful but well scattered over blade, denser over veins, strongly appressed, lower surface similar but more conspicuously hairy particularly over veins, plentiful minute globular glands on very young leaves, visible at maturity as immersed gland dots particularly on lower surface; petiole 35–40mm long, clad in acute upward-pointing hairs to 1mm long. *Inflorescence* a few-flowered cymose cluster, peduncle 16–20mm long, thickly clad in acute upward-pointing hairs to 1mm long. *Bracts* c.4.5–6 × 1.5–2.2mm (few seen), more or less elliptic, clad in acute hairs to 0.2–0.5mm long, mostly on lower surface. *Pedicels* 5–10mm long, clad in acute upward-pointing hairs to 0.5mm long. *Calyx* tube 1–1.2mm long, lobes 5, subequal, 6.1–8 × 1.2–2mm, narrowly deltoid, apex acute, outside clad in acute somewhat spreading hairs to 1mm long, on margins to c.0.2mm, both surfaces minute globular glands. *Corolla* 27–30mm long, tube 20mm, funnel-shaped, arcuate, mouth more or less round, posticous lobes c.9 × 4mm, oblong-elliptic, anticous lobe c.9 × 4mm, oblong-elliptic, corolla ‘red’, lobes fringed with gland-tipped hairs to 0.3mm long, outside pubescent almost to base, hairs to 1mm long, mostly gland-tipped, inside lobes gland-tipped hairs to c.0.2mm long, towards base of lobes mixed with minute acute hairs, elsewhere glabrous, annulus wanting, patch of globose papillae at point of insertion of anticous filaments, partly raised into 2 small longitudinal flaps. *Stamens* 4, anticous filaments inserted 10mm above base of tube, 13mm long, anthers 2mm long, not exceeding posticous lobes; posticous filaments inserted 12mm above base, 11mm long, anthers 1.8mm long, in mouth; all filaments glabrous; staminode 0.8–1mm long. *Disc* 1 × 2mm, cupular, glabrous. *Ovary* c.18 × 1mm, well clad in minute globular glands together with gland-tipped hairs to 0.3mm long on upper part. *Style* c.6–9mm long, hairy as ovary. *Stigmatic lobes* 2 × 1.8mm, minutely papillose inside, outside glandular-puberulous together with minute globular glands. *Capsules* not seen. **Fig. 14: 33a, b.**

MOLUCCAS. Ambon, G. Salahoetoe [almost illegible], *van der Pijl* no. illegible (BO).

Both collections of *A. ambonica* have come from Gunung Salahutu, which rises to just over 1000m in the eastern part of the island of Ambon. The species is easily distinguished from *A. inaequidentata*, which occurs on the neighbouring island, Ceram, by its very short and densely hairy peduncles, calyx clad in more or less spreading hairs to 1mm long (not 0.2–0.5mm long, strongly appressed), and back of stigmatic lobes, style and upper part of ovary clad in gland-tipped hairs to 0.3mm long mixed with minute globular glands (not globular glands only or mixed with short acute hairs). Both stems and leaves are much hairier than those of *A. inaequidentata*.

*Agalmyla columneoides* (Halmahera) also has very short peduncles, but both calyx

and corolla are much bigger and the stamens are remarkable in that the connectives as well as the filaments are glandular-pubescent. See also 34. *A. scabriflora* (Sulawesi).

**34. *Agalmyla scabriflora*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. ambonica* foliis utrinque dentibus 4–6 grossis (nec subintegris vel serratis), floribus sessilibus in quoque axillo solitariis (nec in cyma pauciflora pedunculata dispositis), bracteis fere filiformibus c.4 × 0.2mm (nec ellipticis 4.5–6 × 1.5–2.2mm), corolla externe et intus in lobis pilis acutis insigniter grossis, paucissimis versus corollae basin glandulosis induta (nec pilis praecipue glandulosis), ovario stylo stigmatate dense glanduloso-pubescentibus pilis ad 1.2mm longis (nec glandulis minutis globosis cum pilis glandulosis ad 0.3mm longis in parte superiore ovarii stylo et stigmatate indutis) distinguenda.

Type: Sulawesi, B. Porema [SE Peninsula, south of Malili, northern part of Mengkoka Mts], 1400m, 24 x 1929, *Kjellberg* 2636 (holo. S).

Epiphytic climber, stem elongate, branched, rooting along internodes, c.2mm in diam. on flowering part, thickly clad in spreading hairs to c.1mm long, mostly acute, some gland-tipped, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.4–6 × 1.5–3mm, elliptic, petiolar part c.2–3mm, hairy as developed leaves; blade of largest developed leaves 25–43 × 20–33mm, ovate, apex acute, base rounded, margins with 4–6 very coarse deltoid teeth each side, lateral veins 4–6 each side of midrib, looping close to margin and fading, upper surface well clad in coarse acute hairs to c.0.8mm long, lower densely hairy, hairs acute, to 1.5mm long, plentiful minute globular glands on both surfaces, best seen on young leaves; petioles 13–40mm long, well clad in spreading acute hairs to 1.5mm long. *Flowers* solitary in axils of upper leaves, sessile. *Bracts*: one pair, c.4 × 0.2mm, almost filiform, clad in scattered hairs to c.0.8mm long, both acute and gland-tipped. *Pedicels* 13–20mm long, thickly clad in spreading acute hairs to 1mm long. *Calyx* tube 0.5mm long, lobes 5, subequal, 5–5.8 × 1–1.2mm, narrowly deltoid, acute, outside clad in relatively coarse hairs to 1.2mm long, most acute, a few gland-tipped. *Corolla* 32mm long, tube 26mm, funnel-shaped, slightly arcuate, mouth more or less elliptic, posticous lobes 6 × 4mm, oblong, elliptic, anticous lobe 9 × 3mm, more or less spatulate, corolla ‘red outside, yellow-brown inside’, lobes fringed with coarse acute broad-based hairs, outside thickly clad in remarkable coarse acute hairs to 1.2mm long, a few finer gland-tipped ones to 2mm long near base, similar but shorter coarse acute hairs inside lobes, elsewhere inside tube glabrous, annulus wanting, patch of globose papillae c.0.1mm in diam. from base of anticous lobe to insertion of anticous filaments, tissue thickened particularly near filaments but not raised into flaps. *Stamens* 4, anticous filaments inserted 14mm above base of tube, 20mm long, anthers 2mm long, scarcely exceeding posticous lobes; posticous filaments inserted 15mm above base, 18mm long, anthers 1.9mm, all filaments glabrous; staminode 1.5mm long. *Disc* 1.2 × 1.5mm, cupular, glabrous. *Ovary* 17 × 1.5mm, thickly clad in patent gland-tipped hairs to c.1.2mm long mixed with shorter acute hairs.

*Style* 13mm long, hairy as ovary. *Stigmatic lobes*  $2 \times 1.8$ mm, puberulous outside, hairs mixed acute and gland-tipped. *Capsules* not seen, but 2 fibres still present, 130mm long. **Fig. 15: 34a, b.**

*Agalmyla scabriflora* is known only from the type collection; the trivial name refers to the remarkably coarse hairs on the corolla, present even on the upper surface of the lobes. It is remarkable not only for these coarse hairs but also for the flowers being solitary in the leaf axils, though this is not completely unknown elsewhere in the genus: in *A. montis-tomasii*, for instance, there may be either one flower in the axil or a few, fascicled, and this may prove to be the case in *A. scabriflora* too when it becomes better known. The leaves are relatively small and very coarsely toothed; only further collections will determine whether or not this is merely characteristic of the juvenile state (cf. *A. brownii*).

The closest ally of *A. scabriflora* is possibly *A. ambonica*, which has a similar

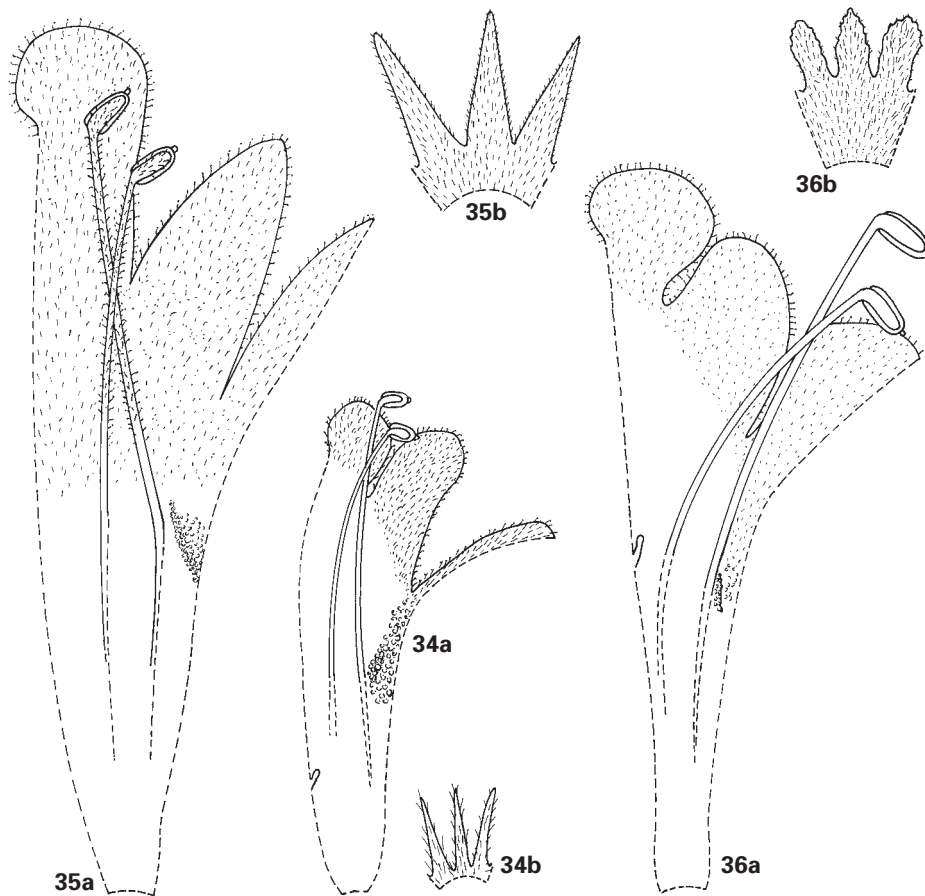


FIG. 15. Part of calyx and longitudinal section of corolla: 34a, b, *A. scabriflora*; 35a, b, *A. columneoides*; 36a, b, *A. roseoflava*. All  $\times 2$ .



deeply divided calyx and small flowers. *Agalmyla scabriflora* differs from *A. ambonica* not only by its small coarsely toothed leaves and solitary flowers but also by its filiform bracts, the coarse hairs on the corolla, and the glandular-pubescent gynoecium.

**35. *Agalmyla columnneoides*** Hilliard & B.L. Burt, **sp. nov.** ab *A. ambonica* Hilliard & B.L. Burt foliis majoribus cujusque paris lamina c.42–56 × 22–32mm (nec c.60–75 × 30–45mm), petiolo 10–18mm longo (nec 35–40mm), calycis tubo 2.8–3mm longo (nec 1–1.2mm), pilis valde appressis (nec plus minusve patentibus), corolla 53–58mm longa (nec 27–30mm), staminum filamentis connectivisque glanduloso-puberulis (nec glabris), ovario et stylo glandulis minutis globosis tantum indutis (nec pilis glandulosis ad 0.3mm longis in stylo et parte ovarii superiore indutis) differt. Type: Moluccas, Halmahera, Kao [Kau] district, at 36km mark on logging road from Tanjung Loleo [Tandjungloleo], 14 ii 1981, *Taylor* (NMII) P-540 (holo. K, iso. A).

Epiphytic climber, stem of indeterminate length, rooting along internodes, c.3mm in diam. on flowering part, thickly clad in acute strongly appressed hairs to 1mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves soon caducous, c.12–14 × 6–7mm, ovate narrowed to broad petiolar part, hairy as developed leaves; blade of largest developed leaves 42–56 × 22–32mm, ovate or elliptic, apex acute or subacute, base cuneate, margins coarsely but shallowly serrate to subentire, lateral veins 4 each side of midrib, looping near margin and merging with it, upper surface with well-scattered acute hairs to 1mm long, on lower surface similar scattered hairs on blade but crowded over veins; petiole 10–18mm long, well clad in acute upward-pointing hairs to 1.5mm long. *Inflorescence* a few-flowered cymose cluster, peduncle 3–10mm long, well clad in acute hairs to 1mm long. *Bracts* (outermost) c.7 × 2–2.5mm (few seen), lanceolate, narrowed to base, acute appressed hairs to 1mm long all over back, few on upper surface. *Pedicels* 4–5mm long, well clad in acute upward-pointing hairs to 1mm long. *Calyx* tube c.2.8–5mm long, lobes 5, subequal, c.6.3–8 × 1.6–3mm, narrowly deltoid, apex acute, acute strongly appressed hairs to 0.5–1mm long outside, to c.0.3mm on margins, both surfaces with very minute globular glands. *Corolla* c.53–58mm long, tube 35–40mm, narrowly funnel-shaped, mouth more or less round, posticous lobes c.17 × 8mm, oblong expanded to more or less suborbicular at apex, anticous lobe c.12–16 × 6–7mm, elliptic, subacute to obtuse, corolla ‘bright orange-red’, lobes fringed with gland-tipped hairs to 0.25–0.5mm long, outside pubescent nearly to base, hairs mostly gland-tipped especially on posticous side, to 0.6–1mm long, mostly shorter and acute on anticous side, inside lobes either gland-tipped hairs to 0.5mm long extending down tube to point of insertion of filaments mixed with acute hairs to 0.2mm long, or hairs almost exclusively acute to 0.2mm long, annulus wanting, patch of globose papillae at point of insertion of anticous filaments, outer margins raised into 2 flaps forming a V. *Stamens* 4, anticous filaments inserted c.21–24mm above

base of tube, 24–27mm long, anthers 2.5–3.2mm long, not exceeding posticous lobes; posticous filaments inserted c.22–26mm above base of tube, 21–22mm long, anthers 2.5–2.8mm long, scarcely exerted; all filaments and connectives glandular-pubescent, hairs to c.0.2mm long; staminode wanting. *Disc* 1 × 2mm, cupular. *Ovary* 32 × 1.2mm, well clad in minute globular glands. *Style* 7mm long, thickly clad in minute globular glands. *Stigmatic lobes* (♂ phase) 2 × 2mm, few globular glands on backs. *Capsules* not seen. **Fig. 15: 35a, b.**

*Additional specimen.* MOLUCCAS. Halmahera, Gunung Jailolo, c.1°04'N, 127°27'E, 950m, 12 x 1974, *de Vogel* 3414 (L).

The relationship of *A. columnneoides* possibly lies with *A. ambonica*, from which it is easily distinguished by its smaller leaves with shorter petioles, much bigger calyx and corolla, glandular-puberulous filaments and connective, and style and ovary clad in globular glands only. In general facies it is not unlike *A. brownii* (Sulawesi) but that species differs not only in its smaller calyx clad in spreading hairs, but also in the smaller and less glandular corolla, and glabrous filaments and connectives. In size and shape of the corolla it resembles many species from New Guinea (similar pollinators?); one of the two known New Guinea species that lack an annulus inside the corolla tube is *A. roseoflava*, readily distinguished by a number of characters including its glabrous stamens and densely glandular-pubescent gynoecium. The shape of the corolla is reminiscent of that of many species of the American gesneriad *Columnnea*, which suggested the trivial name. The hairy connectives appear to be unique in the genus.

Both collections probably came from much the same area, the volcanic peaks west of Kao. De Vogel recorded 'rather dense one-storey primary forest 10m high, with little undergrowth. Steep hillside with deep loose porous black volcanic soil'.

**36. *Agalmyla roseoflava* Hilliard & B.L. Burtt, sp. nov.** ab *A. ambonica* Hilliard & B.L. Burtt caule pilis patentibus acutis et glandulosis intermixtis 2–5mm longis indutis (nec pilis acutis tantum 1–1.5mm longis plus minusve appressis), foliis dense pilosis, pilis 1–1.5mm longis (nec pilis laminae bene dispersis, densius in venis, 0.6–1mm longis), calcycis tubo 5.5mm longo (nec 1–1.2mm), lobis 4–5mm (nec 6–8mm), corolla 42–48mm longa (nec 27–30mm), gynoecio dense pilis glandulosis ad 1.5mm longis induto (nec glandulis minutis globosis cum pilis glandulosis 0.3mm longis in apice ovarii, stylo, stigmatibus induto) differt.

Type: W New Guinea, Wandammen Peninsula, Wondiwoi Mountains, 750m, 7 iii 1962, *Schram* BW13388 (holo. L, iso. CANB).

Epiphytic climber, stem of indeterminate length, c.5mm in diam. on flowering part, rooting along internodes, thickly clad in spreading hairs 2–5mm long, mixed acute and gland-tipped, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves quickly caducous (only 1 seen), c.5 × 2.2mm, elliptic, narrowed to a petiolar part; blade of largest developed leaves 70–110 × 35–52mm, elliptic or narrowly ovate-elliptic, apex acute, base cuneate, shortly decurrent, margins coarsely

serrate or doubly serrate, lateral veins 6 each side of midrib, sharply ascending, looping near margin and fading out, both surfaces densely hairy, hairs 1–2.5mm long, acute; petiole 30–100mm long, thickly clad in acute upward-pointing hairs to 3mm long. *Inflorescence* a several-flowered, terminal axillary cymose cluster, peduncle 35–65mm long, thickly clad in spreading acute hairs to 3.5mm long. *Bracts* (outermost pair, few seen) c.5 × 2.5–3mm, ovate, subacute, outside thickly clad in acute hairs to 1.5mm long, shorter hairs inside confined to upper half. *Pedicels* 5–7mm long, clad in acute spreading hairs to 2mm long. *Calyx* tube 5.5mm long, lobes 5, subequal, 4–5 × 1.8–2.2mm, more or less elliptic, apex subacute to obtuse, margins crenulate especially in upper half, both surfaces of calyx clad in minute globular glands, margins with acute hairs to 0.5mm long, outside dense spreading hairs to 2mm long, inside hairs to 0.25mm confined to upper half of lobes. *Corolla* 42–48mm long, tube 34–40mm, funnel-shaped, slightly curved, mouth more or less round, posticous lobes 8–9 × 8mm, suborbicular, anticous lobe 10 × 9–10mm, broadly elliptic, all lobes rounded, fringed with glandular hairs to 0.4mm long, corolla ‘light pinkish yellow’, outside pubescent to base, hairs to 0.8mm long, mostly acute, some gland-tipped on posticous side, inside lobes acute hairs to 0.15mm long, extending down floor of tube almost to insertion of anticous filaments, small patch of rounded papillae between points of insertion of anticous filaments, partly raised into 2 small longitudinal flaps, elsewhere glabrous, annulus wanting. *Stamens* 4, anticous filaments inserted 17–20mm above base of tube, 25–27mm long, anthers 3.5mm long, not exceeding posticous lobes; posticous filaments inserted 21–23mm above base of tube, 20–21mm long, anthers 3mm long, in mouth; staminode c.1mm long. *Disc* 1 × 1.6mm, cupular, glabrous. *Ovary and style* (indistinguishable at this stage) 23 × 1mm, thickly clad in glandular hairs to 1.5mm long. *Stigmatic lobes* (♂ phase) 1.8 × 1.3mm, densely glandular-pubescent outside. *Capsules* not seen.

**Fig. 15: 36a, b.**

*Agalmyla roseoflava* is known only from the type collection; Schram noted ‘Primary forest. Rather common climber; flowers light pinkish yellow’, which suggested the epithet *roseoflava*. Among species from New Guinea, it appears to be almost unique in the lack of an annulus inside the corolla tube, a character shared with species from islands further west, including Ceram and Ambon. Its relationship seems to lie with *A. ambonica* from which it differs in its longer corolla (42–48mm versus 27–30mm) and the gynoeceum thickly clad in relatively long gland-tipped hairs (versus globular glands all over together with short gland-tipped hairs on stigma, style and upper part of ovary). It also has a much bigger calyx, long spreading gland-tipped hairs on the stem and densely hairy leaves.

In size and shape of the corolla it resembles *A. columnneoides* (Halmahera): see under that species (no. 35).

**37. *Agalmyla bicolor* Hilliard & B.L. Burt in Blumea 44: 382 (1999).**

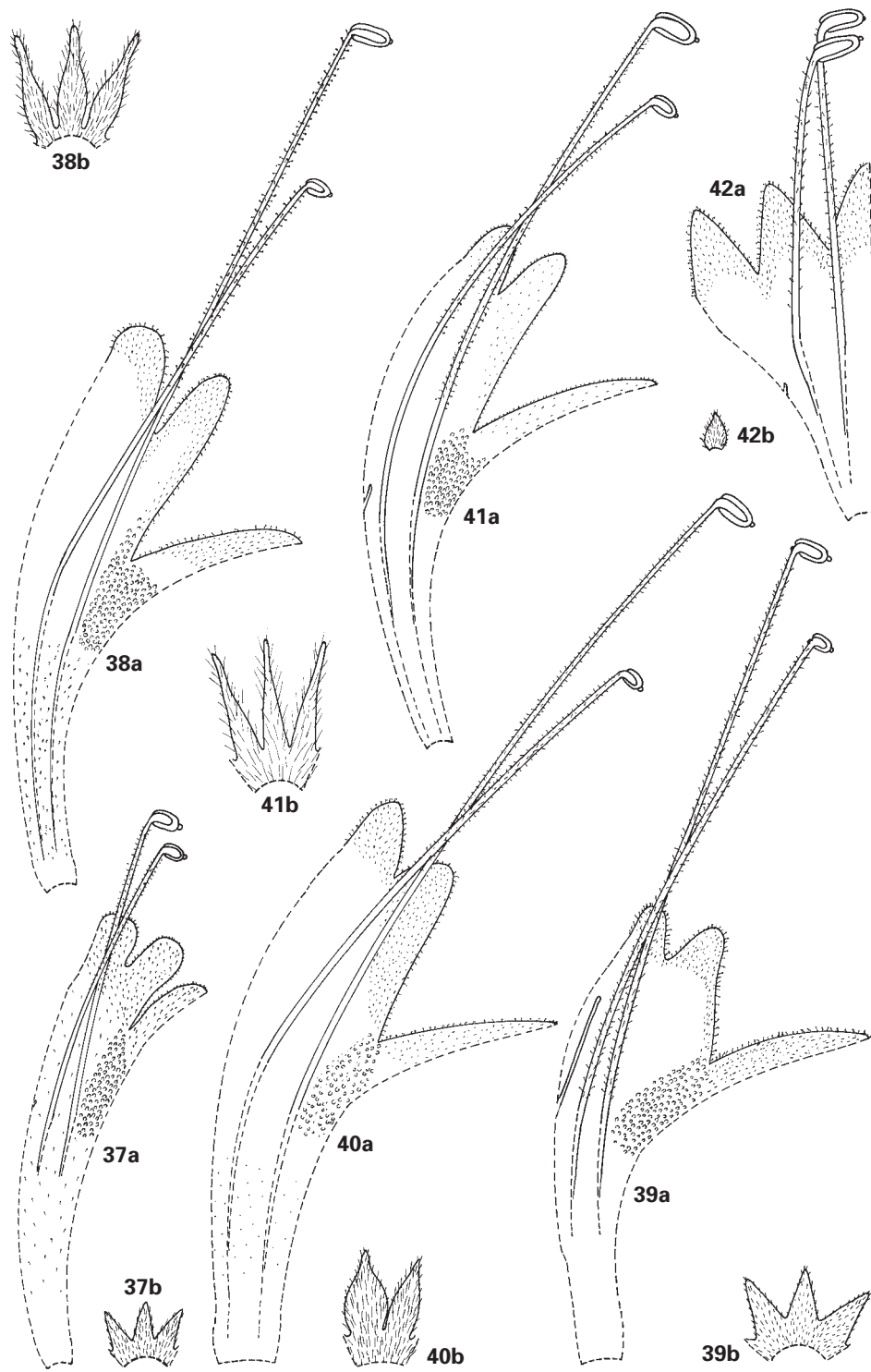
Type: Sulawesi, [Mt Roroka Timbu], Sopa valley, up to P. Dingin – Pr[imary] forest, 1200m, 1979, *Joncheere* 1245 (holo. L, iso. E).

Epiphytic climber, stems of indeterminate length, branching, rooting along the internodes, c.2–4mm in diam., strongly appressed-pubescent, hairs c.0.3–0.5mm long, acute, bark pale, glossy, brittle. *Leaves* more or less opposite, anisophyllous but not strongly so; blade of reduced leaves 22–55 × 6–25mm, petiole 7–30mm, otherwise as larger leaves; blade of largest developed leaves c.36–115 × 10–42mm, elliptic or narrowly obovate, apex acute to subacute, base cuneate, scarcely oblique, tapering into petiole, margins entire, 3–5 pairs of lateral veins ascending at angle of c.45°, looping near margins and fading out, upper surface with acute hairs c.0.3–0.4mm long, strongly appressed, these scattered or nearly confined to marginal area, globular glands as well, less than 0.1mm diam. (best seen on young leaves), lower surface often more densely appressed-pubescent especially over veins, but blade can be nearly glabrous, hairs up to c.0.7mm long; petiole c.13–70mm long, appressed-pubescent. *Flowers* 1 to c.10 in axillary clusters, stem very floriferous. *Bracts* (only 1 seen) c.8 × 1mm, linear-oblong, hairy as leaf. *Pedicels* c.9–10mm long, strongly appressed-pubescent, hairs c.0.25mm long, upward-pointing. *Calyx* tube c.0.8–1mm long, lobes 5, subequal, c.2–3 × 1.7mm, narrowly triangular, acute, glabrous inside, outside densely pubescent, hairs c.0.2–0.25mm long, strongly appressed. *Corolla* c.32–37mm long, tube 28–33mm long, narrowly funnel-shaped, slightly curved, mouth more or less narrowly oval, posticous lobes 3.8–4 × 2.6–3mm, oblong-elliptic, apex rounded, anticous lobe 5–8 × 3.3–4mm, broadly elliptic, margins of all lobes undulate or plane, corolla red and yellow (see below), pubescent outside, hairs c.0.2–0.25mm long, upward-pointing, acute, inside minutely glandular-puberulous all over, hairs c.0.1mm long, scattered, all lobes fringed with very minute acute hairs, densely glandular-puberulous on inner face, palate of stout conical papillae c.0.1mm long from base of anticous lobe to point of insertion of anticous filaments, annulus wanting. *Stamens* 4, inserted c.15–19mm above base of tube, anticous filaments 24–27mm long, anticous anthers 1.8–2mm long, posticous filaments 20–27mm long, posticous anthers 1.5–1.8mm long, all filaments clad in delicate gland-tipped hairs up to 0.3mm long, all anthers well exerted; staminode 1mm long. *Disc* cupular, 1 × 1.8mm, fleshy, rim crenulate. *Ovary* (♀ phase) 30 × 1.1mm including stipe 3mm long, both style and ovary puberulous, hairs upward-pointing, both acute and gland-tipped, these to 0.4mm long, stipe glabrous. *Style* 15mm long, tapering into ovary. *Stigmatic lobes* c.1.8 × 1.8mm. *Capsule* 115–175mm long. *Seeds* 1.2 × 0.2mm, appendages 2–3mm. **Fig. 16: 37a, b.**

SULAWESI. Central Sulawesi, c.0°40'N, 120°10'E, Mt Sojol, c.1400m, 26 ii 2000, *Mendum et al.* 163 (BO, E, K, L).

*Agalmyla bicolor* seems without close allies; both *A. remotidentata* and *A. vogelii*

FIG. 16. Part of calyx and longitudinal section of corolla: 37a, b, *Agalmyla bicolor*; 38a, b, *A. vogelii*; 39a, b, *A. exannulata*; 40a, b, *A. sp. nov.?*; 41a, b, *A. remotidentata*; 42a, b, *A. singularis*. All × 2.



have been recorded in the Roroka Timbu Mts (Joncheere, Hennipman and de Vogel, who collected the types, all being participants in the Indonesian-Dutch expedition to Sulawesi in 1979), but the three species are very easily distinguished. Joncheere described the flowers as 'red with yellow petals', which suggested the trivial name. The second collection, cited above, is much more explicit: 'corolla scarlet with a ring of yellow just above the base and then scarlet shading to deep yellow on the lobes; internally yellow'.

In the original material, the disposition of the leaves is not clear; the second collection includes a number of well-grown stems with opposite leaves, one only slightly smaller than the other. This fact, together with entire leaf margins and notably bicoloured flowers, makes recognition easy.

**38. *Agalmyla vogelii* Hilliard & B.L. Burtt, sp. nov.** ab *A. exannulata* Hilliard & B.L. Burtt pilis in partibus juvenilibus caulis ad 1.5mm longis acutis aliis glanduloso-capitatis intermixtis patentibus (nec acutis ad 0.5mm longis, appressis), foliis utrinque pilosissimis (nec pilis in lamina sparsis subtus in venis tantum densis), calycis lobis lanceolatis supra basin latissimis (nec deltoideis, basi ipsa latissimis), extra pilis patentibus 1.2–1.5mm longis indutis (nec pilis 0.2–0.6mm longis valde appressis), corolla extra fere villosa pilis acutis 2–3mm longis inter alios confertos 0.8mm longos (nec pilis 0.2–1mm longis aliis acutis aliis glanduloso-apiculatis vel omnibus acutis) distinguenda.

Type: Sulawesi [Celebes], Sopa valley, c.80km SSE of Palu, c.1°16'S, 120°18'E, 1300m, 27 v 1979, *de Vogel* 5590 (holo. L, 2 sheets; iso. BO, 2 sheets, K).

Epiphytic climber, stem elongate, loosely branched, rooting along internodes, c.6–8mm in diam. on flowering part, young parts clad in spreading hairs to 1.5mm long, mostly acute, some gland-tipped, glabrescent, bark pale, glossy, brittle. *Leaves* apparently alternate, no reduced leaf visible but new shoot produced opposite a developed leaf, blade of largest developed leaves 135–240 × 43–72mm, elliptic, apex shortly acuminate, base cuneate, oblique or not, shortly decurrent on petiole, margins coarsely but shallowly serrate to subentire, 8–10 pairs of lateral veins, sharply ascending, looping near margins, obscurely or distinctly linking to vein above, upper surface well clad in acute hairs to 1–2mm long, lower surface thickly clad in similar hairs; petiole 85–150mm long, well clad in acute upward-pointing hairs to 1–2mm long. *Inflorescence* a several-flowered axillary cymose cluster, sessile or very nearly so. *Bracts* (lowermost pair, very few seen) 7–8.5 × 4–4.2mm, lanceolate, acute, margins and outside clad in acute hairs to 1mm long, these wanting or almost so inside, minute globular glands on both surfaces. *Pedicels* 10–20mm long, clad in spreading acute hairs to 1–1.5mm. *Calyx* tube 0.5–1mm long, lobes 5, subequal, 5–7.5 × 1.5–3mm, lanceolate, broadest above the base, acute, tip sometimes elongate, outside villous, hairs acute, to 1.2–1.5mm long, spreading, inside glabrous. *Corolla* 38–40mm long, tube 34–35mm, funnel-shaped, arcuate, mouth more or less round, posticous lobes 4–6 × 3–3.5mm, oblong, apex rounded, anticous lobe 9–11 × 5mm, elliptic,

outside of corolla 'bright orange-red, inside ochre' with 1–3 reddish lines down each lobe, almost villous with acute hairs 1.5–3mm long scattered among crowded hairs to 0.8mm long, scattered globular glands as well, lobes fringed with minute acute hairs, inside acute hairs to 0.15mm long, palate of papillae c.0.1mm in diam. from base of anticus lobe to point of insertion of anticus filaments, otherwise glabrous except for minute glandular hairs below insertion of filaments, annulus wanting. *Stamens* 4, anticus filaments inserted 18–19mm above base of tube, 43–45mm long, anthers 3–3.3mm long; posticus filaments inserted 21mm above base, 35–37mm long, anthers 2–2.2mm; all filaments glandular-puberulous, hairs to 0.3mm long, all anthers far exerted; staminode 0.5–7mm long, or wanting. *Disc* cupular, c.2 × 2.5mm. *Ovary* c.15 × 0.8mm (♂ phase), glabrous, transition from hairy style to glabrous ovary abrupt. *Style* c.20mm long (♀ phase), densely glandular pubescent, hairs to 1mm long. *Stigmatic lobes* c.3.5 × 2mm (♀ phase), minutely rugulose inside, outside glabrous or minutely glandular-puberulous. *Capsules* c.120–230mm long (only old shredded ones seen). *Seeds* 1.5 × 0.2mm, appendages 4–5mm long. **Fig. 16: 38a, b.**

SULAWESI. Sopu valley, c.80km SSE of Palu, c.1°16'S, 120°18'E, 1300m, 27 v 1979, *de Vogel* 5589 (K, L).

*Agalmyla vogelii* bears little resemblance to *A. bicolor*, which was also collected in the Sopu valley on Mt Roroka Timbu, but is similar in facies to many specimens of *A. exannulata*, found on Gunung Nokilalaki, a little to the north, as well as further south. It is distinguished from *A. exannulata* by stems with longer, patent, hairs, mixed acute and gland-tipped, leaves very hairy on both surfaces, calyx lobes that are broadest above the base, not at the base, and almost villous corollas.

We could detect no reduced leaves, which is unusual (compare *A. bicolor*), but the production of a shoot opposite the developed leaf suggests extreme reduction.

*Agalmyla vogelii* is known only from the two collections made by *de Vogel* at c.1300m in 'rather disturbed primary forest c.40m high on alluvial soil derived from granite'.

**39. *Agalmyla exannulata* Hilliard & B.L. Burt in Blumea 44: 383 (1999).**

Type: Sulawesi, c.1°10'S, 120°10'E, N slope of Gunung Nokilalaki, 1650m, primary forest, 9 iii 1981, *Johansson, Nyboom & Riebe* 257 (holo. E; iso. L, n.v.).

Epiphytic climber, stems elongate, rooting along internodes, c.5–8mm in diam. on flowering part, clad in acute hairs to 0.5–0.8mm long, appressed, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves c.8–20 × 2–3.5mm, elliptic-lanceolate, acute, broad-based, appressed-hairy, soon caducous; blade of largest developed leaves 125–215 × 90mm, elliptic, apex very acute to shortly acuminate, base cuneate, shortly decurrent, margins very coarsely but more or less regularly toothed to subentire, c.8–9 pairs of lateral veins ascending at angle of c.45°, looping near margin, linking to vein above with short side vein running to apex of adjacent tooth, upper surface clad in widely scattered acute hairs to 0.5–1mm long, blade on

lower surface similar but hairs dense over veins, especially midrib, glandular-punctate; petiole 50–150mm long, clad in acute strongly to weakly appressed hairs to 0.5–0.8mm long. *Inflorescence* an almost sessile, few-flowered axillary cymose cluster. *Bracts* (outermost pair) 7–24 × 1–5mm, lanceolate, acuminate to acute, margins few-toothed near apex, outside acute strongly appressed hairs to 0.5mm long, inside glabrous sometimes except near apex and base. *Pedicel* 8–10(–30)mm long, thickly clad in acute upward-pointing hairs to 0.5mm long. *Calyx* tube 1–2.2mm long, lobes 5, subequal, c.3–7.2 × 1–2.2mm, deltoid, acute, minutely glandular inside, outside strongly appressed acute hairs to 0.25–0.6mm long. *Corolla* c.30–39mm long, tube 25–34mm, funnel-shaped, arcuate, mouth more or less round, posticous lobes 3–6 × 2.5–3.5mm, oblong, obtuse, anticous lobe 7–11 × 3.5–4mm, oblong-elliptic, tapering from base upwards, subacute, outside of corolla red, clad in hairs to 0.2–1mm long, often mixed acute and gland-tipped, sometimes acute only, lobes fringed with acute or acute mixed with gland-tipped hairs to c.0.15mm long, inside lobes acute or gland-tipped hairs to 0.1–0.15mm long, broadly V-shaped patch of subglobose papillae c.0.1mm in diam. extending from sinuses of anticous lobe down floor of tube nearly to base, minute glandular hairs scattered over lowermost 10mm of tube, otherwise glabrous, annulus wanting. *Stamens* either 4 or posticous pair occasionally reduced to staminodes, anticous filaments 28–45mm long, inserted 12–20mm above base of tube, anthers 2–2.5mm long; posticous filaments 25–37mm long, inserted 17–22mm above base, anthers (when not reduced to staminodes) 1.2–1.3mm long, all filaments clad in delicate patent hairs to c.0.5mm long, all anthers far exserted; posticous staminode 3–15mm long. *Disc* 1–1.5 × 1.8–2mm, cupular, rim crenulate. *Ovary* c.25 × 2mm (♀ phase), either glabrous or glandular-puberulous at apex. *Style* c.24–34mm long, glandular-puberulous, hairs to c.0.25mm long. *Stigmatic lobes* (♀ phase) 2–3.5 × 2–2.8mm, glabrous outside, inside minutely papillose. *Capsules* (few seen) c.270 × 2.3mm, glabrous. *Seeds* c.1.3 × 0.2mm, appendages c.3mm long. **Fig. 16: 39a, b.**

SULAWESI [Celebes]. Central. Menado, o.a. Paole, ten oosten van het Lindoe-meer [Danau Lindu] naar den top der Goenoeng Ngilalaki, 2355m, 9 vii 1939, *Bloembergen* (A, L). Todjamboe [Todjambu, between Palopo and Rantepao], 850m, 7 vii 1929, *Kjellberg* 1912 (S). Eastern Central Sulawesi, Morowali Province, 121°25'E, 1°45'S, Mt Tambusisi, 1300m, 28 iii 1980, *Lack & Grimes* 1718 (K); *ibid.*, 1300m, 28 iii 1980, *Lack & Grimes* 1724 (K). [SE Peninsula, northern part of Mengkoka Mts south of Malili], Porema kpg., 1200m, 28 x 1929, *Kjellberg* 2676 (S); B[oeloe] Watoewila [Gunung Watuwila, 3°47'S, 121°34'E], 1300m, 24 iii 1929, *Kjellberg* 1025 (S).

When the name *A. exannulata* was given to this species we did not know that there are at least 15 species that lack an annulus inside the corolla tube. Since writing the original description, based on the type specimen only, several more collections have been seen, thus giving a much better concept of the plant. Bloembergen's collection is particularly interesting not only because the posticous stamens are reduced to staminodes but also because this is the only instance known to us of reduction to



staminodes east of the modified Wallace's Line. Such reduction occurs in seven species west of the line but it is always constant within a species, never variable.

There is much variation in the leaf margins, which range from subentire to jaggedly toothed – it seems the narrower the leaf, the more pronounced the serrations; indumentum is constant, the hairs being relatively few and well scattered. The closest ally of *A. exannulata* is possibly *A. vogelii* but that species has densely hairy leaves and differently shaped calyx lobes clad in patent hairs.

#### 40. *Agalmyla* sp. nov.?

Epiphytic climber, stem rooting along internodes, only a fragment of side shoot seen, this clad in spreading acute hairs to 1mm long. *Leaves* probably opposite and strongly anisophyllous, developed ones seen possibly juvenile, 75–100 × 30–40mm, elliptic, apex subacute, base cuneate, margins sharply and coarsely toothed, almost lobed, 5 lateral veins each side of midrib, spreading at angle of 45–55°, running to tip of adjacent tooth, side vein linking to vein above, upper surface with few acute hairs to 1mm long mainly towards margins, lower surface glabrous except for a few hairs to 0.6mm long mainly on midrib; petiole 28–35mm long, clad in spreading acute hairs to 1mm long. *Inflorescence* not seen, but almost certainly a few-flowered, almost sessile axillary cymose cluster. *Bracts* (outermost) not seen. *Pedicels* c.18mm long, clad in acute upward-pointing hairs to 2mm long. *Calyx* tube 1.5–2mm long, lobes 5, subequal, 5–6 × 2–2.7mm, elliptic, apex somewhat attenuate, tipped with a dark blunt gland, base slightly narrowed, outside clad in acute spreading hairs to 1–2mm long, inside glabrous. *Corolla* 42mm long, tube 35mm, funnel-shaped, arcuate, mouth more or less round, posticous lobes 5 × 4mm, more or less elliptic, anticous lobe 13 × 5mm, deltoid, subacute, corolla 'vuurrood', outside clad in acute hairs to 1.5mm long, lobes fringed with acute hairs to 0.15mm long, inside lobes similar but rather smaller hairs, V-shaped patch of papillae 0.1mm in diam. extending from sinuses of anticous lobe down floor of tube to point of insertion of anticous filaments, scattered minute globular glands on lower part of tube, otherwise glabrous, annulus wanting. *Stamens* 4, anticous filaments inserted 18mm above base of tube, 52mm long, anthers 3mm long, posticous filaments inserted 22mm above base of tube, 37mm long, anthers 1.8mm long, all filaments glandular-puberulous, hairs to 0.25mm long, all anthers far exerted; staminode wanting. *Disc* 1.2 × 2.5mm, cupular, rim crenulate. *Ovary* 28 × 1.8mm, glabrous except for a few minute glandular hairs immediately below style. *Style* 28mm long, glandular-pubescent, hairs to 0.8mm long. *Stigmatic lobes* (♀ phase) 3 × 3mm, minutely papillose inside, few minute glandular hairs outside. *Capsules* not seen. **Fig. 16: 40a, b.**

SULAWESI [Celebes]. Balokan, ten N van Makale, 1500m, 1938, *Monod de Froideville* 199 (L).

Monod de Froideville's specimen comprises a scrap of stem 40mm long, 2mm in diam., bearing two leaf fragments and a tiny side shoot, plus a detached leaf and three detached flowers, and is therefore quite inadequate to typify a name. We have not seen the duplicate that was sent to Buitenzorg.

In shape and marginal teeth or lobes, the leaves resemble those of some specimens of *A. exannulata* and of *A. remotidentata*; from the former they are distinguished by having 5 (not 8–9) lateral veins, and are almost glabrous; from the latter they are also distinguished by having fewer lateral veins (5 not 12) and the petioles are not winged. The elliptic calyx lobes clad in spreading hairs to 1.5–2mm long contrast with the triangular lobes of the other two species, those of *A. remotidentata* with hairs 2–3mm long underlain by much shorter ones, those of *A. exannulata* with strongly appressed hairs to 0.6mm long. The calyx of *A. vogelii* resembles that of Monod's plant, but the leaves are very different. The possibility that the leaves of Monod's plant are juvenile and, by inference, different from mature leaves is suggested in the description above; *A. brownii* provides a striking example of such a phenomenon.

Monod described the flowers as 'vuurrood' (fire red). Even in the dried state it is obvious that the hairs on the corolla were red; that the underlying tissue is also red needs confirmation.

**41. *Agalmyla remotidentata* Hilliard & B.L. Burtt in Blumea 44: 387 (1999).**

Type: Sulawesi (Celebes), Roroka Timbu Mts, c.80km S of Palu, primary evergreen rain forest, 1750–1850m, 18 v 1979, *Hennipman* 5480 (holo. E; iso. BO, L, n.v.).

Epiphytic climber, stems elongate (6m recorded), c.5–7mm diam. on flowering part, rooting along internodes, glabrous (but no young parts seen), bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves all fallen on material seen; blade of largest developed leaves c.300–425 × 50–130mm, but recorded as reaching 700mm, elliptic, apex acuminate, base long-attenuate into a winged petiolar part c.100–150mm long, margins very coarsely toothed, teeth distant, each tipped with a hydathode, c.12 pairs of lateral veins ascending at angle of c.60°, looping near margins and linking to vein above, upper surface glabrous or very nearly so, lower sparsely and minutely gland-dotted, scattered coarse acute hairs up to 1mm long mainly on midrib and margins. *Flowers* in almost sessile, crowded, many-flowered, axillary cymes. *Bracts* (outermost) c.14–20 × 1.2–8mm, linear-lanceolate, acute to acuminate, villous outside, hairs red (as on pedicel, calyx and corolla), glabrous inside. *Pedicel* c.10–20mm long, villous, hairs acute, up to 2.5mm long, patent. *Calyx* tube c.3mm long, lobes 5, c.7–9 × 1.8–3mm at base, subequal, narrowly triangular, acuminate, glabrous inside, outside scattered patent acute hairs up to 2–3mm long underlain by much shorter acute hairs and minute globose glands. *Corolla* c.39mm long (few mature flowers seen), tube c.34mm long, funnel-shaped, curved, mouth more or less round, posticous lobes 6 × 3.5mm, oblong-elliptic, obtuse, anticous lobe 13 × 4mm, elliptic, outside of corolla yellow, villous with patent acute red hairs up to c.2mm long underlain by much shorter acute hairs and minute globose glands; inside lobes minute acute hairs less than 0.1mm long, elsewhere glabrous except for palate of fleshy pyramidal papillae c.0.2mm long, below anticous lobe and extending down between the anticous filaments for c.5mm below their point of insertion, annulus wanting. *Stamens* 4, anticous filaments

c.42mm long, inserted c.23mm above base of corolla tube, anthers c.3mm long; posticous filaments c.34mm long, inserted c.26mm above base, anthers c.2mm long; all filaments clad in delicate patent hairs c.4mm long, all anthers well exerted; staminode c.0.4mm long. *Disc* cupular, 1.2 × 1.5mm. *Ovary* c.16 × 1mm, glabrous. *Style* c.7mm long, glandular-pubescent, hairs c.0.4mm long. *Stigmatic lobes* (♂ phase) 1 × 0.8mm, minutely papillose inside. *Capsules* not seen. **Fig. 16: 41a, b.**

SULAWESI. Mt Roroka Timbu, 1700m, W slope, 16 v 1979, *van Balgooy* 3388 (A, BO, E, K, L). Danau Tambing, round small lake, 1700m, 23 v 1979, *van Balgooy* 3472 (A, BO, E, L).

Long (to 700mm) narrow leaves with petioles winged to the base by the decurrent leaf bases and the tufts of yellow flowers clad in red silky-villous hairs make this a very distinctive species unlikely to be confused with any other. The plants were collected during the Indonesian-Dutch expedition of 1979, all on or near the Roroka Timbu Mountains, in montane forest between 1700 and 1850m above sea level, and were coming into flower in May.

**41a. *Agalmyla immersinervia*.** See p. 204.

**42. *Agalmyla singularis*** Hilliard & B.L. Burtt, **sp. nov.** nulli arcte affinis; planta erecta, foliis oppositis, uno cujusque paris dimidio minore, utrinque dense pubescentibus, floribus numerosis in inflorescentiam dense globosam cymosam in pedunculo brevi axillari, calycis segmentis 5 ad basin liberis, corolla regulari fere hypocrateriformi pallido-lutea glandulosa, staminibus 4 longe exsertis.

Type: West New Guinea, Bird's Head Peninsula, surroundings of Ayawasi, 1°14'S, 132°12'E, swampy forest, c.450m, 13 v 1996, *Ave* 4466 (holo. L).

Plant terrestrial, erect, 2m tall, only top 200mm of stem seen, c.5mm in diam., simple, internodes c.20mm long, leaf scars prominent, densely pubescent, hairs acute, to 1mm long, eventually glabrescent, bark pale, glossy, brittle. *Leaves* opposite, one of each pair roughly half length of other, blade of reduced leaves c.110–115 × 40mm, petiole c.17–25mm, of largest developed leaves (6 pairs on stem together with apical bud) c.225–240 × 72mm, petiole 20–30mm, all leaves elliptic, apex very acute, base narrowly cuneate, margins serrulate, each tooth a relatively large dark blunt gland, lateral veins 7–8 each side of midrib, ascending at angle of c.45°, looping near margin then fading out, both surfaces densely and harshly pubescent, hairs acute, to 1mm long; petioles similarly hairy. *Inflorescence* a dense many-flowered cymose cluster, peduncle 60mm, densely pubescent, hairs acute, to 1mm, in leaf axil near apex of stem. *Bracts* (outermost) possibly 4, soon caducous, c.27 × 20mm, very broadly ovate and rather abruptly contracted into a long-acuminate tip, margins entire, somewhat undulate, central part slightly concave (as if originally embracing very young inflorescence), inner surface dark brown when dry, very minutely and closely glandular, well-scattered acute hairs to 1mm long as well, outside densely silvery appressed-pubescent, hairs acute, to 1mm; inner bracts similar but smaller and narrower, more or less lanceolate, acuminate. *Pedicels* 5–6mm long, densely pubescent. *Calyx* lobes 5, subequal, free to the base, c.3 × 1.4mm, broadly lanceolate, acute,

margins entire, very minutely glandular inside, outside and margins densely pubescent, hairs to 1mm, acute. *Corolla* 25mm long, tube 20mm, subcylindric below then widening upwards, mouth round, c.10mm in diam., limb regular, lobes c.6 × 5mm, deltoid, tips acute, possibly recurved in life, corolla light yellow, outside glandular-pubescent, hairs to c.0.5mm long, hairs fringing lobes c.0.2mm long, gland-tipped, similar hairs inside lobes and extending short distance below sinuses, elsewhere glabrous, annulus wanting. *Stamens* 4, all filaments c.22mm long, sparsely set with gland-tipped hairs c.0.2mm long, inserted c.13mm above base of tube, anthers 3.5mm long, far exerted; staminode c.0.5mm long. *Disc* 1 × 1.7mm, cupular. *Ovary* (♂ phase) 3 × 0.8mm, glabrous. *Style* 0.5mm, glabrous. *Stigmatic lobes* 0.8 × 0.7mm, glabrous. *Capsules* unknown. **Fig. 16: 42a, b.**

This singular plant is known only from the type collection made in 'secondary swampy forest' at an altitude of only 450m near Ayawasi in the south-western part of the Vogelkop Peninsula. The collector described it as a 'tree, 2m'; perhaps shrub would be more accurate, though there is no indication of branching on the stem collected (about 220mm long). In leaves and indumentum, and possibly habit, it is not unlike *A. erecta* from Sarawak, but there the resemblance ends. The corolla, with straight tube, wide mouth, regular limb and equal stamens, is unknown elsewhere in the genus; it looks peloric, and this possibility should be borne in mind. But the habit and habitat of the plant – upright, terrestrial, in swampy forest – are themselves unusual and suggest a pollinator different from those favouring an epiphytic or lithophytic plant with zygomorphic corollas.

*Agalmyla singularis* is only the second species known from New Guinea that lacks an annulus inside the corolla tube, the other being *A. roseoflava* from the Wandiwai Mountains, Wandammen Peninsula, immediately south of the Vogelkop Peninsula. *Agalmyla roseoflava* differs in several important characters: leaves strongly anisophyllous, calyx lobed about halfway to the base, corolla zygomorphic, anticus stamens slightly larger than the posticus ones and not exceeding the posticus lip. The relationship is certainly not close. Although *A. singularis* is without affinity in sect. *Exannularia*, that is where its lack of an annulus places it.

Sect. **DICHROTRICHUM** (de Vriese) Hilliard & B.L. Burtt, **stat. nov.**

Type: *A. elongata* (Blume) B.L. Burtt.

Syn.: *Dichrotrichum* de Vriese, Pl. Ind. Bat. Or. 7: tabs 1–2 (1856). Type: *D. ternateum* de Vriese [= *Agalmyla elongata* (Blume) B.L. Burtt].

*Tetradema* Schltr. in Notizbl. Bot. Gart. Mus. Berlin 7: 359 (errore 15) (1920). Lectotype (chosen here): *Tetradema rubrum* (Merr.) Schltr. [= *Agalmyla rubra* (Merr.) B.L. Burtt].

*Habit*: mostly epiphytic climbers with stems rooting along internodes, two species erect (*A. clarkei*, *A. manuselae*). *Leaves* opposite and strongly anisophyllous in most species, **reduced leaves usually leaf-like**, scale-like in a few species, or, in a few species,

ternate or 4-whorled, equal to very unequal in size in *A. clarkei* and *A. manuselae*, leaf margins without a distinct band of appressed hairs; *inflorescence* an axillary cyme, subsessile in species nos. 43–49, long-pedunculate in nos. 50–57, in New Guinea species peduncle can be variable within a species but probably always subsessile in nos. 74, 78 and 94; *calyx* with a well-developed tube in most species, 5-lobed nearly to base in 10 species; *corolla* variable in colour, ranging from shades of red to orange, yellow or green, lavender in one species, mouth elliptic to roundish, laterally compressed in no. 43, *A. clarkei*; **annulus often dispersed upwards**, extraordinarily so in no. 82, *A. stenosphon*; *stamens* 4, **anthers** well exerted in two species (43. *A. clarkei*, 44. *A. manuselae*), otherwise **not or scarcely exceeding posticous lobes**, all anthers subequal; *ovary* and *style* mostly glabrous or sprinkled with globular glands (ovary glabrous, capsule densely pubescent in *A. clarkei*): gynoecium pubescent in nos. 85–96, but variable in no. 87, *A. valetoniana*. **Figs 17–26.**

*Geographical distribution.* Nearly confined to the Philippines and New Guinea, plus 2 species in the Moluccas. Species nos. 43–96.

*Key to species in the Philippines  
plus A. elongata and A. manuselae (Moluccas)  
(Section Dichrotrichum, Part 1)*

Note: Calyx tube measured *inside*; corolla length measured from top of posticous lobes to base, tube from sinus between posticous and lateral lobes to base, all on rehydrated material.

- 1a. Anthers far exerted \_\_\_\_\_ 2  
 1b. Anthers not or scarcely exceeding posticous lobes of corolla \_\_\_\_\_ 4
- 2a. Stems climbing by adventitious roots along internodes, leaves opposite, strongly anisophyllous. (Palawan) \_\_\_\_\_ **15. A. biflora**  
 2b. Stems erect or pendent, not rooting along internodes, leaves opposite, subopposite or ternate, mostly all well developed though often unequal in size \_\_\_\_\_ 3
- 3a. Blade of largest leaves c.160–300 × 25–87mm, 12–17 veins each side of midrib, both surfaces densely hairy. (Luzon, Leyte, Biliran, Mindoro) \_\_\_\_\_ **43. A. clarkei**  
 3b. Blade of largest leaves 70–120 × 10–20mm, c.5 veins each side of midrib, both surfaces thinly hairy except over veins. (Seram) \_\_\_\_\_ **44. A. manuselae**
- 4a. Peduncles either wanting or up to c.15mm long \_\_\_\_\_ 5  
 4b. Peduncles at least 90mm long \_\_\_\_\_ 9

- 
- 5a. Leaves opposite, ternate or occasionally 4-whorled, ranging from equal in size to one roughly half the size of the other, persistent. (Luzon, Mindoro, Panay, Negros) \_\_\_\_\_ **45. *A. rubra***
- 5b. Leaves opposite, always strongly anisophyllous, reduced leaf up to one third size of other, often less, sometimes caducous \_\_\_\_\_ 6
- 6a. Calyx lobes c.20–25mm long, linear-subulate, clad in hairs c.3–4mm long. (Samar) \_\_\_\_\_ **48. *A. samarica***
- 6b. Calyx lobes c.4–7.8mm long, variously shaped but never linear-subulate, clad in hairs c.0.3–1.5mm long \_\_\_\_\_ 7
- 7a. Calyx lobes broadest at the base. (Luzon, Benguet Prov.) \_\_\_\_\_
- \_\_\_\_\_ **47. *A. montis-tomasii***
- 7b. Calyx lobes broadest about the middle or above \_\_\_\_\_ 8
- 8a. Calyx lobes 4.2–5.5mm long, corolla c.20–25mm long, annulus composed of 5 discrete tufts of hairs inserted well above base of tube. (Mindanao) \_\_\_\_\_
- \_\_\_\_\_ **49. *A. urdanetensis***
- 8b. Calyx lobes 6.5–7.5mm long, corolla c.34mm long, annulus a broad band of hairs extending nearly to base of tube. (Sibuyan) \_\_\_\_\_ **46. *A. sibuyanensis***
- 9a. Calyx lobed nearly to base \_\_\_\_\_ 10
- 9b. Calyx with conspicuous tube, lobes very roughly as long as tube \_\_\_\_\_ 12
- 10a. Calyx lobes deltoid. (Leyte) \_\_\_\_\_ **50. *A. parvilimba***
- 10b. Calyx lobes linear-oblong, oblong, elliptic or spatulate \_\_\_\_\_ 11
- 11a. Calyx lobes elliptic or spatulate, margins always entire, outside clad in acute hairs to c.0.5mm long together with scattered hairs to 1mm. (Luzon, Negros, Panay, Mindoro, Mindanao (Zamboanga Prov. only)) \_\_\_\_\_ **51. *A. chorisepala***
- 11b. Calyx lobes linear-oblong, oblong or spatulate, margins entire or obscurely to strongly toothed in upper part, outside shaggy with acute hairs to 1.5–2mm long. (Mindanao, Mt Apo only) \_\_\_\_\_ **52. *A. calelanensis***
- 12a. Both leaf surfaces distinctly hairy, 7–8(–10) lateral veins each side of midrib \_\_\_\_\_ 13
- 12b. Upper leaf surface sparsely hairy to almost glabrous, lower also mostly sparsely hairy but densely so in *A. rotundiloba*, 5–7 lateral veins each side of midrib \_\_\_\_\_ 14
- 13a. Peduncle clad in spreading hairs 2–3mm long, calyx lobes broadly oblong-elliptic, apex more or less rounded, annulus a broad band of hairs, some gland-tipped. (Mindanao, Agusan Prov. only) \_\_\_\_\_ **53. *A. persimilis***
- 13b. Peduncle either clad in hairs c.0.1–0.2mm long together with scattered hairs 2–3mm long or in long glandular hairs, calyx lobes more or less deltoid, apex acute, gland-tipped, annulus composed of 5 discrete tufts of acute hairs. (Moluccas: Morotai, Ternate, Tidore, Makian, Bacan) \_\_\_\_\_ **57. *A. elongata***

- 14a. Leaves densely hairy on lower surface. (Mindanao, Mt Kampalili only) \_\_\_\_\_ **56. A. rotundiloba**
- 14b. Leaves sparsely hairy on lower surface, hairs often nearly confined to veins \_\_\_\_\_ 15
- 15a. Calyx lobes broadly oblong-elliptic, roughly the same width throughout or broadening towards the apex, corolla clad in acute hairs 0.3–0.5mm long together with few to many gland-tipped ones to 1–1.5mm on posticous side, annulus a broad continuous band of gland-tipped hairs. (Biliran, Leyte) \_\_\_\_\_ **54. A. bilirana**
- 15b. Calyx lobes deltoid, broadest at the base, corolla clad in very short (to 0.2mm) acute hairs only, annulus composed of 5 longitudinal bands of acute hairs, occasionally a few gland-tipped. (Mindanao) \_\_\_\_\_ **55. A. glabra**

**43. *Agalmyla clarkei*** (Elmer) B.L. Burt in Notes Roy. Bot. Gard. Edinb. 28: 224 (1968).

Type: Philippines, Luzon, Prov. Tayabas [Prov. Quezon], Lucban, in humid woods of Mount Banahao, 800m, v 1906, *Elmer* 7499 (A, E, K, L).

Syn.: *Dichrotrichum clarkei* Elmer in Leaflet. Phil. Bot. 1: 345 (1908); op. cit. 3: 954 (1910).

?*Dichrotrichum praelongum* Kraenzlin in Philipp. J. Sci. 8: 170 (1913). Type: Philippines, Luzon, Prov. Laguna, Mt Benajao, 1500m, *Merrill* 7518 (n.v.).

*Dichrotrichum crassicaule* Kraenzlin in Philipp. J. Sci. 8: 169 (1913). Type: Philippines, Luzon, Prov. Rizal, Matulid, *Loher* 6651 (K).

?*Tetradema praelongum* (Kraenzlin) Schltr. in Notizbl. Bot. Gart. Mus. Berlin 7 (no. 68): 18 [362] (1920).

*Tetradema clarkei* (Elmer) Merr., Enum. Phil. Fl. Pl. 3: 453 (1923).

(Measurements in square brackets refer to Mindoro material.) Few- to several-stemmed subshrub, usually epiphytic, sometimes terrestrial, stems c.500mm to 1.5m long, c.6–15mm in diam. on flowering part, rooting only at base, longitudinally striate, bare below and rough with leaf scars, leafy only towards apex, young parts densely appressed-pubescent, hairs acute, upward-pointing, up to 1.5mm long, glabrescent, bark pale, slightly glossy. *Leaves* opposite, both fully developed but one smaller than other (almost as long as to roughly half as long as); blade of largest leaves c.160–300 × 25–87mm, elliptic, apex acute, base cuneate, shortly decurrent on petiole, margins doubly serrate, each tooth tipped with a dark blunt gland, 12–17 lateral veins each side of midrib (or fewer in reduced leaves), ascending at angle of c.45°, looping near margin, then briefly running parallel to it before merging with it, upper surface clad in rather coarse acute hairs up to c.1.2mm long, dense but blade visible between them, lower surface densely clad in finer silky acute hairs c.1–1.2mm long, closely appressed, blade invisible; petiole 30–100mm long, densely clad in acute hairs c.1.2–2mm long. *Inflorescence* a several-flowered congested cyme in upper leaf axils, peduncle very short (c.5mm), densely hairy. *Bracts*: 2 bracts and

4 bracteoles enclosing each cyme, the bracteoles deeply concave and closely enfolding the very young buds, somewhat smaller than bracts; bracts purple-red (colour visible in dried state), c.20–38 × 10–26mm, ovate, acute, base narrowed, sometimes more or less broadly petiolate, margins serrulate, both surfaces pubescent, hairs acute, to 0.5–1mm long, closely appressed. *Pedicels* c.8–20mm long, densely hairy. *Calyx* tube 0.5–1mm long, lobes 5, subequal, 5–14 × 4–7.8mm, mostly obovate, apex often rounded, sometimes slightly retuse or almost truncate with an abrupt acute tip, rarely elliptic, acute, apex always with up to 20 minute oblong teeth, outside densely hairy, hairs acute, up to 0.5–1[–1.2]mm long, closely appressed; inside glabrous to slightly hairy. *Corolla* 21–29 [13.5–16]mm long, tube 18–26 [11–13]mm long, funnel-shaped, somewhat arcuate, mouth oblique, laterally compressed, posticous lobes 2–3 [2–3] × 3–4 [2.5–4]mm, subrotund, anticous lobe 4.5–7 [4–5] × 2–3.25 [2–3]mm, elliptic, corolla ranging in colour from red to green (see discussion), outside glabrous at base, elsewhere a triple indumentum of very minute almost sessile glandular hairs, acute hairs c.0.2–1mm long, and scattered to plentiful gland-tipped hairs 0.8–1.5mm long, lobes fringed with acute hairs c.0.1–0.2mm long, sometimes with a few gland-tipped ones as well [all hairs gland-tipped or a few acute], minute acute hairs inside posticous and anticous lobes in particular and running short way down back of tube, very minute globose papillae in a band from base of anticous lobe down floor of tube to insertion of filaments, 2 small papillose keels sometimes present at that point, minute glandular hairs scattered elsewhere inside tube, most conspicuous near insertion of filaments, 5 partially coalescing tufts of acute [gland-tipped] hairs 2.5–3 [1.5–2]mm long inserted 4–7 [1.25–1.5]mm above base of tube. *Stamens* 4, anticous filaments inserted 10–14 [5]mm above base of tube, 28–31 [26]mm long, anthers 4–4.2 [3]mm long; posticous filaments inserted 10–13 [6]mm above base of tube, 24–28 [20]mm long, anthers 3.2–3.8 [2.5]mm long; staminode 2.5–5.5 [2]mm long, all filaments minutely glandular on lower half. *Disc* c.1 × 2.5mm, cupular, rim crenulate, glabrous. *Ovary* c.20 × 2 [17 × 1.2]mm, glabrous gradually becoming pubescent as it develops into a capsule. *Style* c.17 [8]mm long, with a few acute hairs [glabrous]. *Stigmatic lobes* c.5 × 2.2–2.8mm [2.5 × 1.5mm], papillose inside, outside scattered gland-tipped hairs to 0.25mm long [glabrous]. *Capsules* c.220–380 × 3mm, densely pubescent, hairs to c.0.2mm long, acute, patent. *Seeds* c.1–1.2 × 0.2mm, appendages c.4mm long. **Fig. 17: 43a, b.**

PHILIPPINE ISLANDS. **Luzon.** Mountain Prov., Bayninan, Banave, Ifugao, 4500ft, fl. red, 6 iii 1963, *Conklin & Buwaya* PNH 79577 (K, L, PNH); *ibid.*, 4000ft, 29 vi 1963, *Conklin & Buwaya* PNH 80638 (K, PNH); Mt Polis, Ifugao, ii 1913, *McGregor* BS 19751 (K, L); Quezon Prov., Lucban, v 1907, *Elmer* 9219 (E, K, L); U.P. Land Grant (Llavac), 220m, fl. reddish, 17 xi 1970, *Hernaez* 195-70 (E); *ibid.*, fl. red, 1 iii 1970, *Hernaez* 63-70 (E); Albay Prov., Mayon volcano, 870m, fl. pink, 28 v 1953, *Mendoza* 1003, PNH 18147 (L, PNH); *ibid.*, 860m, fl. green, bract red, 1 vi 1953, *Mendoza* 1170, PNH 18273 (PNH); Sorsogon Prov., Mt Bulusan, along trail from Bulusan Lake to Aguiñgai valley, c.600m, fl. pink, 5 viii 1947, *Sulit* 1840, PNH 2653 (A, L, PNH); *ibid.*, vi 1916, *Elmer* 16377 (GH). Naga Prov., Barangay Panicuason, Mt Isarog, 700–1000m, 23 iii 1997, *Mendum et al.* 29183 (E). Rizal prov., Mt Angilog, ii 1923, *Lopez* BS 42054 (A). **Leyte.** Mt Mamban summit, Ormoc, 1163m, fl. greenish-pink,



14 iv 1950, *G.E. Edaño* 14236, PNH 12092 (A, PNH). **Mindanao**. Distr. of Davao, Todaya (Mt Apo), fl. greenish-yellow, more yellow towards base more green towards apex, v 1909, *Elmer* 10701 (E, GH, K, L); Agusan Prov., Mt Hilong-hilong, Cabadbaran, 1333m, 21 iv 1949, *Mendoza & Convozar* 805, PNH 10788 (PNH). South Cotabato, T'Boli, Datal Lanag, Koli, 21 viii 1993, *Gaerlan et al.* PPI 13003 (PNH). **Biliran**. Mt Suiro, northern slope, 830m, fl. bright pink [but see discussion], 30 iv 1954, *Sulit* PNH 21585 (L, PNH). **Mindoro**. Mt

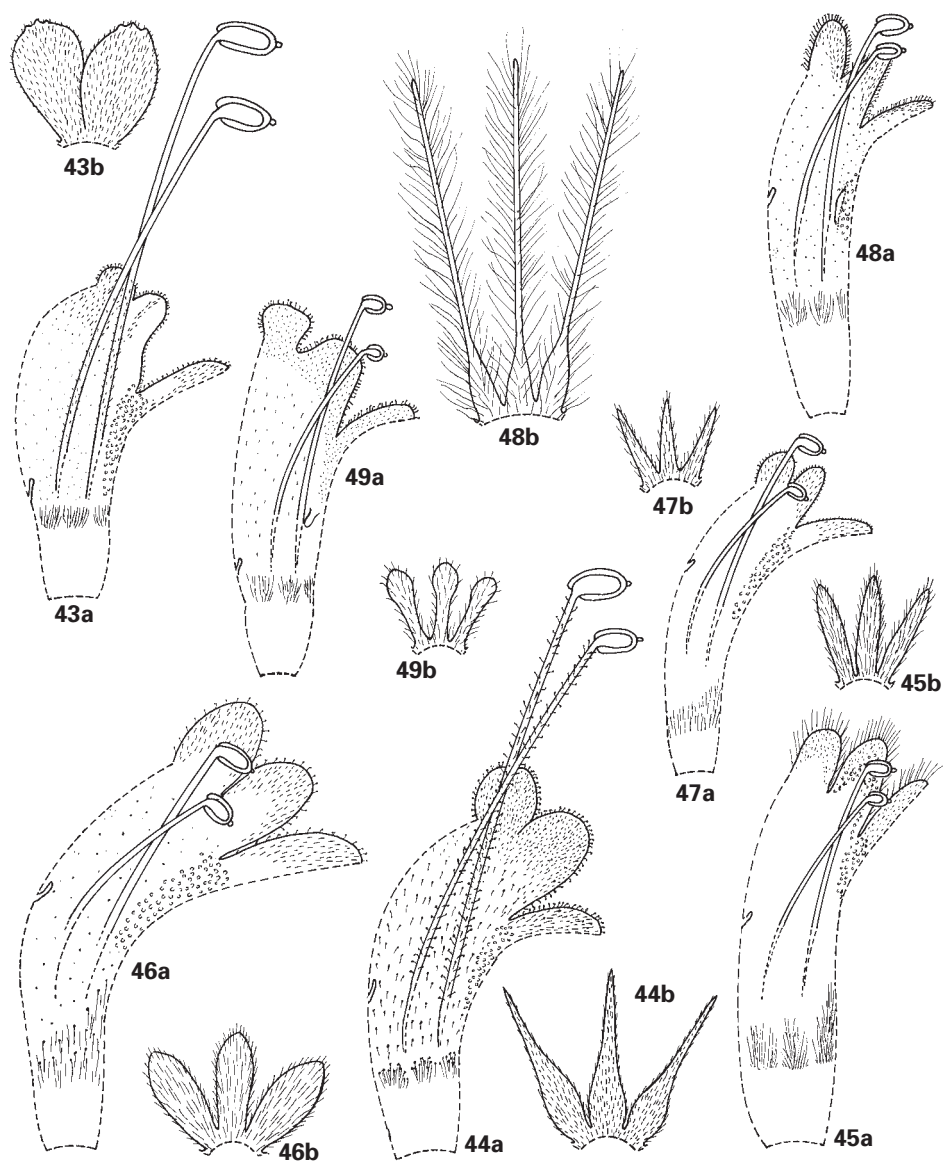


FIG. 17. Part of calyx and longitudinal section of corolla: 43a, b, *Agalmyla clarkei*; 44a, b, *A. manuselae*; 45a, b, *A. rubra*; 46a, b, *A. sibuyanensis*; 47a, b, *A. montis-tomasii*; 48a, b, *A. samarica*; 49a, b, *A. urdanetensis*. All  $\times 2$ .

Ilong summit, 1000m, fl. yellow, 20 ii 1948, *G.E. Edaña* PNH 3353 (A, PNH); San Teodoro, Sibuang R. camp, c.1200m, fl. greenish-yellow, 21 ii 1985, *Ridsdale* 977 (K, L); Subaan R. inland from San Teodoro, 1050m, fl. greenish-white yellow inside, 30 iv 1986, *Coode* 5613 (K, L). Mt Halcon area near Poitan, Dulangan R., c.13°12'N, 121°12'E, "Ramayan" ridge forest dominated by gymnosperms and *Tristania* on gravel/sand, 1200m, 8 v 1986, *Ridsdale* 1710 (L). E Mindoro, Mt Alinyaban, 6km SW of Puerto Galera, 1000m, 30 iv 1987, *Burley* 211 (A). Lagating, Mt Halcon, 14 iv 1991, *Stone & Reynoso* PPI 698 (PNH); Lantuyan, north face of Mt Halcon, 31 iii 1991, *Stone et al.* PPI 496 (PNH).

[Also recorded by Merrill (1923b: 454) from Panay.]

The type of the name *Dichrotrichum praelongum* has not been found (*Merrill* 7518, Luzon, Mt Banajao), but Merrill himself reduced it to synonymy under *Tetradema* [that is, *Agalmyla clarkei*] (*Merrill*, 1923b: 453). The type of *A. clarkei* also came from Mt Banahao, but Kraenzlin's description of *Merrill* 7518 reads, *inter alia*, 'Frutex, 3 ad 4m altus... Folia ... nervi principales pro magnitudine foliorum 7 ad 10 utrinque... Corolla 1.5cm longa', all at variance with specimens of *A. clarkei* from Luzon. Kraenzlin's concluding remark is difficult to understand: 'A singular feature of this shade-growing plant is that all the parts are lengthened in a rather peculiar manner'.

*Agalmyla clarkei* is a very distinctive species: subshrubby, terrestrial or epiphytic but not climbing, one leaf of each pair smaller than the other, both surfaces more or less silky-villous, two bracts and four bracteoles enveloping the young sessile cyme, short corolla with four far-exserted stamens, the size and colour very variable (details below), ovary glabrous but capsule densely pubescent, the only species in which this is known to occur (in many species throughout the genus the capsule remains unknown).

Elmer described the species from fruiting material, but added in the notes, 'only one large chocolate brown flower was seen in the field' (Luzon). Two years later Elmer published another record (*Elmer* 10701, from Todaya (Mt Apo), Mindanao), describing the corolla as being 2.5cm long, 'greenish yellow, more yellow towards the base, more green towards the apex'. Collectors often fail to record colour but there is no further record of brown flowers; the following information has been culled from herbarium sheets:

**Luzon:** corolla 23–29mm long, colour variously described as red, reddish, pink, pinkish, green. The bracts and calyx are purple or red and sometimes it is clearly they, and not the corolla, that were described. A cultivated specimen in E (*Mendum et al.* 29183) had lime green calyx and corolla, brownish red bracts.

**Leyte** (only one collection seen): corolla 21–23mm, greenish-pink.

**Biliran** (only one collection seen): 'bright pink', but only very young buds are present and it is possible that bracts, not flowers, were thus described.

**Mindanao:** no flowers, no notes on specimens seen, but see Elmer's note in preceding paragraph.

**Mindoro:** corolla 13.5–16mm, 'petals greenish-yellow', 'yellow', 'greenish-white, yellow inside'. Flowers so described are all fully developed; bracts and calyx noted as pink, purple or wine red.

*Agalmyla clarkei* appears to be confined to the above islands in the Philippines, in forest c.600–1500m above sea level.

**44. *Agalmyla manuselae*** Hilliard & B.L. Burt in *Blumea* 44: 386 (1999).

Type: Ceram, Pipileina, Manoesala, 29 x 1937, *Eyma* 1918 (holo. L, iso. K).

Herb, habit and stature unknown, stems apparently simple, erect, c.3–5mm in diam. on flowering part, longitudinally striate, not rooting along internodes, young parts appressed-pubescent, hairs stout, acute, upward-pointing, up to c.0.8mm long, glabrescent. *Leaves* opposite, subopposite or  $\pm$  ternate, apparently subequal, but a reduced leaf or leaf-like bract may subtend a pedicel; blade of largest leaves 70–120  $\times$  10–20mm,  $\pm$  narrowly elliptic (upper part mostly slightly broader than lower), apex very acute, base narrowly cuneate and tapering into a petiolar part c.10–26mm long, margins entire but slight irregularities induced by dark blunt glands at intervals, lateral veins in c.5 pairs, immersed, sharply ascending at angle of c.30°, looping near margins, upper surface thinly pubescent, hairs scattered, appressed, c.0.5mm long, more plentiful on midrib, closely glandular-punctate, lower surface with scattered sessile glands, appressed hairs plentiful on midrib, thinly scattered on blade; petiole to c.15mm, appressed-pubescent. *Flowers* axillary, solitary or subsolitary. *Bract* (or reduced leaf?) c.4–6  $\times$  1.5–2mm, lanceolate, acuminate, appressed-pubescent. *Pedicels* 6–12mm long, expanded below calyx, appressed-pubescent. *Calyx* divided to within 0.5mm of base, lobes 5, subequal, c.9.5  $\times$  2mm at base, lanceolate, acuminate, margins involute upwards, apex bluntly callose-tipped, outside coarse appressed acute hairs up to c.0.7mm long, minutely gland-dotted as well, inside glabrous in lower part, involute upper part minutely puberulous with acute and gland-tipped hairs. *Corolla* thick-textured, c.25–27mm long, tube 21–24mm long, funnel-shaped, curved, mouth oblique, more or less oval in outline, posticous lobes erect, c.4–5  $\times$  3.8–4mm, suborbicular, anticous lobe 5–6  $\times$  4mm, broadly elliptic, corolla ‘rose red outside, inside salmon-coloured’, outside pubescent almost to base, hairs up to c.1mm long, mostly acute, some gland-tipped, minute (to c.0.1mm) short-stalked glands as well; lobes fringed with acute and gland-tipped hairs to c.0.2mm long; inside of lobes densely pubescent with similar hairs, patch of globose papillae less than 0.1mm in diam. running from base of anticous lobe to point of insertion of anticous filaments, 5  $\pm$  discrete tufts of gland-tipped hairs c.1–1.5mm long inserted c.4mm above base of tube, these hairs running upwards in 2 bands to insertion of filaments, elsewhere inside tube scattered shorter gland-tipped hairs. *Stamens* 4, inserted c.9mm above base of tube, anticous filaments c.28mm long, anthers 3mm long, posticous filaments c.24mm long, anthers 2.5mm, all filaments glandular-puberulous, hairs c.0.3mm long, all anthers well exerted; staminode well developed, c.9mm long, filiform, with or without a rudimentary anther. *Disc* cupular, 1  $\times$  2mm, rim smooth or crenulate. *Ovary* c.14  $\times$  1mm, glabrous. *Style* c.15mm long, tapering into ovary, glandular-puberulous, hairs c.0.3mm long. *Stigmatic lobes* c.2  $\times$  0.8mm, inner faces minutely papillose. *Capsule*: only fragments seen, glabrous. *Seeds*

c.1.2 × 0.25mm, ellipsoid, brown, papillate (from raised epidermal cells?), appendages c.3mm long. **Fig. 17: 44a, b.**

*Agalmyla manuselae* is known only from the type collection made on the island of Ceram (Seram) in the Moluccas. It is a very distinctive species the relationship of which seems to lie with *A. clarkei* in the Philippines. They have in common erect habit, the stems therefore not rooting along the internodes, leaves not varying greatly in size, hairy on both surfaces but lacking the conspicuous band of appressed hairs along the margins characteristic of species in sect. *Agalmyla*, corolla with an annulus of upward-pointing hairs inside the tube near the base, four well-exserted stamens, and more or less hairy styles, ovary glabrous; capsule glabrous in *A. manuselae* (the usual condition), densely hairy in *A. clarkei*.

Most species from the Moluccas, and also the Lesser Sunda Islands and Sulawesi (Celebes), lack an annulus; the only exception, other than *A. manuselae*, is *A. elongata*, the relationship of which lies with no. 53 *A. persimilis* (Philippines), with stamens not or scarcely exceeding the posticous lip, the usual condition in species from the Philippines.

**45. *Agalmyla rubra*** (Merr.) B.L. Burtt in Notes Roy. Bot. Gard. Edinb. 28: 224 (1968).

Type: Philippines, Luzon, distr. Lepanto, Mt Data, 2200m, 4 xi 1905, *Merrill* 4581 (K).

Syn.: *Trichosporum rubrum* Merr. in Philipp. J. Sci. 1, Suppl.: 227 (1906).

*Tetradema rubrum* (Merr.) Schltr. in Notizbl. Bot. Gart. Mus. Berlin 7 (no. 68): 17 [361] (1920).

Well-branched epiphyte, main stem of indeterminate length (reaching 4–6m), rooting along internodes, branches hanging free and rootless, c.2–5mm diam. on flowering part, bare below and rough with leaf scars, leafy only towards tips, young parts densely appressed-pubescent, hairs acute, upward-pointing, to 2.5mm long, glabrescent, bark pale, glossy, papery. *Leaves* opposite or ternate, occasionally 4-whorled (often on one branch), those at each node equal to markedly unequal in size, blade of largest leaves 40–85 × 8–32mm, elliptic or narrowly obovate, apex acute, base cuneate, margins entire or obscurely to more distinctly serrulate, each tooth tipped with a dark blunt gland, (3–)4(–5) main veins each side of midrib, sharply ascending, looping near margin and merging with it, upper surface appressed-hairy but not densely so, hairs acute, c.1–2mm long, lower surface densely pubescent over veins and along margins, hairs acute, to c.2mm long, between veins hairs sparse and shorter (to c.1mm), sometimes wanting; petiole 10–40mm long, densely clad in acute hairs c.2mm long. *Inflorescence*: few to several flowers fascicled in axils of upper leaves. *Bracts* c.4–7.5 × 0.6–1.6mm, soon caducous, elliptic or oblong, densely silky hairy outside, hairs acute, to 2mm long, glabrous inside. *Pedicels* 6–15mm long, densely hairy. *Calyx* tube 0.2–1mm long, lobes 5, subequal, 4–8.5 × 1.1–2.8mm, lanceolate, acute, outside densely silky hairy, hairs acute, c.1–2.5mm long, inside

glabrous. *Corolla* thin-textured, 17.5–29mm long, tube 13–23mm, more or less cylindrical, slightly arcuate, mouth oblique, not compressed laterally, posticous lobes 4–5.5 × 2–3.3mm, oblong-elliptic, anticous lobe 5–7 × 2.5–3.2mm, oblong-elliptic, corolla variously recorded as pink, red, brick-red, orange-red and orange, hirsute outside right to base, hairs acute, silky, red, 2–3mm long, inside of lobes clad in acute hairs to 0.1mm long, globose papillae to 0.1mm in diam. arching across lateral lobes and merging in a band down floor of tube from base of anticous lobe to insertion of anticous filaments, elsewhere glabrous except for acute hairs 2–3mm long in a ring of more or less discrete tufts inserted 3–5mm above base of tube and extending a few mm up tube on anticous side. *Stamens* 4, anticous filaments inserted 6.5–14mm above base of tube, 9–13mm long, anthers 1.2–2mm long, not or scarcely exceeding posticous lip; posticous filaments inserted 7–15mm above base of tube, 7–11mm long, anthers 1.2–1.8mm long, scarcely exerted; staminode 1mm long; all filaments glabrous. *Disc* c.1.3–1.5 × 1.3mm, cupular, rim more or less crenulate. *Ovary* c.20 × 1mm, glabrous. *Style* c.1.1mm long, glabrous. *Stigmatic lobes* c.1.5–1.8 × 1–1.3mm, minutely papillose inside. *Capsule* 70–120 × 2–3mm, glabrous. *Seeds* c.1 × 0.2mm, appendages c.1.8mm long. **Fig. 17: 45a, b.**

PHILIPPINE ISLANDS. **Luzon.** Isabela Prov., Sierra Madre Mts, Sangcad, Palanan, 3400ft, fls. orange-red, 10 v 1961, *Gutierrez* PNH 78213 (L, PNH); NNW of Dingalan, 1100–1150m, 18 iii 1968, *Jacobs* 7830 (CANB). Mountain Prov., Mt Polis, Bontoc, fl. pink, 1 xii 1953, *Mendoza* PNH 20381 (L, PNH); *ibid.*, 6155ft, fl. red, 2 iv 1956, *Pancho* PNH 34657 (PNH); *ibid.*, 1900m, 14 v 1961, *Steiner* 2191 (E); *ibid.*, c.2000m, 1 xii 1953, *Hoogland* 4095 (CANB). From Bontoc to Mt Polis, 1 xii 1953, *Van Steenis* 17952 (CANB, L). Pologgo, N of Bayninan, Ifugao, 6000ft, fl. red, 16 iv 1963, *Conklin & Buwaya* PNH 80412 (A, K, L, PNH); Nueva Vizcaya Prov., Mt Pulog, 16°36'N, 120°54'E, 2300–2350m, fls. bright red, 5 ii 1968, *Jacobs* 7324 (CANB, K, L, PNH); *ibid.*, 2500–2700m, 6 ii 1968, *Jacobs* 7359 (L). Vicinity of Mt Polis Pass between Bontoc and Benaue, c.6000ft, 30 xi 1953, *Walker* 7508 (CANB). Benguet sub-province, Mt Pulogloco, ix 1921, *Ramos & Edaño* BS 40416 (L). Nueva Ecija prov., Mt Umingan, viii–ix 1916, *Ramos & Edaño* BS 26514 (L). Benguet Prov., Mt Santo Tomas, xii 1922, *Merrill* 11717 (A, K, L); *ibid.*, 30 x 1904, *Williams* 1449 (K); Baguio, iii 1907, *Elmer* 8600 (A, E, K, L); *ibid.*, iii 1913, *Elmer* 14287 (A, E, K, L, U); Bontoc sub-province, Mt Polis, ii 1920, *Ramos & Edaño* BS 37715 (A); *ibid.*, *Ramos & Edaño* BS 37717 (A). Rizal Prov., Mt Irig, ii 1923, *Ramos* BS 41964 (A, K); Mabiluang, x 1913, *Loher* 85 14447 (A). Mountain Prov., Mt Panai, i, ii 1948, *Sulit* PNH 7558 (A); Mt Polis, 18 v 1948, *Celestinó* s.n. (A); Benguet Prov., Mt Pulog Nat. Park, Kabayan, 9 x 1992, *Barbon et al.* PPI 8851 (PNH). Mt Tabayoc, 2400–2500m, 15 ii 1968, *Jacobs* 7458 (CANB). **Mindoro.** Oriental prov., Mount Halcon, 1300m, 15 iii 1997, *Mendum et al.* 29110 (E); Mt Halcon complex above Paitan on Dulangan river, Ramayan to Mustning, 1200m, 11 v 1986, *Coode* 5771 (E, K); Legating, Mt Halcon, 14 iv 1991, *Stone et al.* PPI 721 (PNH); *ibid.*, *Stone et al.* 703 (PNH). **Panay.** Capiz prov., Mt Madias, iv–v 1918, *Ramos & Edaño* BS 30698 (L); Culasi, Hangod Tubig, Mt Madias, 11 ii 1992, *Gaerlan & Fuentes* PPI 4995 (PNH). **Negros.** Negros Occidental, Mt Canlaon, 1860m, fls. pink, iv 1954, *G.E. Edaño* PNH 21937 (L, PNH), 21982 (K, PNH); *ibid.*, 1960m, PNH 21951 (PNH); *ibid.*, 1950m, PNH 2200 (A, L, PNH); *ibid.*, iv 1910, *Merrill* 240 (U); Canlaon Nat. Park, Mt Canlaon, 21 iii 1992, *Stone et al.* PPI 6251 (PNH).

*Agalmyla rubra* is a distinctive plant, epiphytic and flowering at the tips of its rootless pendulous branches (not on the main stem climbing by adventitious roots), only the

flowering parts leafy, leaves opposite, ternate or occasionally 4-whorled, varying from equal to grossly unequal in size, narrowly elliptic and rather small, both surfaces hairy, flowers fascicled in the axils of the leaves, and corolla relatively short and more or less wide-mouthed. The corolla has variously been described as pink, red, brick-red, orange-red or orange, but it is possible that it is the long red hairs on the outside of the corolla that have caught the collector's eye, and the corolla itself is orange; these hairs extend to the base of the tube.

The species appears to be common on the Philippine islands of Luzon, Mindoro, Panay and Negros, in forest between 1100 and 2500m above sea level.

**46. *Agalmyla sibuyanensis*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. rubra* (Merr.) B.L. Burtt apicibus florentibus caulium in internodiis radicanibus (nec pendentibus nec sine radicibus), foliis semper per paria valde anisophyllis (nec oppositis vel 3-4-verticillatis magnitudine vel aequalibus vel valde inaequalibus), ovatis vel ovato-oblongis, venis lateralibus utrinque 6-7 (nec ellipticis vel anguste obovatis, nervis lateralibus utrinque 3-5), pedunculo c.10-15mm longo (nec floribus fasciculatis), calyce corollaque crasse villosis (nec sericeo-villosis) differt.

Type: Philippine Islands, Sibuyan Island, camp 3 above Magdiwang on ridge leading to Mayos Peak, on steep slope in submontane forest, 1300m, 24 viii 1989, *Argent & Reynoso* 8986 (holo. E).

Epiphyte, stems of indeterminate length, rooting along internodes, c.3mm in diam. at flowering tips, clad in acute hairs to 2mm long, bark pale, glossy, papery. *Leaves* opposite, strongly anisophyllous, reduced leaf conspicuous, blade c.14-18 × 10-12mm, ovate abruptly contracted to petiolar part about half as long as blade, triplinerved, hairy on both surfaces; blade of developed leaves c.70-78 × 28-41mm, ovate or ovate-oblong, apex more or less acute, base somewhat cuneate, margins obscurely serrulate, lateral veins 6-7 each side of midrib, looping near margin and merging with it, upper surface clad in acute hairs 1.5-2mm long, crowded but blade visible, lower surface with similar, more scattered, hairs on blade, dense over veins and there to c.2.5mm long; petiole 23-30mm long, densely clad in acute hairs to c.2.2mm long. *Inflorescence* a few (2-4)-flowered cyme, solitary in upper leaf axils, peduncle c.10-15mm long. *Bracts* (outermost pair) c.9 × 2.7mm, elliptic, outside acute hairs to c.1mm, inside acute hairs to 0.7mm on upper half, glabrous below, bracteoles few, similar but smaller. *Pedicels* c.17-19mm long, clad in acute hairs to 2mm long. *Calyx* tube c.0.7-0.8mm long, lobes 5, subequal, 6.5-7.5 × 1.8-2.8mm, oblong to spatulate, obtuse, outside acute hairs to 1.2mm long, inside glabrous except for hairs to c.0.5mm at tip. *Corolla* thin-textured, c.34mm long, tube 27mm, narrowly funnel-shaped, arcuate, mouth more or less round, posticous lobes 6.5 × 4.5mm, oblong-elliptic, anticous lobe 9 × 4.8mm, oblong-elliptic, corolla bright orange-red, outside thickly clad in acute hairs to 1-2mm long together with very minute globular glands, lobes fringed with acute hairs to c.0.6mm long mingled with occasional, longer, gland-tipped ones, inside lobes broad-based acute hairs to 0.2mm

long, globose papillae to 0.1mm in diam. in broad band from base of anticous lobe to point of insertion of anticous filaments, elsewhere scattered minute globular glands, annulus a broad ring of hairs, mostly acute, to 2mm long, a few minutely gland-tipped, 2–3mm long, extending from insertion of anticous filaments nearly to base of tube, there much shorter. *Stamens* 4, anticous filaments inserted 13.5mm above base of tube, 14mm long, very few well-scattered globular glands, anthers 2.3mm long, very shortly exerted, posticous filaments inserted 16mm above base of tube, 12mm long, anthers 2mm long, scarcely exerted; staminode 2.3mm long. *Disc* 1.5 × 2mm, cupular, rim entire. *Ovary* 22 × 1.5mm, very few well-scattered minute globular glands. *Style* 8mm long, with minute scattered globular glands. *Stigmatic lobes* c.2 × 2mm, minutely papillose on inner face. *Capsules* not seen. **Fig. 17: 46a, b.**

This species is known only from the type collection, made on Sibuyan Island. It is in the general affinity of *A. rubra* from which it is at once distinguished by its leaves – always paired, one much smaller than the other, and with 6–7 lateral veins each side of the midrib – and the inflorescence with a short peduncle, as well as by other lesser characters. In general facies it closely resembles *A. montis-tomasii*, from Luzon; see that species (below).

Little is known about *A. sibuyanensis* other than that it is an epiphytic climber in forest, collected at 1300m above sea level.

**47. *Agalmyla montis-tomasii* Hilliard & B.L. Burt, sp. nov.** ab *A. sibuyanensi* Hilliard & B.L. Burt foliis venis lateralibus utrinque 4–5 (nec 6–7), laminis fortasse semper minoribus (maximis 48–67mm, nec 70–78mm), petiolis plerumque longioribus (27–40mm nec 23–30mm), floribus solitariis vel paucis in fasciculis axillaribus (nec in pedunculo 10–15mm longo), calycis lobis 3.5–6 × 1–1.25mm basi latissimis (nec 6.5–7.5 × 1.8–2.8mm in medio latissimis), corolla 22mm longa (nec c.34mm), annulo 2.5mm supra basin tubi posito e pilis omnibus acutis (nec pilis fere ad basin tubi dispersis, acutis aliis glandulosis intermixtis) distinguenda.

Type: Philippine Islands, Luzon, Benguet prov., Mt Santo Tomas, 16°20'N, 120°32'E, south west of Baguio, 1800m, 18 ii 1976, *Sands* 3149 (holo. K; iso. A, L).

Epiphyte, stems of indeterminate length ('several metres'), branching, rooting along internodes, c.4mm in diam. on flowering parts, clad in acute spreading hairs to 2–3mm long, 'hairs purple', bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves c.15–25 × 6–10mm, ± half the length petiolar, blade ovate, hairy as developed leaves; blade of largest developed leaves 48–67 × 27–31mm, broadly elliptic, apex acute, base cuneate, margins subentire to obscurely serrate, lateral veins 4–5 each side of midrib, looping near margin and merging with it, both surfaces well clad in acute hairs to 1–2mm long; petiole 27–40mm long, clad in acute spreading hairs to 2mm long. *Bracts* 6–10 × 1–2.3mm, spatulate, subacute, clad in acute hairs to 1mm long, dense on dorsal surface, fewer, shorter and confined to upper part of ventral surface. *Pedicels* 11–15mm long, clad in acute upward-pointing hairs to 1mm long. *Calyx* tube 0.3–0.5mm long, lobes 5, subequal,

3.5–6 × 1–1.25mm, narrowly deltoid, subacute, outside densely clad in acute hairs 1–1.5mm long. *Corolla* c.22mm long, tube 19mm, subcylindric, slightly arcuate, mouth round, posticous lobes c.3 × 2mm, suborbicular, anticous lobe c.5 × 2.2mm, oblong-elliptic, corolla ‘scarlet’, outside thickly clad to base in acute hairs to 1–1.5mm long, lobes fringed with minute acute hairs, these also inside lobes, broad band of globose papillae c.1mm in diam. on floor of tube from insertion of anticous filaments to base of anticous lobe, elsewhere glabrous except for circlet of acute hairs to 1.5mm long inserted c.2.6mm above base of tube. *Stamens* 4, anticous filaments c.12mm long inserted 11mm above base of tube, anthers 1.8mm long, very shortly exerted; posticous filaments c.9mm long inserted 12mm above base of tube, anthers 1.5mm long, scarcely exerted; all filaments glabrous; staminode c.1mm long. *Disc* 1 × 1.2mm, cupular. *Ovary* c.15 × 1mm, glabrous. *Style* c.8mm long, glabrous. *Stigmatic lobes* 1 × 0.8mm, minutely papillose inside, glabrous outside. *Capsules*: only 1 immature seen, 120 × 2mm. *Seeds* very immature. **Fig. 17: 47a, b.**

*Agalmyla montis-tomasii* is known only from the type collection, made on Mt Santo Tomas, Luzon. In facies it much resembles *A. sibuyanensis* but it is distinguished by its possibly always smaller leaves with only 4–5 lateral veins each side of the midrib, flowers either solitary or few in axillary fascicles, smaller calyx with differently shaped lobes, and shorter corolla with the hairs of the annulus in an irregular band inserted c.2.5mm above the base of the tube. In both *A. montis-tomasii* and *A. sibuyanensis*, the greatly reduced leaf of each pair is long persistent, which contributes to their similarity in appearance.

Sands described his plant as a ‘vigorous climbing epiphyte to several metres; stems pale green with purple hairs; petioles purplish; calyx pale green; corolla scarlet’. It was collected in ‘stunted ridge forest with Ericaceae and ? oak spp.’ at 1800m above sea level.

**48. *Agalmyla samarica* Hilliard & B.L. Burtt in Blumea 44: 388 (1999).**

Type: Philippines, Samar, near summit Mt Apoy, 11°24'N, 125°25'E, primary forest, 600–800ft, v 1969, *Gutierrez et al.* 490, PNH 117472 (holo. K, iso. L).

Epiphytic herb, stems elongate, creeping, rooting along internodes, c.4–6mm diam. on flowering part, villous with coarse acute ± spreading red-brown hairs 3–4mm long, minutely gland-dotted as well. *Leaves* opposite, strongly anisophyllous, blade of largest leaves c.110–155 × 37–75mm, elliptic or obovate, apex acute, base cuneate to almost rounded, slightly oblique or not, margins weakly to strongly coarsely serrate or doubly serrate, 4–5 pairs of lateral veins ascending at angle of c.45°, looping near margin and merging with it, both surfaces villous with acute red-brown hairs c.2.5–4mm long, minutely glandular as well, glandular hairs scattered; petiole c.50–80mm long, hairy as blade; smaller leaf of each pair very variable in size, apparently sometimes wanting. *Flowers* in almost sessile crowded axillary cymes. *Bract* c.10–17 × 2mm, elliptic, apex acute, base cuneate, villous, hairs up to 2–4mm long. *Pedicel* c.14–22mm long, villous as bract. *Calyx* divided to within less than



1mm of base, lobes 5, subequal, c.20–25 × 1mm at base, linear-subulate, villous outside, hairs to 3–4mm long, glabrous inside on upper part, minutely glandular on lower. *Corolla* c.25mm long, tube c.21mm long, subcylindric, slightly curved, mouth oblique, possibly more or less round, posticous lobes c.3.5–4 × 1.4–2.3mm, oblong, obtuse, anticous lobe c.5.5–5.8 × 2mm, oblong, apex more or less rounded, corolla yellow or yellowish-orange, outside villous except near base, hairs acute, up to c.1.3mm long, margins and inside of lobes clad in short (to c.0.2mm) acute hairs, shortest on anticous lobe, mixed with minute globose papillae, these extending down tube to point of insertion of stamens, ring of acute hairs c.2mm long inserted 5–6mm above base of tube. *Stamens* 4, filaments inserted c.14mm above base of tube, anticous filaments c.12mm long, anthers c.2mm, posticous filaments c.11mm long, anthers c.1.8mm, all filaments either glabrous or a few minute glandular hairs near base, anthers scarcely exerted; posticous staminode c.1mm long. *Disc* c.1 × 1.5mm, cupular, rim crenulate. *Ovary* (♂ phase) c.6mm long, glabrous, but later clad in globose glands. *Style* (♂ phase) c.7mm long, glabrous. *Stigmatic lobes* c.1.2 × 0.9mm, inner face smooth (at least when young). *Capsules* not seen. **Fig. 17: 48a, b.**

*Additional specimen.* PHILIPPINES. Samar, Mt Calbiya [Calbiga] Wright, c.300m, 23 v 1948, mid-mountain forest type vicinity of km 61 ridge, *Sulit* 3000, PNH 6401 (K, PNH).

*Agalmyla samarica* is a very distinctive species in the general affinity of *A. montis-tomasii* and *A. urdanetensis*. All parts are villous, and the long filiform calyx lobes are very striking. A remarkable feature appears to be the nude axillary branchlets about 30mm long terminating in a few flowers, contrasting with the almost sessile very crowded cyme, but this needs study on more material. The corolla is yellow or yellowish-orange, and Gutierrez described the hairs as reddish brown. The ovary is glabrous at first but later develops small globose glands; capsules remain unknown. Clearly this is a plant that needs closer study. It is known only from the two collections cited above.

**49. *Agalmyla urdanetensis* (Elmer) Hilliard & B.L. Burtt, *comb. nov.***

Type: Philippines, Mindanao, Agusan prov., Cabadbaran (Mt Urdaneta), ix 1912, *Elmer* 13710 (n.v.).

Syn.: *Dichrotrichum urdanetense* Elmer, *Leafl. Phil. Bot.* 7: 2665 (1915).

*Tetradema urdanatense* (Elmer) Merr., *Enum. Phil. Fl. Pl.* 3: 455 (1923).

Epiphytic climber, main stem of indeterminate length (2–4m), branching above and there flowering, c.6–8mm in diam. on flowering part, rooting along internodes, thickly clad in acute upward-pointing hairs up to 3mm long, glabrescent, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, the small leaf soon caducous, blade of largest leaves 90–150 × 37–60mm, oblong or oblong-elliptic, apex acute or subacute, base rounded or cuneate, margins irregularly serrate, 5–6 lateral veins each side of midrib, looping near margin and merging with it, upper surface appressed-pubescent but not densely so, hairs acute, 1–2mm long, plentiful minute sessile globular glands as well, best seen on young leaves, lower surface similar but

hairs more crowded over veins; petiole 40–70mm long, clad in acute hairs to c.2mm long. *Inflorescence* a crowded axillary cyme (c.20 flowers), peduncle c.5mm long, very stout, hairy. *Bracts* (outermost) c.9–10 × 3.5–4mm (series of smaller bracteoles within), elliptic, subobtuse, hairy on both surfaces, hairs to c.1mm long, acute. *Pedicels* up to 10mm long, clad in acute hairs c.1.5–2mm long. *Calyx* tube c.0.3mm long, lobes 5, subequal, 4.2–5.5 × 1–1.6mm, spatulate, apex obtuse, margins there obscurely crenulate, acute hairs 0.3–1.5mm long scattered outside, together with minute globose glands, inside scattered globose glands all over, scattered acute hairs to 0.25mm long on expanded part. *Corolla* thin-textured, 20–25mm long, tube 17–22.5mm, subcylindric, slightly curved, mouth oblique, not laterally compressed, posticous lobes 2–3 × 2.2–2.8mm, broadly obovate-oblong, apex almost truncate, anticous lobe 5 × 2.8–3mm, oblong, apex broadly rounded, corolla recorded as ‘red’, outside pubescent almost to base, hairs very short there, elsewhere hairs to 0.8mm long, acute, very minutely glandular as well, lobes fringed with gland-tipped hairs c.0.4mm long, inside of lobes clad in very minute acute hairs, these also extending down floor of tube to point of insertion of anticous filaments, 5 tufts of acute hairs c.1.5mm long inserted 6mm above base of tube. *Stamens* 4, anticous filaments inserted 8–11mm above base of tube, 13–16mm long, anthers 1.25–1.5mm long, posticous filaments inserted 9–12mm above base, 11–13mm long, anthers 1.1mm long, all filaments glabrous, anthers scarcely exerted; staminode 0.5mm long. *Disc* 1–1.2 × 1.25–1.5mm, cupular, rim crenulate. *Ovary* c.20 × 1mm, glabrous. *Style* c.6–7mm long, glabrous. *Stigmatic lobes* 1.2–2 × 1.1–1.2mm, minutely papillose inside. *Capsules* c.90–120mm long (only a few shredded ones seen), glabrous. *Seeds* 1 × 0.2mm, appendages c.1.8mm long. **Fig. 17: 49a, b.**

PHILIPPINES. **Mindanao.** Agusan prov., Cabadbaran, Mt Hilong-hilong, 1200m, 20 iv 1929, *Mendoza & Convozar* 785, PNH 10771 (L, PNH). Surigao prov., Mt Kabatuan, 768m, iii 1949, *Mendoza & Convozar* 395, PNH 10525 (A).

The specimen from which the above description was drawn came from Mt Hilong-hilong, inland from the town of Cabadbaran on the west coast of Mindanao near its northern tip; Mt Urdaneta, the type locality, is on the main Diuata range, roughly due east of Mt Hilong-hilong, and Mt Kabatuan lies at the northern end of that range. We are therefore confident that the name is being used correctly, despite our not having seen the type, and despite discrepancies with Elmer’s description. Elmer described the leaves as broadly lanceolate to ovate, yet gave the measurements as 4–6cm long by 1.25–1.75cm below the middle; surely at least 2.25–2.75cm was meant: 40 × 22.5mm yields a broadly lanceolate shape, 60 × 27.5mm an ovate one. The bracts were said to be ‘oblong ... foliaceously tipped’; if this were so, they would be unique in the genus. The outer bracts on the specimens seen were elliptic, subobtuse. In other respects, Elmer’s description, including measurements of calyx and corolla, agrees with the specimens now seen.

Elmer wrote, ‘discovered in the humid moss laden and rigid woods among the

summit peaks of Mount Urdaneta at 6000ft altitude'. Colour of the flowers was not mentioned: Mendoza & Convozar described them as red, habitat 'mossy forest'.

**50. *Agalmyla parvilimba*** Hilliard & B.L. Burt, **sp. nov.** ab *A. montis-tomasii* foliis ovatis (nec ellipticis) basi rotundatis (nec cuneatis), marginibus crenatis (nec sub-integris vel obscure serratis), petiolo folii redacti cujusque paris brevissimo (nec dimidium laminae aequante), pedunculo c.200mm longo (nec inflorescentia sessili), calycis tubo c.2mm longo (nec 0.3–0.5mm); ab *A. bilirana* foliis utrinque pilosis (nec pilis in lamina paucis, supra venis numerosioribus), calycis lobis plus minusve deltoid-eis subacutis (nec late oblongo-ellipticis, apicibus late rotundatis) pilis 1.5–2mm longis (nec 0.2mm longis) distinguenda.

Type: Philippines, Leyte, near Dagami, Mt Lobi [11°02'N, 124°48'E], 800m, 7 xi 1999, *Mendum et al.* 99202 (holo. E).

Epiphyte, stems of indeterminate length, c.6mm in diam. on flowering part, rooting along internodes, clad in acute appressed hairs to 3–4mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves c.14–16 × 9mm, blade ovate contracted into a petiolar part c.2–3mm, hairy as larger leaf; blade of largest developed leaves c.53–66 × 42–52mm, ovate, apex subacute, base rounded then abruptly shortly cuneate, margins crenate or crenate-serrate, 5–6 lateral veins each side of midrib, looping near margin then merging with it, upper surface somewhat thinly clad in acute hairs to 1.5–3mm long (tip of each hair reaching slightly above base of one above), lower surface similar but hairs shorter, crowded over veins, conspicuously glandular-punctate; petiole 36–47mm long, clad in appressed acute hairs to 3mm long. *Inflorescence* a several (c.17)-flowered cymose cluster terminating a stout peduncle c.190–200mm long, clad in acute appressed hairs to 3mm long. *Bracts* (outermost) 12–17 × 8–10mm, ovate contracted to a broad subpetiolar part, outside clad in acute hairs to 2mm long, densest over veins, inside scattered acute hairs to 2mm. *Pedicels* 7–12mm long, thickly clad in acute appressed hairs to 2.5mm. *Calyx* purple, tube c.2mm long, lobes 5, subequal, c.4–4.6 × 1.8–2.8mm, more or less deltoid, outside densely clad in appressed acute hairs to 1.5–2mm long, inside scattered minute globular glands. *Corolla* c.32mm long, tube 27mm, almost cylindrical above the slightly narrowed base, arcuate, mouth more or less round, posticous lobes 4.5 × 3.3mm, anticous lobe 5.5 × 4mm, all lobes more or less oblong, apex broadly rounded, corolla 'light crimson, yellowish inside', outside thickly clad in acute hairs to 1mm long, lobes fringed with acute hairs to 0.5mm, inside of lobes clad in acute hairs to 0.1mm, elsewhere scattered minute globular glands above a broad (c.8mm) ring of acute hairs to 2mm long inserted 4mm above base of tube, 2 small fleshy flaps of tissue at point of insertion of anticous filaments, papillae wanting. *Stamens* 4, anticous filaments inserted 16mm above base of tube, 14mm long, anthers 2.2mm, about level with posticous lobes; posticous filaments inserted 17mm above base of tube, 12mm long, anthers 2mm; staminode wanting. *Disc* 1.1 × 1.25mm, cupular, rim crenulate. *Ovary* 20 × 1.4mm, clad in scattered

minute globular glands. *Style* 8mm, clad in globular glands. *Stigmatic lobes* (♀ phase) 2.2 × 1.8mm, minutely papillose inside, minute globular glands outside. *Capsules* not seen. **Fig. 18: 50a, b.**

*Agalmyla parvilimba* is known only from the type collection made in submontane forest on Mt Lobi, c.20km almost due east of Ormoc on the west coast of Leyte. The corolla tube is narrow, the limb small, which suggested the epithet. In its corolla it resembles *A. montis-tomasii* (Luzon), but that species is at once distinguished by its differently shaped leaves with margins subentire to obscurely serrate, its sessile few-flowered inflorescence, and much shorter calyx tube. Its closest ally is possibly *A. bilirana* (Biliran, Leyte), which differs in its leaves with sparsely hairy blade, hairs being plentiful only over the veins, and its calyx clad in very short hairs (c.0.3mm), the lobes broadly oblong-elliptic with broadly rounded tips.

**51. *Agalmyla chorisepala* (C.B. Clarke) Hilliard & B.L. Burtt, *comb. nov.***

Lectotype (chosen here): Philippine Islands, Luzon, Albay prov., *Cuming* 938 (K, isolecto. L).

Syn.: *Dichrotrichum chorisepalum* C.B. Clarke in A. & C. DC., *Mon. Phan.* 5(1): 53 (1883).

?*D. minus* Kraenzlin in *Philipp. J. Sci. (Bot.)* 8: 314 (1913), non Schumann (1906). Type: Philippine Islands, Negros, Canlaon Volcano, For. Bur. 17376, *Curran* (n.v.).

Epiphyte, main stem of indeterminate length, branching, c.3–5mm in diam. on flowering part, rooting along internodes, clad in acute spreading hairs to 2–3mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves 13–35 × 8–20mm, blade ovate contracted into a short broad petiolar part, hairy as larger leaf; blade of largest developed leaves 55–150 × (25–)30–73(–103)mm, elliptic, ovate-elliptic or ovate, apex acute or subacute, base cuneate or occasionally subcordate, sometimes oblique, shortly decurrent on petiole, margins mostly coarsely serrate, sometimes obscurely so, rarely subentire, 4–6 lateral veins each side of midrib, looping near margin and fading, or occasionally seen to link to vein above, upper surface thinly clad in acute hairs to 1.5–2mm long (hairs mostly overlapping but blade clearly visible, or sometimes hairs sparse), lower surface similar but hairs usually crowded over veins; both surfaces when very young dotted with minute globular glands; petiole 15–50mm long, clad in spreading acute hairs to 2–3mm long. *Inflorescence* a several- to many-flowered cymose cluster terminating a stout peduncle c.150–420mm long, clad in acute spreading hairs to 3mm long. *Bracts* (outermost pair; bracteoles smaller and narrower) 7–12 × 6–8mm, ± ovate contracted to a broad subpetiolar part, outside clad in acute hairs to 1mm long, densest over veins, inside scattered acute hairs to c.0.5mm. *Pedicels* 6–12mm long, thickly clad in acute hairs to 1mm. *Calyx* tube 0.5–1.2(–1.5)mm long, lobes 5, subequal, (3.5–)4.5–8 × (1.5–)2–3.5mm, spatulate or elliptic, apex broadly rounded, often dark red, outside clad in acute hairs to 0.5mm long together with

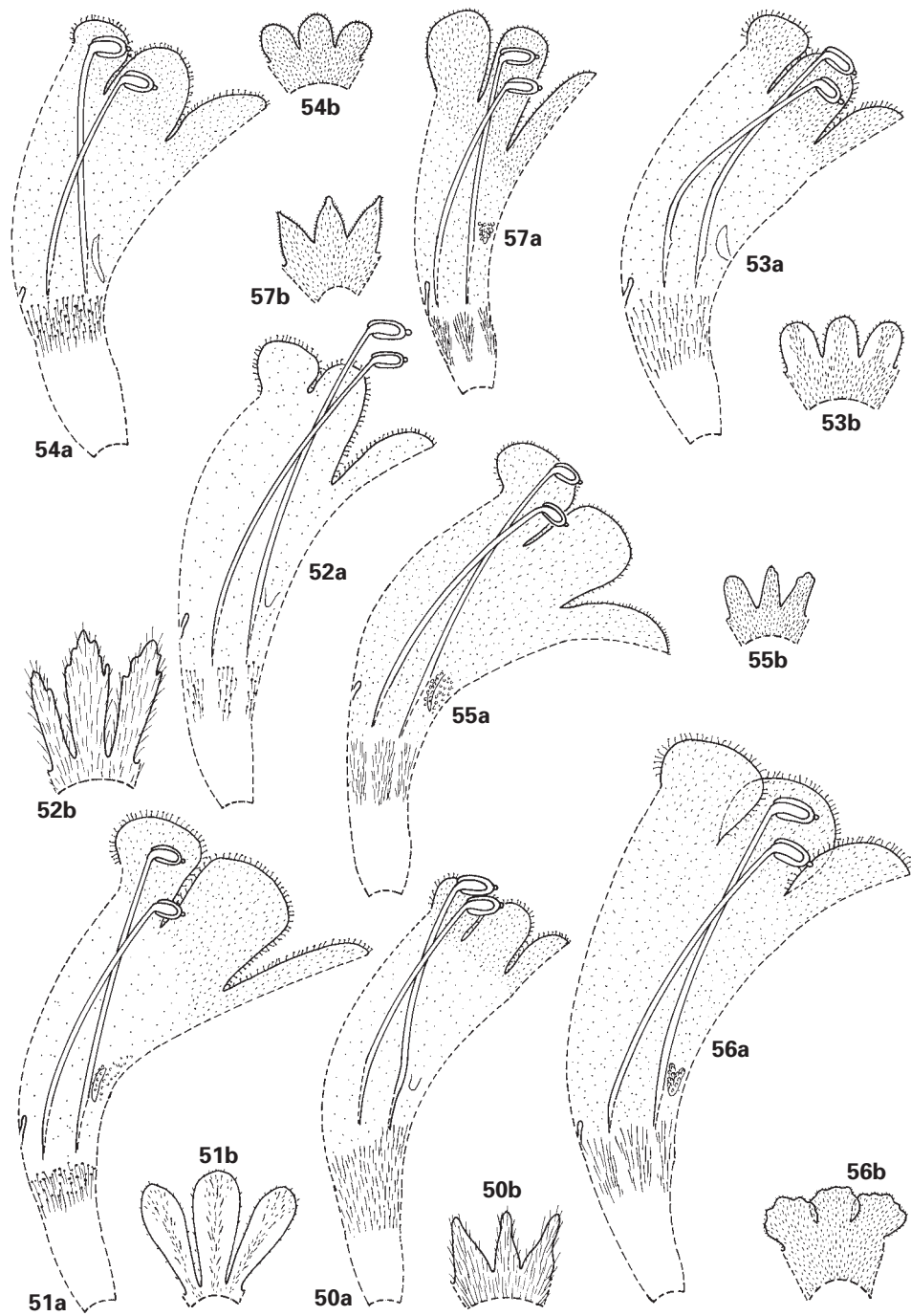


FIG. 18. Part of calyx and longitudinal section of corolla: 50a, b, *Agalmyla parviliba*; 51a, b, *A. chorisepala*; 52a, b, *A. calelanensis*; 53a, b, *A. persimilis*; 54a, b, *A. bilirana*; 55a, b, *A. glabra*; 56a, b, *A. rotundiloba*; 57a, b, *A. elongata*. All  $\times 2$ .

scattered hairs to 1mm. *Corolla* 30–40mm long, tube 24–32mm, funnel-shaped, arcuate, mouth more or less round, posticous lobes 5–10 × 5–9mm, broadly oblong, almost truncate, anticous lobe 8–11 × 6–10mm, oblong-elliptic, broadly rounded, corolla recorded as dark crimson or red, once as pink (Luzon), blood red, dark red, bright crimson, salmon-red (Negros), orange, scarlet (Mindoro), outside densely clad in acute hairs mostly 0.1–0.25mm long, some to 1mm long on posticous side and there mixed with gland-tipped hairs to 1mm long, lobes fringed with gland-tipped hairs to 0.5mm long, inside very minute acute hairs all over lobes, elsewhere very minute glandular hairs above a broad band of gland-tipped hairs c.2–3mm long inserted c.4–7.5mm above base of tube, small V-shaped flap of papillose tissue between anticous filaments at point of insertion, papillae extending a short way up floor of tube. *Stamens* 4, anticous filaments inserted 12.5–18mm above base of tube, 15–17mm long, anthers 2.2–3mm long, very shortly exerted; lateral filaments inserted 13–19mm above base of tube, 13–15mm long, anthers 2–2.25mm long, scarcely exerted; all filaments glabrous; staminode c.2–4mm long. *Disc* 1 × 1.8mm, rim crenulate. *Ovary* to c.15 × 1mm, glabrous. *Style* to c.8mm long, glabrous. *Stigmatic lobes* to c.3 × 2mm, very minutely papillose inside. *Capsules* c.150–250 × 2mm, glabrous. *Seeds* c.1.4 × 0.2mm, appendages c.4mm long. **Figs 1 and 18: 51a, b.**

PHILIPPINE ISLANDS. **Luzon.** Laguna prov., Mt Maquiling [Mt Makiling], vi–vii 1917, *Elmer* 17684 (GH, K, L, S, U); *ibid.*, 17 iii 1906, *Merrill* 5127 (K, L); *ibid.*, 12 iii 1949, *Corpus* PNH 9594 (A, L); *ibid.*, c.1000m, 10 iv 1986, *Coode* 5287 (A, K, L); *ibid.*, 8 iii 1949, *Ardieta* PNH 9813 (A); *ibid.*, 23 iv 1947, *Sulit* PNH 7011 (A); *ibid.*, 8 ii 1913, *Brown* BS 26671 (A); *ibid.*, *Limbo* sub Gates 7793 (MICH); *ibid.*, 3500ft, 28 iii 1913, *Catalan* sub Gates 7804 (MICH). Tayabas prov., Lucban, v 1907, *Elmer* 9155 (A, E, K, L, U); *ibid.*, vi 1906, *Elmer* 7464 (E, K, L). Camarines Sur prov., Mt Isarog, 1050–1250m, 13 ii 1976, *Sands* 3123 (A, K, L); *ibid.*, 1000m, 21 iii 1997, *Mendum et al.* 29118 (E). Albay prov., Mt Malinao, 560m, 28 i 1956, *Edaño* 8333, PNH 34413 (L, PNH). Sorsogon prov., Mt Bulusan, v 1916, *Elmer* 16171 (A, GH, K); *ibid.*, vii–viii 1947, *Sulit* PNH 2678 (A); *ibid.*, 750m, 16 v 1957, *Edaño & Gutierrez* 197, PNH 37855 (L). **Mindoro.** Oriental prov., San Teodoro, Sibuang river camp, c.1200m, 21 ii 1985, *Ridsdale* 970 (L); inland from San Teodoro, Subaan river, 800m, 29 iv 1986, *Ridsdale et al.* sub Coode 5611 (K). Mt Halcon, 30 iii 1991, *Stone et al.* PPI 457 (GH, PNH); *ibid.*, 1200m, 13 iii 1997, *Mendum et al.* 29046 (E). Mt Ilong, 1000m, 21 ii 1948, *Edaño* 364, PNH 3363 (A, L). **Negros.** Occidental prov., Mt Canlaon, 1130m, 8 iv 1954, *Edaño* 8075, PNH 21926 (L); *ibid.*, 1330m, 20 iii 1992, *Stone et al.* PPI 6224 (PNH). Oriental prov., Tanjay, Lake Balinsasayao, 976m, 21 v 1949, *Edaño* 1546, PNH 11620 (A); *ibid.*, Sibulan, Kabalanan, 18 v 1981, *Reynoso et al.* PPI 958 (GH, PNH). Cuernos de Negros, Cuernos Mts, v 1908, *Elmer* 10074 (E, K, L, U); *ibid.*, 1370m, 16 vi 1931, *Herre* 1103 (A); *ibid.*, 1700m, 6 ix 1953, *Britton* 336, PNH 19566 (L, PNH); *ibid.*, *Britton* 344, PNH 19574 (PNH); *ibid.*, Mt Malburg, 10 vi 1948, *Edaño* 697, PNH 7239 (A); *ibid.*, Matangwa river, 900m, 15 v 1948, *Edaño* 107, PNH 7403 (A); *ibid.*, Mt Talines, 1000m, 1 iii 1976, *Sands* 3223 (K, L). **Panay.** Capiz Prov., Mt Macosolon, iv–v 1918, *Ramos & Edaño* BS 30788 (K). **Mindanao.** Zamboanga distr., xi–xii 1911, *Merrill* 8252 (L).

[Also recorded by Merrill (1923b: 453) from Biliran, Leyte and Camiguin de Misamis.]

C.B. Clarke saw three specimens, all from Luzon, on which he based the name *Dichrotrichum chorisepalum*: *Cuming* 938, very good material in both flower and

fruit, has been chosen to lectotypify the name; *Lobb* 462 is also good but the fruits are not fully ripe; *Jagor* 808 will have been destroyed in the Berlin fire.

The type of *D. minus* came from Canlaon Volcano on Negros, but was destroyed in the Manila fire and no duplicate has been found. Kraenzlin wrote, 'Very near *D. chorisepalum* C. B. Clarke, but smaller in all its parts'. Two collections have been seen from Mt Canlaon, *Edaño* 8075, PNH 21926 (L) with only calyces and ovaries present, and *Stone et al.* PPI 6624 (PNH); both are normal *Agalmyla chorisepala*.

In the Philippines, *A. chorisepala* and *A. calelanensis* are distinctive among species with long peduncles in having the calyx divided nearly to the base (the epithet *chorisepala* means free sepals); they differ mainly in the shape and indumentum of the calyx lobes. The calyx lobes of *A. chorisepala*, spatulate or broadly elliptic with rounded tips, allied to the very short calyx tube and long peduncle, make it easily recognizable. The colour of the flowers is variable, ranging from orange to dark crimson (details in description above). The species appears to be common, with a wide distribution: Luzon, Mindoro, Negros and Zamboanga province of Mindanao. It is epiphytic on tree trunks in forest between c.550 and 1400m above sea level.

**52. *Agalmyla calelanensis* (Elmer) Hilliard & B.L. Burt, comb. nov.**

Lectotype (chosen here): Philippine Islands, Mindanao, Davao distr., Todaya (Mt Apo), viii 1909, *Elmer* 11347 (E; iso. GH, K, L).

Syn.: *Dichrotrichum calelanense* Elmer in *Leafl. Phil. Bot.* 3: 955 (1910).

Epiphyte, stems of indeterminate length, well branched, c.3–5mm in diam. on flowering part, rooting along internodes, clad in acute spreading hairs c.1.5–2.5mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves c.13–17 × 4.5–5.5mm, ovate contracted to a broad petiolar part, hairy as larger leaf; blade of largest developed leaves 47–90 × 25–47mm, ovate to ovate-lanceolate, apex subacute, base rounded to cordate, margins coarsely serrate or doubly serrate, 4–6 lateral veins each side of midrib, looping near margin and merging with it, upper surface clad in acute hairs to 2–3.5mm long, plentiful but blade clearly visible, lower surface with acute hairs 1–2mm long, dense over veins, scattered on blade, in extreme youth both surfaces dotted with minute globular glands; petiole c.30–57mm long, clad in acute spreading hairs to 1.5–2.5mm long. *Inflorescence* a few-flowered cymose cluster terminating a stout peduncle c.120–230mm long, clad in acute spreading hairs to 2–3mm long. *Bracts* (outermost pair; few smaller bracteoles within, soon caducous) c.10–14 × 6–8mm, ovate, subacute, broad-based, acute hairs to 1.5–2mm long on both surfaces. *Pedicels* 14–20mm long, thickly clad in acute hairs 1.5–2mm long. *Calyx* tube 1–2mm long, lobes 5, varying greatly in size within a single calyx, 6–8.5 × 1.2–4.2mm, linear-oblong, oblong, or spatulate, margins entire or obscurely to strongly toothed in upper half, outside acute hairs to 1.5–2mm long, inside glabrous except at tips. *Corolla* 25–32mm long, tube 22–27.5mm long, funnel-shaped, arcuate, mouth nearly round, posticous lobes 3–3.5 × 3–4.3mm, oblong to subrotund, anticous lobe 7 × 3.6–4.2mm, elliptic, corolla recorded as

'yellowish red' (*Elmer*), 'bright orange with reddish flush on tube outside' (*Madulid et al.*), 'dark pink' (*Edaña*), outside thickly clad in mixed acute and gland-tipped hairs to c.1.5mm long but mostly c.1mm, lobes fringed with gland-tipped hairs to 0.4mm long, inside very minute gland-tipped hairs scattered all over inside above annulus but sometimes to 0.2mm near tips of lobes, annulus inserted c.4.5–6mm above base of tube, c.2.5–4mm deep, composed of minutely gland-tipped hairs c.2mm long, 2 small glabrous flaps of tissue between anticous filaments at their point of insertion. *Stamens* 4, anticous filaments inserted 11–14mm above base of tube, 12–18mm long, anthers 2.2–2.8mm long, very shortly exerted; lateral filaments inserted 13–15mm above base of tube, 10.5–16mm long, anthers 1.8–2.2mm long; all filaments glabrous; staminode 1–1.5mm long. *Disc* c.1.2–2mm, rim crenulate. *Ovary* c.20 × 1.2mm, glabrous. *Style* c.12mm long, glabrous. *Stigmatic lobes* c.2 × 1.2mm, very minutely papillose inside. *Capsules* c.150 × 3mm (not fully mature), glabrous. *Seeds* c.1.5 × 0.2mm, appendages c.3.5mm long (not mature). **Fig. 18: 52a, b.**

PHILIPPINE ISLANDS. **Mindanao.** Davao prov., Lake Linao, Mt Apo, 6900ft, 30 x 1946, *Edaña* 1227, PNH 1375 (A, L). North Cotabato, Ilomavis, above Marble Hot Springs, Mt Apo, 1800m, 15 iii 1992, *Madulid et al.* PPI 9702 (PNH).

*Agalmyla calelanensis* is known only from Mt Apo on Mindanao; this is the locality on Elmer's type collection, but his notes read 'creeping and climbing upon moss laden roots, trunks and limbs of the elfinwoods at or near the summit of Mt Calelan at 8500ft'. All the collections seen are very scrappy. The species is closely allied to *A. chorisepala* (both have the calyx lobed nearly to the base) but it is easily distinguished by the long shaggy hairs on the calyx, the lobes of which are often toothed apically (always entire in *A. chorisepala*).

**53. *Agalmyla persimilis* Hilliard & B.L. Burtt, sp. nov.** ab *A. chorisepala* C.B. Clarke foliis venis lateralibus utrinque 7–8 (nec 4–6) praeditis, calyce ± ad medium lobato (nec fere ad basin), corollae lobo antico 5–6mm longo (nec 8–11mm) distinguitur. Type: Philippine Islands, Mindanao, Agusan prov., Cabadbaran, Mt Hilong-hilong, 1166m, 20 iv 1949, *Mendoza & Convocar* 781, PNH 10767 (holo. A).

Epiphyte, main stem of indeterminate length, branching, c.5–7mm in diam. on flowering part, rooting along internodes, clad in acute spreading hairs to 3–3.5mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves c.14–25 × 9–16mm, blade ovate or suborbicular abruptly contracted into a petiolar base, hairy as larger leaf; blade of developed leaves 130–190 × 70–90mm, broadly elliptic, oblong-elliptic or ovate, apex subacute, base cuneate to more or less rounded, slightly unequal, very shortly decurrent, margins coarsely serrate or doubly serrate, sometimes more or less crenate, 7–8 lateral veins each side of midrib, sharply ascending then looping near margin and fading out, upper surface somewhat thinly hairy, hairs acute, to 2–3mm long, lower surface more densely hairy but blade still clearly visible, hairs 2–3mm long; petiole 35–65mm long, clad in spreading acute hairs to 3mm long. *Inflorescence* a several (to c.12)-flowered cymose cluster



terminating a stout peduncle c.400–510mm long, clad in spreading acute hairs to 2–3mm long. *Bracts* (outermost pair, bracteoles similar but smaller) c.9–10 × 5.5–7mm, more or less ovate or suborbicular contracted to a broad petiolar part, outside clad in acute hairs to 1mm long, inside few scattered hairs. *Pedicels* 10–28mm long, thickly clad in acute hairs to 0.6mm long, upward-pointing. *Calyx* tube 3–4mm long, lobes 5, subequal, 3.2–4.3 × 2–3.2mm, broadly oblong-elliptic, apex rounded, outside clad in acute hairs mostly to 0.3mm long, a few to 0.5mm together with many very minute globular glands, margins fringed with hairs 0.1–0.2mm long, inside clad in minute glands. *Corolla* c.30–32mm long, tube 25–27mm, almost cylindrical, arcuate, mouth more or less round, posticous lobes c.4.5–4.8 × 4–4.8mm, anticous lobe c.5–6.5 × 5–6mm, corolla recorded as ‘red’, outside densely clad in acute hairs to 0.1–0.2mm long, few 0.3–1mm long on posticous side, minute globular glands scattered all over, lobes fringed with gland-tipped hairs to 0.4–0.5mm long mixed with shorter acute hairs, inside minute acute hairs less than 0.1mm long all over lobes, elsewhere very minute globular glands above a broad (c.4–4.5mm) band of hairs c.2mm long, gland-tipped or acute, inserted c.5mm above base of tube, small V-shaped flap of tissue between anticous filaments at point of insertion. *Stamens* 4, anticous filaments c.16mm long, inserted 11–13mm above base of tube, anthers 2.5–2.8mm long, scarcely exceeding posticous lobes; posticous filaments c.14mm long, inserted 12–14mm above base, anthers 2.2–2.6mm long; all filaments glabrous; staminode c.1.3–4mm long. *Disc* c.1 × 2mm, cupular. *Ovary* c.23 × 1.2mm, glabrous. *Style* c.5–7mm long, glabrous. *Stigmatic lobes* c.2 × 1.5mm, very minutely papillose inside. *Capsules* (few very old shredded ones seen) c.270mm long. *Seeds* c.1.2 × 0.2mm, appendages c.3mm long. **Fig. 18: 53a, b.**

PHILIPPINE ISLANDS. **Mindanao.** Agusan prov., Cabadbaran, Mt Urdaneta, viii 1912, *Elmer* 13565 (E, GH, K, L, U: GH and U without flowers); Diuata Mts, iv 1931, *Ramos & Convocar* BS 83717 (GH).

Particularly in its vegetative parts, *A. persimilis* bears a strong superficial resemblance to both *A. chorisepala* and *A. urdanetensis*. From *A. chorisepala*, which is probably its closest ally, it differs in its leaves with 7–8 lateral veins each side of the midrib, calyx lobed roughly halfway to base, and the anticous lobe of the corolla only 5–6mm long (not 8–11mm). The corolla of *A. persimilis* is more cylindrical than funnel-shaped as in *A. chorisepala*, a character difficult to quantify. The geographic areas of the two species are not known to overlap.

On the other hand, *A. persimilis* and *A. urdanetensis* grow on the same mountains in the extreme north-east of Mindanao (Mt Hilong-hilong, and Mt Urdaneta in the Diuata Mountains). They are difficult to distinguish vegetatively, but are at once distinguishable in flower: the inflorescence of *A. persimilis* is borne on a long stout peduncle, and the calyx differs markedly in having a tube roughly as long as the lobes. Also, the annulus inside the corolla tube comprises a broad band of hairs (as in *A. chorisepala*) not discrete tufts as in *A. urdanetensis*.

**54. *Agalmyla bilirana*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. persimili* foliis venis lateralibus utrinque 5–7 (nec 7–8), pilis in pagina superiore 1.2–2mm longis sparsis sed supra costam densis (nec 2–3mm aliis alios obtegentibus), pagina inferiore venis praecipue costa exceptis fere glabra (nec densius pilosa), pilis in petiolo pedunculoque appressis (nec patentibus), calycis tubo 2–3mm longo (nec 3–4mm), lobis 2.2–3.3mm longis (nec 3.2–4.3mm) distinguenda.

Type: Philippine Islands, Biliran Island, Mt Suiro (northern slope), 880m, 5 v 1954, *Sulit* 5446, PNH 21614 (holo. L).

Epiphyte, main stem of indeterminate length, branching, c.6–8mm in diam. on flowering part, rooting along internodes, clad in acute  $\pm$  appressed hairs to 2–3mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves c.15–28  $\times$  11–20mm, blade ovate contracted into a short broad petiolar part, hairy as larger leaf; blade of largest developed leaves 80–150  $\times$  45–90mm, ovate or broadly elliptic, apex subacute, base more or less cuneate, oblique or not, shortly decurrent, margins coarsely serrate, serrations often slight, 5–7 lateral veins each side of midrib, looping near margin and linking to vein above (this sometimes obscure), upper surface with acute hairs to 1.2–2mm long thinly scattered on blade, dense over main veins or midrib only, lower surface with few hairs on blade, denser over veins, especially midrib, both surfaces dotted with minute globular glands when very young; petiole c.20–70mm long, clad in acute appressed hairs to 2mm long. *Inflorescence* a few (c.10)-flowered cymose cluster terminating a stout peduncle c.215–700mm long, clad in acute appressed hairs to 2–3mm long. *Bracts* (outermost pair) c.8–15  $\times$  6–10mm,  $\pm$  ovate contracted to a broad subpetiolar part, outside clad in acute appressed hairs to c.1mm long, inside few hairs to c.0.5mm long. *Pedicels* c.7–10mm long, clad in acute appressed hairs c.0.6mm long. *Calyx* tube 2–3mm long, lobes 5, subequal, 2.2–3.3  $\times$  2–3mm, broadly oblong-elliptic, apex rounded, outside clad in acute appressed hairs to c.0.3mm long, inside minute glands particularly on tube. *Corolla* 30–34mm long, tube 25–28mm long, narrowly funnel-shaped, arcuate, mouth more or less round, posticous lobes 4.2–6  $\times$  3.6–4.2mm, anticous lobe 5–7  $\times$  4–5.5mm, all broadly oblong-elliptic, rounded, corolla ‘red’, outside densely clad in acute hairs mostly to c.0.3mm long, to c.0.5mm on posticous side, and there sometimes a few gland-tipped hairs to 0.5–1.5mm long, lobes fringed with gland-tipped hairs to c.0.4mm long mixed with shorter acute ones, inside very minute acute hairs all over lobes, elsewhere minute globular glands above a broad band of gland-tipped hairs c.2mm long inserted c.7mm above base of tube, V-shaped flap of tissue between anticous filaments at point of insertion. *Stamens* 4, anticous filaments 12–14mm long inserted c.14–16mm above base of tube, anthers c.2.5mm long; lateral filaments 11–13mm long, inserted c.15–16mm above base of tube, anthers c.2.2mm long, all filaments glabrous, anthers scarcely exerted; staminode c.1.5mm long. *Disc* 1  $\times$  1.8mm. *Ovary* c.17–19  $\times$  1.3mm, glabrous. *Style* c.7–10mm long, glabrous. *Stigmatic lobes* c.2  $\times$  1.6mm, minutely papillose inside. *Capsules* not seen. **Fig. 18: 54a, b.**

PHILIPPINE ISLANDS. **Biliran.** Mt Suiro, northern slope, 1030m, 5 v 1954, *Sulit* 5470, PNH 21631 (L). Naval, Libtong, 13 viii 1992, *Barbon et al.* PPI 8615 (PNH).

*Agalmyla bilirana* is allied to *A. persimilis*, from which it differs in the appressed hairs on stem, petioles and peduncles, by its leaves with 5–7 lateral veins each side of the midrib, hairs on the upper surface sparse on the blade but dense over the midrib, 1.2–2mm long (not hairs overlapping each other, 2–3mm long), lower surface almost glabrous except over the veins, especially the midrib (not relatively densely hairy), and by the calyx being smaller in all its parts.

The species is known from three collections made on the island of Biliran, off the northern tip of Leyte and separated from it by a channel about 2km across at its narrowest. What may be no more than a variant of *A. bilirana* occurs on Leyte: four collections have been seen, namely Mt Lobi [11°02'N, 124°48'E, c.20km almost due east of Ormoc], 1250m, 7 xi 1999, *Mendum et al.* 99209 (E); Ormoc, Mt Janagdan [11°05'N, 124°44'E], 1190m, summit, 7 iv 1950 [fruit only], *Edaño* 2384, PNH 12021 (A, L, PNH, SING); *ibid.*, 866m, 6 iv 1950, *Edaño* 2360, PNH 12005 (A, L, PNH), and Mt Abucayan, ii 1923, *Edaño* BS 41784 (A, K, L, SING). We have not been able to trace the exact position of Mt Abucayan. Ormoc lies on the north-west coast about 50km almost due south of the nearest point on Biliran. The plant resembles *A. bilirana* in having appressed hairs on stem, petioles and peduncles, but these are generally shorter (stem to 0.8–1mm, not 2–3mm; petiole to 0.5–1.5mm, not 2mm; peduncle to 0.5–2mm, not 2–3mm), and the hairs on the leaves are not only shorter (to 0.5–0.8mm, not 1.2–2mm) but are sparser, being very nearly confined to the veins. On the other hand, the calyx tube may be longer (3–5mm) though the lobes are similar to those of *A. bilirana*.

**55. *Agalmyla glabra* (Merr.) Hilliard & B.L. Burtt, *comb. nov.***

Lectotype (chosen here): Philippines, Mindanao, Davao prov., Mt Apo, 6000ft, iv 1904, *Copeland* 998 (K).

Syn.: *Dichrotrichum glabrum* [Copel. ex] Merr. in Philipp. Gov. Lab. Bur. Bull. 17: 46 (1904).

*D. coriaceum* Merr. in Philipp. J. Sci. 20: 439 (1922). Type: Philippines, Mindanao, Bukidnon subprov., Mt Candon, c.1600m, 3 vii 1920, *Ramos & Edaño* BS 38924 (A, K).

Epiphyte, main stem of indeterminate length, branching, c.3–5mm in diam. on flowering part, rooting along internodes, clad in scattered acute hairs to c.0.8mm long, more or less appressed, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves c.8–13 × 2.5–8mm, blade elliptic or ovate, contracted into a petiolar part; blade of largest developed leaves 50–165 × 17–40(–58)mm, elliptic or narrowly obovate-elliptic, apex acute or subacute, base cuneate, shortly decurrent, margins coarsely serrate to subentire, lateral veins 5–7 each side of midrib, looping near margin and linking to vein above, this sometimes obscure, upper surface either glabrous except on midline or with scattered acute hairs to 0.7mm, lower

surface with acute hairs to 0.5mm mainly confined to veins, in extreme youth both surfaces clad in minute globular glands, later lower surface glandular-punctate (not always clearly visible); petiole (25–)36–75mm long, thinly clad in acute hairs to c.1mm long, more or less appressed. *Inflorescence* a several- to many-flowered cymose cluster terminating a stout peduncle c.150–580mm long, thinly clad in acute more or less appressed hairs to c.1mm long. *Bracts* (outermost pair) 7.5–10 × 4–8mm, ± ovate contracted to a broad subpetiolar part, outside a few acute hairs c.0.2–0.8mm long, longest at base, inside glabrous or sparsely hairy. *Pedicels* 10–14mm long, clad in acute hairs to 0.25mm long, appressed. *Calyx* tube 2.2–4.2mm long, lobes 5, subequal, 2–3.8 × 1.2–3mm, shorter than or about equalling the tube, more or less deltoid, apex obtuse, outside clad in strongly appressed acute hairs to c.0.2mm. *Corolla* 26–33mm long, tube 22–26mm, funnel-shaped, arcuate, mouth more or less round, posticous lobes 4–6 × 3.5–7.2mm, suborbicular, anticous lobe 4–7.5 × 3.5–8.5mm, broadly elliptic, corolla recorded as dark red, bright red, red-dish-orange, deep pink, outside thickly clad in acute hairs to c.0.2mm long, lobes fringed with acute hairs to 0.15–0.3mm long, occasionally some gland-tipped, inside acute hairs less than 0.1mm long all over lobes and tube above annulus, there mixed with minute gland-tipped hairs, annulus inserted c.4–6.5mm above base of tube, c.6.5mm long, composed of acute hairs (occasionally a few gland-tipped), hairs c.2–2.5mm long arranged in 5 broad longitudinal bands, small V-shaped flap of papillose tissue between the anticous filaments at point of insertion, papillae extending short way up floor of tube. *Stamens* 4, anticous filaments 13–18mm long, inserted 12–14mm above base of tube, anthers 2.2–2.8mm long, very shortly exerted; posticous filaments 11–16mm long, inserted 13–15mm above base, anthers 2–2.5mm long, scarcely exerted; all filaments glabrous; staminode c.1–3mm long. *Disc* c.1 × 2mm, cupular. *Ovary* c.15 × 1mm, glabrous. *Style* c.6mm long, glabrous. *Stigmatic lobes* c.2 × 2mm, inner face minutely papillose. *Capsules* c.150–250 × 2mm. *Seeds* c.1.4 × 0.2mm, appendages c.3mm long. **Fig. 18: 55a, b.**

PHILIPPINE ISLANDS. **Mindanao.** Bukidnon prov., Mt Katanglad, 2300m, 14 iv 1949, *Sulit* 3478, PNH 10128 (A, PNH); *ibid.*, 1800m, 16 ii 1949, *Sulit* 3083, PNH 9864 (A, L, PNH). Davao prov., Mt McKinley, 1890m, 4 ix 1946, *Edaño* PNH 1074 (A, L, PNH); *ibid.*, 24 viii 1946, *Edaño* PNH 1103 (PNH); *ibid.*, 2000m, 24 viii 1946, *Edaño* 1123 (PNH). Mt Apo, 1600m, 15 iii 1992, *Argent et al.* 92197, PPI 9701 (E, PNH); *ibid.*, 1160m, iv 1964, *Kellman* ANU 1673 (CANB, L, PNH); *ibid.*, v 1974, Univ. of San Carlos 534 (L); *ibid.*, viii 1909, *Elmer* 11555 (E, L). S Cotabato prov., T'Boli, Lake Parker, 1219m, viii 1993, *Gaerlan et al.* PPI 13036 (PNH).

The name *Dichrotrichum glabrum* was based on two syntypes, *De Vore & Hoover* 297, which has not been found (destroyed in the Manila fire?), and *Copeland* 998, a good flowering stem of which is in the Kew herbarium; this has been designated lectotype. Both syntypes came from Mt Apo (6°59'N, 125°16'E); there are several subsequent collections from that mountain, as well as from Mt Katanglad (8°06'N, 124°54'E), Mt McKinley in Davao Prov. (not traced) and from the far south of the

island, at Lake Parker (6°07'N, 124°54'E). A plant from Mt Matutum (6°22'N, 125°05'E) is discussed below.

Amongst its close allies, the diagnostic characters of *A. glabra* are its nearly glabrous stems and leaves, calyx tube about as long as the lobes, lobes broadest at the base (in contrast to those of *A. chorisepala*, broadest at or above the middle) and corolla clad outside in very short (to 0.2mm) acute hairs.

We have seen three poor specimens from Mt Matutum: *Gaerlan et al.* PPI 5190 (PNH) and PPI 5293 (PNH), and *Ramos & Edaño* BS 85095 (A). In the important character of the shape of the calyx lobes this plant resembles *A. glabra*; it differs in the longer hairs on the stem (1–2mm, not to 0.8mm), leaves mostly broader and hairier, and the hairs longer (1–1.2mm on upper surface (not 0.7mm), 1–2mm on lower surface (not 0.5mm)). *Ramos* BS 14483 (K, L), from Camaguin de Mindanao (island immediately north-west of Mindanao), differs from the specimens from Mt Matutum in having calyx lobes broadest in the upper half. More needs to be known about these plants.

**56. *Agalmyla rotundiloba*** Hilliard & B.L. Burt, **sp. nov.** ab *A. glabra* (Merr.) Hilliard & B.L. Burt foliis in pagina inferiore dense pubescentibus, pilis 1–1.5mm longis (nec pilis ad 0.5mm longis praecipue ad venas restrictis), calycis lobis 2.2–3 × 2.8–3.8mm subrotundis, semper latioribus quam longis (nec 2–3.8 × 1.2–3mm plus minusve deltoideis semper longioribus quam latis) extra pilis acutis c.0.6mm longis (nec tantum ad 0.2mm), corolla 36–38mm (nec 26–33mm) differt.

Type: Philippine Islands, Mindanao, Davao province, Mt Kampalili, summit, 750m, 22 iii 1949, *Edaño* 1044, PNH 11551 (holo. A; iso. PNH, L, the latter sterile).

Epiphyte, stems of indeterminate length, branched, rooting along internodes, 5–7mm in diam. on upper, flowering, part, densely clad in acute upward-pointing hairs 1–1.2mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, reduced leaves c.13–18 × 7–10mm, ovate, abruptly narrowed to a petiolar part; blade of largest developed leaves 85–150 × 35–70mm, elliptic, apex subacute, base cuneate, shortly decurrent, margins coarsely serrate to doubly serrate, lateral veins 6–7 each side of midrib, sharply ascending then looping near margin and linking to vein above, upper surface very sparsely hairy, hairs acute, to 1–1.5mm long, lower surface densely pubescent, especially over veins, hairs acute, to 1–1.5mm long, both surfaces sprinkled with minute, often amber-coloured, globular glands; petiole 50–90mm long, densely clad in acute upward-pointing hairs to 1–1.5mm long. *Inflorescence* a several-flowered cyme terminating a stout peduncle c.380–410mm long, clad in acute appressed hairs 1–2mm long. *Bracts* (outermost pair) 8.5–13 × 6–7.2mm, more or less ovate, abruptly contracted to a broad petiolar part, both surfaces thickly clad in acute hairs to c.0.8mm long. *Pedicels* c.15–20mm long. *Calyx* tube c.4mm long, lobes subequal, 2.2–3 × 2.8–3.8mm, suborbicular, outside strongly appressed acute hairs to 0.6mm long, lobes minutely fringed, inside very minutely glandular. *Corolla* c.36–38mm long, tube 27–31mm, funnel-shaped, arcuate, mouth

more or less round, posticous lobes c.7 × 8mm, subrotund, anticous lobe c.8 × 8mm, subrotund, corolla recorded as 'pink' and 'dark brown', outside thickly clad in acute hairs to 0.25mm long, on posticous side acute hairs to c.0.5mm mixed with few gland-tipped hairs to c.0.8mm long, lobes fringed with acute hairs to c.0.2mm together with scattered gland-tipped hairs to 0.4mm, inside very minute glandular hairs all over mixed with very minute acute hairs on upper part of lobes, annulus inserted c.7mm above base of tube, composed of acute hairs c.2mm long arranged in 5 longitudinal bands c.4mm deep, 2 small V-shaped flaps of papillose tissue between anticous filaments at point of insertion. *Stamens* 4, anticous filaments c.20mm long, inserted c.14mm above base of tube, anthers 3mm long, not exceeding the posticous lobes; posticous filaments c.18mm long, inserted c.15mm above base of tube, anthers 2.8mm long; all filaments glabrous; staminode c.1mm long. *Disc* 1.2 × 2.5mm, cupular, rim more or less crenulate. *Ovary* c.23 × 1.2mm, glabrous. *Style* c.10mm long, glabrous. *Stigmatic lobes* c.2.5 × 2.3mm, minutely papillose on inner face. *Capsules* either very young or old and reduced to few shreds. **Fig. 18: 56a, b.**

PHILIPPINE ISLANDS. **Mindanao.** Davao province, Mt Kampalili, summit, 750m, 23 iii 1949, *Edaño* 1092, PNH 11569 (A, PNH).

*Agalmyla rotundiloba* is distinguished from *A. glabra* by its leaves with the lower surface densely pubescent, the hairs 1–1.5mm long, and calyx lobes subrotund, always broader than long (not more or less deltoid, always longer than broad). The hairs on the outside of the calyx are longer, and those on the outside of the corolla tube, particularly on the posticous side, include some with glandular tips.

Edaño gave no information on the habit or habitat of the plant, but it is clearly a climber on the trunks of forest trees.

**57. *Agalmyla elongata* (Blume) B.L. Burtt in Blumea 44: 383 (1999).**

Neotype: Moluccas, Ternate, viii 1821, *Reinwardt* (L, 903310-58).

Syn.: *Tromsdorffia* ? *elongata* Blume, *Bijdr.* 14: 763 (1826).

*Morstdorffia elongata* (Blume) Steud., *Nomencl.* ed. 2, 2: 162 (1841).

*Liebigia* ? *elongata* (Blume) A. DC., *Prodr.* 9: 259 (1845).

*Dichrotrichum ternateum* [Reinw. ex] de Vriese, *Pl. Ind. Bat. Or.* 7: tabs 1–2 (1856); Belg. Hort. xxi: 353 (1871); C.B. Clarke in A. & C. DC., *Mon. Phan.* 5(1): 53 (1883); Hook.f. in *Bot. Mag.* 110: tab. 6791 (1884). Type: the neotype of *A. elongata*.

*D. elongatum* (Blume) Vill. in Blanco, *Fl. Filip.* ed. 3, 4: *Noviss. App.* 150 (1880).

Coarse epiphytic climber, stems branching, of indeterminate length (2–15m recorded), c.5–10mm in diam. on flowering part, rooting along internodes, densely pubescent, hairs mainly acute, 1.5–3mm long, sometimes mixed with gland-tipped hairs near apex, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, the small leaf soon caducous, c.10–35 × 3–16mm, more or less lanceolate, hairy as developed leaves; blade of largest leaves 85–230 × 65–170mm, usually ovate, elliptic

on Bacan, apex acute, base usually rounded, cuneate when leaf elliptic, equal or unequal, margins coarsely serrate or doubly serrate, 7–8 lateral veins each side of midrib, looping near margin and linking to vein above, upper surface clad in acute hairs to 1–2mm long, somewhat scattered, lower surface densely pubescent, hairs finer than those above; petiole 45–125mm long, clad in acute hairs to 1.5–3mm long. *Inflorescence* a crowded several- to many-flowered axillary cyme, peduncle 250–370mm long, stout, clad in acute hairs c.0.1–0.2mm long together with scattered hairs 2–4mm long. *Bracts* (lowermost) c.7–20 × 2–6mm, elliptic or elliptic-lanceolate, both surfaces clad in acute hairs to 0.4–1mm long. *Pedicels* 7–20mm long, clad in acute upward-pointing hairs 0.1–0.5mm long. *Calyx* tube 3.5–4mm long, lobes 5, subequal, 2.2–4.2 × 1.5–3mm, roughly deltoid, apex furnished with a stout blunt gland, outside covered in minute globular glands together with appressed acute hairs to c.0.1mm together with scattered ones c.0.25–0.5mm long, inside globular glands only. *Corolla* 25–47mm long, tube 19–37mm, funnel-shaped, slightly arcuate, mouth more or less round, posticous lobes 5.5–11 × 3–5.5mm, oblong-elliptic, anticous lobe 8–12 × 3.6–6mm, elliptic, corolla ‘red’, outside densely pubescent almost to base, hairs 0.1–0.2mm long, acute, sometimes (Bacan) with gland-tipped hairs to 0.5–0.8mm long on posticous side, lobes fringed with acute hairs to c.0.2mm long mixed with gland-tipped ones to 0.4mm long, inside very minutely pubescent, hairs acute, inside tube scattered globular glands, densely papillose patch at point of insertion of anticous filaments raised at base into two small flaps, 5 tufts of acute hairs 1.5–2mm long inserted c.4–8mm above base of tube. *Stamens* 4, anticous filaments 10–25mm long inserted 8–22mm above base of tube, anthers 2.4–3mm long, not or scarcely exceeding posticous lip; posticous filaments 8–20mm long, inserted 8.5–22mm above base of tube, anthers 2.2–2.8mm long; all filaments glabrous; staminode c.0.8–3mm long. *Disc* c.1 × 2mm, cupular, rim crenulate. *Ovary* c.15–37 × 1mm, either glabrous or a few globular glands scattered on upper part, rarely all over except on stipe. *Style* c.2–5mm long, few scattered globular glands, rarely a few acute hairs as well. *Stigmatic lobes* c.2 × 2mm, papillose on inner face, minute globular glands outside. *Capsules* 150–260 × 1.5–2mm, glabrous. *Seeds* 1 × 0.2mm, appendages c.3.5mm long. **Fig. 18: 57a, b.**

MOLUCCAS. **Morotai.** Gunung Pare Pare, 1000m, 28 v 1949, *Kostermans* 1302 (A, BO, K, L, SING); *ibid.*, 27 v 1949, *Kostermans* 1195 (L). **Ternate.** 1857–1861, *de Vriese* 32 a, b (L); 1859–1860, *Teijsmann* s.n. (L); sine coll., Hort. Bog. 5214 (U); Gunung Aki Abdas, 30 viii 1951, *Idjan & Mochtar* 12 (K, L); Kei Doehoe (Piek van Ternate), 26 ii 1938, *Anang* 3 (L); *Steen* s.n. (MICH). **Tidore.** Gunung Mala-Mala, 7 vii 1926, *Lam* 3687 (K, L). **Makian.** 1000m, 30 v 1940, *Curran* 3490 (A). **Bacan.** Gunung Sibela near Waiaua, 900m, 20 x 1974, *de Vogel* 3533 (L).

Typical *A. elongata* has leaves hairy on both surfaces, the hairs fine and dense on the lower surface, and the peduncles have a double indumentum of very short hairs (c.0.1–0.2mm) together with much longer (2–3mm) scattered ones; such plants occur on Ternate, Tidore, Makian and Bacan, all off the east coast of Halmahera (no specimens have been seen from Halmahera itself).

Two specimens from Morotai, off the north-east coast of Halmahera (*Kostermans* 1302 and 1195, cited above), differ slightly in having the lower leaf surfaces more sparsely hairy, and the calyx tube is shorter (c.2.5mm). *Kostermans* 1131 (AB, BO, K, L), also from Gunung Pare Pare and collected at the same time as nos. 1195 and 1302, is probably an undescribed species, but the material is inadequate to typify a name as there are no flowers, only young buds (however, *Kostermans* described the flowers as 'lila', a most unusual colour in *Agalmyla*) and old shredded fruits. Stems, petioles and peduncles are thickly clad in glandular hairs to 5–6mm long; these are also present on the upper surface of the leaf and along the margins, mixed with acute hairs; on the lower surface, hairs are nearly confined to the main veins; lateral veins 9–10 each side of midrib. The calyx tube is about 4mm long (measured on a fruit).

The typification of the basionym and the proposal of a neotype (as cited above) was dealt with in our previous paper (Hilliard & Burtt, 1999: 383).

*Key to species in New Guinea*  
(mainly Section *Dichrotrichum*, Part 2)

Note: Calyx tube measured *inside*; corolla length measured from top of posticous lobes to base, tube from sinus between posticous and lateral lobes to base, all on rehydrated material.

- 1a. No annulus inside corolla tube (Sect. *Exannularia*) \_\_\_\_\_ 2
- 1b. Annulus present inside corolla tube (Sect. *Dichrotrichum*) \_\_\_\_\_ 3
- 2a. Plant epiphytic, climbing, leaves strongly anisophyllous, corolla distinctly 2-lipped, anthers scarcely exerted. (Wandammen Peninsula) \_\_\_\_\_ **36. A. roseoflava**
- 2b. Plant terrestrial, erect, one leaf of each pair roughly half size of other, corolla regular, anthers far exerted. (Vogelkop) \_\_\_\_\_ **42. A. singularis**
- 3a. Lower third or half of corolla tube exceptionally narrow (c.1.5mm diam. when hydrated), annulus reduced to longitudinal lines of hairs to c.0.2mm long. (Nassau Mts to Snow Mts) \_\_\_\_\_ **82. A. stenosiphon**
- 3b. Lower part of corolla tube not exceptionally narrow, annulus composed of 5 tufts, 5 longitudinal bands, or circlet of hairs mostly at least 0.8mm long \_ 4
- 4a. Gynoecium clad in minute globular glands or glabrous \_\_\_\_\_ 5
- 4b. Gynoecium with few to many hairs at least on style, often over whole ovary excluding stipe (globular glands may be present as well) \_\_\_\_\_ 33
- 5a. On inside of anticous lobe of corolla, hairs defining median vein separated by glabrous bands from those defining the 2 lateral veins, these hairs merging with those around periphery of lobe. (Papua New Guinea, north of Central Range, Hunsteinspitze) \_\_\_\_\_ **83. A. lobata**



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- 5b. Inside of anticous lobe hairy all over \_\_\_\_\_ 6
- 6a. Corolla limb small, lobes apparently often directed forwards, posticous lobes of the order 2–5mm long, anticous lobe 4.5–8mm, peduncle at least 70mm long (except in 67. *A. pauciflora*, 4–55mm, and in 80. *A. brevipes*, 25–45mm) \_\_\_\_\_ 7
- 6b. Corolla limb large, lobes spreading, posticous lobes of the order 5–12mm long, anticous lobe 7–14mm, peduncle very variable in length, from almost wanting to 500mm \_\_\_\_\_ 17
- 7a. Peduncle 4–55mm long \_\_\_\_\_ 8
- 7b. Peduncle at least 70–350mm long \_\_\_\_\_ 9
- 8a. Hairs on calyx acute, corolla lobes directed forwards, on outside of corolla gland-tipped hairs to 1–2mm long on posticous side, elsewhere acute hairs to 1mm. (Owen Stanley Range) \_\_\_\_\_ **67. *A. pauciflora***
- 8b. Hairs on calyx often mixed gland-tipped and acute, corolla lobes spreading, on outside of corolla hairs mostly acute, to 0.5mm on posticous side, to 0.1–0.2mm elsewhere, occasionally some hairs on posticous side gland-tipped. (Vogelkop) \_\_\_\_\_ **80. *A. brevipes***
- 9a. Hairs on calyx to 2mm long, more or less evenly distributed on tube and lobes, at least 0.5mm on margins of lobes \_\_\_\_\_ 10
- 9b. Hairs on calyx to 1.5mm long, often to only 1.2mm, mostly median on lobes and sometimes long hairs scattered among much shorter ones, to only 0.1–0.2mm on margins \_\_\_\_\_ 12
- 10a. Leaves with 4–5 lateral veins each side of midrib, calyx tube 2.4–3mm long, corolla 20–30mm long, acute hairs only outside, lobes fringed with acute or gland-tipped hairs. (Southern foothills of Bismarck Range to environs of Okapa) \_\_\_\_\_ **61. *A. minor***
- 10b. Leaves with 6–8 lateral veins each side of midrib, calyx tube 3–5.5mm long, corolla 30–40mm long, outside gland-tipped hairs at least on posticous side, lobes fringed with gland-tipped hairs \_\_\_\_\_ 11
- 11a. Base of leaf usually rather abruptly narrowly cuneate then markedly decurrent for 10–20mm, petioles of mature leaves 28–30mm long, calyx lobes broadest at base, entire, hairs on outside of calyx not markedly patent. (Papua New Guinea, roughly Mt Piora to Mt Scratchley) – **64. *A. schlechteri***
- 11b. Base of leaf cuneate, not markedly decurrent, petioles of mature leaves 35–80mm long, calyx lobes broadened at the tips, margins there often with 1 or 2 small teeth, hairs on outside of calyx strongly patent. (Inland from Morobe and in environs Waria river) \_\_\_\_\_ **65. *A. villosa***

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- 12a. Calyx c.4.5mm long, lobes deltoid, sharply acute. (Vogelkop) \_\_\_\_\_  
 \_\_\_\_\_ **59. *A. aitinyuensis***
- 12b. Calyx c.6–12mm long, lobes oblong, spatulate or deltoid, always obtuse or  
 subobtuse \_\_\_\_\_ 13
- 13a. Calyx lobes more or less oblong or spatulate \_\_\_\_\_ 14
- 13b. Calyx lobes deltoid \_\_\_\_\_ 15
- 14a. Calyx c.6mm long, leaves densely hairy. (Wandammen Peninsula) \_\_\_\_\_  
 \_\_\_\_\_ **58. *A. wondiwoiana***
- 14b. Calyx c.10mm long, leaves thinly hairy especially on blade of lower surface  
 (veins densely hairy). (Owen Stanley Range) \_\_\_\_\_ **66. *A. sp. nov.***
- 15a. Leaves with 4 lateral veins each side of midrib, corolla orange. (Central  
 Papua New Guinea) \_\_\_\_\_ **63. *A. aurantiaca***
- 15b. Leaves with 5–8 lateral veins each side of midrib, corolla orange-red to deep  
 red \_\_\_\_\_ 16
- 16a. Lateral veins 5–6 each side of midrib, calyx clad in acute hairs to 1–1.2mm  
 long, 0.2–0.25mm on margins but longer at tips, corolla clad in acute hairs  
 only, mostly to 0.25mm, occasionally some to 0.5mm on posticous side.  
 (Papua New Guinea, roughly Okapa to Mt Dilmargi) — **60. *A. porrectiloba***
- 16b. Lateral veins 6–8 each side of midrib, calyx clad in acute hairs to 0.2–0.8mm  
 long, to 0.15mm on margins, corolla clad in acute hairs to 0.5–0.8mm,  
 together with gland-tipped hairs to 0.4–1.5mm on posticous side, lobes  
 fringed with gland-tipped hairs to 0.2–0.4mm. (Central Papua New Guinea)  
 \_\_\_\_\_ **62. *A. hooglenii***
- 17a. Leaves with distinctly 3-lobed apex and 2–3 coarse teeth each side on lower  
 part, lateral veins 3 each side of midrib. (Vogelkop) \_\_\_\_\_ **73. *A. angiensis***
- 17b. Leaves neither distinctly 3-lobed at apex nor so few teeth in lower part,  
 lateral veins 3–10 \_\_\_\_\_ 18
- 18a. Calyx tube c.1mm long, inflorescence almost sessile. (Nassau Mts) \_\_\_\_\_  
 \_\_\_\_\_ **74. *A. paromoia***
- 18b. Calyx tube at least 3mm long, inflorescence almost sessile to long-  
 pedunculate \_\_\_\_\_ 19
- 19a. Peduncle c.2–5mm long, calyx tube c.3mm, lobes 7–9mm, clad in appressed  
 hairs to 1.2mm. (Vogelkop) \_\_\_\_\_ **78. *A. tamrauana***
- 19b. Peduncles 5–400mm long, calyx differing in detail from description above \_  
 \_\_\_\_\_ 20
- 20a. Leaves with (7–)9–10 lateral veins each side of midrib, upper leaf surface

- either glabrous or with well-scattered hairs to 1mm long, base of leaf remarkably narrowed and long-attenuate. (Vogelkop) – **79. *A. longiattenuata***
- 20b. Leaves with 3–8 lateral veins each side of midrib, upper leaf surface with well-scattered to dense hairs, base varying from rounded to cuneate \_\_\_\_\_ 21
- 21a. Calyx lobes 9–15mm long, corolla lavender-coloured. (Papua New Guinea, Frieda river, 4°40'S, 142°E) \_\_\_\_\_ **71. *A. lavandulacea***
- 21b. Calyx lobes 2.5–8mm long, corolla shades of red \_\_\_\_\_ 22
- 22a. Leaves with 3–4 lateral veins each side of midrib \_\_\_\_\_ 23
- 22b. Leaves with 5–8 lateral veins each side of midrib \_\_\_\_\_ 25
- 23a. Hairs on stem to 4–5mm long, hairs on calyx to 3mm. (Vogelkop) \_\_\_\_\_ **76. *A. hirta***
- 23b. Hairs on stem to 2–3mm long, hairs on calyx to 1–2mm \_\_\_\_\_ 24
- 24a. Peduncle c.100–235mm long, calyx lobes more or less deltoid. (Saruwaged Range and Huon Peninsula) \_\_\_\_\_ **69. *A. keysseri***
- 24b. Peduncle c.10–33mm long, calyx lobes more or less oblong. (Vogelkop) \_\_\_\_\_ **75. *A. dentatisepala***
- 25a. Corolla clad in acute hairs only, to 0.7–0.8mm on posticous side, c.0.25mm fringing margins of lobes. (Papua New Guinea, Mt Bosavi) – **72. *A. centralis***
- 25b. Corolla mostly with gland-tipped hairs on posticous side as well as acute hairs elsewhere, lobes always fringed with gland-tipped hairs \_\_\_\_\_ 26
- 26a. Leaf blade on both surfaces scantily hairy, the lower surface sometimes nearly glabrous. (Karkar Island, New Britain, New Ireland and Lihir Island) \_\_\_\_\_ **70. *A. insularis***
- 26b. Leaf blade on both surfaces more or less densely hairy (hairs sometimes sparse in 68. *A. macrocolon*) \_\_\_\_\_ 27
- 27a. Calyx, including margins of lobes, clad in acute hairs to c.0.2mm long, together with patent hairs to 1–2mm long plentiful on tube, becoming median on lobes, lobes broadly oblong with rounded tips. (Cyclops Mts) \_\_\_\_\_ **84. *A. triflora***
- 27b. Calyx not as described above: hairs not median on lobes, short hairs underlying long ones on tube wanting, lobes more or less deltoid to more or less narrowly oblong to broadly so in 68. *A. macrocolon* \_\_\_\_\_ 28
- 28a. At least anticous anthers shortly exceeding posticous lobes \_\_\_\_\_ 29
- 28b. Anthers not exceeding posticous lobes \_\_\_\_\_ 30
- 29a. Peduncle 25–45mm long, long delicate gland-tipped hairs usually mixed with acute hairs on stem, leaves (mainly upper margins), peduncle, bracts and calyx, outside of corolla clad in acute hairs mostly 0.1–0.2mm long,

- sometimes to 0.5mm on posticous side, these longer hairs sometimes gland-tipped. (Vogelkop) \_\_\_\_\_ **80. A. brevipes**
- 29b. Peduncle 100–300mm long, only acute hairs on vegetative parts, outside of corolla clad in acute hairs to 1mm long, gland-tipped hairs to 1mm long on posticous side. (Nassau Mts and Central Mts) \_\_\_\_\_ **81. A. parvifolia**
- 30a. Corolla tube 28–46mm long, anticous lobe 13–19mm, outside of corolla clad in acute hairs to 0.2–0.5mm long. (Nassau Mts to Snow Mts) \_\_\_\_\_ **87. A. valetonia**
- 30b. Corolla tube 19–30mm long, anticous lobe to 12mm, outside of corolla clad in acute hairs to 1mm long together with gland-tipped hairs to 0.6–1.5mm \_\_\_\_\_ 31
- 31a. Corolla clad in gland-tipped hairs to 1.5mm long together with much shorter acute ones, calyx hairs to 3mm long, acute. (Vogelkop) – **77. A. wekariensis**
- 31b. Corolla hairs mainly acute, to 1mm long, gland-tipped hairs to 0.6–1mm on posticous side, calyx hairs to 1–2mm long \_\_\_\_\_ 32
- 32a. Calyx lobes oblong (see Fig. 20: 68b), peduncles 5–75mm long. (Fergusson Island, Normanby Island and Rossel Island) \_\_\_\_\_ **68. A. macrocolon**
- 32b. Calyx lobes deltoid (see Fig. 20: 69b), peduncles 100–235mm long. (Saruwaged Mts and Huon Peninsula) \_\_\_\_\_ **69. A. keysseri**
- 33a. Hairs on stems, leaves, petioles, peduncles and bracts strongly appressed, veins on leaves prominent especially on lower surface, peduncle c.2–8mm long, outermost bracts 23–35 × 7–10mm, prominently 3–5-veined on lower surface. (South-central Papua New Guinea, Mt Bosavi – Lake Kutubu area) \_\_\_\_\_ **94. A. nervosa**
- 33b. Plant not as described above, particularly bracts smaller and not prominently veined, peduncles mostly longer \_\_\_\_\_ 34
- 34a. Both leaf surfaces very sparsely hairy, hairs to 0.5mm long, peduncle sparsely appressed-hairy, hairs to 1mm, calyx sparsely hairy, hairs to 0.25mm. (Western New Guinea, Gautier Mts) \_\_\_\_\_ **92. A. gjellerupii**
- 34b. Leaves sparsely to densely hairy, hairs mostly at least 1.5mm long, hairs on peduncles patent, to 1.5–6mm long, calyx with plentiful hairs at least 0.5mm long \_\_\_\_\_ 35
- 35a. Peduncles clad in both gland-tipped and acute hairs, gland-tipped hairs also often present on upper margins of leaves, particularly young leaves \_\_\_\_\_ 36
- 35b. Peduncles clad in acute hairs only, leaves mostly acute hairs only, a few at the tips of young leaves of 95. *A. formosa* gland-tipped \_\_\_\_\_ 38
- 36a. Gynoecium clad in hairs to 1–1.5mm long, few to many of them gland-tipped. (Vogelkop) \_\_\_\_\_ **96. A. similis**
- 36b. Gynoecium clad in acute hairs only to 0.25–0.3mm long (globular glands also present) \_\_\_\_\_ 37

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- 37a. Corolla c.32mm long, calyx clad outside in spreading acute hairs to 1mm long all over tube and along median part of lobes, intermingled with much shorter hairs. (Western New Guinea, Ruffaer river) \_\_\_\_\_ **86. *A. glandulosa***
- 37b. Corolla c.53–56mm long, calyx thickly clad outside in acute appressed hairs to 0.5mm long. (North of Fak-Fak) \_\_\_\_\_ **88. *A. kowapiana***
- 38a. Calyx clad in patent acute hairs to 3–4mm long. (Wide area around Lake Kutubu) \_\_\_\_\_ **95. *A. formosa***
- 38b. Hairs on calyx up to c.2.2mm long \_\_\_\_\_ 39
- 39a. Calyx clad all over in acute hairs to 1.2–2.2mm long, not much shorter on margins of lobes \_\_\_\_\_ 40
- 39b. Calyx clad either in a mixture of very short hairs with longer ones to 0.6–1.5mm scattered among them (or, in 91. *A. multiflora*, no specimen seen, calyx described as puberulous, so uniformly short hairs assumed), hairs to 0.2–0.25mm long on margins of lobes \_\_\_\_\_ 41
- 40a. Stem clad in hairs to 3–4mm long, hairs on petiole to 1.5–3mm, upward-pointing, peduncle well clad in patent acute hairs to 1.5–4mm, outermost bracts 7–11 × 2.5–4.5mm, clad in hairs 1–1.5mm long. (Nassau Mts and Snow Mts) \_\_\_\_\_ **87. *A. valetonia***
- 40b. Stem clad in hairs 4–7mm long, hairs on petiole 3.5–5mm, patent, peduncle clad in scattered patent acute hairs to 3.5–5mm underlain by very short (to 0.5mm) hairs, these often sparse, outermost bracts 9–19 × 6–13mm, clad in hairs 1.7–2.5mm long. (Papua New Guinea, Central Range and Victor Emmanuel Range) \_\_\_\_\_ **93. *A. chryostyla***
- 41a. Calyx puberulous (*e descr.*, therefore hairs assumed to be all short). (South of Nabire, SE Geelvink Bay) \_\_\_\_\_ **91. *A. multiflora***
- 41b. Calyx clad in a mixture of very short hairs with much longer ones scattered among them \_\_\_\_\_ 42
- 42a. Hairs (as opposed to globular glands) on gynoecium confined to backs of stigmatic lobes and style, rarely just descending onto top of ovary, calyx lobes always broadest in upper part. (Cyclops Mts) \_\_\_\_\_ **84. *A. triflora***
- 42b. Gynoecium hairy all over, calyx lobes usually broadest at base, only occasionally broadened at tips \_\_\_\_\_ 43
- 43a. Corolla c.34mm long, anticous lobe c.8mm. (Papua New Guinea, en route Feramin–Telefomin) \_\_\_\_\_ **85. *A. gracilis***
- 43b. Corolla c.40–60mm long, anticous lobe 9–17mm \_\_\_\_\_ 44
- 44a. Base of leaf normally cuneate and shortly decurrent, each lateral vein clearly linked to vein above near margin, both leaf surfaces densely hairy, peduncle 115–630mm long, clad in scattered hairs to 2–5mm underlain by crowded,

much shorter, hairs c.0.15–0.3mm, outside of corolla thickly clad in acute hairs to 0.25–0.5mm long, lobes fringed with gland-tipped hairs to 0.25–0.6mm often mixed with acute ones. (Papua New Guinea, central spine of mountains from Bismarck Range to Owen Stanley Range, possibly also Yapen Island, West New Guinea) \_\_\_\_\_ **89. *A. chalmersii***

- 44b. Base of leaf varying from rounded to cuneate, each lateral vein only weakly linked to vein above, leaf surfaces thickly to thinly hairy but blade always clearly visible, peduncle 10–190mm long, thinly to thickly clad in hairs 2.5–5mm long, very short underlying hairs sparse or wanting, outside of corolla thickly clad in acute hairs to 0.2–0.5mm long, often a few gland-tipped hairs to 0.6–0.7mm on posticous side, lobes fringed with gland-tipped hairs to 0.4–0.5mm. (Papua New Guinea, coastal ranges from Bewani Mts to Prince Alexander Range) \_\_\_\_\_ **90. *A. elegans***

**58. *Agalmyla wondiwoiana*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. elongata* folio redacto utriusque paris persistente (nec mox caduco), lamina foliorum maximorum 63–82 × 40–53mm (nec 85–230 × 65–170mm), venis lateralibus utrinsecus costae 4–5 (nec 7–8), calycis lobis oblongis obtusis (nec deltoideis acutis) differt.

Type: West New Guinea, Wandammen Peninsula, Wondiwoi Mountains, 1225m, 4 iii 1962, *Koster* BW 13690 (holo. L, iso. CANB).

Epiphyte, stems of indeterminate length, sparingly branched, c.4mm in diam. on flowering part, rooting along internodes, thickly clad in spreading acute hairs to 2.5–3mm long, bark pale, glossy, brittle. *Leaves* opposite, anisophyllous, reduced leaves persistent, blade 16–30 × 12–25mm, ovate, contracted to a petiolar part 5–12mm long; blade of largest developed leaves 63–82 × 40–53mm, ovate to ovate-elliptic, apex acute, base more or less rounded then abruptly and shortly cuneate, margins coarsely serrate, 4–5 lateral veins each side of midrib, sharply ascending, looping near margin and merging with it, upper surface thickly clad in acute hairs to c.1.2mm long, lower surface similar, hairs over veins to 1.5mm long; petiole 25–40mm long, thickly clad in acute upward-pointing hairs to 2mm long. *Inflorescence* a 5–9-flowered cymose cluster, peduncle 95–250mm long, clad in acute hairs to 2.5–3mm long together with much shorter hairs. *Bracts* (outermost, few seen) 4–6 × 1.2mm, elliptic, clad in acute hairs to 1mm. *Pedicels* 7–10mm long, clad in acute spreading hairs 0.8–1mm long scattered among much shorter ones. *Calyx* tube 2.5–3mm long, lobes 5, subequal, 1.7–3 × 1.25–1.8mm, more or less oblong or tips slightly broadened, obtuse, margins entire or obscurely toothed near apex, outside well clad in short acute hairs, hairs to 0.7–1mm long scattered among them, on lobes these long hairs more or less median, mostly less than 0.2mm long on margins, inside scattered minute globular glands. *Corolla* 24–27mm long, tube 20–21mm, cylindric near base, soon narrowly funnel-shaped, slightly curved, mouth more or less round, posticous lobes 3.5–5.5 × 3–3.5mm, more or less oblong, upper

part subround, anticous lobe 5–8 × 3.2–4.2mm, elliptic, corolla ‘red’ or ‘orange-red’, outside thickly clad in acute hairs to 0.3mm long (longest on posticous side), gland-tipped hairs to 0.5mm on posticous side near apex, lobes fringed with gland-tipped hairs to 0.3mm long, inside lobes acute hairs to 0.1mm long, scattered globular glands inside tube, palate of globose papillae extending from base of anticous lip to insertion of filaments, annulus inserted c.5mm from base of tube, extending upwards for c.8mm, acute hairs to 1mm long near base, there crowded, decreasing upwards to c.0.4mm and thinning out into 5 longitudinal bands. *Stamens* 4, anticous filaments 11–13mm long, inserted 11–12mm above base of tube, anthers 2.2–2.5mm long, shortly exceeding posticous lobes; posticous filaments 10–11mm long, inserted c.12mm above base, anthers 2–2.2mm long, about equalling posticous lobes; all filaments with a few minute globular glands near base; staminode 0.5–1mm long. *Disc* 0.5 × 1.8mm, cupular, rim crenulate. *Ovary* c.27 × 1.3mm, stipitate, few minute globular glands near apex. *Style* c.4.5mm long (♀ phase) with scattered globular glands. *Stigmatic lobes* 2 × 1.8mm (♀ phase), scattered globular glands outside, few minute acute hairs on margins in early stage of development. *Capsule* c.140mm long (only 2 shredded ones seen). *Seeds* 1.3 × 0.2mm, appendages c.3mm long. **Fig. 19: 58a–c.**

WEST NEW GUINEA. Wandammen Peninsula, Wondiwoi Mountains, 1100m, 4 iii 1962, *Schram* BW 13322 (L); *ibid.*, 750m, 7 iii 1962, *Schram* BW 13394 (L).

The relationship of *A. wondiwoiana* possibly lies with *A. elongata*, from the Moluccan islands of Morotai, Ternate, Tidore, Makian and Bacan, lying off the northern and western coasts of Halmahera, away to the north-west of the Vogelkop Peninsula of Western New Guinea. A striking feature of *A. wondiwoiana* is the persistent reduced leaves, each roughly one third to one half as long as the developed leaf of each pair: reduced leaves are soon caducous in *A. elongata*. The developed leaves are smaller than those of *A. elongata*, with shorter petioles and only 4–5 lateral veins each side of the midrib; also, the leaves are more densely pubescent above, a character easy to see but difficult to quantify. The two species differ further in the shape of the calyx lobes, roughly oblong and obtuse in *A. wondiwoiana*, deltoid and acute in *A. elongata*.

*Agalmyla wondiwoiana* is known only from a small area of the Wondiwoi Mountains, which form the backbone of the Wandammen Peninsula on the western side of Geelfink Bay, Western New Guinea, where Schram and Koster, who must have been working together, found it in montane forest between 750 and 1225m above sea level. The geographically closest species that somewhat resembles *A. wondiwoiana* is *A. multiflora* (known to us only from the original description and accompanying line drawings) from Dallman [Dalman], c.50km south of Nabire, at the head of Geelfink Bay, altitude 500m. The drawing shows a piece of villous stem with the reduced leaf of each pair persistent, developed leaves ovate, shortly petiolate, 5 pairs of lateral veins, both surfaces described as *subdense hirsuta* (densely pubescent in *A. wondiwoiana*), the calyx divided roughly halfway, lobes described as oblong,

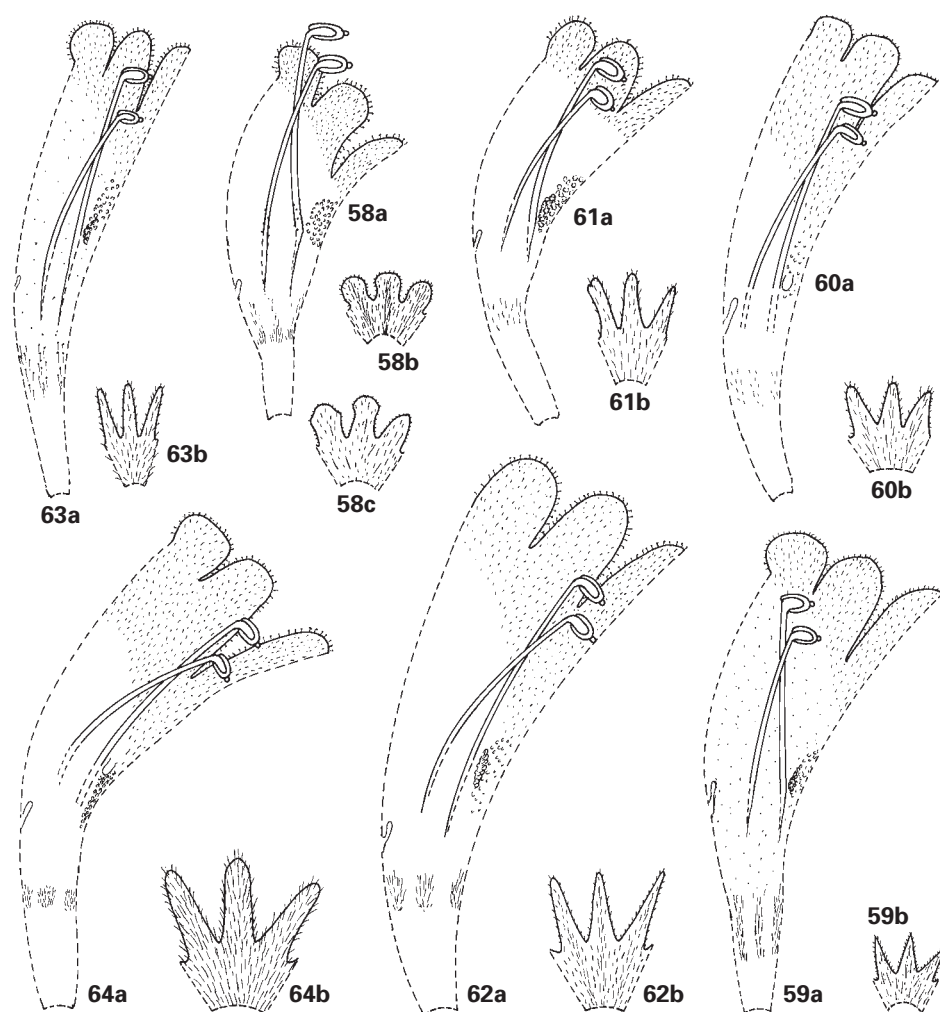


FIG. 19. Part of calyx and longitudinal section of corolla: 58a–c, *Agalmyla wondiwoiana*; 59a, b, *A. aitinyuensis*; 60a, b, *A. porrectiloba*; 61a, b, *A. minor*; 62a, b, *A. hooglenii*; 63a, b, *A. aurantiaca*; 64a, b, *A. schlechteri*. All  $\times 2$ .

obtuse, but illustrated as deltoid, subacute. The striking differences from *A. wondiwoiana* are the many-flowered cyme on a peduncle only 35mm long, corolla 45mm long, and ovary and style shortly pubescent. The drawing of the floral parts of *A. multiflora* is crude, but the stamens appear to be shorter than the posticous lip, and they are so described.

See also 59. *A. aitinyuensis*, which has leaves similar to those of *A. wondiwoiana*.

**59. *Agalmyla aitinyuensis*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. porrectiloba* foliis haud profunde serratis basi rotundatis apice sine lobo distincto (nec foliis grosse



serratis, basi cuneatis, apice lobo deltoideo distincto), calycis tubo 2mm longo (nec 2.5–4mm), lobis 1.8–2.5mm longis, abrupte acutis (nec 2.2–6.2mm, obtusis) differt. Type: West New Guinea, Vogelkop Peninsula, Aitinjoe [Atinju, Atinyu], 250m, 12 v 1958, *Versteegh* BW 7408 (holo. L).

Epiphyte, stems of indeterminate length, loosely branched, c.3–5mm in diam. on flowering part, rooting along internodes, thickly clad in acute patent hairs to 2–3mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 6–10 × 5–8mm, ovate, hairy as developed leaves, petiole 3–5mm long; blade of largest developed leaves 55–105 × 33–70mm, ovate to broadly elliptic, apex subacute to obtuse, base rounded, slightly oblique or not, sometimes shortly decurrent, margins irregularly and shallowly serrate, lateral veins 5–6, ascending at angle of c.45°, looping near margin and linking to vein above, upper surface densely hairy, hairs acute, to 1–1.8mm long, tip of each hair reaching well beyond base of hair above, lower surface similar, hairs somewhat finer and shorter, dense over veins; petiole 25–80mm long, well clad in acute upward-pointing hairs to 2mm long. *Inflorescence* axillary, cymose, flowers c.7–9, crowded, peduncle 85–180mm long, clad in upward-pointing acute hairs to 2mm long. *Bracts* (outermost pair) c.3.5–5 × 1.5–3.2mm, ovate narrowed to a broad base, acute hairs to 0.8–1mm long on both surfaces. *Pedicels* 4–7mm long, clad in acute suberect hairs to 1mm long. *Calyx* tube 2mm long, lobes 5, subequal, 1.8–2.5 × 1–1.8mm, deltoid, sharply acute, inside minutely gland-dotted, outside plentiful very short acute hairs with hairs to 0.8–1mm long scattered among them, on margins hairs 0.1–0.2mm long. *Corolla* 23.5–31mm long, tube 20–27.5mm, narrowly funnel-shaped, lower half subcylindric, mouth round, limb not spreading, posticous lobes 3.5 × 3.5–4.5mm, suborbicular, anticous lobe 5–8 × 4–5mm, oblong-elliptic, corolla more or less orange (details below), outside clad in acute hairs to 0.25–0.5mm long, lobes fringed with acute hairs to 0.1mm long, similar hairs inside lobes, elsewhere inside tube minute globular glands, small palate of globose papillae at insertion of anticous filaments, raised into 2 small flaps, annulus inserted 2–3mm above base of tube, hairs acute, to 0.6–0.8mm long, in 5 discrete longitudinal bands c.5mm deep. *Stamens* 4, anticous filaments 11–12mm long, inserted 10.5–14.5mm above base of tube, anthers 2–2.2mm long, not exceeding posticous lobes; posticous filaments 9–10mm, inserted 11.5–15.5mm above base, anthers 1.8–2mm; staminode 1–2mm. *Disc* c.0.8 × 1.2mm, cupular, rim crenulate. *Ovary*, including stipe, c.1.6 × 1mm (nearly at ♀ phase). *Style* c.4mm long. *Stigmatic lobes* c.1.5 × 1.2mm, minute globular glands scattered on backs of lobes, style, and ovary excluding stipe. *Capsules* not seen. **Fig. 19: 59a, b.**

WEST NEW GUINEA. Vogelkop Peninsula, surroundings of Ayawasi, 1°14'S, 132°12'E, 450m, 9 ix 1995, *Ave* 4073 (L); *ibid.*, 13 i 1996, *Ave* 4129 (L); *ibid.*, first hill north of the airstrip, 1°09'S, 132°29'E, 450m, 8 ix 1995, *de Vogel* 9649 (E).

*Agalmyla aitinyuensis* appears to be allied to *A. porrectiloba*, which is known from a small area near Okapa and Aiyura in Papua New Guinea. The morphology of their flowers is similar, but the calyx of *A. aitinyuensis* is smaller than that of

*A. porrectiloba*, the lobes are more sharply acute, and the indumentum differs in detail. The leaves of *A. aitinyuensis* are more rounded at the base than those of *A. porrectiloba*, and the margins are much more shallowly toothed with the teeth running right to the apex so that a distinct apical lobe is wanting; one is present in *A. porrectiloba* by virtue of its much coarser and sharper toothing. The leaves of *A. aitinyuensis* are similar to those of *A. wondiwoiana* from the Wondiwoi Mountains on the Wandammen Peninsula, geographically much closer to the area of *A. aitinyuensis*. The calyx lobes of *A. wondiwoiana* are oblong with rounded tips, the corolla lobes fringed with gland-tipped hairs, and these lobes possibly spread; the stamens are shortly exerted.

All three collectors of *A. aitinyuensis* recorded a limestone substrate for the forests in which the species grows, on hills around Atinyu and Ayawasi, which, so far as we can judge from inadequate maps, are only c.25km apart. The collections were made at a remarkably low altitude for *Agalmyla* in New Guinea, only 250–450m above sea level. Versteegh noted the corolla to be ‘orange white, lobes yellow’, de Vogel ‘orange red, throat orange’, and Ave ‘red’ and ‘bright red with orange tip’.

**60. *Agalmyla porrectiloba* Hilliard & B.L. Burtt, sp. nov.** ab *A. minore* foliis venis lateralibus utrinque 5–6 (nec 4–5), calycis lobis omnibus deltoideis integris (nec deltoideo-oblongis vel spatulatis in eodem calyce, marginibus integris vel dentatis), externe pilis 1–1.2mm longis pro maxima parte in lobis medianis, ad c.0.2–0.25mm in marginibus apicibus exceptis (nec externe omnino pilis 1.2–2mm, in marginibus 0.5–1mm), corolla externe pilis acutis ad c.0.25mm longis raro ad 0.5mm indutis (nec pilis 0.8–1.5mm longis pro maxima parte acutis interdum nonnullis glanduloso-apiculatis) distinguenda.

Type: Papua New Guinea, c.15 miles SW Okapa, near Wanatabi [c.6°32'S, 145°37'E], c.5000ft, 28 ix 1964, *Hartley* 13152 (holo. A; iso. CANB, K, L).

Epiphyte, stems of indeterminate length, branched, c.2–4mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs 2–3mm long, on young parts often some hairs gland-tipped, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 6–23 × 4–16mm, ovate, hairy as developed leaves, petiole 2–5mm long; blade of largest developed leaves 55–150 × 27–80mm, elliptic, oblong-elliptic or ovate, apex acute, base cuneate, oblique or not, margins coarsely serrate or doubly serrate, 5–6 lateral veins each side of midrib, ascending at angle of c.45°, then looping and running out to margin, upper surface well clad in somewhat coarse acute hairs to 1.5–2mm long, blade remaining visible, lower surface densely clad in finer hairs to c.1mm long, blade remaining visible, to 1.5mm over veins; petiole 22–90mm long, densely clad in ± spreading hairs to 2.5mm long. *Inflorescence* a congested axillary cymose cluster, flowers 5–17, peduncle 120–300mm long, clad in patent acute hairs 1.5–2mm long. *Bracts* (outermost) 6–15 × 2–6mm, more or less elliptic tapering into a broad petiolar part, acute hairs to 1mm long on both surfaces. *Pedicels* 4–14mm long, clad in acute patent hairs to

1mm long. *Calyx* red, tube 2.5–4mm, lobes 5, subequal, 2.2–6.2 × 1–2mm, more or less deltoid, obtuse, margins entire, inside minutely gland-dotted, a few acute hairs near apex of lobes, outside globular glands all over, together with acute hairs to 1–1.2mm long all over outside of tube, mainly median on lobes, lobes fringed with much shorter hairs (c.0.2–0.25mm) except at tips. *Corolla* 26–34mm long, tube 24–30mm, subcylindric, arcuate, mouth round, lobes of limb not spreading, posticous lobes 3–4 × 2.8–3mm, oblong, apex broadly rounded, anticous lobe 5–6.5 × 2.5–3.3mm, oblong, apex broadly rounded, corolla orange-red (further details below), outside clad in acute broad-based hairs mostly up to c.0.25mm long, rarely some 0.5mm, lobes fringed with acute hairs to c.0.25mm, inside lobes minute acute hairs extending short way down tube, small patch of minute globose papillae above and below insertion of anticous filaments, adjacent to filaments raised into 2 small flaps, annulus inserted c.6mm above base of tube, hairs in 5 discrete patches, somewhat scanty and dispersed upwards, to c.0.8mm long, acute. *Stamens* 4, anticous filaments 11–17mm long, inserted 12–14mm above base of tube, anthers 2mm, not exceeding posticous lobes; posticous filaments 9–15mm, inserted 12–15mm above base, anthers 1.8mm long; staminode c.1–6mm long. *Disc* c.1 × 1.5mm, cupular, rim crenulate. *Ovary* c.25 × 1.2mm (♀ phase), sometimes a few minute globular glands scattered at apex, shortly stipitate. *Style* c.4–7mm long, few scattered globular glands, rarely a few minute acute hairs as well. *Stigmatic lobes* c.1.25–2 × 1.25–2mm, papillose inside, outside a few minute globular glands. *Capsules* not seen. **Fig. 19: 60a, b.**

PAPUA NEW GUINEA. E Highlands, north of Kainantu [6°17'S, 145°52'E], Kainantu–Ramu divide, Tudor coffee plantation, 4500ft, 5 x 1957, *Robbins* 972 (CANB, L). NE of Kainantu, near Abinakenu [6°13'S, 145°54'E], 1524–2134m, flowered in cult. Hort. Bot. Reg. Ed. 1972, *Argent* RBGE 721373 (E). Aiyura [6°19'S, 145°54'E], 6000ft, 27 xi 1950, *Womersley* NGF 3399 (A, CANB, L); *ibid.*, 5800ft, 8 vii 1954, *Womersley* 6011 (A, L). Between Omaura and Aiyura, Mount Elandora, west side near village of Suwaira [c.6°19'S, 145°55'E], 1800–2400m, 11 ii 1965, *Jermy* 5013 (E). Hill above Aiyura–Arona road, 8km from Aiyura [6°19'S, 145°55'E], 4 ii 1970, *Winters & Higgins* 292 (CANB). Kisingam, Mt Dilmargi, 6°20'S, 146°35'E, 1850m, 16 xii 1972, *Stevens* LAE 58021 (E, L). Omaura [6°22'S, 145°59'E], 5000ft, *Sayers* 14 (K); 3mi W of Omaura, 6°23'S, 145°58'E, 6000ft, 26 xi 1963, *Hartley* TGH 12403 (A). Kainantu subdistrict, above Noreikora swamp, 6°30'S, 145°55'E, c.6200ft, ix 1966, *Wheeler* ANU 5928 (CANB, L). Purosa, Okapa area [6°40'S, 145°32'E], 2050m, 30 ix 1959, *Brass* 31809 (A, CANB, K, L); *ibid.*, 1950m, 22 ix 1959, *Brass* 31657 (CANB, K, L).

*Agalmyla porrectiloba* is closely allied to *A. minor*, from which it is distinguished by its leaves with mostly 6 lateral veins each side of the midrib (not mostly 5), calyx lobes always deltoid, entire (not varying in shape within a single calyx: deltoid–oblong–spatulate, the margins of the broader lobes in particular obscurely to boldly toothed), calyx clad in hairs 1–1.2mm long, the long hairs mostly median on the lobes, to 0.2–0.25mm on the margins except sometimes near the tips (versus calyx evenly clad in hairs to 1–2mm long, to 0.5–1mm on margins), and outside of corolla very shortly pubescent, hairs acute, mostly to 0.25mm long, rarely some 0.5mm (not hairs to 0.8–1.5mm long, often gland-tipped on posticous side).

A striking feature of *A. porrectiloba* is the forward-directed corolla lobes (whence

the trivial name). This is apparent in the dried material and two collectors mention it: 'not widely splayed at the throat' (*Womersley* 6011) and 'lobes pointing forwards' (*Sayers* 14). From the appearance of the dried flowers, this could also be the case in *A. minor*, but the only comment recorded is 'flowers ... tubular-shaped' (*Wiakabu et al.* LAE 73450). The colour of the corolla also seems to be important: eight collectors of *A. porrectiloba* described it as orange red or bright reddish orange, one as 'bright red, top one third to one quarter orange'. *Womersley* 3399 strikes a discordant note with 'flowers bright crimson' (his 6011 has 'flowers orange red'). Schumann & Lauterbach described the corolla of *A. minor* as 'rote', a loose term; subsequent collectors have noted 'bright red' and 'scarlet' as well as 'red'.

*Agalmyla porrectiloba* grows in montane rain forest c.1525–2055m above sea level, often recorded as climbing up tree trunks, once on rotting logs, once as 'low-growing, sprawling'. Its area lies mainly east of that of *A. minor*, from the environs of Okapa to Mt Dilmargi.

**61. *Agalmyla minor*** (Schumann & Lauterb.) Hilliard & B.L. Burtt, **comb. nov.**

Type: New Guinea, Kaiser-Wilhelmsland, Bismarck-Gebirge, 1800m, i 1902, *Schlechter* 14012 (holo. B<sup>†</sup>; iso. BO, K).

Syn.: *Dichrotrichum minus* Schumann & Lauterb., Nachtr. Fl. Deutsch. Südsee: 375 (1905); Schltr. in Bot. Jahrb. 58: 292 (1923).

Epiphyte, stems of indeterminate length, branched, c.2–3mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs to 2–3mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.10–13 × 5–7mm, ovate, hairy as developed leaves, petiole c.3mm; blade of largest developed leaves 60–110 × 34–45mm, ovate to elliptic, apex acute, base narrowly cuneate, margins coarsely and irregularly serrate or doubly serrate, 4–5 lateral veins each side of midrib, ascending at angle of c.45°, looping near margin and linking to vein above, upper surface well clad in acute hairs to 1.5–2mm long, lower surface similar but hairs finer, dense over veins, blade visible between hairs on both surfaces; petiole 25–29mm long, densely clad in acute hairs to 2mm. *Inflorescence* a congested cymose cluster, c.5–11-flowered, peduncle 100–185mm long, clad in acute hairs to 2mm. *Bracts* (outermost) 5–10 × 2–4mm, elliptic or ovate tapering to a broad petiolar part, acute hairs to 1mm long on both surfaces. *Pedicels* 5–10mm long, clad in acute hairs to 2mm long. *Calyx* tube 2.4–3mm long, lobes 5, subequal, 2.7–4.5 × 1–1.8mm, oblong to subspathulate, occasionally narrowly deltoid (all in one calyx), mostly broadest in upper part, obtuse, margins very minutely to distinctly toothed in upper part or entire (in one calyx), inside minute globular glands, outside globular glands obscured by acute hairs to 1–2mm long, to 0.5–1mm on margins. *Corolla* 24–30mm long, tube 20.5–26mm, subcylindric, slightly curved, lobes not spreading, posticous lobes 2–3.5 × 2–2.8mm, oblong, apex broadly rounded, anticous lobe 4.5–5.5 × 2.3–3.2mm, oblong, apex broadly rounded, corolla bright red or scarlet, outside clad in acute hairs to 0.8–1.5mm long, occasionally

some hairs gland-tipped, lobes fringed with acute or gland-tipped (as in type) hairs to 0.25–0.4mm long, inside lobes minute acute hairs to c.0.15mm spreading short way down tube, small patch of globose papillae mostly below insertion of anticous filaments, adjacent to filaments raised into 2 small flaps, annulus inserted c.4–6.5mm above base of tube, hairs in 5 discrete patches somewhat dispersed upwards, acute, to c.1mm long. *Stamens* 4, anticous filaments 9–10mm long, inserted 11–16mm above base of tube, anthers 1.7–2.2mm, not exceeding posticous lobes; posticous filaments 6.5–9mm long, inserted 12–16.5mm above base, anthers 1.5–2.2mm; staminode c.0.5–2mm long. *Disc* c.1 × 1.2–1.6mm, cupular, rim crenulate. *Ovary* c.15–18 × 0.8–1mm, few minute globular glands scattered at apex. *Style* 4–5mm long, few minute globular glands. *Stigmatic lobes* c.2 × 1.25mm, few minute globular glands outside, occasionally a few acute hairs to 0.2mm long as well. *Capsules* c.100–140 × 2mm, shortly stipitate, glabrous. *Seeds* (immature) c.2 × 0.2mm, appendages 4–4.5mm long. **Fig. 19: 61a, b.**

PAPUA NEW GUINEA. About 2km from the Baijer River and Jimmy Valley road, 5°35'S, 144°10'E, 1725m, 3 vi 1980, *Wiakabu et al.* LAE 73450 (L). Jimmi valley near Karap village, 5°30'S, 144°10'E, 5650ft, vi 1955, *Womersley & Millar* NGF 7634 (BRI). 2km NNW of Okapa, 6°30'S, 145°36'E, Puserasa village, 1720m, 9 xii 1982, *Vinas* 49 (A, CANB, K, L).

The holotype of *A. minor* was destroyed in the Berlin fire. An isotype in the Kew herbarium is now in poor condition; that in Bogor is better, having four flowers and half a mature capsule, but only three immature leaves. Schlechter travelled inland from Erima Harbour (5°25'S, 145°44'E) on the northern coast of what is now Papua New Guinea to the Ramu river, which rises in the Bismarck Mts and flows NW then N to the sea; the original material of *A. minor* was collected almost due south of Erima (see map in Schlechter, *Orchidaceae of New Guinea*) at approximately 5°50'S, 145°40'E. The three subsequent collections of *A. minor* have come from localities roughly 200km apart in what are essentially the foothills of the Bismarck Range along its SW face. The plants grow in montane forest at c.1675–1800m above sea level.

The corolla lobes of *A. minor* appear to project straight forward as they do in *A. porrectiloba*, which suggests an affinity between them; both species have been collected in the vicinity of Okapa, but the area of *A. minor* appears to lie west of that of *A. porrectiloba*. Distinguishing characters of the species are the leaves with 4–5 lateral veins, villous calyx with lobes mostly broadest at the tips, and relatively long hairs on the corolla; in *A. porrectiloba*, there are 5–6 lateral veins, the calyx lobes are broadest at the base and the longest hairs are median, being much shorter on the margins except sometimes at the tips, and the hairs on the corolla are shorter. See also 60. *A. porrectiloba*.

**62. *Agalmyla hooglenii* Hilliard & B.L. Burt, sp. nov.** ab *A. minore* foliis venis utrinque 6–8 (nec 4–5), pilis in pagina inferiore paucioribus bene dispersis (nec numerosis), calycis tubo c.4mm longo (nec 2.4–3mm), pilis in calyce 0.2–0.8mm longis pro maxima parte medianis in lobis ad c.0.15mm in marginibus (nec omnino 1.2–2mm longis in marginibus 0.5–1mm), corolla 35–37mm longa (nec 20–30mm), fusco-rubra (nec vivide rubra) distinguenda.

Type: Papua New Guinea, west of Togoba [ $5^{\circ}53'S$ ,  $144^{\circ}10'E$ ], c.1900m, 12 ix 1956, *Hoogland & Pullen* 6195 (holo. K; iso. A, BM, CANB, L).

Epiphyte, stems of indeterminate length, branched, 2–5mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs to 2–3mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.7–10 × 3.5–7mm, ovate, hairy as developed leaves, petiole 2–3mm long; blade of largest developed leaves 90–140 × 25–60mm, elliptic or ovate-elliptic, apex acute, base cuneate, margins irregularly and rather coarsely serrate or doubly serrate, 6–8 lateral veins each side of midrib, ascending at angle of c.45°, then looping and running out to margin, upper surface well clad in acute hairs to 1–1.5mm long, blade remaining visible, lower surface clad in finer acute hairs to 1mm long well scattered on blade, dense only over principal veins; petiole 35–70mm long, well clad in acute hairs to 1mm. *Inflorescence* a many-flowered congested axillary cyme, peduncle 75–330mm long, clad in patent acute hairs to 2mm. *Bracts* (outermost) 5–14 × 2.2–6mm, lanceolate, broad-based, acute hairs to 1mm on both surfaces. *Pedicels* 6–12mm long, clad in acute hairs to 1mm. *Calyx* purple, tube c.4mm long, lobes 5, subequal, 4–5.5 × 1.6–2.2mm, narrowly deltoid, obtuse, margins entire, inside minutely gland-dotted, outside acute appressed hairs 0.2–0.8mm long, mainly median on lobes, to 0.15mm on margins. *Corolla* 35–37mm long, tube 30–32mm, funnel-shaped, slightly arcuate, mouth round, lobes of limb possibly not spreading or anticus lobe correct, posticus lobes 4–5 × 4–4.8mm, anticus lobe 5.5–8 × 3.2–5mm, all lobes oblong, apex broadly rounded, corolla deep red, outside clad in acute hairs to 0.3–0.8mm long, longest hairs on posticus side and there some gland-tipped to 0.5–1.4mm long, lobes fringed with gland-tipped hairs to 0.25–0.4mm long, inside lobes minute acute hairs extending short way down tube, small patch of globose papillae between points of insertion of anticus filaments, raised into 2 small papillose flaps adjacent to filaments, annulus inserted 7–8.5mm above base of tube, hairs in 5 discrete patches somewhat dispersed upwards, to c.1mm long, acute or a few gland-tipped. *Stamens* 4, anticus filaments 14–17mm long, inserted 17–20mm above base of tube, anthers c.2.5mm long, not exceeding posticus lobes; posticus filaments 11.5–13mm long, inserted 17–19.5mm above base, anthers c.2.2mm long; staminode 2–4mm long. *Disc* 1 × 1.4–1.8mm, cupular. *Ovary* 26 × 1.3mm (♀ phase), shortly stipitate, either glabrous or a few minute globular glands scattered on upper part. *Style* c.4mm long, either glabrous or with scattered globular glands, sometimes a few acute hairs as well. *Stigmatic lobes* c.3 × 2.3mm (♀ phase) dotted with minute globular glands, sometimes a few acute hairs as well. *Capsules* c.150–230 × 2mm, shortly stipitate. *Seeds* c.1.2 × 0.2mm, appendages c.3–4mm. **Fig. 19: 62a, b.**

PAPUA NEW GUINEA. [ $5^{\circ}45'S$ ,  $144^{\circ}02'E$ ], 5km SE of Mt Hagen station, near Wantil village, c.2050m, 12 viii 1956, *Hoogland & Pullen* 5964 (CANB). Mendi valley, above Kiburu [ $6^{\circ}10'S$ ,  $143^{\circ}40'E$ ], c.6500ft, 28 vi 1961, *Schodde* 1357 (A, CANB, L).

*Agalmyla hooglenii* (the epithet derives from the first and last syllables of the names of the original collectors) is distinguished from *A. minor* by its leaves with 6–8 lateral

veins each side of the midrib (not 4–5), the lower surface of the blade only scantily clad in hairs (except over the main veins), the calyx tube longer, and the hairs on the outer surface to 0.2–0.8mm long, mostly median on the lobes, c.0.15mm on the margins (not to 1.2–2mm long, more or less evenly distributed, to 0.5–1mm on the margins). The corolla is probably always longer and darker in colour (described by the collectors as deep red or deep scarlet). The dark red corolla contrasts with the orange-red of that of *A. porrectiloba*, another allied species, which differs further in its leaves with often fewer lateral veins (5–6) and densely pubescent on both surfaces, and its corolla probably always shorter (26–34mm) and differently shaped (sub-cylindric versus funnel-shaped). The shape of the corolla is difficult to judge precisely from dried specimens, but collectors have recorded that the corolla lobes of *A. porrectiloba* are directed straight forwards; this may also be the case in *A. hooglenii*, but the shape of the tube suggests that the anticous lobe is directed forwards, the other lobes upwards. The lobes of the two species differ in breadth: posticous lobes 4–4.8mm in *A. hooglenii*, 2.8–3mm in *A. porrectiloba*, anticous lobe 3.2–5mm versus 2.5–3.3mm.

*Agalmyla hooglenii* is known with certainty from three collections made in central Papua New Guinea at an altitude of roughly 1900–2050m above sea level, in montane forest; mid-montane oak forest (*Schodde*). Two more collections need mention. One, *Reeve* 2235 (E), made on Mt Murray (6°47'S, 143°58'E), comprises the tip of a flowering branchlet 85mm long, largest leaf 55 × 30mm, petiole 15mm, lateral veins 5 each side of midrib, scanty hairs on both blade and veins on lower surface. Vegetatively, it differs from *A. hooglenii* only in having leaves with fewer lateral veins, but the flowers have a longer calyx tube (4.5–5mm), the calyx being otherwise similar to that of *A. hooglenii*; the corolla is shorter (30–32mm) with narrower lobes (all lobes 2.8–3mm broad) and the flowers were described as light red. It is possibly an undescribed species in the affinity of *A. hooglenii*, but the material is inadequate for a sound judgement to be made. No other collections of any species have been seen from Mt Murray or its vicinity.

The other collection requiring mention (*Reeve* 2828, E) came from Winjaka, Lagaip district [Lagaip 5°30'S, 143°30'E], at c.2000m above sea level. The largest leaf measures 85 × 40mm (petiole 30mm, but broken and point of attachment on stem not visible), with 5 lateral veins each side of midrib and blade densely hairy on both surfaces, inflorescence perhaps 5-flowered, calyx tube 7mm long, lobes 5.4–6.8 × 1.8–2mm, more or less oblong, margins entire or obscurely toothed, clad in patent acute hairs to 1.3mm long, corolla 48mm, tube 42mm, anticous lobe 11 × 7mm, posticous lobes 6 × 6mm, hairy as in *A. hooglenii*, gynoecium scabrid. It thus differs from typical *A. hooglenii* in having leaves with fewer veins and densely hairy on both surfaces, longer calyx and corolla, and the whole gynoecium scabrid. More needs to be known of this plant before its status can be determined.

**63. *Agalmyla aurantiaca* Hilliard & B.L. Burt, sp. nov.** ab *A. hooglenii* foliis venis lateralibus utrinque 4 (nec 6–8), laminis foliorum maximorum 50–65mm longis (nec 90–140mm), corolla aurantiaca (nec fusco-rubra) lobis posticis 3–4 × 2.8–4mm

(nec  $4-5 \times 4-4.8\text{mm}$ ), lobo antico  $5.5-6 \times 3-3.2\text{mm}$  (nec  $5.5-8 \times 3.2-5\text{mm}$ ) distinguitur.

Type: Papua New Guinea, Southern Highlands Province, Tari district, Komo [ $6^{\circ}04'S$ ,  $142^{\circ}51'E$ ] Subdistrict, Tombete, 1700m, 23 xii 1982, *Reeve* 6093 (holo. E).

Epiphyte, stems of indeterminate length, branched, tending to twine, c.2mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs to 2.5–3mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves  $6-8 \times 3-6\text{mm}$ , elliptic, hairy as developed leaves, petiole c.2mm; blade of largest developed leaves  $50-65 \times 22-35\text{mm}$ , ovate or elliptic, apex acute, base shortly cuneate, margins coarsely and irregularly serrate or doubly serrate, lateral veins 4 each side of midrib, ascending at angle of  $c.45^{\circ}$  then looping and running out to margin, upper surface well clad in overlapping acute hairs to 1.5–2mm long, blade remaining visible, lower surface more thinly clad (except over veins) in acute hairs to 1–1.5mm long, these not or very slightly overlapping; petiole 15–35mm long, well clad in acute hairs to 2mm long. *Inflorescence* a few (up to c.9)-flowered axillary cymose cluster, peduncle 70–170mm long, thinly clad in patent acute hairs to 2mm long. *Bracts* (outermost, few seen)  $5-6 \times 1.5-2\text{mm}$ , narrowly elliptic, acute hairs to 0.8–1mm long on lower surface. *Pedicels* 4–9mm long, clad in somewhat spreading acute hairs to 1–1.5mm long. *Calyx* tube 2.3–4mm long, lobes 5, subequal,  $3-5.2 \times 0.8-1.5\text{mm}$ , narrowly deltoid, obtuse, margins entire, inside minutely gland-dotted, outside thinly clad in acute hairs to 0.8–1mm long, median on lobes, much shorter hairs on margins. *Corolla* 32–37mm long, tube 28–32mm, narrowly funnel-shaped, slightly arcuate, mouth round, lobes of limb possibly not spreading, posticous lobes  $3-4 \times 2.8-4\text{mm}$ , anticous lobe  $5.5-6 \times 3-3.2\text{mm}$ , all lobes oblong, apex broadly rounded, corolla bright orange, outside clad in acute hairs to 0.25–0.3mm long mixed with some gland-tipped hairs to 0.5–0.8mm long on posticous side, lobes fringed with gland-tipped hairs to 0.2–0.3mm long, inside lobes minute acute hairs, inside tube very minute scattered globular glands, small patch of globose papillae between anticous filaments at their point of insertion, there raised into 2 small flaps, papillae extending in a median line nearly to annulus, annulus inserted 6–7mm above base of tube, hairs in 5 discrete patches c.3mm deep, hairs to 1mm long, acute or some gland-tipped. *Stamens* 4, anticous filaments 11–14mm long, inserted 16–20mm above base of tube, anthers 1.5–2mm long, not exceeding posticous lobes; posticous filaments 9–11.5mm long, inserted 17–19mm above base, anthers 1.3–1.8mm long; staminode 1–2mm long. *Disc* c.1  $\times$  1.5mm, cupular. *Ovary* 22  $\times$  1mm ( $\text{♀}$  phase), stipitate, glabrous. *Style* c.4mm long, glabrous. *Stigmatic lobes* 1.5  $\times$  1.25mm, glabrous. *Capsules* not seen. **Fig. 19: 63a, b.**

PAPUA NEW GUINEA. Enga Province, Porgera distr., Hewa [ $5^{\circ}15'S$ ,  $143^{\circ}E$ ] Census Div., between Karipari and Badiye, 1500m, iv 1978, *Reeve* 145 (E).

In the colour of the flowers and in general facies, *A. aurantiaca* resembles *A. porrectiloba*, from which it is distinguished by its leaves with fewer lateral veins and scanty hairs on the lower surface of the blade. It differs from *A. hooglenii* by its



leaves with fewer lateral veins, and possibly always smaller blade, and by the differently coloured corolla with smaller lobes.

*Agalmyla aurantiaca* is known only from Reeve's two collections made roughly 100km apart in the montane forests of central New Guinea.

**64. *Agalmyla schlechteri* Hilliard & B.L. Burtt, sp. nov.** ab *A. villosa* foliis basi decurrentibus per 10–20mm (nec vix decurrentibus), petiolis 35–80mm longis (nec 28–30mm), calycis lobis basi latissimis, integris (nec ad apicem latioribus, marginibus saepe dentibus 1–2 minutis instructis), pilis in calyce semi-erectis (nec valde patentibus), pilis annuli omnibus acutis (nec pilis acutis et glanduloso-apiculatis intermixtis) differt.

Type: Papua New Guinea, 6°43'S, 145°58'E, Mt Piora, north slopes, 2400m, 6 ix 1975, *Croft & Akakavara* LAE 68228 (holo. L, iso. A).

Epiphyte, stems of indeterminate length, branched, c.3–5mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs to 2–3mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 8–35 × 5–24mm, ovate, hairy as developed leaves, petiole 2–12mm long; blade of largest developed leaves 75–175 × 23–65mm, elliptic or ovate, apex acute, base, in all but the narrowest leaves, rather abruptly cuneate then decurrent for c.10–20mm, margins regularly to irregularly serrate, 6–8 lateral veins each side of midrib, ascending at angle of c.45°, looping near margin and linking to vein above, upper surface thickly clad in acute hairs to 2mm long (blade visible between the hairs), lower surface similar but hairs finer, to 1.5mm long, dense over veins; petiole 35–80mm long, well clad in acute suberect hairs to 2mm long. *Inflorescence* a few (5)- to many (27)-flowered congested axillary cymose cluster, peduncle 110–360mm long, clad in patent acute hairs to 2–3mm long. *Bracts* (outermost) 6–15 × 2–6mm, lanceolate, acute hairs to 1mm long on both surfaces. *Pedicels* 5–13mm long, clad in acute hairs to c.1.8mm long. *Calyx* maroon or purple, tube 3–5.5mm long, lobes 5, subequal, roughly as long as tube, 3.2–7 × 1.2–2.2mm, all lobes oblong, obtuse, margins entire, inside minutely gland-dotted, outside thickly clad in acute suberect hairs to 1–1.8mm long, shorter on margins. *Corolla* 28–38mm long, tube 25–34mm, funnel-shaped, arcuate, mouth round, lobes of limb possibly not spreading, posticous lobes 2.5–4 × 3–5mm, subrotund, anticous lobe 5–8 × 3.3–5mm, oblong, obtuse, corolla various shades of red (see below), outside with gland-tipped hairs to 0.8mm long on posticous side, acute hairs to 0.25–0.8mm long all over, lobes fringed with gland-tipped hairs to 0.3–0.4mm long, inside lobes minute acute hairs to c.0.1mm long extending down tube to point of insertion of filaments, small palate of globose papillae between points of insertion of anticous filaments and there raised into 2 small longitudinal flaps, annulus inserted 4–7mm above base of tube, hairs in 5 more or less discrete patches 2–5mm deep, acute, to 1mm long. *Stamens* 4, anticous filaments 12–15mm long, inserted 13–18mm above base of tube, anthers 2–2.5mm long, not exceeding posticous lobes; posticous filaments 10–13mm long, inserted

12–20mm above base of tube, anthers 1.6–2.2mm long; staminode 1.5–2.2mm long. *Disc* 1 × 1.3mm, cupular. *Ovary* c.26 × 1.2mm (♀ phase), shortly stipitate, often with minute globular glands scattered on upper part. *Style* c.4mm long, scattered globular glands. *Stigmatic lobes* c.2.2 × 2mm, globular glands scattered outside. *Capsules* 150–180 × 3mm. *Seeds* c.1.2 × 0.2mm, appendages 4–6mm. **Fig. 19: 64a, b.**

PAPUA NEW GUINEA. Kainantu subprovince, 6°43'S, 145°58'E, Mt Piora, descending to Habi'ina from rock camp, 2300m, 6 ix 1975, *Sands et al.* 1727 (K). Morobe distr., Wagau, 6°50'S, 146°50'E, c.4600ft, 5 i 1965, *Sayers* NGF 21514 (BM, E); *ibid.*, 6°45'S, 146°50'E, 4500ft, xi 1963, *Womersley* NGF 17843 (E, L). Lomalom [6°52'S, 146°46'E], 4400ft, 13 vi 1964, *Millar* NGF 23428 (E, L). Namtake, 7°21'S, 146°16'E, on ridge N of Aseki road, 1906m, 12 x 1988, *Takeuchi & Kiapranis* 4190 (A); *ibid.*, 6200ft, 14 x 1988, *Takeuchi & Kiapranis* 4203 (E). Ababa, Menyamyā–Kaintiba road, 7°21'S, 146°03'E, 7800ft, 12 v 1968, *Streimann & Kairo* NGF 35931 (L). Bulolo–Aseki road, 35km WSW of Bulolo, 7°19'S, 146°23'E, 2200m, 16 vi 1982, *Streimann* 8386 (L). Aseki–Spreader divide, 7°20'S, 146°10'E, 1830m, 8 i 1972, *Stevens* LAE 54799 (E, L); *ibid.*, *Stevens* LAE 54800 (E, L). Mt Scratchley [8°43'S, 147°27'E], 4000ft, 1896, *Giulianetti* s.n. (K).

The name *A. schlechteri* commemorates Rudolf Schlechter, who travelled in New Guinea and subsequently (Schlechter, 1923) wrote the first account of the *Gesneriaceae* of New Guinea, including 20 species of *Dichrotrichum*.

The species ranges from Mt Piora east and south to the environs of Wagau and Bulolo, with a southernmost record from Mt Scratchley; Schlechter collected the type material of *A. villosa* on mountains lying in the big curve of the Waria river south-west of Morobe, separated from the area of *A. schlechteri* by the Owen Stanley Fault Zone; we have seen a collection from further south-east, on the upper reaches of the Musa river, also east of this fault zone. *Agalmyla schlechteri* differs from *A. villosa* in its leaves, markedly decurrent for 10–20mm, and with longer petioles (35–80mm versus 28–30mm), calyx lobes broadest at the base, entire (not broadened at the tips, the margins there often with 1 or 2 minute teeth), and the hairs not so markedly spreading as those of *A. villosa*. Also, the hairs of the annulus are always acute, lacking the gland-tipped component seen in *A. villosa*, though too few specimens of that species have been seen to judge its constancy.

There is a good deal of variation in the colour of the flowers of *A. schlechteri*. Most records of colour are subjective and therefore difficult for comparative purposes, but P.F. Stevens made two collections at the same place on the same day; of his no. LAE 54799, he wrote 'Leaves mid-green above, veins below purple. Flowers: peduncle and calyx purple, corolla tube red, lobes yellow'. Of no. LAE 54800, 'Leaves mid-green above and below. Flowers: peduncle and calyx purple, corolla red all over'. Of plants from the same general area, *Takeuchi & Kiapranis* 4190 recorded 'Leaves dark green above, light green below with purple veins. Flowers bright red'; of their no. 4203, 'corolla bright red'; *Streimann & Kairo* NGF 35931, 'Leaves dull green above, green and reddish below. Flowers orange and yellow'; *Streimann* 8386, 'Leaves dull dark green above, dull green below. Flowers red and yellow'. All these

specimens were collected in diverse montane forest between 1830 and 2380m above sea level.

Further north, inland from Lae, in forest between 1340 and 1400m above sea level, *Sayers* NGF 21514 recorded 'Flowers deep crimson; tube inside yellow; stamens and stigma yellow'; *Womersley* NGF 17843, 'Leaves pale grey green, flowers scarlet'; *Millar* NGF 23428, 'Leaves olive green ... on top, paler below. Flowers chinese red'.

To the west, on Mt Piora at 2300–2400m, *Croft & Akakavara* LAE 68228 recorded 'Leaves dull, fleshy, dark green above, light green below. Flowers light red', while *Sands et al.* noted 'Petioles flushed maroon like the veins below; lamina dark green above, paler below; calyx maroon; corolla bright scarlet, yellow on the lobes; anthers buff'.

**65. *Agalmyla villosa* (Schltr.) Hilliard & B.L. Burtt, comb. nov.**

Types: Papua New Guinea, on trees in the cloud forest of the Dischore Mountains (Waria area), 1200m, v 1909, *Schlechter* 19617 (n.v.); on trees in the cloud forest of the Govidjoa stream (Waria area), 1100m, vi 1909, *Schlechter* 19800 (n.v.).

Syn.: *Dichrotrichum villosum* Schltr. in Bot. Jahrb. Syst. 58: 289, 292 (1923).

Epiphyte, stems of indeterminate length, branched, c.3mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs to 2.5mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 5–10 × 4–6.5mm, ovate, hairy as developed leaves, petiole c.1mm; blade of largest developed leaves 95–140 × 36–55mm, narrowly ovate to oblong-elliptic, apex acute (somewhat obtuse), base cuneate, margins serrate, 6 lateral veins each side of midrib ascending at angle of c.45°, looping near margin and fading out, upper surface thickly clad in acute hairs to 1.5mm long, blade visible between hairs, lower surface similar but hairs finer, to 1mm long, dense over veins; petiole 28–30mm long, well clad in acute suberect hairs to 2mm long. *Inflorescence* a congested axillary cyme, flowers 5–7, peduncle 70–270mm long, thickly clad in acute suberect hairs to 2mm long. *Bracts* (outermost) c.7 × 2.5mm, elliptic, entire or with 2 incipient teeth, subobtuse, acute hairs to 1mm long outside, appressed, inside nearly glabrous except for a few short hairs near apex. *Pedicels* 5–8mm long, thickly clad in patent acute hairs to 2mm. *Calyx* tube c.5mm long, lobes 5, subequal, c.4.1–4.5 × 1.2–1.8mm at tips, oblong-spathulate, obtuse, margins with 1 or 2 minute teeth near apex, inside minutely gland-dotted, outside thickly clad in strongly patent acute hairs to 2mm. *Corolla* c.40mm long, tube c.36mm, narrowly funnel-shaped, arcuate, mouth round, lobes of limb possibly not spreading, posticous lobes c.5 × 5mm, anticous lobe c.7.8 × 6.8mm, all lobes suborbicular, corolla red, outside glandular and acute hairs to 1mm long, glandular more plentiful on posticous side, lobes fringed with gland-tipped hairs to 0.5mm long, inside lobes acute hairs to 0.25mm, these becoming stouter on anticous side and extending down floor of tube nearly to point of insertion of filaments, small palate of globose papillae between points of insertion of anticous filaments and there raised into 2 small longitudinal flaps, annulus inserted 7mm

above base of tube, hairs in 5 discrete patches c.5mm deep, hairs mixed acute and gland-tipped. *Stamens* 4, inserted 19mm above base of tube, anticous filaments 16mm long, anthers 2.3mm, not exceeding posticous lobes, posticous filaments 15mm, anthers 2.2mm; staminode 0.5mm. *Disc* 1 × 1.2mm, cupular. *Ovary* 14 × 1mm (♂ phase), shortly stipitate, minute globular glands scattered all over, also on style and back of stigmatic lobes. *Style* 2.5mm. *Stigmatic lobes* 1 × 0.8mm. *Capsules* not seen. **Fig. 20: 65a, b.**

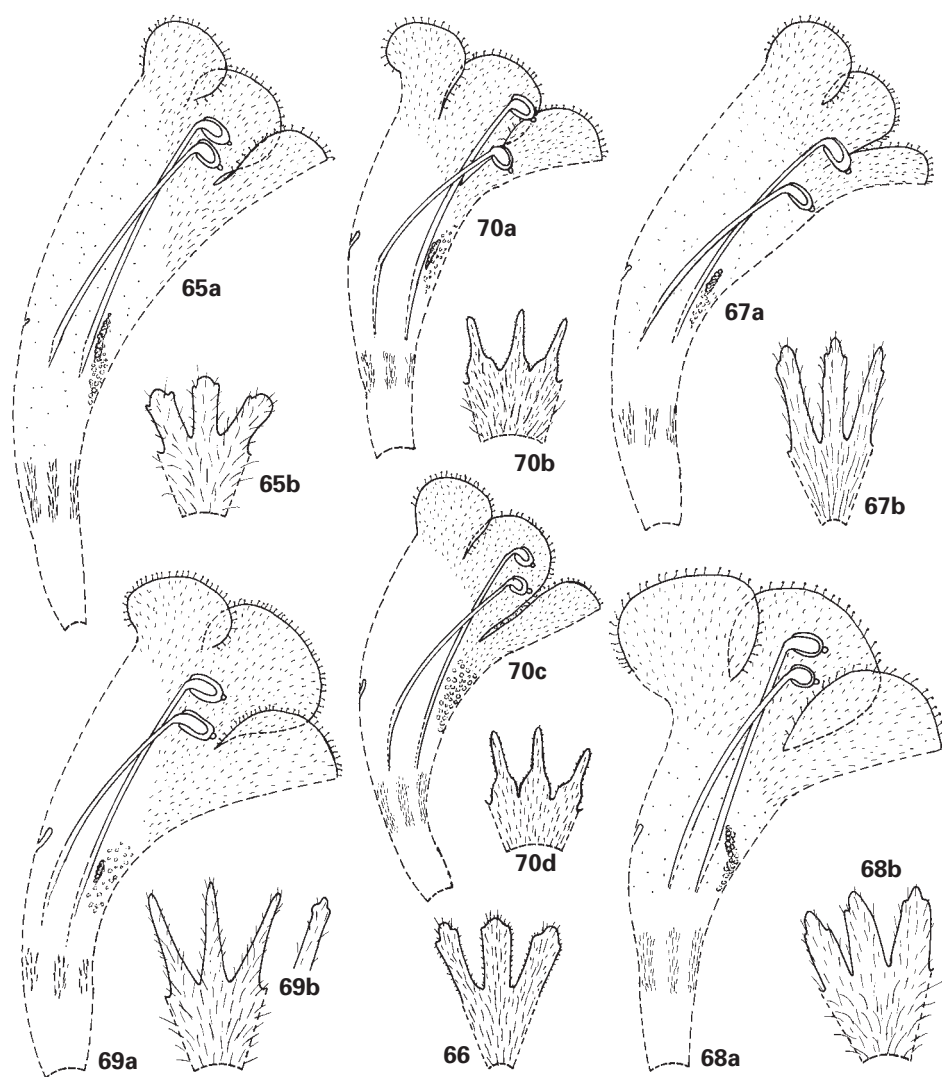


FIG. 20. Part of calyx and longitudinal section of corolla: 65a, b, *Agalmylea villosa*; 66 (calyx only), *A. sp. nov.*; 67a, b, *A. pauciflora*; 68a, b, *A. macrocolon*; 69a, b, *A. keysseri*; 70a, b, *A. insularis* subsp. *insularis*; 70c, d, *A. insularis* subsp. *prionodes*. All × 2.

PAPUA NEW GUINEA. South of Jaure [Jora], upper Musa valley, c.9°2'S, 148°55'E, c.4700ft, 20 ix 1963, *Paijmans* 136 (CANB).

Schlechter's original specimens were destroyed in the Berlin fire and no duplicates have been found. Our description is based on Paijmans' specimen, a unicate, collected roughly 200km to the south-east of Schlechter's type locality immediately north of the Waria river, at more or less the same altitude (1100–1200m and 1400m respectively), and we have little doubt that it is *A. villosa* despite some discrepancies with Schlechter's description. Schlechter described the leaves as oblong, somewhat obtuse, margin crenate-dentate, whereas we describe them as oblong-elliptic to narrowly ovate, apex acute, margins serrate; only the description of the apex can be judged non-subjective. Schlechter's flowers were smaller, calyx 'scarcely 6mm long', corolla 30mm, but this is an acceptable range in size.

In his diagnosis, Schlechter stressed the shaggy indumentum ('zottige Behaarung') of the plant, but several species unknown to Schlechter have similar indumentum on stems and leaves; it is the calyx that has shaggy indumentum unlike that of any other species seen by him. He also stressed the short petioles, a character that helps distinguish *A. villosa* from *A. schlechteri* and *A. pauciflora*, possibly its closest allies: see those species.

#### 66. *Agalmyla* sp. nov.

Epiphyte, climbing to 10–20m, stems sparingly branched, c.3mm diam. on flowering part, well clad in patent acute hairs to 2mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.10 × 7mm, ovate, hairy as developed leaves, petiole 2mm; blade of largest developed leaves 130–150 × 50–52mm, elliptic, apex shortly acuminate, base narrowly cuneate, margins serrate, 6–7 lateral veins each side of midrib, ascending at angle of c.45°, looping near margin and merging into it, upper surface thinly clad in acute hairs to 1.5mm long (tip of each hair reaching just beyond base of hair above), lower surface similar, glandular-punctate, hairs crowded over veins; petiole 70–80mm long, well clad in acute hairs to c.1.5mm long, probably appressed. *Inflorescence* a several-flowered cymose cluster, peduncle 250mm long (but will be longer at maturity), thinly clad in acute appressed hairs to 1.5mm long. *Bracts* (outermost pair) c.6 × 3mm, ovate, contracted to broad base, acute hairs to c.1mm on backs. *Pedicels* immature, well clad in upward-pointing acute hairs to 1.5–2mm long. *Calyx* (in young bud) tube 5mm long, lobes 5, subequal, 4.5–5 × 1.5–2mm at base, more or less spathulate, apex broadly rounded, obscurely toothed, suberect acute hairs to 1.5mm long on tube, median on lobes, mostly to 0.2mm long on margins, a little longer at tips. *Corolla*: young buds only, 'orange-red', largest 13mm long, lobes fringed with gland-tipped hairs to 0.8mm long, similar hairs on upper part of tube on posticous side, elsewhere acute hairs to 1mm long, inside tube annulus composed of 5 discrete tufts of acute hairs. *Stamens* 4. *Gynoecium* glabrous except for globular glands on backs of stigmatic lobes.

**Fig. 20: 66.**

PAPUA NEW GUINEA. Maneau Range, Mt Dayman, [9°50'S, 149°17'E], oak forest, 1450m, 5 vii 1953, *Brass* 23298 (A).

This plant seems to be close to *A. villosa*, but has less hairy leaves and markedly different indumentum on the calyx; in *A. villosa*, the hairs on the calyx are c.2mm long, strongly patent even in young bud, and thickly distributed all over the outside and along the margins. Superficially, the plant resembles *A. chalmersii*, which Brass collected in full flower at the same locality as this plant in young bud, but *A. chalmersii* differs in a number of characters, including its hairy gynoecium. The material is inadequate for typifying a name; also, the identity of *A. villosa* is not absolutely clear.

**67. *Agalmyla pauciflora* Hilliard & B.L. Burtt, sp. nov.** ab *A. villosa* foliorum petiolis 40–75mm longis (nec 28–30mm), inflorescentia 1–4(–5) floribus (nec 5–7), pedunculis 4–55mm longis (nec 70–270mm), calycis lobis 5–7.5mm (nec 4–4.5mm).

Type: Papua New Guinea, north of Cape Rodney, Obaka range, ridge SE of Doma, 9°45'S, 148°29'E, 24 x 1962, *Woods* 1962 (holo. E; iso. BO, CANB, K, L).

Epiphyte, stems of indeterminate length, branched, c.3mm in diam. at flowering tips, rooting along internodes, thickly clad in patent acute hairs to 2–3mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 7–17 × 5–9mm, ovate, hairy as developed leaves, petiolar part 2.5–4mm long; blade of largest developed leaves (60–)90–175 × (30–)33–67mm, oblong-elliptic to elliptic, apex acute, base cuneate, shortly decurrent, margins serrate, 6–7 lateral veins each side of midrib, ascending at angle of c.45°, looping near margin, linking to vein above with side vein to adjacent tooth, upper surface well clad in acute overlapping hairs to 2mm long, blade visible, hairs on lower surface to 1.5mm long on blade, sparser than on upper surface but still overlapping, to 2mm over veins and there dense; petiole 40–75mm long, well clad in suberect hairs to 2mm long. *Inflorescence* a congested axillary cyme, flowers 1–4(–5), peduncle 4–55mm long, clad in acute upward-pointing hairs to 2mm long. *Bracts* (outermost pair) 5–13 × 2–3.8mm, lanceolate, entire, scattered acute hairs to 1mm long on margins and outer surface, upper surface nearly glabrous. *Pedicels* 4–10mm long, clad in patent acute hairs to 2mm long. *Calyx* tube 4.5–6mm long, lobes 5, subequal, 5–7.5 × 1–2mm at base, somewhat variable in shape, mostly oblong or oblong-spathulate, obtuse, entire or with 2–4 small teeth near apex, inside minutely gland-dotted, outside patent acute hairs to 2mm long on tube, slightly shorter on lobes, calyx sometimes (always?) purple. *Corolla* 31–33mm long, tube 27–29mm, narrowly funnel-shaped, arcuate, mouth round, lobes of limb not spreading, posticous lobes 4–5 × 4–5mm, suborbicular, anticous lobe 6–7 × 4.8–6mm, broadly oblong, obtuse, corolla bright red, outside gland-tipped hairs to 1–1.2mm long on posticous side, elsewhere acute hairs to 1mm, lobes fringed with gland-tipped hairs to 0.5–0.6mm long, inside lobes minute acute hairs, inside tube scattered minute globular glands, small palate of globose papillae between points of insertion of anticous filaments and there raised into

2 small longitudinal flaps, annulus inserted 6–7mm above base of tube, hairs in 5 discrete longitudinal bands c.3mm deep, acute, to 1.2–1.8mm long. *Stamens* 4, filaments inserted 11–16mm above base of tube, anticous filaments 8–14mm long, anthers 2.5–3mm, not exceeding posticous lobes, posticous filaments 7–10mm long, anthers 2.2–2.8mm; staminode 0.5–2mm long. *Disc* c.1 × 2mm, cupular. *Ovary* c.27 × 1.3mm (♀ phase), shortly stipitate, minute globular glands scattered all over, also on style and backs of stigmatic lobes. *Style* 3–4mm long. *Stigmatic lobes* c.3.8 × 2.8mm. *Capsules* c.200mm long (only old ones seen). *Seeds* c.1.2 × 0.2mm, appendages c.4mm long. **Fig. 20: 67a, b.**

PAPUA NEW GUINEA. 9°58'S, 149°12'E, Mt Garatun, above Agaun Station, 1220m, 21 i 1973, *Stevens* LAE 58092 (A, BRI, CANB, E, L); *ibid.*, 5000ft, 1 xi 1950, *Crutwell* 231 (K); *ibid.*, 4500ft, 26 vi 1956, *Crutwell* 812 (K); *ibid.*, 4500ft, 20 xi 1961, *Crutwell* 1209 (K); *ibid.*, 4500ft, 3 vii 1974, *Crutwell* 1695 (K). Rabaraba subdistrict, Daga: Birat to Nepesip, Kwaruné above Maup waterfall on river Iao [c.9°56'S, 149°25'E], 1200m, 10 vii 1968, *Woods* 2232 (E). Provenance uncertain (mixed with *A. schlechteri*): Isuarava (possibly c.9°8'S, 147°43'E), c.4000ft, 8 ii 1936, *Carr* 15465 (L).

*Agalmyla pauciflora* is closely allied to the ill-known *A. villosa*, the species being similar in the indumentum of the leaves and the form and indumentum of both calyx and corolla; they differ in length of petiole (40–75mm versus 28–30mm), number of flowers in the inflorescence (1–4(–5) versus 5–7), length of peduncle (4–55mm versus 70–270mm), and length of calyx lobes (5–8mm versus 4–4.5mm). The length of the peduncle in *A. pauciflora* does not correlate with age: some of the shortest peduncles seen bore mature capsules.

*Agalmyla pauciflora* appears to be confined to the Owen Stanley Range of Papua New Guinea, in forest between 1200 and 1525m above sea level. Although usually epiphytic, the plants have also been recorded scrambling on mossy logs. A photograph of the type specimen, taken in the field, shows that the corolla lobes are directed straight forwards.

**68. *Agalmyla macrocolon*** Hilliard & B.L. Burt, **sp. nov.** ab *A. pauciflora* foliis minus pilosis, venis lateralibus ad marginem evanescentibus (nec vena superiore conjunctis), calycis lobis basi 1.8–3mm latis (nec 1–2mm), corollae lobis posticis 6–7 × 7–9mm (nec 4–5 × 4–5mm), lobo antico 8–10 × 10–12mm suborbiculari (nec 6–7 × 4.8–6mm, late oblongo) distinguitur.

Type: Papua New Guinea, Normanby Island, Mt Pabinama, 820m, 10 v 1956, *Brass* 25818 (holo. L; iso. A, K, S).

Epiphyte, stems of indeterminate length, branched, 2–5mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs to 2–3mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 10–15 × 4–12mm, ovate, hairy as developed leaves, petiolar part 2–5mm long; blade of largest developed leaves 65–185 × 34–90mm, elliptic, or occasionally oblong, apex acute, base cuneate, shortly decurrent, margins serrate to subentire, lateral veins 6–7 each side of midrib, ascending at angle of c.45°, looping near margin

and fading out, upper surface more or less well clad in acute hairs to 1.5–2mm long, weakly to strongly overlapping, hairs on lower surface to 1–1.5mm long, well scattered to overlapping, denser over veins, there to 2mm long; petiole 20–80mm long, well clad in acute hairs to 2.5–3mm long, suberect to patent. *Inflorescence* a congested axillary cyme, flowers 1–9, peduncle 5–75mm long, clad in acute upward-pointing to patent hairs to 2–3mm long. *Bracts* (outermost pair) 4–15 × 2–6mm, lanceolate, entire, scattered acute hairs to 1.2mm long outside, sparser and shorter inside. *Pedicels* 5–10mm long, clad in patent acute hairs to 2–2.5mm long. *Calyx* tube 4–5.5mm long, lobes 5, subequal, 4–7 × 1.8–3mm at base, more or less oblong but slightly tapering to obtuse apex, margins entire or with 2–4 minute teeth, inside minutely gland-dotted, outside patent acute hairs to 2mm long. *Corolla* 29–34mm long, tube 21–27mm, narrowly funnel-shaped, arcuate, mouth round, limb spreading, posticous lobes 6–7 × 7–9mm, anticous lobe 8–10 × 10–12mm, all lobes suborbicular, corolla bright crimson to deep red, outside acute hairs to 1mm long, a few on posticous side gland-tipped, lobes fringed with gland-tipped hairs to 0.4–0.7mm long, inside lobes acute hairs to 0.1–0.5mm long, inside tube scattered minute globular glands, small patch of globose papillae between points of insertion of anticous filaments and there raised into 2 small longitudinal flaps, annulus inserted 3–5mm above base of tube, hairs in 5 discrete longitudinal bands 3–4mm deep, acute, to 1.5–2mm long. *Stamens* 4, inserted 13–15mm above base of tube, anticous filaments 10–16mm long, anthers 2.3–3mm, not exceeding posticous lobes, posticous filaments 9–14mm long, anthers 2–2.8mm; staminode 1–2mm. *Disc* 1 × 2mm, cupular. *Ovary* (♀ phase) c.22 × 1.2mm, shortly stipitate, minute globular glands scattered all over, also on style and backs of stigmatic lobes. *Style* 5–6mm long. *Stigmatic lobes* c.3 × 2.5mm. *Capsules* 210–300 × 2mm. *Seeds* c.1.2 × 0.2mm, appendages c.3.5mm long.

**Fig. 20: 68a, b.**

PAPUA NEW GUINEA. **Fergusson Island.** Mountains between Agamoia and Ailuluai, 950m, 9 vi 1956, *Brass* 27054 (A, L); *ibid.*, 900m, 8 vi 1956, *Brass* 27010 (A, K, L); Morima Range above Ailuluai village, 650m, 26 vi 1976, *Henty* NGF 49867 (K). **Normanby Island.** South slopes of Mt Rumabubu, 10°6'S, 150°56'E, 810m, 3 xii 1977, *Benjamin* LAE 67867 (CANB, K, L). West of Esa'ala, Mt Solomonai, 9°45'S, 150°47'E, 1000m, 26 xi 1976, *Croft et al.* LAE 68921 (A, CANB, E, L). Mount Pabinama, 820m, 1 v 1956, *Brass* 25643 (K, L). **Tagula Island** (= Sudest Island). Mount Emuwa, 11°30'S, 153°30'E, 700m, 8 iii 1979, *Damas & Anos* LAE 74511 (A, CANB, E, L). Mount Riu, west slopes, 700m, 25 viii 1956, *Brass* 27828 (A, L). **Rossel Island.** Mount Rossel, south slopes, 700m, 16 x 1956, *Brass* 28435 (A, K, L, S); *ibid.*, 11°22'S, 154°11'E, 700m, 19 iii 1979, *Gideon* LAE 76022 (A, CANB, E, L). Above Abilete, Kwa Mt, 11°20'S, 154°10'E, 600m, 6 xi 1965, *Henty* NGF 27065 (L).

In its few-flowered inflorescence on a short peduncle and calyx with long spreading hairs and more or less oblong lobes, *A. macrocolon* resembles *A. pauciflora*; they differ strikingly in the corolla limb, that of *A. macrocolon* showy with relatively big spreading suborbicular lobes (whence the trivial name), that of *A. pauciflora* with smaller, more oblong lobes that possibly do not spread. The calyx lobes of *A. macrocolon* are generally broader, measuring 1.8–3mm at the base (versus 1–2mm), and



the leaves are less hairy, a character difficult to quantify. The termination of the lateral veins is different too, fading out at the margins in *A. macrocolon*, distinctly linking to the vein above in *A. pauciflora*.

*Agalmyla macrocolon* is confined to the larger islands at the eastern tip of Papua New Guinea. On Rossel Island (the furthest east that the genus is recorded) collectors mention forest dominated by tree ferns and palms, the plants climbing up the trunks of the ferns. On Fergusson Island, mossy oak forest is recorded, but most collectors are not specific, noting only that the stems will climb to 5m above the ground. The altitudinal range is 600–1000m above sea level.

**69. *Agalmyla keysseri* (Diels) Hilliard & B.L. Burtt, *comb. nov.***

Type: [Papua] New Guinea, Saruwaged Mountains [c.6°12'S, 146°47'E], 3000m, *Keysser* 6 (B<sup>†</sup>). Neotype (chosen here): Papua New Guinea, Huon Peninsula, Rawlinson Mountains, near Aregenang, Belah village, c.3500ft, 19 vi 1968, *Woods* 1946 (E; iso. L, LAE; WU, n.v.).

Syn.: *Dichrotrichum keysseri* Diels in Bot. Jahrb. Syst. 62: 493 (1929).

Epiphyte, stems of indeterminate length, branched, 2–5mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs up to 2.5–3mm long mixed with fewer shorter gland-tipped ones, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.8–13 × 5–8mm, ovate, hairy as developed leaves, petiole c.3mm long; blade of largest developed leaves 55–155 × 35–95mm, ovate, apex acute, base cuneate, oblique or not, margins coarsely doubly serrate, lateral veins 4–6 each side of midrib, ascending at angle of c.45°, looping and running out to margin, upper surface well clad in acute hairs up to 1–2mm long, lower surface similar but hairs finer, crowded over veins; petiole 28–45mm long, well clad in acute hairs to 2mm long. *Inflorescence* an axillary cymose cluster, flowers 3–9, peduncle 100–235mm long, clad in acute patent hairs to 2–3mm long. *Bracts* (outermost pair) 5–8 × 2–4mm, elliptic, acute, base broad, acute hairs to 1mm long scattered on both surfaces. *Pedicels* 6–15mm long, clad in patent acute hairs to 1.5mm long. *Calyx* crimson-brown, tube 4–5mm long, lobes 5, subequal, 5–7.4 × 1.8–2.5mm, more or less deltoid, apex varying from narrowly obtuse to subspathulate and obscurely toothed, often in a single calyx, inside scattered minute globular glands, outside patent acute hairs to 1–2mm long, to 1mm on margins. *Corolla* bright scarlet crimson, 31–37mm long, tube 26–29mm, funnel-shaped, arcuate, limb spreading, mouth round, posticous lobes 4–7 × 5–8mm, anticous lobe 5–10 × 5.5–10.5mm, all suborbicular, fringed with gland-tipped hairs to 0.3–0.5mm long, outside of corolla clad in acute hairs to 0.6–0.7mm long together with gland-tipped hairs to 0.6–1mm long on posticous side, inside lobes acute hairs to c.0.1mm long all over and descending short way down tube, small palate of globose papillae at point of insertion of anticous filaments, strongly to weakly raised into 2 small longitudinal flaps, annulus inserted 5–7mm above base of tube, composed of 5 longitudinal bands c.3–4mm deep, hairs acute, to 0.8–1.2mm long. *Stamens* 4,

anticous filaments c.13mm long, inserted 13–18mm above base of tube, anthers 2.5mm long, not exceeding posticous lobes, posticous filaments 10–11mm long, inserted 14–16mm above base, anthers 2.2mm long; staminode 1–5.5mm long. *Disc* c.1.2 × 1.5mm, cupular, rim crenulate. *Ovary* 27 × 1.5mm, shortly stipitate, few minute globular glands scattered on upper part. *Style* c.5mm long, few minute globular glands. *Stigmatic lobes* c.2 × 2mm, minute globular glands scattered on outer face. *Capsules* not seen. **Fig. 20: 69a, b.**

PAPUA NEW GUINEA. Huon Peninsula: Yunzain [6°23'S, 147°37'E], 5500ft, 31 vii 1936, *Clemens* 3730 (A); North West of Moragoc village, Mt Kurunkurungnu, 6°29'S, 147°32'E, 2200m, 6 x 1977, *Vinas* LAE 59861 (L).

The type of *Dichrotrichum keysseri* was destroyed in the Berlin fire, and no duplicate has been found. It came from the Saruwaged Mountains and no other collection of any species of *Agalmyla* has been seen from there. However, three collections from the Huon Peninsula, immediately to the east of the Saruwaged Mountains, match Diels's description so well that we have chosen one as a neotype. The only discrepancy seems to lie in the length of the corolla, which Diels described as 26–28mm; in the three specimens before us it is 31–37mm when the flower is rehydrated, but the dried flowers are approximately 26–28mm.

Diels described the calyx as '*longe hispidus*' and the lobes as '*anguste lineares, apice cochleari-dilati*', and this is precisely so in the specimens from the Huon Peninsula, although every lobe in any one calyx is not always dilated at the tip. These two characters, allied to the patent hairs on the stem, mixed acute and gland-tipped, the ovate leaves relatively densely hairy on both surfaces and with 4–6 lateral veins each side of the midrib, and the well-rounded corolla lobes, make recognition of the species easy.

Diels diagnosed *A. keysseri* primarily against *A. lobata*, distinguishing it by its leaves lacking a pronounced apical lobe, spatulate calyx lobes, coarser hairs and longer corolla. Comparative length of the corollas is of doubtful value, but the patent hairs on stems and calyx contrast strikingly with the appressed hairs of *A. lobata*, as does the much denser indumentum on the leaves. Also, the hairs on the inside of the corolla lobes are evenly distributed, while on the anticous lobe of *A. lobata* two glabrous bands separate the hairs overlying the median vein from those bordering the lobe.

**70. *Agalmyla insularis*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. keysseri* foliis in paginis ambabus praeter supra venas parce (nec dense) pilosis, calyce pilis appressis (nec patentibus) indutis lobis saepe recurvis (nec haud recurvis), lobo corollae antico oblongo-spatulato (nec suborbiculari) differt.

Two subspecies are recognized:

Subsp. **insularis**

Type: Papua New Guinea, Madang distr., Karkar Island, 2000ft, 15 i 1968, *Ridsdale* NGF 33967 (holo. E; iso. CANB, L).

Epiphyte, sometimes creeping, stems of indeterminate length, branched, 4–5mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs 2–4mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.14–20 × 5–13mm, ovate, hairy as developed leaves, petiole c.2–3mm, soon caducous; blade of largest developed leaves 105–205 × 46–115mm, ovate, apex shortly acuminate, base broadly cuneate to rounded then abruptly shortly decurrent, margins serrate, lateral veins 6–8 each side of midrib, ascending at angle of c.45°, looping near margin and fading out, upper surface with well-scattered acute hairs to 2–3.5mm long, lower surface similar but hairs finer and a little shorter, sometimes almost wanting on the blade, more crowded over the principal veins; petiole 27–60mm long, clad in patent acute hairs to 3–4mm long. *Inflorescence* an axillary cymose cluster, flowers 5–9, peduncle 150–450mm long, thinly clad in patent acute hairs to 3–4mm long. *Bracts* (outermost pair) 9–16 × 2–5mm, narrowly elliptic, subacute, acute hairs to 1–2mm long scattered on both surfaces. *Pedicels* 4–14mm long, clad in ascending acute hairs to 1–1.5mm long. *Calyx* often dark red or tinged with red, tube 3–4mm long, lobes 5, subequal, roughly as long as tube, 2.5–4.8 × 1.3–2.4mm, upper half narrowly oblong, tip usually strongly recurved, lower half abruptly broadened, inside scattered minute globular glands, outside acute hairs to 0.6–1.8mm long scattered on the tube, shorter on the lobes, together with many shorter acute hairs, all more or less appressed, hairs to 0.15mm long on margins. *Corolla* bright pink, pinkish-red or red, 27–40mm long, tube 20–32mm, funnel-shaped, arcuate, limb spreading, mouth round, posticous lobes 6–7 × 5.5–6.5mm, suborbicular, anticous lobe 8–11 × 6–8mm, oblong-spathulate, all lobes fringed with gland-tipped hairs 0.3–0.5mm long, outside of corolla clad in acute hairs to 0.5–0.6mm long, gland-tipped hairs as well on posticous side to 0.4–1mm long, sometimes only near apex, inside lobes acute hairs to 0.1mm long extending very short way down tube, small palate of globose papillae near insertion of anticous filaments, sometimes obscure, sometimes raised into 2 small longitudinal flaps, annulus inserted 4–7mm above base of tube, composed of 5 bands of acute hairs to 1–1.5mm long, bands 3mm deep. *Stamens* 4, anticous filaments 12–20mm long, inserted 11–18mm above base of tube, anthers 2.1–3mm long, not exceeding posticous lobes; posticous filaments 10–18mm long, inserted 11–19mm above base of tube, anthers 2–2.6mm long; staminode 2.5–5.2mm long. *Disc* c.1 × 1.3mm, cupular, rim crenulate. *Style* c.7mm long. *Ovary* c.30 × 1.2mm. *Stigmatic lobes* c.2.5 × 1.7mm, whole gynoeceum glabrous. *Capsules* c.250mm long (few old ones seen). *Seeds* (few seen) c.1.3 × 0.2mm, appendages c.4mm long. **Fig. 20: 70a, b.**

PAPUA NEW GUINEA. **Karkar Island.** 4°40'S, 146°E, 3800ft, 10 vi 1969, *Mann & Vandenberg* NGF 43194 (A, E, L); *ibid.*, at Mater-Merangis Barat, 3000ft, 16 vii 1968, *Millar* NGF 37737 (E); *ibid.*, Kawasop, 4°35'S, 145°55'E, 1300m, 14 x 1980, *Rau* 678 (L). **New Britain.** Track from Ganeboku to summit Mt Bagum, 5°21'S, 149°57'E, 1000m, 22 x 1974, *Barket & Vinas* LAE 66615 (K, L); *ibid.*, 20km SE of Salelubu, gorge below Yau Yau village in Nakanai Range, 700m, 5 vii 1973, *Gillett* 2562 (E); *ibid.*, c.25mi NNE of Fulleborn Harbour, Mt Sule,

5°50'S, 150°50'E, 1500m, 7 v 1953, *Croft & Katik* NGF 14948 (E, L); *ibid.*, lower slopes of Mt Lululua, 5°43'S, 151°02'E, 1065m, 4 v 1973, *Stevens & Lelean* LAE 58243 (E, L).

The relationship of *A. insularis*, so-called because of its island provenance, lies with *A. keysseri*, from the Huon Peninsula and adjacent Saruwaged Mountains, geographically close to Karkar Island and New Britain. They differ in their leaves, those of *A. insularis* being only very thinly (not densely) hairy on both surfaces; the tothing of the leaves also differs, that of *A. insularis* subsp. *insularis* being less pronounced than that of *A. keysseri*, the serrations always simple, never themselves toothed. In subsp. *prionodes* (meaning 'jagged'), the tothing is mostly more pronounced than that of *A. keysseri*, the teeth subtly different in shape, tending to acuminate rather than acute. The calyx of *A. insularis* is appressed hairy and the lobes are mostly recurved; the two species differ further in the shape of the anticous corolla lobe (oblong-spathulate versus subrotund).

Like most species of *Agalmyla*, *A. insularis* grows up the trunks of forest trees, subsp. *insularis* having been recorded in mixed forest at 700m above sea level, and in forest dominated by *Castanopsis* at 1300m, and by *Nothofagus* at 1065–1500m, the highest altitude recorded. The leaves appear to be dark glossy green above, paler below, the hairs, as on the corolla, white.

Subsp. **prionodes** Hilliard & B.L. Burtt, **subsp. nov.** a planta typica foliis grossius dentatis, petiolis saepe longioribus (c.50–120mm nec 27–60mm), lamina pilis brevioribus (0.5–2mm nec 2–3.5mm), parte calycis exterioris pilis brevioribus (0.6–1.3mm, nec 1.2–1.8mm) differt.

Type: Papua New Guinea, Lihir Island, above Palie Mission, Mt Tementa, 3°12'S, 152°36'E, 600m, 7 xi 1984, *Gideon* LAE 57203 (holo. L; iso. A, CANB, E, K).

*Leaves* opposite, strongly anisophyllous, reduced leaves c.10–20 × 6–9mm, petiole 3–4mm; blade of largest developed leaves 80–180 × 42–100mm, broadly to narrowly ovate, apex acute to shortly acuminate, margins coarsely doubly serrate, venation and indumentum as in typical plant but hairs often shorter, 1–2mm on upper surface, 0.5–1mm on lower, there 1–1.5mm over veins; petiole 50–120mm long, clad in more or less appressed hairs to 2mm. *Inflorescence* c.7–15-flowered. *Bracts* (outermost pair) 13–20 × 3.5–7mm, lanceolate narrowed to a broad basal part, margins entire or with a few minute teeth. *Pedicels* and *calyx* as in typical plant. *Corolla* 'bright red', 'crimson', 'scarlet', 'carmine red', slightly differing from that of typical plant only in indumentum on outside, on Lihir Island acute hairs to 0.5mm all over, few gland-tipped to 0.5mm on posticous side; on New Ireland, gland-tipped hairs to 0.8mm all over, acute hairs sparser, 0.5–0.8mm long. *Stamens* and *gynoecium* as in typical plant. *Capsules* not seen. **Fig. 20: 70c, d.**

PAPUA NEW GUINEA. **Lihir Island.** Only type collection seen. **New Ireland.** Hans Meyer Range, 4°26'S, 152°58'E, c.8km WNW of Taron on east coast, 1350m, 9 x 1975, *Sands* 1934 (E, L); *ibid.*, 4°24'S, 152°57'E, lower approach ridges to Mt Angil, c.9km NW of Taron, 1600m, 12 x 1975, *Sands* 2192 (E, L); *ibid.*, Angil Mt, c.1800m, 3 ii 1994, *Takeuchi & Wiakabu* 9357

(A, E); *ibid.*, ridge adjacent to Weitin River, c.4°27'S, 152°56'E, c.1175m, 25 i 1994, *Takeuchi & Wiakabu* 9495 (A, E).

*Agalmyla insularis* subsp. *prionodes* is distinguished by the coarse tothing of the leaves with hairs mostly shorter than in subsp. *insularis*, and shorter hairs on the outside of the calyx; specimens from the Hans Meyer Range are further distinguished by their more glandular corollas.

On Lihir Island, the habitat is given as 'ridge top moss forest' at 600m above sea level. On New Ireland, where the plant has been recorded only from the Hans Meyer Range at the southern tip of the island, information includes 'mossy montane forest' at 1175m, 'montane forest often mossy' at 1600m, and 'subcloud forest dominated by bryophytic and ferny growth' at c.1800m.

*Agalmyla* has not been recorded from Bougainville Island in the Solomons Group, though it has high mountains only 2° of longitude south-east of the Hans Meyer Range.

**71. *Agalmyla lavandulacea*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. keysseri* foliis venis lateralibus utrinque 6–8 (nec 4–6), lamina utrinque parcissime (nec dense) pilosa, bracteis extimis 10–19mm longis (nec 5–8mm) dorso pilis tantum in media linea confertis (nec aequaliter dispersis), calycis lobis 9–15mm longis (nec 5–7.5mm), corolla lavandulacea (nec rubra) differt.

Type: Papua New Guinea, West Sepik province, Telefomin subprovince, Frieda River, hill above drilling camp, 4°40'S, 142°00'E, 500m, 1 v 1978, *Kerenga & Lelean* LAE 74223 (holo. CANB; iso. BRI, L).

Epiphyte, stems of indeterminate length, branched, 4–6mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs to 2–2.5mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.8–16 × 5–8mm, lanceolate, hairy as developed leaves, petiole c.4mm long; blade of largest developed leaves 70–180 × 45–95mm, ovate to broadly elliptic, apex acute, base cuneate, margins weakly to strongly coarsely doubly serrate, lateral veins 6–8 each side of midrib, ascending at angle of c.45°, looping near margin with short veinlet running out to it, vein itself linking to vein above, upper surface clad in few well-scattered acute hairs to 1.2mm long, sometimes denser over midrib near base, lower surface with finer acute hairs to 1mm, well scattered on blade, crowded over veins; petiole 45–110mm long, thickly clad in upward-pointing acute hairs. *Inflorescence* an axillary cymose cluster, flowers to c.15, peduncle 180–500mm long, clad in acute hairs to 2–2.5mm long, possibly upward-pointing. *Bracts* (outermost pair) 10–19 × 3–5mm, elliptic, appressed acute hairs to 1–1.5mm long on both surfaces, crowded on midline of lower surface, scattered elsewhere. *Pedicels* 8–16mm long, clad in patent acute hairs to 1.3mm long. *Calyx* tube 5mm long, lobes 5, subequal, 9–15 × 1.6–2mm, almost linear, broadening only at base, apex subacute, outside clad in patent acute hairs to 1–2mm long, mostly shorter on margins, inside scattered minute globular glands. *Corolla* lavender, 32–40mm long, tube 27–33mm,

funnel-shaped, arcuate, limb spreading, mouth round, posticous lobes 4.5–6 × 4.5–6mm, subrotund, anticous lobe 8.5–10 × 6–8mm, obovate, all lobes fringed with gland-tipped hairs to 0.5–0.6mm long, outside of corolla clad in acute hairs mostly to 0.5mm long, on posticous side low down to 1mm, on upper part posticous side gland-tipped hairs to 1–1.5mm long, inside lobes acute hairs to 0.1mm long, inside tube scattered minute glandular hairs above a circlet 5–8mm deep (annulus) of acute hairs to 0.5–0.8mm long, inserted c.6mm above base of tube, small palate of globose papillae at point of insertion of anticous filaments raised laterally into 2 small flaps. *Stamens* 4, anticous filaments 15–17mm long inserted 15–16mm above base of tube, anthers 2–3mm long, not exceeding posticous lobes; posticous filaments 12–13mm long inserted 16–19mm above base of tube, anthers 1.8–2.8mm long; staminode 1.2–2mm long. *Disc* c.1 × 1.2mm, cupular. *Ovary* c.16–25 × 1–1.3mm (♂ phase), stipitate, few minute globular glands scattered on upper part. *Style* 2–3mm long, few scattered globular glands. *Stigmatic lobes* (♂ phase) c.2.5 × 2mm, few minute globular glands scattered outside. *Capsule* (only a shredded one seen) 140mm long. *Seeds* c.1 × 0.2mm, appendages c.5mm long. **Fig. 21: 71a, b.**

PAPUA NEW GUINEA. W Sepik prov., Carpentaria Exploration Base Camp [c.4°30'S, 142°00'E], stream margin on Ekwaii river, 500m, xii 1977, Hoover 438 (A).

In its calyx and the shape of the corolla *A. lavandulacea* resembles *A. keysseri*, which has been recorded roughly 500km further to the east, on the Huon Peninsula and nearby Saruwaged Mountains. The calyx lobes of *A. lavandulacea* are longer than those of *A. keysseri* (9–15mm versus 5–7.5mm) and appear never to be expanded at the tips as they sometimes are in *A. keysseri*; the lobes have similar indumentum. The two species differ further in their leaves, the blade with few scattered hairs in *A. lavandulacea* (versus densely hairy) and 6–8 (versus 4–6) lateral veins, and in their bracts, those of *A. lavandulacea* having a median longitudinal band of crowded hairs on the dorsal surface while the hairs are evenly distributed in *A. keysseri*. Furthermore, *A. lavandulacea* is most unusual in having lavender-coloured flowers; the collectors also recorded the leaves as dark green above, lavender below (regrettably, Hoover made no mention of colour in flowers or leaves). There is only one other reference to *Agalmyla* having flowers at the blue end of the spectrum: Kostermans recorded 'flowers lilac' for a plant he collected on Morotai in the Moluccas (see under 37. *A. elongata* (Kostermans 1131)).

Kerenga & Lelean noted 'epiphytic on rocks', but the plant is surely also epiphytic on tree trunks.

**72. *Agalmyla centralis* Hilliard & B.L. Burt, sp. nov.** ab *A. keysseri* foliis ellipticis (nec ovatis), corollae tubo c.34mm longo anguste infundibulari (nec 26–29mm late infundibulari), lobo antico 8–10 × 5–5.5mm elliptico (nec 5–10 × 5.5–10.5mm subrotundo), lobis omnibus pilis acutis ad 0.25mm longis fimbriatis (nec pilis glanduloso-apiculatis, ad 0.3–0.5mm longis), corolla externe tantum pilis acutis indutis postice 0.7–0.8mm longis alibi brevioribus (nec pilis acutis et glanduloso-apiculatis ad 0.6–1mm longis intermixtis) distinguenda.

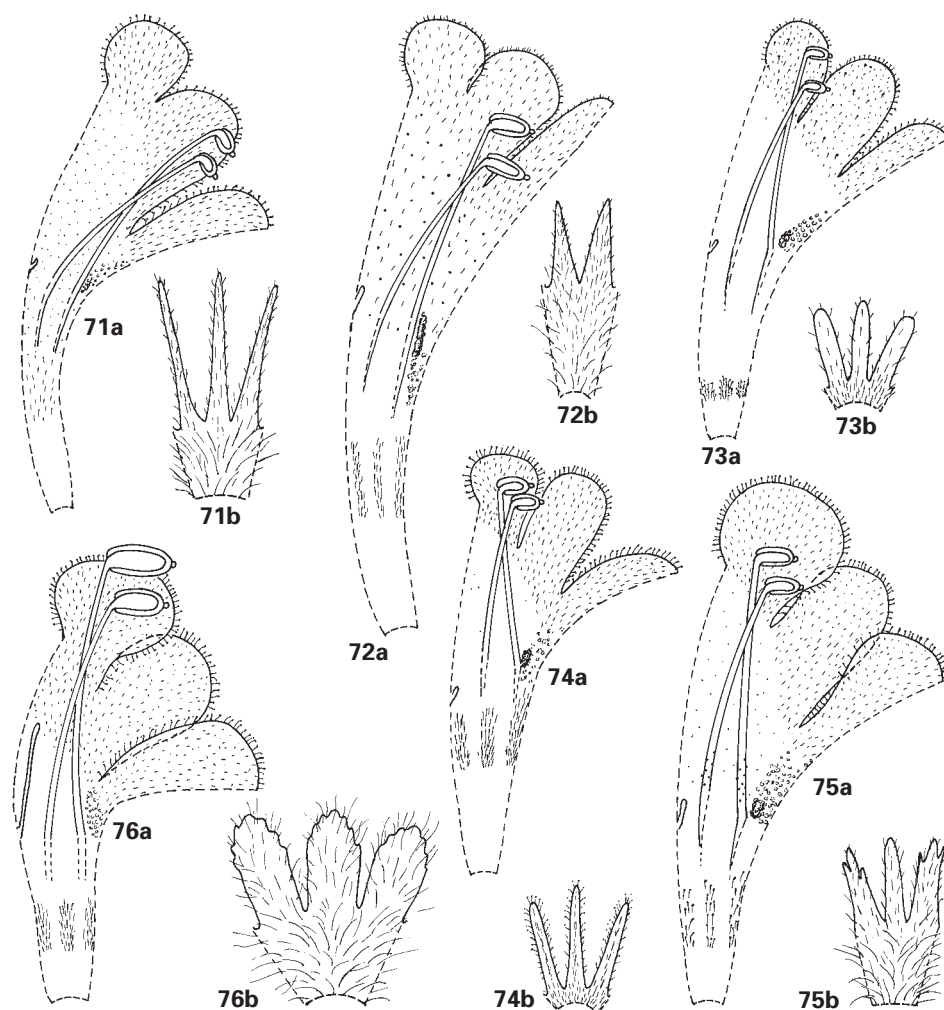


FIG. 21. Part of calyx and longitudinal section of corolla: 71a, b, *Agalmyla lavandulacea*; 72a, b, *A. centralis*; 73a, b, *A. angiensis*; 74a, b, *A. paromoia*; 75a, b, *A. dentatisejala*; 76a, b, *A. hirta*. All  $\times 2$ .

Type: Papua New Guinea, Mt Bosavi, northern side,  $6^{\circ}26'S$ ,  $142^{\circ}50'E$ , 1350–1550m, 26 ix 1973, *Jacobs* 8819 (holo. L, iso. CANB).

Epiphyte, stems of indeterminate length (5–12m recorded), branched, c.7mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs to 2mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.9–10  $\times$  4.5–6mm, elliptic, hairy as developed leaves, petiole c.3mm long; blade of largest developed leaves 90–120  $\times$  30–55mm, elliptic, apex acute, base cuneate, margins coarsely and irregularly doubly serrate, lateral veins 6 each side of midrib, ascending at angle of c.45 $^{\circ}$ , looping and running out to margin,

upper surface well clad in acute hairs to 1.5–2mm long, lower surface similar but hairs finer, to 1.2–1.5mm long, crowded over veins; petiole 30–55mm long, well clad in acute upward-pointing hairs to c.2mm long. *Inflorescence* an axillary cymose cluster, flowers c.15, peduncle 160–450mm long, clad in acute  $\pm$  appressed hairs to 2mm long. *Bracts* (outermost pair) c.5–6  $\times$  2–3.5mm, elliptic, acute, broad-based, acute hairs to 1mm long scattered on both surfaces. *Pedicels* c.10mm long, clad in patent acute hairs to 1.5mm long. *Calyx* dull dark purple, tube 7mm long, lobes 5, subequal, 5.5–8  $\times$  2–2.2mm, more or less deltoid, apex subobtusate, inside scattered minute globular glands, outside patent acute hairs to 1–1.2mm long, shorter on margins. *Corolla* red, 40mm long, tube c.34mm, narrowly funnel-shaped, arcuate, limb spreading, mouth round, posticous lobes c.5  $\times$  5mm, subrotund, anticous lobe 8–10  $\times$  5–5.5mm, elliptic, lobes fringed with acute hairs to c.0.25mm long, outside of corolla clad in acute hairs to 0.7–0.8mm long on posticous side, shorter on anticous, inside lobes acute hairs to 0.2mm long, extending down tube to insertion of filaments and mixed with scattered globular glands, 2 small papillose flaps at point of insertion of anticous filaments otherwise palate almost wanting, annulus inserted 6–7mm above base of tube, composed of 5 longitudinal bands of acute hairs to 0.8mm long, bands 6–8mm long. *Stamens* 4, anticous filaments c.15mm long, inserted c.20mm above base of tube, anthers 2.5–3mm long, not exceeding posticous lobes; posticous filaments c.13mm long, inserted c.22mm above base of tube, anthers 2.3–2.8mm long; staminode 1mm long. *Disc* c.1.5  $\times$  1.3mm, cupular. *Ovary* 27  $\times$  1.2mm, shortly stipitate, minute globular glands scattered on upper part, also on style and backs of stigmatic lobes. *Style* c.4mm long. *Stigmatic lobes* 2.3  $\times$  1.8mm. *Capsule* 110mm long (only 1 seen, old and shredded). *Seeds* not seen. **Fig. 21: 72a, b.**

*Agalmyla centralis* is known only from the type collection made on the great volcanic cone of Mt Bosavi in south-central Papua New Guinea, where it was recorded as a ‘creeper on slender trunks, 5–12m; young parts and leaves somewhat glaucous, peduncle and calyx dull dark purple, corolla red, style and stigma yellow’. Its relationship possibly lies with *A. keysseri*, whose nearest known localities lie roughly 450–500km to the north-east, in the Saruwaged Mountains and adjacent Huon Peninsula. It differs from *A. keysseri* in the shape of its leaves (elliptic not ovate), its longer and narrower corolla tube, anticous lobe elliptic (not subrotund), corolla lobes fringed with acute (not gland-tipped) hairs, and outside of corolla also clad in acute hairs only (not some gland-tipped).

*Gideon* LAE 57378 (E), also from Mt Bosavi, northern slopes at 6°28'S, 142°50'E, collected in cloud forest at 1500m on 23 viii 1986, comprises a long (nearly 1m), very slender stem bearing leaves similar to those of *A. centralis* in all respects except size: they are much smaller. The material is judged to be young, and it is badly galled. The collector recorded ‘climbing herb with bright red flowers, leaves green, fleshy’. There is no inflorescence on the stem, only a single flower caught up in moss: *calyx* tube 5mm, lobes 5.8–6.3  $\times$  1–1.8mm at base, narrowly deltoid, hairy as in *A. centralis*; *corolla* 33mm long, tube 28mm, posticous lobes 5  $\times$  4.8mm, anticous



lobe  $7 \times 6$  mm, all lobes fringed with gland-tipped hairs to 0.6 mm, outside of corolla clad in mixed acute and gland-tipped hairs to 1 mm long. The flower therefore differs from that of *A. centralis* in size, in the shape of the anticous lobe, and in the hairs on the corolla. Further material, including an inflorescence, is needed to judge the status of this plant.

**73. *Agalmyla angiensis* (Kaneh. & Hatusima) Hilliard & B.L. Burtt, **comb. nov.****

Type: West New Guinea, Arfak Mts, Lake Giji [Anggi Gigi,  $1^{\circ}22'S$ ,  $133^{\circ}53'E$ ], along the Iray river, 1900 m, 8 iv 1940, *Kanehira* & *Hatusima* 13870 (holo. FU, n.v.; iso. A). Syn.: *Dichrotrichum angiense* Kaneh. & Hatusima in Bot. Mag. Tokyo 57: 114 (1943) cum fig.

Epiphyte, stems of indeterminate length, loosely branched, slender, c. 2.5 mm in diam., somewhat flexuous, rooting along internodes, well clad in patent hairs to 2 mm long, mixed acute and gland-tipped, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves  $c.5-6 \times 2-4$  mm, more or less elliptic, hairy as developed leaves, petiole 1–2 mm long; blade of largest developed leaves  $37-45 \times 20-24$  mm, obtrullate in outline, 3-lobed in upper part, apical lobe c. 14–15 mm long, entire or with a pair of small teeth, side lobes smaller, entire on upper margin, 1-toothed on lower, margins of lower part of leaf with 2–3 coarse teeth, apex acute to subacute, base narrowly long-cuneate, lateral veins 3 each side of midrib, ascending at angle of  $c.45^{\circ}$ , running straight out to margin, upper surface with scattered acute hairs to 2–2.5 mm long, hairs on lower surface shorter and more delicate on blade, somewhat crowded to well scattered, longer and more crowded over veins; petiole 17–25 mm long, clad in upward-pointing acute hairs to 1.5 mm. *Inflorescence* an axillary cymose cluster, flowers 2–4, peduncle c. 35–40 mm long, clad in more or less spreading acute hairs to 1.5 mm. *Bracts* (lowermost, few seen)  $c.4 \times 1.8$  mm, elliptic narrowed to a broad base, clad in a few scattered acute hairs to 0.5 mm long. *Pedicels* 4–6 mm long, clad in acute upward-pointing hairs to 1 mm long. *Calyx* tube 1.7–2.2 mm long, lobes 5, subequal,  $4.2-5.3 \times 1.2-2$  mm at base, more or less oblong, slightly widened at base, obtuse, margins entire, outside and on margins scattered acute hairs to 0.5–1.4 mm long, inside tube minute globular glands. *Corolla* 'red', c. 28 mm long, tube c. 20 mm, narrowly funnel-shaped, slightly arcuate, mouth more or less round, limb spreading, posticous lobes  $c.6 \times 4$  mm, oblong, apex broadly rounded, anticous lobe  $c.7 \times 4.5$  mm, oblong, apex broadly rounded, outside of corolla clad in mixed acute hairs and longer gland-tipped ones to 0.5–0.8 mm long, the latter most plentiful on posticous side, lobes fringed with gland-tipped hairs to c. 0.2 mm long, inside lobes mixed gland-tipped hairs to 0.25 mm and acute hairs to 0.1 mm, small palate of globose papillae at point of insertion of anticous filaments, annulus inserted c. 2.5 mm above base of tube, composed of 5 tufts of gland-tipped hairs to 1.5 mm long. *Stamens* 4, anticous filaments c. 11 mm long, inserted 13 mm above base of tube, anthers c. 1.7 mm long, not exceeding posticous lobes; posticous filaments c. 9 mm long, inserted 14 mm above base, anthers c. 1.5 mm long; staminode

2mm. *Disc* 1 × 1mm, cupular, rim crenulate. *Ovary* 13 × 1mm, scarcely stipitate, glabrous. *Style* 10mm long, clad in scattered acute hairs to 0.3mm. *Stigmatic lobes* 1 × 1mm, very minute gland-tipped hairs on backs. *Capsules* not seen. **Fig. 21: 73a, b.**

*Agalmyla angiensis* is known only from the type collection, made near Lake Gigi (Anggi Gigi in the local language, whence the epithet) in the Arfak Mountains near the north-east coast of the Vogelkop Peninsula. The authors recorded 'scrambling in mossy forest'.

Kanehira & Hatusima gave a rather weak diagnosis against *Dichrotrichum lobatum* (*Agalmyla lobata*), which they probably knew only from Schlechter's description and illustration; that species is known only from the Hunsteinspitze on the northern flank of the Central Range of Papua New Guinea, at c.4°30'S, 142°48'E. It differs markedly from *A. angiensis* not only in the shape, tothing and venation of the leaves, but also in the lack of gland-tipped hairs on the stem and on the inner face of the corolla lobes, longer calyx tube and lobes, annulus composed of acute hairs, and glabrous style.

The closest relationship of *A. angiensis* appears to be with *A. dentatisepala* (no. 75); see there, as well as *A. wekariensis*, *A. tamrauana* and *A. paromoia*.

**74. *Agalmyla paromoia* Hilliard & B.L. Burtt, sp. nov.** ab *A. angiensi* foliis apice haud distincte trilobo, venis lateralibus utrinsecus costae 4–5 (nec 3), pedunculo c.3mm longo (nec c.35–40mm), calyce pilis acutis ad 1mm longis in tubo et linea media loborum in dimidio superiore marginum pilis glandulosis ad 1mm longis (nec pilis dispersis acutis tantum), corollae lobis pilis acutis in facie interiore tantum (nec pilis glanduloso-apiculatis et acutis intermixtis), stylo glabro differt.

Type: West New Guinea, Nassau Mts, 1500m, x 1926, *Docters van Leeuwen* 10940 (holo. L).

Epiphyte, stems of indeterminate length, loosely branched, c.3mm in diam. on flowering part, flexuous, rooting along internodes, well clad in patent hairs to 2mm, mixed acute and gland-tipped, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.8 × 2mm (few seen), oblong, petiole c.1mm, hairy as developed leaves; blade of largest developed leaves 67–77 × 26–40mm, elliptic to almost obtrullate in outline, apex deltoid, acute, base narrowly long-cuneate, margins with 3–4 coarse teeth each side, teeth sometimes confined to upper part, lateral veins 4–5 each side of midrib, ascending at angle of c.45°, looping near margin and linking to vein above with a short side vein running out to apex of adjacent tooth, upper surface clad in acute hairs to 1.5mm long, tip of each hair either not reaching base of hair above or overlapping to about one third, on lower surface hairs widely scattered on blade, crowded over veins; petiole 25–40mm long, clad in acute upward-pointing hairs to 2mm long. *Inflorescence* axillary, cymose, 2–5-flowered, peduncle c.3mm long, clad in acute appressed hairs. *Bracts* (lowermost, few seen) 3–5 × 0.6–1mm, more or less spatulate, clad in acute hairs to 1mm long. *Pedicels* c.4mm long, clad in acute hairs to 1mm. *Calyx* tube 1mm long, lobes 5,

subequal,  $5-7 \times 1-1.3$  mm at base, almost linear, obtuse, margins entire, outside of tube well clad in appressed acute hairs to 1 mm long, hairs on lobes mainly median, patent, shorter, hairs on margins, gland-tipped on upper half of each lobe. *Corolla* 'clear red', c. 2.7 mm long, tube 22 mm, narrowly funnel-shaped, slightly arcuate, mouth more or less round, limb spreading, posticous lobes  $6 \times 4.5$  mm, subrotund in upper half, more or less oblong below, anticous lobe  $8 \times 5$  mm, elliptic, tip broadly rounded, outside of corolla clad in acute hairs to 0.6 mm long together with gland-tipped hairs to 1 mm, mainly on posticous side, lobes fringed with gland-tipped hairs to 0.7 mm long, inside lobes acute hairs to 1.5 mm long, these running down floor of tube to meet palate, small palate of globose glands at point of insertion of anticous filaments, annulus inserted 7 mm above base of tube, composed of 5 discrete longitudinal bands of acute hairs to 1.5 mm long, on anticous side these hairs running up to palate. *Stamens* 4, anticous filaments 12 mm long, inserted 14 mm above base of tube, anthers 2 mm long, not exceeding posticous lobes; posticous filaments 11 mm long, inserted 14 mm above base, anthers 1.8 mm long; staminode 1.5 mm. *Disc*  $1 \times 1$  mm, cupular, rim crenulate. *Ovary* ( $\text{♀}$  phase)  $17 \times 1$  mm, glabrous. *Style* 5 mm, glabrous. *Stigmatic lobes*  $2 \times 1.8$  mm, glabrous. *Capsules* not seen. **Fig. 21: 74a, b.**

*Agalmyla paromoia* is known only from the type collection made in the western part of the Nassau Mountains, more than 450 km south-east of the Arfak Mountains, whence came *A. angiensis*, which appears to be its closest ally. It bears a superficial resemblance to *A. angiensis* suggesting the epithet *paromoia* (Greek: similar), but differs in a good many characters: the leaves are not distinctly 3-lobed at the apex, and have 4–5 lateral veins each side of the midrib (not 3); the termination of these veins also differs – looping near the margin in *A. paromoia* and linking to the vein above, with a short side vein running out into the adjacent tooth, whereas in *A. angiensis* the lateral veins do not curve, but run straight out to the margin. The peduncles of *A. paromoia* are barely 3 mm long (versus c. 35–40 mm), the inner surfaces of the corolla lobes are clad in acute hairs only (versus acute hairs plus gland-tipped ones to 0.25 mm long), the hairs on the outside of the calyx lobes tend to be median (not widely scattered) and there are gland-tipped hairs on the margins of the lobes (not acute ones only), the annulus is composed of acute (not gland-tipped) hairs, and the style is glabrous (not furnished with patent acute hairs).

Little information about the plant is available; the collector merely recorded 'forest. Climber'.

**75. *Agalmyla dentatisepala*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. angiensi* foliis apice haud distincte trilobo, basi late cuneatis (nec anguste et longe cuneatis) calycis tubo 5–6 mm longo (nec 1.7–2.7 mm), nonnullis loborum saltem dentibus 2–3 prominentibus instructis (nec omnibus integris), corollae lobis pilis in interiore omnibus acutis (nec pilis glanduloso-apiculatis et acutis intermixtis), stylo glandulis globularibus dispersis exceptis glabro (nec pilis patentibus acutis induto) distinguitur.

Type: West New Guinea, Vogelkop Peninsula, S slope of Mt Nettoti, path Andjai–Wekari river, 1750 m, 28 xi 1961, *Royen & Sleumer* 7397 (holo. L, iso. K).

Epiphyte, stems of indeterminate length, loosely branched, slender, 1.5–3mm in diam. on flowering part, somewhat flexuous, rooting along internodes, well clad in patent hairs to 1.5–2.5mm long, mixed acute and gland-tipped, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.3–3.5 × 1.5mm, more or less elliptic, hairy as developed leaves, petiole c.2mm; blade of largest developed leaves 43–55 × 18–32mm, narrowly ovate in outline, apex acute (elongate deltoid), base broadly cuneate to almost round, margins with 4–5 coarse deltoid teeth each side together with a few smaller teeth, lateral veins 3–4 each side of midrib, ascending at angle of c.45°, running out to margin, upper surface with scattered acute hairs to 2mm long (tip of each hair reaching or slightly over-reaching base of hair above), lower surface with shorter, finer, more crowded hairs to 1–1.3mm long, dense over veins and there 2mm; petiole 15–45mm long, well clad in acute upward-pointing hairs to 2mm long. *Inflorescence* axillary, cymose, flowers 1–4, peduncle 10–33mm, clad in more or less spreading hairs to 1.5–3mm long, mostly acute, or some gland-tipped. *Bracts* (lowermost) c.4–6 × 1mm, spatulate, entire or with a few minute teeth, clad in acute hairs to 1.2mm. *Pedicels* 7–14mm, clad in patent acute hairs to 2mm. *Calyx* tube 5–6mm long, lobes 5, subequal, 5.2–6.8 × 1.5–2.5mm, more or less oblong, slightly widened at base, apex obtuse to subacute, margins of at least some lobes with 2 or 3 prominent teeth, outside and margins well clad in patent acute hairs to 1–2mm long, inside tube minute globular glands, a few short acute hairs inside tips of broadest lobes. *Corolla* ‘scarlet’ or ‘pinkish red’, 34–40mm long, tube 24–28mm, funnel-shaped, slightly arcuate, mouth more or less round, limb spreading, posticous lobes 10–12 × 8–9.5mm, broadly rounded, anticus lobe 11–15 × 9.5–12mm, ± oblong, broadly rounded, outside clad in gland-tipped hairs to 1mm long, mostly on posticous and lateral sides, acute to 0.15–0.4mm on anticus side, lobes fringed with gland-tipped hairs to 0.6mm long, inside lobes acute hairs to 1.5mm long, palate of globose papillae extending from point of insertion of anticus filaments (and there raised into 2 small keels) halfway along floor of tube towards base of anticus lobe, annulus inserted c.3mm above base of tube, composed of 5 longitudinal bands of gland-tipped hairs to 1.2mm long extending c.7mm up tube. *Stamens* 4, anticus filaments c.17mm long, inserted c.12mm above base of tube, anthers 2.5mm long, not exceeding posticous lobes; posticous filaments c.14mm long, inserted c.14mm above base of tube, anthers 2.3mm long, all filaments very minutely glandular on lower part; staminode c.1.4mm long. *Disc* 1 × 2mm, cupular, rim crenulate. *Ovary* (♀ phase) 29 × 1.2mm, few minute globular glands scattered on upper part. *Style* c.10mm long, minute globular glands scattered all over. *Stigmatic lobes* 3 × 2.8mm, globular glands scattered on backs, minutely papillose inside. *Capsules* not seen. **Fig. 21: 75a, b.**

WEST NEW GUINEA. Vogelkop Peninsula, S slope Mt Nettoti, path Andjai–Wekari river, 1750m, 29 xi 1961, *Royen & Sleumer* 7469 (L).

*Agalmyla dentatisejala* is known from two collections made on the southern slopes of Mt Nettoti, at roughly 0°30'S, 133°E and 130km north-west of Anggi Gigi, type

locality of *A. angiensis*, which is probably one of its immediate allies. It differs from *A. angiensis* in its differently shaped leaves that lack the distinctly 3-lobed apex characteristic of *A. angiensis* and have a broadly cuneate (not narrowly long-cuneate) base, its longer calyx tube (5–6mm versus 1.7–2.2mm), and calyx lobes with prominent teeth (whence the trivial name), corolla lobes with acute hairs only on the inner face (no gland-tipped hairs to 0.2mm long), and style lacking acute patent hairs. Other allies are *A. hirta* and *A. wekariensis*: see those species.

The collectors recorded 'Epiphyte in moss-cushions on *Nothofagus* in *Nothofagus* forest. Climber; leaves olive green above, greyish-green below. Flowers scarlet. Immature fruit purple. Young leaves purple below'. Their second collection noted that the flowers were pinkish-red and the leaves dark green above, light green below with purple veins; also that the plant was rather common locally.

**76. *Agalmyla hirta*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. dentatisepala* caulibus pilis acutis 4–5mm longis dense indutis (nec pilis acutis et glandulo-apiculatis ad 1.5–2.5mm longis), foliis utrinque pilis acutis 2.5–3mm longis dense indutis (nec pilis 1.5–2mm parce pilosis), bracteis ovatis (nec spatulatis), calyce pilis acutis patentibus ad 3mm longis (nec 1–2mm), lobis obscure dentatis (nec dentibus 2mm longis) distinguenda.

Type: West New Guinea, subdistrict Manokwari, Vogelkop, Arfak, Anggi Gita lake, 1800m, 9–22 x 1948, *Kostermans* 2356 (holo. L).

Epiphyte, stems of indeterminate length, loosely branched, twining, c.4–5mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs to 4–5mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.4–9 × 3.5–5mm, ovate, petiole c.1–2mm, hairy as developed leaves; blade of largest developed leaves 50–57 × 30–36mm, ovate, apex acute, base broadly cuneate, margins coarsely and jaggedly doubly serrate, lateral veins 4 each side of midrib, ascending at angle of c.45°, running straight out to margin, both surfaces shaggy with crowded acute hairs to 2.5mm long on upper surface, finer, even denser, to 3mm long on lower surface; petiole 30–45mm long, thickly clad in patent acute hairs to 2.5–3mm long. *Inflorescence* an axillary, crowded cymose cluster, flowers c.7, peduncle c.270–320mm long, thickly clad in patent acute hairs to 4–5mm long. *Bracts* (lowermost, only 1 seen) 6 × 4mm, ovate abruptly contracted to a broad petiolar part, both surfaces thickly clad in acute hairs to 2mm long outside, to 1mm inside. *Pedicels* c.10mm long, well clad in patent acute hairs to 3mm long. *Calyx* tube 6mm long, lobes 5, subequal, 6.2–7 × 2–3.5mm, oblong, obtuse, margins in upper part obscurely toothed, thickly clad outside in patent acute hairs to 3mm long, shorter hairs inside near tips of lobes. *Corolla* 'bright red', c.29mm long, tube 20mm, funnel-shaped, slightly arcuate, mouth more or less round, lobes spreading, posticous lobes 8 × 7–8.5mm, subrotund contracted to an oblong base, anticous lobe 10 × 7–8mm, broadly elliptic, apex rounded, outside clad in gland-tipped hairs to 1mm long on posticous side, elsewhere acute to 1mm, rapidly shorter

upwards to c.0.3mm on backs of lobes, lobes fringed with gland-tipped hairs to 0.5mm long, inside lobes acute hairs to 0.1mm long extending short way down tube, palate of globose papillae on floor of tube from near base of anticous lobe to point of insertion of anticous filaments, annulus inserted 3mm above base of tube, composed of 5 longitudinal bands of acute hairs to 1.2mm, extending c.3mm up tube. *Stamens* 4, anticous filaments 17–18mm long, inserted c.11mm above base of tube, anthers 4.2mm long, about equalling posticous lobes; posticous filaments 15–16mm long, inserted c.12mm above base, anthers 3.8mm long; staminode 4–7mm long. *Disc* 1 × 2mm, cupular, rim crenulate. *Ovary*, including stipe, c.20 × 1.2mm (♀ phase), glabrous. *Style* c.2mm, glabrous. *Stigmatic lobes* 3 × 2.5mm, glabrous outside, minutely papillose inside. *Capsules* not seen. **Fig. 21: 76a, b.**

A striking feature of *A. hirta* is the shaggy indumentum on stems, leaves, peduncles and calyx, whence the trivial name. In general facies the plant somewhat resembles *A. dentatisepala*, but is readily distinguished by acute hairs only on the stem, to 4–5mm long (not mixed acute and gland-tipped 1.5–2.5mm), leaves shaggy on both surfaces, hairs to 2.5–3mm long (not sparsely hairy, hairs to 1.5–2mm), calyx hairs to 3mm long (not 1–2mm), and calyx lobes obscurely toothed (not conspicuous teeth c.2mm long). Also, the peduncles appear to be much longer (270–320mm versus 10–33mm) with more flowers in the inflorescence (c.7 flowers, not 1–4), but too little material has been seen to be sure of this.

*Agalmyla hirta* is known only from the type collection made in swampy forest at Anggi Gita (lake) (1°23'S, 133°58'E) in the Arfak Mountains on the Vogelkop Peninsula roughly 150km south-east of the Nettoti Range, type locality of *A. dentatisepala*.

**77. *Agalmyla wekariensis*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. dentatisepala* foliis venis lateralibus 5–6 (nec 3–4), calyce pilis acutis ad 3mm longis induto paucis ad loborum apices glanduloso-apiculatis (nec pilis 2mm longis omnibus acutis), lobis linearibus integris (nec oblongis conspicue dentatis) distinguenda.

Type: West New Guinea, Vogelkop Peninsula, Nettoti Range, Wekari River camp, 1550m, 3 xii 1961, *Royen & Sleumer* 8079 (holo. L).

Epiphyte, stems of indeterminate length, twining, loosely branched, rooting along internodes, c.3mm in diam. on flowering part, well clad in patent hairs to 2–3mm long, mixed acute and gland-tipped, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, only immature reduced leaves seen; blade of largest developed leaves 55–80 × 30–43mm, ovate, acute, base shortly cuneate, margins irregularly serrate, the toothing sometimes shallow and distant, lateral veins 5–6 each side of midrib, ascending at angle of c.45°, slightly curved, running out to margin, upper surface well clad in acute hairs to 2–3mm long (hairs overlapping but blade visible), lower surface with matted acute hairs to 1.5mm long on blade, crowded acute hairs to 2.5mm over veins; petiole 20–55mm long, clad in acute, upward-pointing hairs to 2mm long. *Inflorescence* axillary, cymose, flowers c.3, peduncle c.30mm long

(twisted around supporting branch and difficult to measure), clad in acute patent hairs to 2mm. *Bracts* (lowermost, only 1 seen)  $6 \times 2.4$ mm, elliptic, broad-based, acute hairs to 1mm outside, a few inside near apex. *Pedicels* c.7mm long, clad in patent acute hairs to 2.5mm. *Calyx* tube 5mm long, lobes 5, subequal,  $7.2\text{--}8 \times 1.6\text{--}2$ mm at base, abruptly much narrower upwards and there linear, entire, outside and margins well clad in acute hairs to 3mm long, a few gland-tipped hairs at apex of lobes, inside tube minute globular glands. *Corolla* red, 30mm long, tube 19mm, cylindric in lower part then curved and expanded above, mouth more or less round, limb large in relation to size of tube, spreading, posticous lobes  $10 \times 8$ mm, suborbicular becoming oblong towards base, anticous lobe  $12 \times 7.5$ mm, obovate, outside of corolla clad in gland-tipped hairs to 1.5mm long together with much shorter acute ones, lobes fringed with gland-tipped hairs to 0.6mm long, inside lobes acute hairs to 1.5mm long, palate of globose papillae on floor of tube from base of anticous lobe to insertion of anticous filaments, elsewhere inside tube minute globular glands, annulus inserted 3mm from base of tube, composed of 5 tufts of gland-tipped hairs to 1.5mm long, hairs scanty. *Stamens* 4, anticous filaments 16mm long, inserted 8mm above base of tube, anthers 2.2mm long, not exceeding posticous lobes; posticous filaments 15mm long, inserted 9mm above base, anthers 2mm long; all filaments with minute gland-tipped hairs scattered on lower part; staminode 2mm long. *Disc*  $0.8 \times 1.5$ mm, cupular, rim crenulate. *Ovary*  $12 \times 1$ mm ( $\delta$  phase), minute globular glands scattered on upper part. *Style* 2.5mm ( $\delta$  phase), with scattered globular glands. *Stigmatic lobes*  $2.5 \times 1.2$ mm, globular glands on backs of lobes. *Capsules* unknown. **Fig. 22: 77a, b.**

*Agalmyla wekariensis* is known with certainty only from the type collection, but a second plant, collected by Royen & Sleumer the following day, at the same locality, is mentioned below. The species is allied to *A. dentatisejala*, found by Royen & Sleumer in the same general area; *A. dentatisejala* has oblong calyx lobes furnished with a few conspicuous teeth and acute hairs to 2mm long, while those of *A. wekariensis* are linear, broadening rather abruptly at the base, clad in acute hairs to 3mm, with a few gland-tipped ones at the apices. The two species differ further in their leaves, those of *A. wekariensis* having 5–6 pairs of lateral veins (not 3–4) and the blade more densely hairy (on fully mature leaves, hairs strongly overlapping in *A. wekariensis*, scarcely so in *A. dentatisejala*).

Royen & Sleumer recorded of *A. wekariensis*: 'Epiphyte climber in forest. Leaves dark green above, light greyish-green with purple veins below. Flowers red'. The plant that they collected the following day had 'flowers both pure brick-red and carmine-red' and was found at 1550m in riverine forest: Royen & Sleumer 8121 (L), Vogelkop Peninsula, Nettoti Range, Wekari River camp. It is almost certainly conspecific with *A. wekariensis*; the leaves are narrower (c.47–65  $\times$  12–18mm) but otherwise accord well, the calyx is shorter (tube 3mm, lobes 4–5.4  $\times$  1.7–2mm at base, linear upwards) and lacks gland-tipped hairs at the apices of the lobes, the corolla is similar in form and indumentum but is longer – 34mm long, tube 26mm,

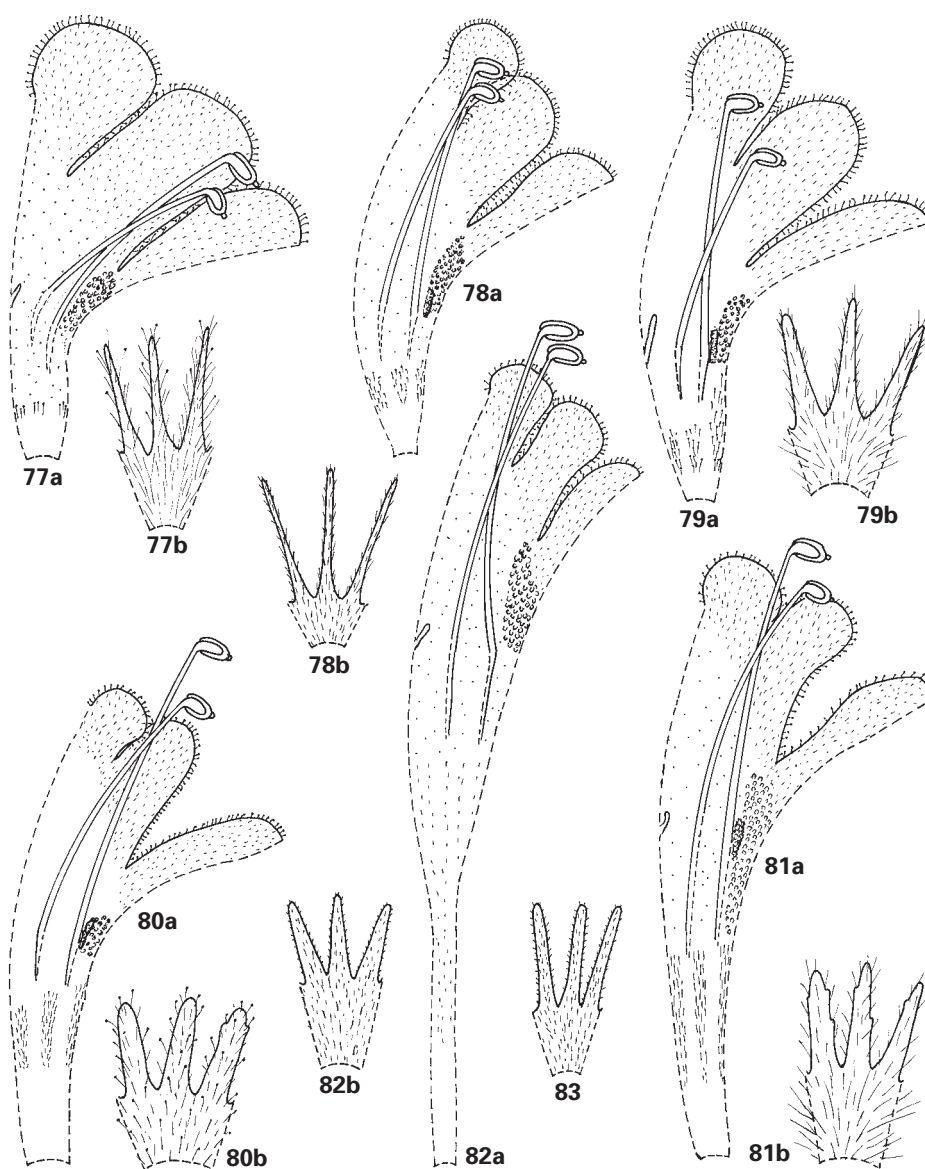


FIG. 22. Part of calyx and longitudinal section of corolla: 77a, b, *Agalmyla wekariensis*; 78a, b, *A. tamrauana*; 79a, b, *A. longiattenuata*; 80a, b, *A. brevipes*; 81a, b, *A. parvifolia*; 82a, b, *A. stenosphon*; 83, *A. lobata* (calyx only). All  $\times 2$ .

posticous lobes  $7.5 \times 6$ mm, anticous lobe  $11 \times 7$ mm. *Agalmyla wekariensis* is yet another species known from insufficient material to permit sound judgement of variability.

**78. *Agalmyla tamrauana*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. wekariensi* caulibus pilis appressis acutis ad 1.5mm longis indutis (nec pilis acutis et glandulosis



patentibus 2–3mm longis), pagina superiore foliorum pilis acutis 1–1.3mm longis (nec 2–3mm), calyce pilis acutis appressis 1.2mm longis (nec pilis patentibus acutis ad 3mm longis, aliis paucis glanduloso-apiculatis ad apices loborum) induto differt. Type: West New Guinea, Vogelkop Peninsula, central part of Tamrau Range, S slope, path from Sudjak village to Mt Kusemun, Aiwa river, 880m, 7 xi 1961, *Royen & Sleumer* 7756 (holo. L, iso. K).

Epiphyte, stems of indeterminate length, c.3mm in diam. on flowering part, flexuous, loosely branched, rooting along internodes, well clad in acute appressed hairs to 1.5mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.5–6 × 2–2.5mm (few seen), petiole c.2mm; blade of largest developed leaves 47–75 × 18–37mm, ovate to elliptic, acute, base either narrowly cuneate and shortly decurrent or broadly cuneate and not decurrent, margins coarsely serrate or doubly serrate, lateral veins 5–6 each side of midrib, ascending at angle of c.45°, looping near margin and running into it, upper surface clad in crowded acute hairs to 1–1.3mm long, lower surface similar but hairs finer; petiole 14–40mm long, clad in acute appressed hairs to 1.5mm long. *Inflorescence* axillary, cymose, 2–5-flowered, peduncle 2–5mm long, clad in acute appressed hairs to 1mm long. *Bracts* (few seen) 6 × 1.5mm, oblanceolate, both surfaces clad in scattered acute hairs to 1mm long. *Pedicels* 3–10mm long, clad in acute appressed hairs to 1.2mm long. *Calyx* tube 3mm long, lobes 5, subequal, 7–9.2 × 1.5–1.8mm at base, abruptly much narrower upwards and there linear, entire, outside and margins well clad in acute hairs to 1.2mm long, appressed particularly on tube, inside tube scattered globular glands. *Corolla* orange-red, 24–30mm long, tube 17.5–21mm, funnel-shaped, slightly arcuate, mouth more or less round, limb spreading, posticous lobes 6–7 × 4.8–5mm, suborbicular in upper half, oblong in lower, anticous lobe 7.5–10 × 5–6.5mm, obovate, outside of corolla clad in acute hairs to 0.6–0.8mm long, sometimes also with scattered gland-tipped hairs to 1mm on posticous side, lobes fringed with gland-tipped hairs to 0.4–0.6mm long, inside lobes acute hairs to 0.1mm long, inside tube scattered globular glands, palate of globose papillae on floor of tube from base of anticous lobe to insertion of anticous filaments, sometimes raised into 2 small flaps, annulus inserted 2–4mm above base of tube, composed of 5 patches of scanty gland-tipped hairs. *Stamens* 4, anticous filaments 14–17mm long, inserted 8.5–9mm above base of tube, anthers 1.8–2mm long, not or very shortly exceeding posticous lobes; posticous filaments 13–15mm long, inserted 10mm above base, anthers 1.7–1.8mm; staminode c.1mm long. *Disc* 1 × 1.2mm, cupular. *Ovary* 22 × 1.2mm (♀ phase), stipitate. *Style* 5mm. *Stigmatic lobes* 2 × 1.8mm, papillose on inner faces, minute globular glands outside, also on style and most of ovary. *Capsules* 55–95mm long. *Seeds* all shed. **Fig. 22: 78a, b.**

*Agalmyla tamrauana* is distinguished from *A. wekariensis* by its stems with appressed acute hairs to 1.5mm long (not mixed acute and gland-tipped patent hairs to 2–3mm long), upper surface of leaves with acute hairs to 1–1.3mm long (not 2–3mm), and

the calyx clad in acute appressed hairs to 1.2mm long (not patent acute to 3mm, a few gland-tipped ones near apices of lobes).

The type material came from the central part of the Tamrau Range in the north of the Vogelkop Peninsula, west of the Nettoti mountains whence came *A. wekariensis*. The stems are remarkably well branched, very slender and flexuous though the majority appear to be old (clad in disintegrating bark); the only young stems are very short (up to 30mm) side shoots that bear the flowering inflorescences. The old shredded capsules are on the main stems.

We have seen no other specimen of *A. tamrauana* from the mainland, but a collection from Waigeo Island off the north-west coast of the Vogelkop Peninsula appears to be the same species: Waigeo Island, Mt Buffelhoorn, c.10km north east of Waifo on east bank of Majalibit Bay, c.820m, 17 i 1955, 'growing among dense shrubbery on western slope of Mt Buffelhoorn, climbing or creeping ... flowers red', *Royen* 5199 (E, L). It differs slightly from typical *A. tamrauana* in the presence of a few gland-tipped hairs at the apices of the stem, broader leaves (largest leaf blade 70 × 50mm), peduncles to 37mm long arising from the simple main stem, calyx tube 4mm long, and lobes 6–7 × 1.8–2.3mm at base. In other floral details and in its appressed indumentum it resembles *A. tamrauana*.

**79. *Agalmyla longiattenuata* Hilliard & B.L. Burtt, sp. nov.** *A. wekariensi* et speciebus arcte accedentibus affinis sed facile distinguenda foliis basi insigniter secus petiolum longe attenuatis, venis lateralibus 7–10 utrinsecus costae, pagina superiore laminae maturae vel glabra vel parce pilosa.

Type: West New Guinea, Vogelkop Peninsula, Ije river valley, 900m, near Bamfot (Benfot) village, 2 xi 1961, *Royen & Sleumer* 7657 (holo. L; iso. A, K).

Epiphyte, stems of indeterminate length, c.3mm in diam. on flowering part, loosely branched, flexuous, rooting along internodes, clad in patent acute hairs to 2–3mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.4–9 × 1.5–4mm, elliptic, hairy as developed leaves, petiolar part c.2mm long; blade of largest developed leaves 120–210 × 32–52mm, elliptic, apex acute, base cuneate, remarkably long-attenuate, margins finely to more coarsely serrate, long-attenuate base entire, lateral veins (7–)9–10 each side of midrib, ascending at angle of c.45°, looping near margin and merging into it, upper surface sparsely hairy to glabrous, hairs to 1mm, acute, lower surface with few hairs on blade, but crowded appressed hairs over veins; petiole 20–55mm long, clad in acute upward-pointing hairs to 1.5–2mm long. *Inflorescence* axillary, cymose, flowers c.5–7, clustered, peduncle 15–400mm long, well clad in appressed or upward-pointing acute hairs to 2–2.5mm long. *Bracts* (lowermost) 5–13 × 2–4mm, elliptic tapering to a broad petiolar part, apex subacute, margins entire or with a few teeth, acute hairs to 1mm long outside and on margins, a few shorter hairs inside on upper part. *Pedicels* 7–12mm long, well clad in patent acute hairs to 2–2.5mm long. *Calyx* tube 3–4.5mm long, lobes 5, subequal, 6–8.5 × 1.5–2.2mm at base, narrowly oblong

broadening rather abruptly at base, apex obtuse, entire, outside well clad in patent acute hairs to 2–3mm long, inside a few short acute hairs at tips, elsewhere scattered minute globular glands. *Corolla* ‘carmine’ or ‘reddish-pink’, 28–31mm long, tube 20–21mm, almost cylindrical in lower part then curved and expanded above, mouth more or less round, limb spreading, large in relation to size of tube, posticous lobes 8–9 × 6–7mm, suborbicular becoming oblong in lower part, anticous lobe 8.5–12mm, broadly elliptic, outside of corolla clad in gland-tipped hairs to 1mm long on posticous side, acute hairs to 1mm elsewhere, lobes fringed with gland-tipped hairs to 0.7mm, inside lobes acute hairs to 0.1mm long, palate of globose papillae extending from near base of anticous lobe to insertion of anticous filaments and there raised into 2 small longitudinal flaps, elsewhere inside tube minute globular glands, annulus inserted 1.5–2mm above base of tube, composed of 5 longitudinal bands of gland-tipped hairs to 1–2mm long, bands c.2.5–6mm long. *Stamens* 4, anticous filaments 14–17mm long, inserted 9–10mm above base of tube, anthers 2–2.4mm long, not exceeding posticous lobes; posticous filaments 11–14mm, inserted 8–12mm above base, anthers 1.8–2mm; staminode 1–10mm long. *Disc* c.1 × 1.6mm, cupular, rim crenulate. *Ovary* (♀ phase) c.20 × 1.5mm including stipe. *Style* c.5mm. *Stigmatic lobes* c.2 × 2mm, inside lobes papillose, outside very minute globular glands, these extending down style and ovary, excluding stipe. *Capsules* c.120 × 2mm. *Seeds* c.1.2 × 0.2mm, appendages c.4mm long. **Fig. 22: 79a, b.**

WEST NEW GUINEA. Vogelkop Peninsula, Ije river valley, 850m, Bamfot village, 2 xi 1961, Royen & Sleumer 7630 (K, L).

*Agalmyla longiattenuata* is in the general affinity of *A. wekariensis* and its allies (corolla similar in form), but is distinctive by virtue of its leaves, remarkably long-attenuate at the base (whence the epithet), glabrous or very thinly hairy on the upper surface, the blade on the lower surface thinly hairy, but hairs crowded over the veins; there are mainly 9–10 lateral veins each side of the midrib. In many species, length of peduncle is very variable, but the range in *A. longiattenuata*, 15–400mm, is arresting.

Royen & Sleumer collected the plant twice, on the same day, in the vicinity of Bamfot village, not traced by us, but the Ije river valley in which it lies is approximately 0°53'S, 132°38'E, central to the Vogelkop Peninsula. The collectors described it as a ‘pendulous herb’ and ‘climbing herb with slightly pendulous inflorescences’ epiphytic on tree trunks in *Quercus* forest.

**80. *Agalmyla brevipes* (C.B. Clarke) B.L. Burt, comb. nov.**

Type: West New Guinea, Mt Arfak, prope Hatam, ix 1872, *Beccari* 977 (FI).

Syn.: *Dichrotrichum brevipes* C.B. Clarke in A. & C. DC., *Mon. Phan.* 5(1): 54, tab. 4 (1883); Schltr. in *Bot. Jahrb.* 58: 292 (1923); Kaneh. & Hatusima in *Bot. Mag. Tokyo* 57: 116 (1943).

Epiphyte, stems of indeterminate length, branched, c.2–4mm in diam. on flowering part, rooting along internodes, young unglorified parts twining, clad in spreading

hairs c.1–3mm long, mixed acute and gland-tipped, the latter sometimes wanting, glabrescent, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.5–14 × 2–7mm, elliptic tapering into a petiolar part 2–5mm long; blade of largest developed leaves 60–160 × 35–65mm, elliptic, apex acute, base long-cuneate, margins more or less coarsely serrate, roughly 10–12 teeth each side, 6–8 lateral veins each side of midrib, sharply ascending, looping near margin and running out into a sinus, side vein into the adjacent tooth, both surfaces thickly clad in fine acute hairs to 1.2–1.5mm long, a few on margins sometimes gland-tipped; petiole c.25–60mm long, hairs to 2mm long, appressed. *Inflorescence* a cymose cluster, flowers c.4–8, peduncle c.25–45mm long, often strongly curved, clad in patent hairs to c.2mm long, acute or some gland-tipped. *Bracts* (outermost) 5–13 × 2–5.5mm, lanceolate or elliptic, acute hairs to c.1.5mm on both surfaces. *Pedicels* 6–25mm long, thickly clad in patent hairs to 2mm long, mostly acute, some gland-tipped. *Calyx* tube 4–5mm long, lobes 5, subequal, 3.5–7.5 × 1.5–2.7mm, mostly more or less oblong or broadened at the tips, obtuse to subacute, margins entire or with a few teeth at apex, outside delicate spreading hairs to 1–2mm long, usually mixed acute and gland-tipped, latter sometimes wanting, inside similar but shorter hairs. *Corolla* 25–48mm long, tube 20–36mm, funnel-shaped, only very slightly arcuate, mouth nearly round, posticous lobes 5–11 × 4–9mm, subrotund, anticous lobe 5–14 × 4–10mm, elliptic, corolla red, outside thickly clad in acute hairs mostly 0.1–0.2mm long, to c.0.5mm near sinuses and on upper part on posticous side, these longer hairs sometimes gland-tipped, lobes fringed with gland-tipped hairs 0.1–0.2mm long, inside lobes acute hairs to c.0.1mm long, palate of globose papillae less than 0.1mm in diam. from base of anticous lobe to insertion of anticous filaments, there raised into 2 short longitudinal papillose flaps, annulus inserted shortly above base of tube, comprising 5 elongated patches of acute hairs c.1–1.5mm long (anticous patch up to 10mm long). *Stamens* 4, anticous filaments 17–27mm long, inserted 12–19mm above base of tube, anthers 2–3mm long, shortly exceeding posticous lobes; posticous filaments 13–25mm long, inserted 15–21mm above base of tube, anthers 2–2.5mm long, not exerted; all filaments glabrous; staminode 1.5–11mm long. *Disc* c.1.5 × 2mm, cupular, rim crenulate. *Ovary* c.18 × 1mm (♀ phase), glabrous. *Style* c.9mm long (♀ phase), glabrous or with scattered minute globular glands. *Stigmatic lobes* 2.5–3 × 1.8–2.1 (♀ phase), few globular glands on back or not. *Capsules* c.150mm long (only shredded fragments seen). *Seeds* not seen. **Fig. 22: 80a, b.**

WEST NEW GUINEA. Vogelkop Peninsula, Arfak Mts, lower foothills, 4000ft, xii 1913, *Gibbs* 6130 (BM); South Manokwari [prov.], Mt Krabo [Arfak Mts], 800m, 1 xi 1960, *Koster* BW 10755 (L); Arfak Mts, Lake Giji, 1900m, 7 iv 1940, *Kanehira & Hatusima* 13800 (A); Arfak Mts, Mt Beribai, 1100m, 21 vi 1961, *Vink* BW 11461 (L); Arfak Mts, near Minjambau, Mt Nerimbau, 1650m, 19 v 1962, *Koster* BW 13877 (CANB, L); Arfak Mts, track from Wamare to Mokwam, 800–850m, 23 iii 1994, *Johns* 7708 (A).

*Agalmyla brevipes* is known only from the Arfak Mountains where it was originally collected in 1872 by Beccari, that great Italian naturalist who, between 1865 and

1878, travelled extensively in the Dutch East Indies and adjacent territories, including Sarawak. His book, *Wanderings in the great forests of Borneo*, is fascinating reading and a monument to the wildernesses that have almost disappeared.

A characteristic feature of *A. brevipes* is its indumentum of long delicate patent hairs, often gland-tipped, on the vegetative parts including the calyx. Johns (no. 7708, quoted above, but no flowers present on sheet) wrote a detailed description: 'stems covered with long white hairs ... leaves with dense white hairs. Bracts green, sepals reddish with green tips, both with long white hairs ... outside of [corolla] tube and petals with long reddish hairs [this sounds wrong for *A. brevipes*]. The basal lobe of flower with dark red stripes internally'. Vink (quoted above) also described the calyx as purplish red, corolla red, and both he and Koster found it to be a common plant in primary forest.

**81. *Agalmyla parvifolia* (S. Moore) Hilliard & B.L. Burtt, *comb. nov.***

Lectotype (chosen here): West New Guinea, Utaqua river to Mt Carstensz, 4989–5874ft, Camps VIII & IX, Wollaston Expedition, 8–9 i 1913, (flowers) *Boden Kloss* s.n. (BM). Syntype: Camp VIb, 4200ft, i 1913, (fruit) *Boden Kloss* s.n. (BM).

Syn.: *Dichrotrichum parvifolium* S. Moore in Trans. Linn. Soc. ser. 2, Bot. 9: 126 (1916); Schltr. in Bot. Jahrb. 58: 292 (1923).

Epiphyte, stems of indeterminate length, sparingly branched, c.2–6mm in diam. on flowering part, rooting along internodes, young tips sometimes twining, thickly clad in spreading acute hairs to 2–3mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.6 × 3–6mm, ovate or elliptic contracted to a petiolar part c.3mm long; blade of largest developed leaves 40–180 × 20–60mm, ovate to ovate-elliptic, apex acute to very acute, base cuneate, scarcely decurrent, margins coarsely serrate or doubly serrate, 5–7 lateral veins each side of midrib, sharply ascending and running out to margin, upper surface thickly clad in acute hairs to 1.5–3mm long, lower surface with shorter less crowded hairs, long and dense over veins; petiole 25–90mm long, thickly clad in acute hairs to c.2mm long. *Inflorescence* a crowded cymose cluster, flowers few to many, peduncle 100–300mm long well clad in more or less spreading acute hairs to 1.5–3mm long. *Bracts* (outermost) c.4–10 × 2–4mm, more or less ovate, acute hairs to 1mm long outside, shorter and sparser inside. *Pedicels* 8–20mm long, thickly clad in spreading acute hairs to 2–3mm long. *Calyx* tube 5–6mm long, lobes 5, subequal, 6–13 × 1.2–2mm, more or less oblong or tips broadened, margins entire or obscurely toothed near apex, thickly clad in acute hairs to 2–3mm long on tube, mostly shorter on lobes and margins. *Corolla* 36–49mm long, tube 30–41mm, narrowly funnel-shaped, slightly arcuate, mouth nearly round, posticous lobes 5–8 × 4–5.2mm, subrotund in upper part, oblong below, anticous lobe 8–14 × 4.5–5.5mm, broadly spatulate; corolla 'red', 'dark red', 'fire red', outside thickly clad in acute hairs to 1mm long, shortest on anticous side, gland-tipped hairs to 0.8–1mm long on upper part on posticous side, lobes fringed with gland-tipped hairs to 0.25–0.5mm long, acute hairs

to 0.1mm inside lobes, scattered globular glands inside tube, palate of globose papillae from base of anticous lobe to insertion of filaments, sometimes there raised into 2 small flaps, annulus inserted 5–9mm above base of tube, 6–12mm deep, composed of 5 longitudinal bands of acute hairs to 1–1.5mm long. *Stamens* 4, anticous filaments 15–24mm long, inserted 18–24mm above base of tube, anthers 2.5–3.2mm long, shortly exceeding posticous lobes; posticous filaments 11–21mm long, inserted 20–25mm above base of tube, anthers 2.1–3mm long; all filaments glabrous; stamino-ode 1.5–2mm long. *Disc* 1 × 1–1.8mm, cupular, rim crenulate. *Ovary* c.24 × 1mm, with well-developed stipe, scattered globular glands on upper part. *Style* c.4–6mm long (♀ phase), with scattered globular glands. *Stigmatic lobes* c.2.5 × 2mm (♀ phase), scattered globular glands outside. *Capsules* c.250–350 × 2mm. *Seeds* c.1.3 × 0.2mm, appendages 4.5–5mm long. **Fig. 22: 81a, b.**

WEST NEW GUINEA. Wissel Lake region [3°55'S, 136°15'E], 1600–1634m, 10 i 1939, *Eyma* 4310 (L); *ibid.*, Enarotalie, Res. Biah, 1850m, 27 iii 1955, *Versteegh* BW 3123 (CANB, L). Nassau Mts, 700m, x 1926, *Docters van Leeuwen* 10471 (L); *ibid.*, 700m, x 1926, *Docters van Leeuwen* 11030 (L); *ibid.*, 1200m, x 1926, *Docters van Leeuwen* 10807 (L); *ibid.*, 700m, x 1926, *Docters van Leeuwen* 10605 (K, L). Central Mountains, Swart Valley, Kadubaka [3°36'S, 138°28'E], 1600–2000m, 28 ii 1958, *Bergman* 35 (S); *ibid.*, 14 iii 1958, *Bergman* 102 (S); *ibid.*, 26 iii 1958, *Bergman* 318 (S); *ibid.*, 2 iv 1958, *Bergman* 517 (S); *ibid.*, 3 iv 1958, *Bergman* 568 (S).

Spencer Moore's choice of the epithet *parvifolia* was an unfortunate one as the leaves of the species can reach relatively large proportions. He saw two scraps of stem apices bearing inflorescences and young, small, leaves, and a second collection comprising a fruiting inflorescence only. The distinguishing features of *A. parvifolia* are the villous vegetative parts and calyx, the latter further distinguished by its narrowly oblong lobes at least as long as the tube, the rather narrow corolla tube contrasting with the comparatively large limb, and the shortly exerted stamens. See also 82. *A. stenosphon*.

*Agalmyla parvifolia* appears to be confined to the Nassau Mountains of Western New Guinea and neighbouring mountains south of the Idenburg river. It climbs the trunks of forest trees between c.1200 and 2000m above sea level.

**82. *Agalmyla stenosphon* Hilliard & B.L. Burtt, sp. nov.** ab *A. parvifolia* calycis lobis 3.5–5.5mm longis (nec 6–13mm) pilis plerumque minus quam 0.5mm longis cum paucis dispersis 0.6–1mm longis, corollae tubo in parte inferiore valde angustato et annulo ad lineas longitudinales 5 pilis dispersis ad 0.2mm longis redacto (nec annulo e fasciis pilorum 1–1.5mm longorum composito) distinguitur.

Type: West New Guinea, Idenburg River, 6km SW of Bernhard Camp [northern slopes Snow Mts, c.3°28'S, 139°11'E], rain forest at 1200m, ii 1939, *Brass* 12774 (holo. A; iso. CANB, L).

Epiphyte, stems of indeterminate length, c.3–5mm in diam. on flowering part, rooting along internodes, young tips sometimes flexuous, thickly clad in acute hairs to 1.8–2mm long, appressed to spreading, bark pale, glossy, brittle. *Leaves* opposite,

strongly anisophyllous, blade of reduced leaves 8–16 × 4.5–10mm, ovate, contracted to a petiolar part 2–6mm long; blade of largest developed leaves 56–160 × 25–65mm, elliptic or ovate-elliptic, apex acute, base cuneate, shortly decurrent, margins coarsely and irregularly serrate or doubly serrate, 7–9 lateral veins each side of midrib, ascending at angle of c.45°, looping near margin and running out to it, sometimes seen to link to vein above, upper surface clad in acute hairs to 1.5–2mm long, overlapping or scarcely so, blade on lower surface similar but hairs shorter and finer, veins densely hairy; petiole 30–75mm long, well clad in acute hairs to 2mm. *Inflorescence* a many-flowered cymose cluster, peduncle 110–440mm long, clad in acute hairs to 1.8–2.5mm long, appressed to spreading. *Bracts* (outermost, few seen) c.5–8 × 2.5–3mm, elliptic, clad in acute hairs to 0.7mm long. *Pedicels* 7–20mm long, thickly clad in upward-pointing acute hairs to 0.5–0.8mm long. *Calyx* tube 2.7–6mm long, lobes 3.5–5.5 × 1.3–1.8mm, narrowly deltoid, apex obtuse, margins entire or with a few minute teeth near apex, outside thickly clad in acute hairs mostly much less than 0.5mm long, some scattered hairs to 0.6–1mm, often appressed. *Corolla* 49–53mm long, tube 45–47mm, narrowly cylindrical in lower third or half (c.1.5mm in diam. hydrated, 1mm dry), narrowly funnel-shaped above, scarcely arcuate, mouth nearly round, posticous lobes 3.5–5 × 2.2–4mm, oblong in lower part, subrotund in upper, anticous lobe 5.5–8 × 2.2–4mm, more or less elliptic; corolla red outside, inside lobes red, tube yellow, outside well clad in acute hairs to 0.25mm long, gland-tipped hairs to 0.5–0.8mm long on posticous side, scanty, lobes fringed with gland-tipped hairs to 0.3–0.4mm long, inside lobes acute hairs to 0.1mm, scattered globular glands inside tube, palate of globose papillae from insertion of anticous filaments to base of anticous lobe, annulus greatly reduced, inserted c.8–14mm above base of tube, composed of acute hairs to 0.2mm long, scanty, ascending roughly in longitudinal lines c.8–17mm long. *Stamens* 4, anticous filaments 18–21mm long, inserted 30–35mm above base of tube, anthers 2.3–2.8mm long; posticous filaments 16–20mm, inserted 31–36mm above base, anthers 2–2.5mm long, all anthers shortly exerted, all filaments glabrous; staminode 1–2mm long. *Disc* c.1.5 × 1mm, cupular, rim crenulate. *Ovary* c.43–55 × 1mm including conspicuous stipe, often scattered globular glands in upper part, sometimes a few acute hairs at apex. *Style* 4–6mm long (♀ phase) clad in acute hairs to 0.2mm long, occasionally confined to upper part. *Stigmatic lobes* (♀ phase) c.1.5–1.8 × 1.5–1.7mm, acute hairs on lower part outside. *Capsules* c.260 × 1mm (few seen, not fully developed). *Seeds* (immature) c.1.3 × 0.2mm, appendages c.4mm long. **Fig. 22: 82a, b.**

WEST NEW GUINEA. Wissel Lakes, Motito [c.3°55'S, 136°15'E], 1800m, 18 v 1960, *Vink & Schram* BW 8689 (CANB, L). Idenburg River, 15km SW of Bernhard Camp [N flank, Snow Mts, c.3°28'S, 139°11'E], 1750m, i 1939, *Brass* 12152 (A). Snow Mountains, E of Baliem Valley, Kab. Jayawijaya, Kec. Kurima, 4°14'S, 139°20'E, 1500m, x 1992, *Milliken* 1537 (BO).

The corolla tube of *A. stenosphon* is remarkably narrow, particularly in its lower part (which suggested the epithet), so narrow (only c.1.5mm in diam.) that there is no room to accommodate an annulus, which is reduced to very short acute hairs

scattered over the inside of the tube in its lower part. Its relationship possibly lies with *A. parvifolia*, which occurs in the same mountains and from which it is distinguished, *inter alia*, by its calyx with shorter lobes and shorter indumentum, its remarkable corolla tube with a reduced annulus, much shorter hairs on the outside of the corolla, and hairy style.

*Agalmyla stenosphon* probably ranges all along the mountains from the Wissel Lakes to the Snow Mountains, though is currently known from only these two general areas. The plants climb tree trunks in rain forest, between 1200 and 1800m above sea level.

**83. *Agalmyla lobata* (Schltr.) Hilliard & B.L. Burtt, *comb. nov.***

Type: NE New Guinea [Papua New Guinea], Hunsteinspitze [c.4°30'S, 142°48'E], 1350m, viii 1912, *Ledermann* 8484 (holo. B<sup>†</sup>, lecto. BM).

Syn.: *Dichrotrichum lobatum* Schltr. in Bot. Jahrb. 58: 289 (1923) cum ic.

*D. lobatum* var. *brachypus* Schltr., op. cit. 291. Type: [Papua New Guinea], Hunsteinspitze, 1350m, *Ledermann* 10919 (ii 1912), 10915b (ii 1913), 11422a (iii 1913) (B<sup>†</sup>, no duplicates found).

Epiphyte, stems of indeterminate length, weakly branched, c.3mm in diam. on flowering part, rooting along internodes, thickly clad in acute hairs up to 2mm long, upward-pointing, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 8.5–12 × 6–7mm, ovate, hairy as developed leaves, petiole 2–3mm long; blade of largest developed leaves 40–110 × 22–55mm, elliptic or ovate-elliptic, apex acute with a reasonably well-marked cuneate apical lobe c.15–18mm long, entire or somewhat serrulate, base cuneate, margins rather coarsely serrate, lateral veins 4–5 each side of midrib, ascending at angle of c.45°, looping and running out to margin, upper surface clad in acute hairs to 1.5mm long, well dispersed and not overlapping, lower surface similar but hairs dense over veins; petiole 18–50mm long, acute hairs to 2mm long, upward-pointing. *Inflorescence* an axillary cymose cluster, flowers c.5–10, peduncle 26–90mm long, clad in acute upward-pointing hairs c.1.5mm long. *Bracts* (outermost) c.7 × 1.5mm, oblong, acute hairs to 0.8mm long outside. *Pedicels* 4–9mm long, clad in acute upward-pointing hairs to c.1mm long. *Calyx* tube c.4mm long, lobes 5, subequal, c.7 × 1.7mm, linear-oblong, obtuse, margins entire, inside scattered acute hairs on upper part, outside appressed acute hairs to 1mm, to c.0.25mm on margins. *Corolla* 'miniata' (see discussion), 25–26mm long, tube 20–23mm, subcylindric, arcuate, mouth round, limb spreading, posticous lobes c.3 × 3mm, oblong, apex broadly rounded, anticous lobe c.6 × 4mm, oblong, apex broadly rounded, outside clad in acute hairs to c.0.3mm long, lobes fringed with gland-tipped hairs to 0.25mm, inside of 4 lobes densely clad all over in minute acute hairs, hairs on anticous lobe bordering margins, on central part confined to three main veins, glabrous between the veins, annulus inserted c.7mm above base of tube, hairs acute, c.0.5mm long, dispersed upwards for c.5mm. *Stamens* 4, anticous filaments c.13mm long, anthers 2mm, not exceeding posticous lobes, posticous



filaments c.11mm long, anthers 2mm; staminode not seen. *Disc* not seen. *Ovary* c.12 × 0.8mm, stipitate, few minute globose glands scattered on upper part. *Style* c.3mm, gland-dotted. *Stigmatic lobes* c.1.5 × 1mm, gland-dotted, a few acute hairs to 0.3mm long on backs of lobes. *Capsules* not seen. **Fig. 22: 83.**

Schlechter's type specimen was destroyed in the Berlin fire; fortunately, a duplicate of *Ledermann* 8484 had been presented to the British Museum (BM) and this is now designated lectotype. The specimen comprises a good piece of leafy stem and an inflorescence with two flowers and the stubs of two more pedicels; the peduncle is only 26mm long. Schlechter described the peduncle as '*foliis subaequilongo*' but in the accompanying illustration it measures roughly 90mm, much exceeding the subtending leaf. His var. *brachypus*, distinguished by '*pedunculis conspicue abbreviatis, nunc quam pedicello brevioribus*', is clearly untenable on the basis of length of peduncle. Had there been any other character to distinguish it, it would surely have been mentioned. In any case, now that the species of *Agalmyla* in New Guinea are becoming known, it is clear that peduncle length is sometimes astonishingly variable within a species.

The epithet *lobata* refers to the well-marked apical lobe of the leaf (the leaf-lobing in *A. angiensis* is similar: see that species). Another distinguishing character (not mentioned by Schlechter) is the arrangement of the hairs on the inside of the anticous lobe: in the centre of the lobe they are confined to the median vein with a glabrous band between that vein and the two lateral veins, which are also well defined by hairs, these hairs merging with those around the periphery of the lobe, a condition seemingly unique to *A. lobata*.

**84. *Agalmyla triflora*** (Valeton) B.L. Burt in *Blumea* 44: 389 (1999).

Type: West New Guinea, Cyclops Range, Gunung Sinagai, 1903, *Atasrip* 206 (holo. BO, iso. L).

Syn.: *Dichrotrichum triflorum* Valeton in Bull. Dept. Agric. Indes Neerl. 10: 57 (1907).

Epiphyte, stems of indeterminate length, branched, c.3–4mm in diam. on flowering part, rooting along internodes, young unclimbed parts sometimes twining, clad in patent acute hairs to 2–3mm long, few gland-tipped hairs as well, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 6–13 × 5–10mm, petiole 3–5mm long, resembling developed leaves; blade of largest developed leaves 65–150 × 35–80mm, ovate or ovate-elliptic, apex acute, base cuneate, slightly oblique or not, margins coarsely serrate or doubly serrate, 5–7 lateral veins each side of midrib, ascending at angle of c.45° and running out to margin, both surfaces well clad in acute hairs mostly 1–1.5mm long, some to 2mm along veins on lower surface; petiole 26–52mm long, clad in acute hairs 2–3mm long, more or less patent. *Inflorescence* a cymose cluster, flowers 3–15, peduncle 130–430mm long, clad in patent acute hairs 2–3mm long. *Bracts* (outermost pair) 6–10 × 3–5mm, ovate tapering to a broad petiolar part, toothed, acute hairs to 1mm long outside, on

upper half inside. *Pedicels* 8–30mm long, thickly clad in acute hairs c.0.2mm long together with scattered to plentiful hairs c.1–2mm long. *Calyx* tube 2–5mm long, divided roughly halfway into 5 subequal lobes  $2.6\text{--}5.2 \times 1.4\text{--}2.5\text{mm}$ , more or less oblong and broadest in upper half, obtuse, margins entire, acute hairs to 0.2mm long fringing margins and on outer surface, together with acute hairs to 1–2mm long, these confined to median keel on lobes, inside few acute at tips of lobes, elsewhere minute scattered glandular hairs. *Corolla* 33–40mm long, tube 26–30mm, funnel-shaped, arcuate, mouth nearly round, posticous lobes  $7\text{--}10 \times 6\text{--}10\text{mm}$ , anticous lobe  $8\text{--}11 \times 6\text{--}10.5\text{mm}$ , all lobes subrotund, corolla carmine red, outside thickly clad in broad-based acute hairs c.0.1–0.2mm long, occasionally some gland-tipped hairs to 0.5mm long on posticous side, lobes fringed with gland-tipped hairs to 0.2–0.3mm long, inside lobes minute acute hairs extending short way down tube, palate of globose papillae extending from insertion of anticous filaments upwards and outwards to meet the acute hairs, slightly raised into 2 short keels just above insertion of anticous filaments, annulus inserted c.5–6mm above base of tube, comprising 5 discrete tufts of acute hairs c.2mm long. *Stamens* 4, anticous filaments 12–18mm long, inserted 13–16mm above base of tube, anthers 3–4mm long, not or scarcely exceeding posticous lip; posticous filaments 10–15mm long, inserted 12–18mm above base of tube, anthers 2.5–3.8mm long; filaments glabrous or with a few minute  $\pm$  sessile glands near base; staminode c.2mm long. *Disc*  $1 \times 1.5\text{mm}$ , cupular, rim crenulate. *Ovary* c.16–23  $\times$  1–1.5mm, globular glands scattered over  $\pm$  two thirds of surface, lower third glabrous, sometimes a few acute hairs adjacent to style. *Style* c.6mm long, scattered globular glands, sometimes acute hairs as well. *Stigmatic lobes* c.2  $\times$  2mm, papillose inside, outside minute globular glands often with scattered hairs 0.2–0.4mm long as well, these mostly acute, a few sometimes gland-tipped. *Capsules* c.2.40  $\times$  2mm (few seen, not fully ripe), glabrous. *Seeds* (not fully developed) c.1.5  $\times$  0.2mm, appendages c.4mm long. **Fig. 23: 84a, b.**

WEST NEW GUINEA. Cyclops Mountains, 19 vi 1911, *Gjellerup* 528 (K, L); *ibid.*, path leading from path Ifar-Ormoe to Mt Baboko, 1450m, 9 x 1954, *Royen* 3628 (E, L); *ibid.*, *Royen* 3636 (A, CANB, E, K, L); *ibid.*, 1520m, 9 x 1954, *Royen* 3651 (A, CANB, E, L); *ibid.*, path Ifar-Ormoe, Faika river bank, 990m, 8 vi 1961, *Royen & Sleumer* 5747 (A, K, L); *ibid.*, path to Mt Rara from path Ifar-Ormoe, 1600m, 21 vi 1961, *Royen & Sleumer* 5933 (L); *ibid.*, path Ifar-Ormoe, camp site, 1220m, 28 vi 1961, *Royen & Sleumer* 6063 (L); *ibid.*, path Dozai-Dafonsero, N of Dozai, Mt Dafonsero, 1200m, 3 viii 1961, *Royen & Sleumer* 6432 (L).

The epithet *triflora* is misleading because the inflorescence may be many-flowered. One concludes that the type collection is depauperate, not only because of the few-flowered inflorescence, but also because the flowers are the smallest seen (calyx tube only 2mm long) and so are the leaves. Schlechter (1923) attributed the type collection only to Wichmann's collector; he was Atasrip, an Indonesian who participated in the Wichmann Expedition in 1903.

The distinguishing features of the species are the patent hairs on stems, peduncles and petioles, calyx lobed roughly halfway, the lobes more or less oblong, mostly broadest in the upper half, margins entire, the outside of the calyx and the margins

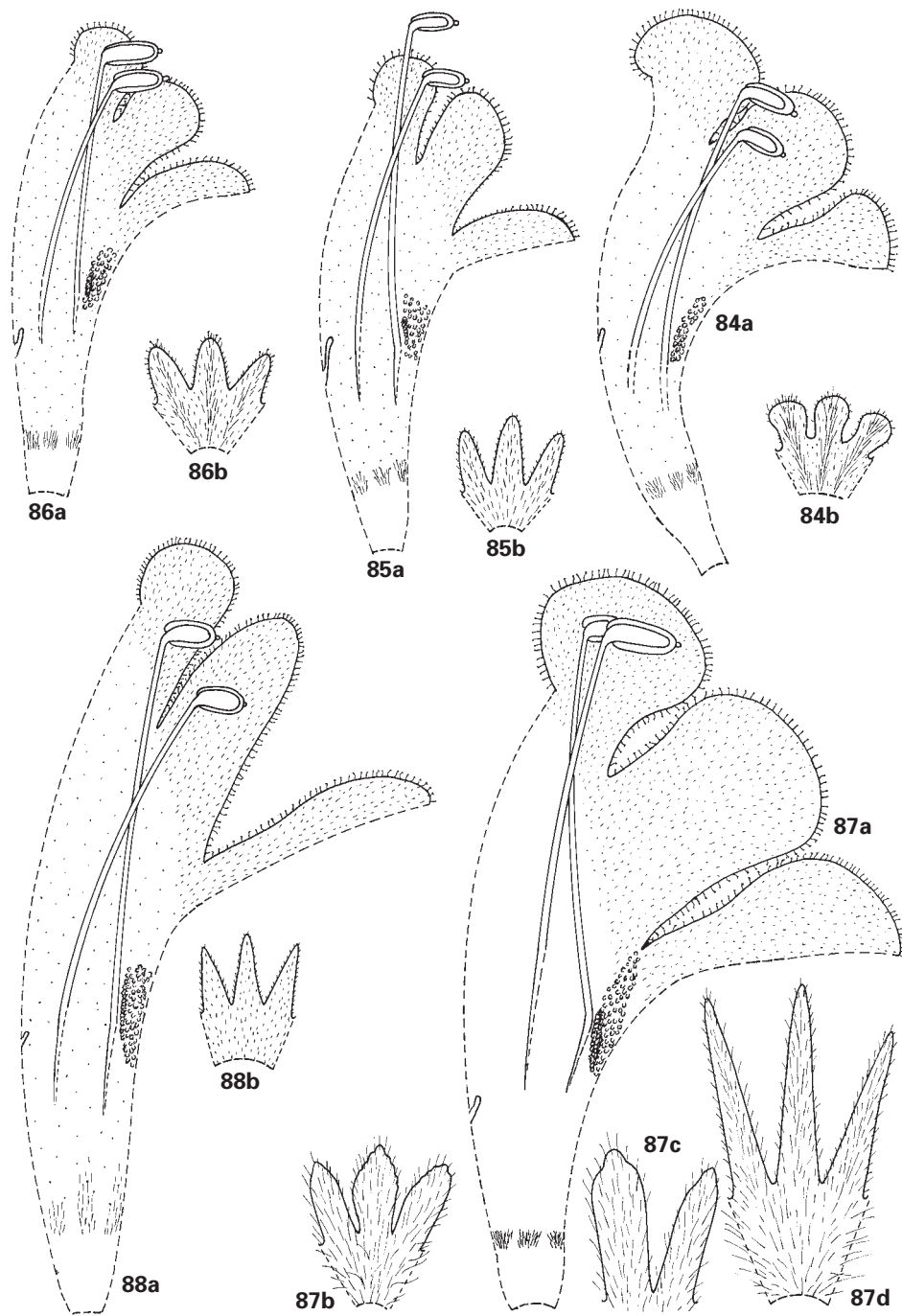


FIG. 23. Part of calyx and longitudinal section of corolla: 84a, b, *Agalmyla triflora*; 85a, b, *A. gracilis*; 86a, b, *A. glandulosa*; 87a–d, *A. valetoniana*; 88a, b, *A. kowapiana*. All  $\times 2$ .

of the lobes clad in short (to 0.2mm long) acute hairs, longer hairs (1–2mm) confined to the median line of the lobes, but all over the tube, outside of corolla thickly clad in very short rather coarse acute hairs (longer gland-tipped ones occasionally present on the posticous side, the lobes always with a glandular fringe), the corolla lobes subequal, almost round, the gynoecium always clad in minute globular glands (wanting on lower parts of ovary), small acute (sometimes a few gland-tipped) hairs often present as well on the backs of the stigmatic lobes, the style and the top of the ovary (as in the type).

*Agalmyla triflora* may be confined to the Cyclops Mountains. Most collections seen were made by P. van Royen, who noted the plant as a climber on *Syzygium*, *Nothofagus*, *Quercus* and *Pandanus* in various types of forest between 990 and 1600m above sea level, and as a 'rather common species in this forest (*Nothofagus*, coll. no. 3651) and usually growing in dense moss cushions at about 2m height [above ground level?]'. The leaves are always recorded as dark or olive-green above, greyish-green, light green with purple main nerves, or dark purple below, flowers usually as dark red or dark carmine, once as pinkish-carmine with pale yellow throat. Van Royen's comment that the inflorescence is directed obliquely downwards, the flowers erect, raises the interesting question 'What is the pollinator?' This is probably the stance in all species with long peduncles.

A specimen collected in the Sidoarsi Mountains (Gautier Mountains) roughly 175km west of the Cyclops Mountains is either *A. triflora* or a closely allied species (Vink BW 8456 (L), collected at c.660m above sea level in primary forest on clay). It differs from typical *A. triflora* in its longer petioles (to 80mm), shorter peduncle (10–35mm), longest hairs on calyx to c.0.8mm, very few and well scattered among hairs only 0.25mm long, smaller corolla limb (posticous lobes 6 × 5mm, anticous lobe 7.5 × 6mm), well-dispersed annulus, anticous anthers shortly exceeding posticous lip, gynoecium scabrid all over, only the stipe glabrous. The most significant difference is probably the indumentum on the calyx. Only two collections have been seen from these mountains, the other being the type of *A. gjellerupii*; they clearly need further exploration.

See also 89. *A. chalmersii*.

**85. *Agalmyla gracilis* Hilliard & B.L. Burtt, sp. nov.** ab *A. triflora* calycis lobis oblongis (nec late spatulatis), pilis in calyce longissimis 0.8mm paucis (nec 1–2mm numerosis), corollae limbo minore, lobis posticis c.7 × 4–5mm, lobo antico c.8 × 4.5–4.8mm (nec lobis posticis 7–10 × 6–10mm, lobo antico 8–11 × 6–10.5mm), ovario, stylo et dorso lorum stigmati pilis acutis praeditis (nec pilis acutis in stylo praesentibus vel absentibus, raro etiam paucis in summo ovarii) distinguenda.

Type: Papua New Guinea, track from Feramin to Telefomin [5°13'S, 141°41'E], 1500m, 14 vii 1976, van Royen 11482 (holo. K, iso. L).

Epiphyte, stems of indeterminate length, loosely branched, c.4mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs to

2.5–3mm long, gland-tipped hairs wanting to plentiful, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.5–7 × 3–5mm, ovate, abruptly contracted to petiolar part 1–2mm long, hairy as developed leaves; blade of largest developed leaves 60–95 × 40–42mm, ovate or ovate-elliptic, apex acute, base cuneate, very shortly decurrent, margins coarsely doubly serrate, lateral veins 5 each side of midrib, ascending at angle of c.45°, looping near margin and linking to vein above, both surfaces densely clad in acute hairs to 1.5–2mm long on upper surface, mostly to 1mm on lower surface but to 1.5–2mm over veins; petiole 33–45mm long, well clad in patent acute hairs to 2mm long. *Inflorescence* a cymose cluster, flowers c.15, peduncle 130–280mm long, clad in scattered acute hairs to c.3.5mm long underlain by much shorter, finer ones. *Bracts* (outermost pair, few seen) 5–7 × 2–3mm, elliptic-oblong, obscurely toothed, acute hairs to 1.3mm outside and on margins, few to c.0.5mm inside at tips. *Pedicels* 8–10mm long, patent acute hairs to 0.8mm. *Calyx* tube 3–4mm long, lobes 5, subequal, 2.8–4.8 × 1.7–2mm at base, oblong, obtuse, inside minute globular glands, outside acute hairs to 0.25–0.8mm long, mostly short on margins, longest on tube and median on lobes. *Corolla* 34mm long, tube 27mm, narrowly funnel-shaped, slightly arcuate, mouth nearly round, posticous lobes 7–7.4 × 4–5mm, more or less oblong, subrotund in upper part, anticous lobe 8 × 4.5–4.8mm, oblong-elliptic, corolla ‘brownish-red’, outside thickly clad in broad-based acute hairs to 0.25mm long, lobes fringed, especially at apex, with gland-tipped hairs to 0.4–0.5mm long, inside lobes acute hairs to 0.15mm long, inside tube minute globular glands, conspicuous palate of globose papillae adjacent to insertion of anticous filaments, raised into 2 very small longitudinal keels, annulus inserted c.4mm above base of tube, composed of 5 discrete tufts of acute hairs to 1.5mm, a few gland-tipped. *Stamens* 4, anticous filaments inserted 14–16mm above base of tube, 18–22mm long, anthers 3–3.2mm, shortly exceeding posticous lip; posticous filaments inserted 15–16mm above base of tube, 15–18mm long, anthers 2.8–3mm; staminode 2mm. *Disc* 0.8 × 1.8mm, cupular, rim crenulate. *Ovary* (♂ phase) 17 × 1mm. *Style* 2mm. *Stigmatic lobes* c.1.2 × 1mm, papillose inside, outside globular glands together with acute hairs c.0.2–0.25mm long, both types of hairs extending down style to ovary, stipe glabrous. *Capsules* unknown.

**Fig. 23: 85a, b.**

*Agalmyla gracilis* is known with certainty only from the type locality, where it was collected ‘in undergrowth of oak forest’ at 1500m above sea level. It seems to be allied to *A. triflora* from which it is distinguished by its oblong (not broadly spatulate) calyx lobes, longest hairs on calyx c.0.8mm, few (not 1–2mm, plentiful), smaller corolla limb, posticous lobes c.7 × 4–5mm, anticous lobe c.8 × 4.5–4.8mm (not posticous lobes 7–10 × 6–10mm, anticous lobe 8–11 × 6–10.5mm), ovary, style and back of stigmatic lobes clad in acute hairs (not acute hairs present or absent on style, rarely also a few at top of ovary).

Its geographically closest ally is *A. chrysostyla*, from which it differs in having shorter hairs on the stem, lateral veins clearly linking to the vein above, calyx smaller

and clad in shorter hairs, and shorter corolla with a smaller limb. It is a much more delicate-looking plant than *A. chrysostyla*, which suggested its trivial name. See also 86. *A. glandulosa*.

*Gideon* LAE 57525 (A) is clearly close to *A. gracilis*, and seems to be no more than a minor variant of it, differing as it does merely in the lack of short hairs on the peduncle underlying the much longer hairs, and the calyx lobes slightly dilated at the tips and there obscurely toothed. It was collected on the lower slopes of Mt Manaua, East Bewani Mountains, 3°39'S, 141°32'E, almost due north of Telefomin at 1400m, in 'tall mid montane forest with tall palms of *Gulubia* towering above the forest'.

**86. *Agalmyla glandulosa*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. gracili* foliorum venis utroque costae latere 8 ad marginem percurrentibus (in *A. gracili* venis 5 marginem versus sursum arcuatis et inter se confluentibus) pilis glandulosis paucis multis acutis intermixtis praecipue secus margines (nec pilis glandulosis absentibus), pedunculis pilis glandulosis acutis intermixtis (nec pilis glandulosis absentibus) differt.

Type: West New Guinea, Ruffaer River, c.250m above sea level, ix 1926, *Docters van Leeuwen* 10305 (holo. BO; iso. K (sterile), L (young flower buds only)).

Epiphyte, stems of indeterminate length, loosely branched, 4–5mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs to 4mm long mixed with gland-tipped ones to 3mm, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 5–7 × 4–6mm, ovate, petiole c.2mm, hairy as developed leaves; blade of largest developed leaves 105–115 × 40–52mm, ovate-elliptic, apex acute, base narrowly cuneate, margins serrate or doubly serrate, lateral veins 8 each side of midrib, looping near margin and merging with it, upper surface thickly clad in acute hairs to 2mm long, very occasionally a hair gland-tipped, these more frequent but still sparse along margins, lower surface similar, gland-tipped hairs a little more frequent; petiole 35–55mm long, thickly clad in patent hairs to 2–3mm long, mixed acute and gland-tipped. *Inflorescence* a cymose cluster, flowers c.15, peduncle c.260–360mm long, scattered acute hairs to 4–5mm long together with gland-tipped hairs to 2–3mm long, underlain by plentiful short (c.0.2mm) acute hairs. *Bracts* (outermost, few seen) 5–7 × 2.6–4mm, ovate contracted to a short broad petiolar part, margins obscurely toothed or entire, acute hairs to 1.25mm long crowded on inner face, a few at apices gland-tipped, fewer and shorter on outer. *Pedicels* 8–10mm long, thickly clad in acute hairs to 1.5mm long scattered among much shorter ones. *Calyx* tube c.4mm long, lobes 3–3.5 × 2–2.5 at base, deltoid, apex broadly rounded, inside scattered globular glands, a few short acute hairs at tips, outside acute hairs to 1mm long on tube and median line of lobes intermingled with much shorter hairs, mostly to c.0.2mm long on margins, longer at tips and there some gland-tipped. *Corolla* c.32mm long, tube 26mm, narrowly funnel-shaped, slightly arcuate, mouth nearly round, posticous lobes 6 × 5mm, subrotund in upper part, anticous lobe 9 × 6mm, oblong-elliptic, corolla

'donkerpaars' [dark purple], outside thickly clad in acute hairs to 0.5mm long, lobes fringed with gland-tipped hairs to 0.4mm long, inside lobes acute hairs to 0.1mm long, inside tube scattered globular glands, conspicuous palate of globose papillae at insertion of anticus filaments and extending about halfway along floor of tube, annulus inserted 3mm above base of tube, composed of 5 discrete tufts of acute hairs to 1mm long. *Stamens* 4, anticus filaments inserted 14mm above base of tube, 16mm long, anthers 4mm, about equalling posticus lobes; posticus filaments inserted 15mm above base, 14mm long, anthers 3.5mm; staminode 2mm. *Stigmatic lobes* (♂) 1.5 × 1mm. *Style* 2mm. *Ovary* 14 × 1mm, whole gynoecium thickly clad in acute hairs to 0.3mm long together with globular glands, a few gland-tipped hairs at apex of stigmatic lobes. *Disc* 1 × 1.5mm, cupular, rim crenulate. *Capsules* unknown. **Fig. 23: 86a, b.**

*Agalmyla glandulosa* is known only from the type collection made somewhere along the Rouffaer river, which flows roughly west to east to the north of the central mountain spine of Western New Guinea. The trivial name draws attention to the gland-tipped hairs that occur scattered along at least the margins of the leaves, and on the petioles and peduncles in particular. Such hairs on these vegetative parts are uncommon (though common on stems); we have otherwise seen them only in *A. brevipes*, *A. kowapiana* and *A. similis*, all in the western half of New Guinea. In the eastern half, we have noticed them only in *A. formosa*, and then only occasionally at the leaf tips, but they are easily overlooked and may be confined to the tips of young leaves.

The relationship of *A. glandulosa* seems to lie with *A. gracilis*, to which it bears a strong superficial resemblance heightened by the small flowers. *Agalmyla gracilis* lacks gland-tipped hairs on leaves and peduncles, and differs further in having only 5 (not 8) lateral veins each side of the midrib, which link to the vein above instead of running out into the margin.

**87. *Agalmyla valetonia*** (Lauterb.) Hilliard & B.L. Burtt, **comb. nov.**

Lectotype (chosen here): West New Guinea, an dem Noord-Fluss [Lorenz river], Resi-Gipfel, 900m, 27 viii 1907, *Versteeg* 1667 (L; isolecto. K, U). Syntype: *ibid.*, *Versteeg* 1666 (n.v.).

Syn.: *Dichrotrichum valetonianum* Lauterb. in *Nova Guinea* 8: 325 (1909); Schltr. in *Bot. Jahrb.* 58: 296 (1923).

*D. amabile* S. Moore in *Trans. Linn. Soc. ser. 2, Bot.* 9: 124 (1916); Schltr., *op. cit.* 291 (1923). Type: West New Guinea, Utaqua River to Mt Carstensz, Camp III, 2538ft, 3 xii 1912 – 2 i 1913, *Boden Kloss* s.n. (holo. BM).

*D. concinnum* S. Moore, *op. cit.* 125 (1916); Schltr., *op. cit.* 291 (1923). Type: West New Guinea, Utaqua River to Mt Carstensz, Camp VIb, 4200ft, i 1913, *Boden Kloss* s.n. (holo. BM).

*D. vanderwateri* S. Moore, *op. cit.* 125 (1916); Schltr., *op. cit.* 296 (1923). Type: West New Guinea, Utaqua River to Mt Carstensz, Camp VIa, 3100ft, 14 i 1913, *Boden Kloss* s.n. (holo. BM).

*D. lateritium* S. Moore, *op. cit.* 126 (1916); Schltr., *op. cit.* 296 (1923). Type:

West New Guinea, Utaqua River to Mt Carstensz, Camp VIc, 5500ft, 20 ii 1913, *Boden Kloss* s.n. (holo. BM).

*D. splendidum* Schltr., op. cit. 289, 292 (1923) and in *Nova Guinea* 14(2): 311 (1927). Lectotype (chosen here): West New Guinea, Oroh River, 1300m, 24 ii 1913, *Pulle* 1123 (K; iso. L, U).

Epiphyte, stems of indeterminate length, loosely branched, 2–4mm in diam. on flowering part, flexuous, rooting along internodes, well clad in patent acute hairs to 3–4mm long, rarely some gland-tipped, bark pale, brittle, glossy. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 9–12 × 5–9mm, petiole c.3mm long, resembling developed leaves; blade of largest developed leaves 70–150 × 30–85mm, narrowly ovate, ovate or elliptic, apex acuminate, base rounded, rounded then abruptly shortly cuneate, or shortly cuneate, oblique or not, margins coarsely doubly serrate, 6–8 lateral veins each side of midrib, ascending at angle of c.45°, looping near margin and linking to vein above, both surfaces densely hairy, hairs acute, to 1.5–2.5mm long, lower surfaces at least sometimes tinged violet when young; petiole 30–90mm long, well clad in upward-pointing hairs 1.5–4mm long, rarely a few gland-tipped. *Inflorescence* a cymose cluster, flowers 5–15, peduncle 30–120mm, often flexuous, well clad in patent acute hairs to 1.5–4mm long, rarely a few gland-tipped. *Bracts* (outermost pair) 7–11 × 2.5–4.5mm, elliptic, entire, acute hairs to 1–1.5mm long on both surfaces. *Pedicels* 5–12mm long, thickly clad in upward-pointing hairs to 1.5–3mm long. *Calyx* sometimes purplish, tube 4–9mm long, lobes 5, subequal, 5–14 × 2–3.5mm at base, ranging from narrowly triangular to oblong, apex subacute, margins entire or obscurely to distinctly toothed, outside well clad in patent acute hairs to 1.2–2mm long, inside few short hairs near apex of lobes, elsewhere either scattered globular glands or glabrous. *Corolla* 38–60mm long, tube 28–46mm, funnel-shaped, arcuate, mouth nearly round, limb very large, spreading, posticus lobes 10–13 × 8–15mm, subrotund, anticous lobe 13–19 × 10–18mm, broadly spatulate, rounded, corolla bright red, outside thickly clad in acute hairs to 0.2–0.5mm long, lobes fringed with gland-tipped hairs to 0.3–0.5mm long, inside lobes acute hairs to 0.1mm long, these running down floor of tube almost to insertion of anticous filaments, palate of globose papillae extending from short distance below insertion of anticous filaments along floor of tube in 2 broad arms extending to sinuses of anticous lobe, raised into 2 small papillose keels adjacent to bases of anticous filaments, annulus inserted c.2–5mm above base of tube, comprising 5 discrete tufts of acute hairs to 0.5–1mm long. *Stamens* 4, anticous filaments 17–32mm long, inserted 17–26mm above base of tube, anthers 3.2–4.5mm long, about equalling or very shortly exceeding posticus lobes; posticus filaments 13–26mm long, inserted 18–25mm above base of tube, anthers 3–4.5mm long; staminode 1–4mm. *Disc* 0.5–1 × 1.5–2.5mm, cupular, rim crenulate. *Ovary* (♀ phase) 25–40 × 1–2mm, shortly stipitate. *Style* 8–14mm. *Stigmatic lobes* 2–3 × 1.7–2.6mm, papillose inside, scattered globular glands outside extending down style and ovary as far as stipe, presence or absence of acute hairs to 0.2–0.5mm long highly variable (see discussion). *Capsules* not seen. **Fig. 23: 87a–d.**



WEST NEW GUINEA. Wissel Lakes, Moenajepa, 1500m, 20 v 1960, *Vink & Schram* BW 8781 (L); *ibid.*, 1700m, 19 v 1960, *Vink & Schram* 8751 (L); Wissel Lake region, Biv. XII – Biv. XIV, 7 i 1939, *Eyma* 4246 (L); *ibid.*, Biv. XIV – Biv. XVI, 8 i 1939, *Eyma* 4264 (L). [Nassau Mts], 4°16'S, 137°1'E, Kali Kopi river along track from mile 50 (Heath Forest), site 186, 522m, 10 iii 1999, *Utteridge* 88 (K); *ibid.*, 4°17'S, 137°1'E, path east at mile 50 on road to Tagapura, site 13, 540m, 11 ii 1998, *Dransfield* 7664 (K); *ibid.*, but without details, 7 x 1998, *Sands* 7258 (K). Utakwa river to Mt Carstenz, Camp I, 4000ft, 1912–1913, *Boden Kloss* s.n. (BM).

The considerable synonymy set out above stems in part from remarkable variation in the indumentum on the gynoecium allied to variation in the size of the calyx, and in part from the facts that Spencer Moore was almost certainly unaware of Lauterbach's species, *Dichrotrichum valetonianum*, and Schlechter, though aware of all the published names, saw none of Spencer Moore's types, and clearly considered that the long calyx and 'glabrous' ovary of his *D. splendidum* distinguished it from Lauterbach's species, with short calyx and hairy ovary.

Type and disposition of indumentum is usually a reliable discriminatory character in *Agalmyla*; and so it is on the organs of *A. valetoniana* with the exception of the gynoecium. As in a great many species, minute globular glands are present, but in this case there are often acute hairs as well. They are remarkably well developed on the type specimen of *A. valetoniana*, extending from the backs of the stigmatic lobes to the base of the ovary (excluding stipe), and are up to 0.5mm long; in *Dichrotrichum amabile* they are 0.2mm long and confined to the backs of the stigmatic lobes; *D. concinnum*, a few to 0.3mm long scattered on the ovary; *D. vanderwateri*, plentiful to 0.3–1mm long on style and ovary, very few on stigmatic lobes; *D. lateritium*, few acute to 0.5mm mainly on upper part of ovary; *D. splendidum*, acute hairs wanting. Of the specimens cited above, *Vink & Schram* BW 8751 has hairs to 0.5mm long on the style and upper part of the ovary, a few scattered elsewhere; *Dransfield* 7664, very few to 0.2mm long at base of ovary, 2–3 at base of style and top of ovary; *Eyma* 4264, acute to 0.5mm at base of style and upper part of ovary; *Boden Kloss*, Camp I, dense acute hairs to 1mm all over. It is robust specimens that have the longest calyces.

Despite this variation, the species is relatively easily recognized by its hirsute stems, peduncles, petioles and calyces, the leaves very closely hairy with acuminate tips, and handsome large-limbed corolla with almost scabrid hairs outside, gland-tipped hairs confined to the margins of the lobes. It is widely distributed along the Nassau Range and the Snow Mountains, between c.540 and 1675m above sea level, variously recorded as climbing in 'primary forest on clay', 'transitional forest between lowland rain forest and heath forest', and 'along river in lowland rain forest'.

**88. *Agalmyla kowapiana*** Hilliard & B.L. Burt, **sp. nov.** ab *A. chalmersii* pilis foliorum 3–5mm longis paucis in marginibus superioribus glandulosis (nec pilis ad 1.5mm longis omnibus acutis), pilis in pedunculis acutis et glandulosis intermixtis (nec omnibus acutis), calycis lobis deltoideis (nec plerumque plus minusve oblongis), pilis in calycis parte externa ad 0.5mm longis (nec 1–1.5mm longis) distinguenda.

Type: West New Guinea, N from Fak-Fak, Kowap [c.2°45'S, 132°15'E], 640m, 26 ii 1962, *Vink* BW 12188 (holo. L, iso. A).

Epiphyte, stems of indeterminate length, c.5mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs to 5mm long together with many, shorter, gland-tipped hairs, bark pale, brittle, glossy. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 8–9 × 4–5mm, elliptic, hairy as developed leaves, petiolar part c.2mm long; blade of largest developed leaves 108–145 × 50–62mm, elliptic, apex acute, base cuneate, shortly decurrent, margins coarsely serrate or doubly serrate, lateral veins 7 each side of midrib, ascending at angle of c.45°, looping near margin and fading out, upper surface thickly clad in acute hairs to 3mm long, few, shorter, gland-tipped ones along upper margins, hairs less dense on lower surface, to 3mm on blade, to 4–5mm along midrib; petiole 48–85mm long, thickly clad in patent acute hairs to 4–5mm. *Inflorescence* a cymose cluster, flowers c.15, peduncle 180–285mm long, thinly clad in patent acute hairs to 4–5mm long together with gland-tipped hairs to 3mm, underlain by many much shorter (to c.0.2mm) acute hairs. *Bracts* (outermost pair) 8–9 × 3–4mm, elliptic contracted to a broad petiolar part, outside well clad in patent acute hairs to 2mm, inside glabrous. *Pedicels* 7–8mm long, thickly clad in acute appressed hairs to 0.2mm long. *Calyx* tube 4–6mm long, lobes 5, subequal, 4–5.5 × 2–2.8mm, roughly equalling tube in length, deltoid, more or less acute, outside thickly clad in acute appressed hairs to 0.5mm long, mostly 0.2mm along margins, minute globular glands both inside and out. *Corolla* 53–56mm long, tube 40–42mm, narrowly funnel-shaped, arcuate, mouth nearly round, posticous lobes 13–14 × 6–8mm, lower part oblong, upper subrotund, anticous lobe 16–17 × 6–7mm, oblong-elliptic, apex rounded, corolla red, outside acute hairs to 0.5mm long, mostly shorter, very few gland-tipped hairs near posticous sinuses, minute globular glands scattered all over, lobes fringed with gland-tipped hairs to 0.6mm long, inside lobes minute acute hairs to 0.2mm, inside tube scattered globular glands, palate of globose papillae above and below insertion of anticous filaments, scarcely raised into 2 longitudinal keels, annulus inserted 3–5mm above base of tube, comprising 5 discrete tufts of acute hairs to 2mm long, sometimes a few gland-tipped, hairs may be slightly dispersed upwards. *Stamens* 4, anticous filaments inserted 20–22mm above base of tube, 26–27mm long, anthers 3.5–3.8mm, not exceeding posticous lobes; posticous filaments inserted 21–24mm above base, 23–26mm long, anthers 3.2–3.5mm, staminode 1.5mm. *Disc* 1 × 2mm, cupular, rim crenulate. *Ovary* (♀ phase) 35 × 1.2mm. *Style* 9–10mm. *Stigmatic lobes* 2.8 × 2mm, papillose inside, outside acute upward-pointing hairs to 0.25mm long together with minute globular glands, both types of hair extending down style and ovary, stipe glabrous. *Capsules* not seen. **Fig. 23: 88a, b.**

*Agalmyla kowapiana* is known only from the type collection made north of Fak-Fak in 'strongly depleted primary forest with forest culture of *Myristica*; limestone with thin clay cover'. The collector also noted 'calyx brownish red, lobes light green; corolla red; anthers greyish purple; the other flower parts white'.

It is the only species of *Agalmyla* so far known from the huge peninsula on which Fak-Fak stands. Its general affinity appears to lie with *A. chalmersii*, which is widely distributed along the mountainous spine of Papua New Guinea, far to the east (there is a somewhat doubtful record from Yapen Island at the mouth of Geelvink Bay). It is distinguished by the much longer hairs on the leaves and the presence of a few gland-tipped ones on the upper leaf margins, gland-tipped hairs also being mixed with acute ones on the peduncle; the calyx lobes are always deltoid and the hairs on the outside of the calyx are much shorter.

**89. *Agalmyla chalmersii*** (F. Muell.) B.L. Burt in *Blumea* 44: 383 (1999).

Type: New Guinea, Owen Stanley Range, 1884, *Chalmers* (holo. MEL, n.v., photograph in E; iso. K).

Syn.: *Dichrotrichum chalmersii* F. Muell. in *Melbourne Chem. Drug.* (June 1884).

[*D. papuanum* S. Moore in *J. Bot.* 37: 174 (1899), nom. nud.]

[*Chalmersia papuana* F. Muell. MSS; S. Moore in *J. Bot.* 37: 174 (1899) in syn.]

*Dichrotrichum filarskyi* Schumann & Lauterb., *Nachtr. Fl. Deutsch. Südsee*: 374 (1905); Schltr. in *Bot. Jahrb.* 58: 289, 296 (1923). Type: Kaiser-Wilhelmsland [Papua New Guinea, Huon Peninsula], Sattelberg, *Biro* 25 (B<sup>†</sup>). Neotype (chosen here): Morobe distr., Sattelberg, 3000ft, 21 ix 1935, *Clemens* 186 (L).

*D. magnificum* Schltr. in *Bot. Jahrb.* 58: 296 (1923). Type: Kanigebirges [c.5°45'S, 145°45'E], 1000m above sea level, 5 x 1907, *Schlechter* 16638 (holo. B<sup>†</sup>, lecto. SING).

Epiphyte, stems of indeterminate length, reaching at least 10m, loosely branched, c.3–7mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs to 3–6mm long, almost invariably mixed with few to many shorter gland-tipped hairs, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 5–26 × 4–21mm, ovate, hairy, petiole 2–5mm long; blade of largest developed leaves 70–290 × 40–115mm, mostly broadly elliptic, sometimes narrowly elliptic or ovate, apex shortly acuminate, base normally narrowly cuneate and shortly decurrent, sometimes oblique, very rarely almost rounded and shortly decurrent, margins doubly serrate, lateral veins 5–8 each side of midrib, ascending at angle of c.45°, looping near margin and linking to vein above, both surfaces thickly clad in acute hairs to 1.5mm long, sometimes longer on midrib on lower surface; petiole 20–90mm long, well clad in more or less spreading acute hairs to 2–5mm long. *Inflorescence* a cymose cluster, flowers c.9 to many, peduncle 115–630mm long, well clad in short acute hairs c.0.15–0.3mm long with patent acute hairs to 2–5mm long scattered among them. *Bracts* (outermost pair) 7–17 × 2.5–8mm, oblong or broadened about the middle, apex obtuse, acute hairs to 1–2mm long on both faces, sometimes confined to upper part of inner face. *Pedicels* 8–18mm long, clad in acute patent hairs to 1.5mm long scattered among shorter, crowded, hairs. *Calyx* tube 4–7mm long, lobes 5, subequal, 3–7.5 × 1.8–3.2mm, slightly shorter than to roughly equalling length of tube, mostly oblong with broadly rounded

apex and broadest at base, sometimes broadest about the middle, occasionally deltoid, apex obtuse, margins entire or with incipient toothings near apex, outside acute hairs to 0.2–0.5mm long with scattered hairs to 1–1.5mm long, these very rarely wanting (seen only in cultivated material), hairs on margins short except sometimes at tips of lobes and there sometimes gland-tipped, inside minute globular glands, with or without a few short acute hairs at tips. *Corolla* 40–50mm long, tube 35–40mm, funnel-shaped, arcuate, mouth nearly round, posticous lobes 7–12 × 5–12mm, subrotund, anticous lobe 9–17 × 5–10mm, oblong or subspathulate, apex rounded, corolla shades of red (details in discussion below), outside thickly clad in broad-based acute hairs to 0.25–0.5mm long, lobes fringed with gland-tipped hairs to 0.3–0.6mm long often mixed with acute hairs, inside lobes acute hairs to 0.15mm long, palate, of globose papillae, roughly 10mm long, half above, half below insertion of anticous filaments, at that point raised into 2 small keels, annulus inserted 3.5–5mm above base of tube, comprising 5 discrete tufts or longitudinal bands of acute hairs to 1–2mm long. *Stamens* 4, anticous filaments inserted 17–22mm above base of tube, 22–31mm long, anthers 3–5.2mm, not or shortly exceeding posticous lobes, posticous filaments inserted 19–24mm above base of tube, 17–28mm long, anthers 3–5mm; staminode 1–15mm long, or rarely a 5th stamen fully developed, filament 16mm, anther 2mm. *Disc* 1 × 1.5–3mm, cupular, rim crenulate. *Ovary* (♀ phase) 30–45 × 1–1.5mm. *Style* 5–9mm. *Stigmatic lobes* 2–3 × 1.5–3mm, minutely papillose inside, outside acute hairs to 0.15–0.3mm long together with minute globular glands, both types of hair extending down style and ovary excluding stipe. *Capsules* c.270–340 × 2mm, glabrous or a few hairs persisting. *Seeds* c.1.3 × 0.2mm, reticulate, appendages 4–5mm long. **Fig. 24: 89a–d.**

PAPUA NEW GUINEA. Jimmi Valley, 5°30'S, 144°10'E, 5800ft, 11 vi 1966, *Womersley & Millar* NGF 7769 (BRI). [5°52'S, 144°45'E], near Nondugl, 6000ft, 6 iv 1953, *Womersley* 4861 (A, CANB, K, L, SING); *ibid.*, iv 1951, *Womersley* 4315 (A, CANB, K, L); *ibid.*, iv 1951, *Womersley* 4416 (A, BRI, CANB). Bismarck Range, en route Mt Oibo–Mt Gulno, 5°36'S, 144°47'E, c.1740m, 9 x 1995, *Takeuchi* 10636 (E). [5°55'S, 145°58'E], foothills of southern slope of Finisterre Range, Damanti village, 3600ft, 8 x 1964, *Pullen* 5968 (BM, CANB, L). [6°19'S, 145°55'E], Aiyura, 1 vi 1971, *Woods* C 6580 (E). [c.6°S, 146°E], Finisterre Range, Budemu, 4000ft, 13 x 1964, *Sayers* NGF 21324 (BM, E). Near Omaura, Apirin, 6°20'S, 146°E, 5200ft, 18 i 1966, *Henty* NGF 27151 (E, L). [6°23'S, 146°04'E], Arau, 1400m, 6 x 1959, *Brass* 31896 (A, CANB, K, L). 6°20'S, 146°35'E, Kisingam, Mt Dilmargi, 1160m, 16 xii 1972, *Stevens* LAE 58015 (CANB, E, L). 6°25'S, 146°60' [sic] E, Zatarl, from SE Boana, 5500ft, *Royen & Millar* NGF 17523 (E). 6°28'S, 146°05'E, Arau–Andandra road, Kainantu, 1600m, 19 i 1972, *Streimann* NGF 23966 (CANB, E, L). [6°28'S, 147°24'E], Huon Peninsula, Rawlinson Mts, W side of Aregenang village, 4400ft, 22 vi 1968, *Woods* 2027 (E). 6°27'S, 147°E, Rawlinson Range, path Gawan–Sambui, Warkirak Hill, 3500ft, 21 ii 1963, *Royen* NGF 16104 (A, BO, CANB, E, L). [c.6°30'S, 146°55'E], Butemu, 1300m, 17 x 1964, *Jermy* 3709 (E). Matap, 4–5000ft, 5 iii 1940, *Clemens* 11231 (MICH). [6°41'S, 146°59'E], above Boana Mt, 3500–4500ft, 23 viii 1938, *Clemens* 8869 (A). [c.6°41'S, 146°59'E], Wantoat (Wantot), 25 i 1940, *Clemens* 11041 (A). 6°45'S, 146°50'E, due north of Wagau airstrip, 4000ft, 3 xi 1963, *Womersley* NGF 17870 (A, CANB, E, K, L). [6°25'S, 147°47'E], Wareo, 4 i 1936, *Clemens* 1501 (L). [6°51'S, 146°36'E], Bupu village above Wampit, 2500ft, 3 iii 1964,

*Millar* NGF 23294 (E, L). 7°16'S, 146°11'E, Oiwa–Benula track, Langimar, 4500ft, 24 xi 1970, *Streimann & Kairo* NGF 42495 (A, CANB, E, L). 7°10'S, 147°E, Wau–Salamaua road, Skindewai, 5400ft, 6 i 1956, *Womersley & Millar* NGF 8395 (A, BM, CANB, K, L). 7°23'S, 146°08'E, Poiyu road to Aseki, 5000ft, 17 v 1968, *Streimann & Kairo* NGF 39001 (L). 7°23'S, 146°05'E, Titamunga–Aseki road, on main ridge, 6500ft, 14 v 1968, *Streimann & Kairo* NGF 35991 (E, L). [8°12'S, 146°47'E], Mt Yule area, upper Akaifu valley, 2000ft, 17 iv 1952, *Brown* 67 (A, CANB); *ibid.*, *Brown* 67A (A). [9°58'S, 149°12'E, Mt Baratun], Mt Garatun, 4500ft, i v 1972, *Cruttwell* 1555 (E). [9°50'S, 149°17'E], Maneau Range, N slopes of Mt Dayman, 900m, 22 vii 1953, *Brass* 23605 (A); *ibid.*, 15 vii 1953, 700m, *Brass* 23420 (A, CANB, L). [c.9°25'S, 147°25'E], Sogere, Mt Koikoko, 3000ft, 1885–86, *Forbes* 776 (BM).

*Dichrotrichum chalmersii* was unknown to Schlechter, who re-described the species as *D. magnificentum*; this he separated from *D. filarskyi* by its more oblong, smaller

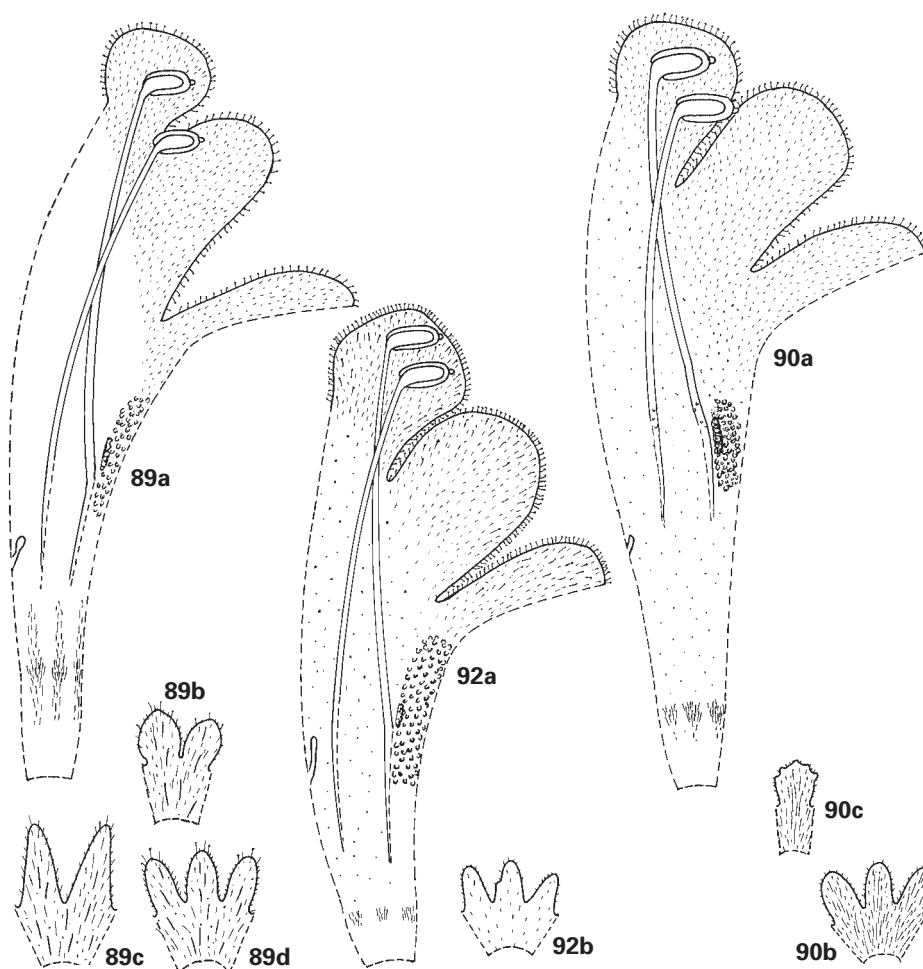


FIG. 24. Part of calyx and longitudinal section of corolla: 89a–d, *Agalmyla chalmersii*; 90a–c, *A. elegans*; 92a, b, *A. gjellerupii*. All  $\times 2$ .

leaves and somewhat shorter flowers. However, these supposed differences do not accord with the very full original description of *D. filarskyi*, the type of which Schlechter must have seen (it was later destroyed in the Berlin fire), and we are confident that both *D. filarskyi* and *D. magnificum* are conspecific with *Agalmyla chalmersii*.

*Agalmyla chalmersii* has the widest distribution of any species known to us from New Guinea, ranging as it does along the central spine of mountains from the Jimmi valley (on the northern flank of the Bismarck Mountains) and the environs of Nondugl in the west (the latter place close to the type locality of *D. magnificum*) east to the Huon Peninsula (type locality of *D. filarskyi*) and south-east to the Owen Stanley Range (type locality of *A. chalmersii*); but see note below. One of its most distinctive features is the very hairy leaves with shortly acuminate tips and, typically, long narrowly cuneate base; the base is occasionally rounded. Another is the indumentum on peduncles, pedicels and calyx, composed of very short hairs and, scattered among them, longer ones reaching 2–5mm on the peduncle, 1–1.5mm on pedicels and calyx; on the calyx long hairs are nearly confined to the outside of the tube and the median part of the lobes, with occasionally a few at the tips of the lobes; the hairs on the lateral margins of the lobes are always short. The flowers are large, with a large spreading limb. They are always red outside, but the shades of red vary considerably, ranging from orange-red (recorded only once) to deep coral red, deep scarlet, crimson, to deep maroon or dull deep red; one collector recorded deep coral red to deep maroon, which perhaps suggests darkening with age. Collectors have often recorded yellow in the throat and sometimes on the inner face of the lobes as well. There are also records of the calyx sometimes being red or reddish, and one record of leaves dull red below (many more records of green).

Little ecological information is available, but five collectors mention *Castanopsis*-dominated forest, or *Castanopsis-Quercus*, or *Castanopsis-Lithocarpus*, with an altitudinal range of 610–1980m above sea level. A specimen from Yapen (Japan) Island, at the mouth of Geelvink Bay, the only specimen of *Agalmyla* seen from that island, appears to be *A. chalmersii*, a remarkable disjunction. The specimen in Leiden (L) is in bud only, while that in Bogor (BO) has flowers, but they are half rotten and impossible to dissect satisfactorily to judge the size of the limb: *Aet & Idjan* 800 (BO, L), collected near Seroei [Serui], Sg. Mémpérawaja, on 16 ix 1939; flower described as red. A second collection (*Aet & Idjan* 365, BO) is completely sterile; it was collected at Wasaberi near Seroei on 11 viii 1939.

*Agalmyla chalmersii* can be confused with *A. triflora*, a species possibly confined to the Cyclops Mountains near the north coast of New Guinea. They have similar indumentum on the vegetative parts, though that on the fully expanded leaves of *A. triflora* is less dense than in *A. chalmersii* (difficult to quantify), and similar hairs on the outer surface of the corolla; the calyx-lobing is similar and so are the large-limbed corollas. The base of the leaf in *A. chalmersii* is normally much more attenuate than in *A. triflora*, the inflorescence carries more flowers, the calyx is mostly larger, and the gynoecium is always well clad in acute hairs. See also 90. *A. elegans* and 93. *A. chrysostyla*.

**90. *Agalmyla elegans*** (Schumann & Lauterb.) Hilliard & B.L. Burt, **comb. nov.**

Type: Kaiser-Wilhelmsland [Papua New Guinea], Torricelli Gebirges, 1100m, iv 1902, *Schlechter* 14468 (holo. B<sup>†</sup>; lecto. (chosen here) BO).

Syn.: *Dichrotrichum elegans* Schumann & Lauterb., Nachtr. Fl. Deutsch. Südsee: 375 (1905); Schltr. in Bot. Jahrb. 58: 14 (1923).

?*D. schultzei* Schltr. in Bot. Jahrb. 58: 289, 293 (1923). Type: [Papua New Guinea], bei dem Lager 'Hochmoos' etwa 65km südlich der Tami-Mundung, etwa 1200m ü M., vii 1910, *Schultze* s.n. (B<sup>†</sup>, no duplicate found).

*D. torricellense* Schltr. in Bot. Jahrb. 58: 289, 294 (1923). Type: [Papua New Guinea], Toricelli-Gebirges, etwa 800m ü M., ix 1909, *Schlechter* 20224 (B<sup>†</sup>, no duplicate found).

Epiphyte, stems of indeterminate length, loosely branched, c.3–5mm in diam. on flowering part, rooting along internodes, thickly clad in patent acute hairs to 3–4mm long, rarely a few shorter gland-tipped hairs as well, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 9–25 × 6–23mm, ovate, petiole 3–7mm, hairy as developed leaves; blade of largest developed leaves 70–150 × 37–80mm, ovate, ovate-oblong, or elliptic, apex acute or subacute, base rounded, rounded then abruptly cuneate, or cuneate, margins coarsely serrate, doubly serrate, or crenate-serrate, lateral veins 6–7 each side of midrib, ascending at angle of c.45°, looping near margin, with short side vein running out to adjacent tooth and weak linkage to vein above, upper surface thickly to thinly clad in coarse acute hairs to 1.5–2mm long, blade always clearly visible, lower surface hairs finer and often shorter except over veins, otherwise as upper surface, glandular-punctate; petiole 30–140mm long, well clad in more or less spreading acute hairs to 2–3mm long. *Inflorescence* a few- to many-flowered cymose cluster, peduncle 10–190mm long, thinly to more thickly clad in patent acute hairs to 2.5–5mm long, very short underlying hairs sparse or wanting. *Bracts* (outermost pair) 6–10 × 2.5–6mm, elliptic-oblong to ovate, acute hairs to 1–1.5mm on both faces, or inner face glabrous. *Pedicels* 5–15mm long, thickly clad in short acute hairs with longer ones, to 1.5mm, often scattered among them. *Calyx* tube 3–5mm long, lobes 5, subequal, 2.5–6 × 1.8–3mm at the base, roughly equalling to shorter than the tube, mostly more or less oblong, sometimes broadest in upper part, always broadly rounded, margins entire or with a few minute rounded teeth near apex, outside acute hairs to c.0.2–0.25mm long, together with scattered acute hairs to 0.6–1.5mm long all over tube, median on lobes, margins mostly with very short hairs but longer ones, occasionally gland-tipped, sometimes present at apex of lobe. *Corolla* 45–58mm long, tube 38–47mm, funnel-shaped, slightly arcuate, mouth nearly round, posticous lobes 10–11 × 9–13mm, subrotund, anticous lobe 11–14 × 9–13mm, oblong or oblong-elliptic, corolla dark red, outside thickly clad in broad-based acute hairs to 0.2–0.5mm long, often few gland-tipped hairs to 0.6–0.7mm long on posticous side, either confined to area around posticous sinus, or around posticous and lateral sinuses, occasionally extending short distance down tube on posticous side, lobes fringed with gland-tipped hairs to 0.4–0.5mm

long, inside lobes acute hairs to 0.1–0.15mm long extending short way down floor of tube on anticous side, elsewhere inside tube minute scattered globular glands, palate of globose papillae adjacent to insertion of anticous filaments, raised into 2 small longitudinal keels, annulus inserted c.2.5–4mm above base of tube, comprising 5 discrete tufts of hairs to 1–2mm long, either all acute or some gland-tipped. *Stamens* 4, anticous filaments 23–30mm long, inserted 15–24mm above base of tube, anthers 3.5–5mm long, not exceeding posticous lobes; posticous filaments 18–26mm, inserted 16–24mm above base, anthers 3–4.5mm; staminode 1–4mm long. *Disc* 0.8–1 × 2–2.2mm, cupular, rim crenulate. *Ovary* (♀ phase) 30–43 × 1.2mm, both ovary (excluding stipe) and style clad in acute hairs to 0.2–0.5mm long together with minute globular glands. *Style* 6–9mm. *Stigmatic lobes* 2–3.2 × 1.8–2.1mm, minutely papillose inside, outside hairy as ovary, sometimes a few glandular hairs as well to 0.2–0.6mm long. *Capsules* c.130–280 × 2mm, glabrous or a few hairs persisting. *Seeds* (immature) 1 × 0.2mm, appendages c.4mm long. **Fig. 24: 90a–c.**

PAPUA NEW GUINEA. 2°45'S, 141°14'E, Bewani Highway near Daunda Bridge, 110m, 15 ix 1977, *Wiakabu & Feni* LAE 73303 (L). [3°21'S, 142°03'E], Mt Gorbu, near old Wantipi village, c.1000ft, 3 viii 1961, *Darbyshire & Hoogland* 8378 (CANB). [3°25'S, 142°06'E], Torricelli Mts, near Miwaute village, c.2600ft, 18 viii 1961, *Darbyshire* 217 (CANB, L). [3°26'S, 142°09'E], Torricelli Mts, near Wigote village, c.2600ft, 12 ix 1961, *Darbyshire* 406 (CANB). [3°28'S, 142°14'E], Torricelli Mts, near Sikel, Mt Sulen, c.850m, 23 vii 1981, *Reeve* 3826 (E). [c.3°20'S, 142°25'E], Torricelli Mts, Lipan Pass, 900m, 6 viii 1981, *Reeve* 4069 (E). [c.3°35'S, 142°30'E], 34km NW of Dreikikir, c.425m, 16 ix 1966, *Heyligers* 1716 (CANB). [3°37'S, 143°22'E, Prince Alexander Mts], north of Yangoru Patrol Post, Mt Turu, c.3000ft, 14 viii 1959, *Pullen* 1441 (CANB); *ibid.*, c.3400ft, 21 viii 1959, *Pullen* 1552 (CANB). [4°30'S, 142°40'E], eastern ridge of Sumset (Mt Hunstein), 3900ft, 8 viii 1966, *Hoogland & Craven* 10847 (CANB, L). 4°55'S, 141°08'E, Star Mts near Busilmin airstrip, 1500m, 24 iii 1975, *Barker* LAE 66781 (A, E, L).

WEST NEW GUINEA. [3°36'S, 138°28'E], Swart Valley [= Ilim], Kadubaka, 25 iii 1958, *Bergman* 299 (S). [3°30'S, 139°15'E], 4 km SW of Bernhard Camp, Idenburg river, 850m, iii 1939, *Brass* 13302 (A); *ibid.*, 850m, iii 1939, *Brass* 13461 (A, L). 4°10'S, 139°20'E, Snow Mountains, E of Baliem valley, vicinity Panggema village, x 1992, *Milliken* 1420 (A). 4°16'S, 139°24'E, between Angguruk and Halariki, 1450m, *Sauveur & Sinke* 2702 (L).

The holotypes of the names *Dichrotrichum elegans*, *D. schultzei* and *D. torricellense* were destroyed in the Berlin fire; fortunately a duplicate of *D. elegans* survives in the herbarium at Bogor, but no duplicates of the other two have been traced. In his key to the species of *Dichrotrichum*, Schlechter (1923) distinguished his new species *D. torricellense* from *D. elegans* on the basis of 'peduncle considerably longer than petiole' in *D. elegans*, 'peduncle about as long as the petiole' in *D. torricellense*. This criterion is worthless, and no other is given; in the discussion following the description of *D. torricellense*, Schlechter gives equally unsatisfactory diagnoses against *D. gjellerupii* and *D. chrysostylum*; *D. elegans* is not mentioned. The types of both *D. elegans* and *D. torricellense* came from the Torricelli Mountains, but the precise localities are not easy to trace. In early April 1902, Schlechter was on Seleo Island (3°9'S, 142°28'E) whence he made his way to Paup (Paub) on the mainland, thence



up the Garub (Garup) river to the Torricelli Mts towards their eastern end (Loesener, 1926: 932). In September 1909, he used much the same route into the Torricelli Mts, so the types of both *D. elegans* and *D. torricellense* would have been collected in approximately the same area, the former at 1100m, the latter at 800m above sea level. We have little doubt that they are conspecific.

*Dichrotrichum schultzei* is much more problematic. The type came from much further west, in the Bewani Mountains that straddle the then German–Dutch border. In 1910, Schultze joined a German–Dutch border expedition; between 12 June and 31 July he marched from the mouth of the Tami river via the Bewani Mts to the Omkeer [Keerom] river and back to the Tami river mouth (*Flora Malesiana* 1: 478 (1950)). Keerom village (a name that must have replaced Schultze's locality Lager Hochmoos) lies at 3°14'S, 141°3'E, and he reached it via the Bewani river, a tributary of the Tami. Schlechter described Schultze's plant as having narrowly elliptic leaves 60–100 × 20–35mm, shortly puberulous on both surfaces, peduncle only 6–11mm long, inflorescence 1–2-flowered, and thus unlike any Papuan member of the genus known to him. Of the two specimens we have seen from the general area of the Bewani Mts, *Gideon* LAE 57525, collected on Mt Manaua, has much smaller flowers than those described for *D. schultzei*, and in addition fits none of the criteria given above (see 85. *A. gracilis*); *Wiakabu & Feni* LAE 73303 (cited above) also fits none of the criteria listed above. The specimen most closely approaching them is *Reeve* 3826 (cited above), which came from Mt Sulen, roughly 130 km east-south-east of the headwaters of the Bewani river. It is a slender side branch, the largest leaf 70 × 36mm, oblong-elliptic, peduncle 25mm, inflorescence apparently 3-flowered, but close inspection reveals a bud and 3 pedicel scars; we consider this to be merely a young, atypical, specimen of *A. elegans*. Specimens of *A. elegans* from Western New Guinea have peduncles 10–80mm long but more than 7 flowers in an inflorescence. The inflorescence of *A. elegans* was described as '*multiflora*' (which is true of many specimens seen by us), but the isotype now bears only 2 flowers, though, again, close inspection shows that originally there were 7–9. Until the Bewani Mountains are better known and a truly 1–2-flowered *Agalmyla* found, we judge it best to leave *Dichrotrichum schultzei* as possibly synonymous with *Agalmyla elegans*.

The calyx and corolla of *A. elegans* are similar in aspect to those of *A. chalmersii*, but the species differ in detail: the hairs on the stem of *A. elegans* are usually acute with only occasionally a few gland-tipped ones intermingled (as opposed to gland-tipped hairs normally present), the base of the leaf varies from rounded to cuneate (normally cuneate and shortly decurrent in *A. chalmersii*), each lateral vein shows only weak linkage to the vein above, and the disposition of the hairs on both surfaces of the leaf blade varies from somewhat crowded to dispersed, the blade always clearly visible (in contrast to the very crowded hairs in *A. chalmersii*), the peduncle tends to be shorter (10–190mm versus 115–630mm), thickly to thinly clad in patent hairs 2.5–5mm long, very short underlying hairs either wanting or very sparse (these always plentiful in *A. chalmersii*), a few gland-tipped hairs often present on the posticous side of the corolla, the corolla lobes always fringed with gland-tipped hairs

only (not mixed gland-tipped and acute), the annulus often composed of a mixture of gland-tipped and acute hairs (versus acute hairs only), and often gland-tipped hairs present on the backs of the stigmatic lobes.

The area of *A. elegans* lies along the Papuan coastal ranges from the Bewani Mountains in the west to the Prince Alexander range in the east, with a record from Mt Hunstein, lying on the far side of the marshes of the Sepik river almost due south of Dreikikir, on the southern flank of these coastal mountains, thence westwards, with records from the Star Mountains straddling the Western New Guinea–Papua New Guinea border, the Snow Mountains, and the Idenburg river area on the northern flank of these mountains. Collectors have several times recorded ‘montane rain forest’, but only twice the specific information ‘*Pandanus* common’ and ‘*Agathis* forest’ between c.100 and 1350m above sea level. *Agalmyla chalmersii* grows in *Castanopsis*-dominated forest further east, along the mountainous central spine of Papua New Guinea, mainly between 600 and 1980m above sea level (two records at 110m and 425m). See also 93. *A. chrysostyla*.

**91. *Agalmyla multiflora* (Kaneh. & Hatusima) Hilliard & B.L. Burtt, *comb. nov.***

Type: Western New Guinea, Dallmann [Dalman, c.50km south of Nabire], *Agathis*-forests, c.500m, 1 iii 1940, Kanehira & Hatusima 12002 (holo. FU, n.v.).

Syn.: *Dichrotrichum multiflorum* Kaneh. & Hatusima in Bot. Mag. Tokyo 57: 116 (1943) cum fig.

Epiphyte, stems of indeterminate length, sparingly branched, rooting along internodes, thickly clad in spreading acute hairs 3–4mm long. *Leaves* opposite, anisophyllous, reduced leaves persistent, c.20 × 1.4–1.7mm, ovate, contracted to a petiolar part 3–4mm long; blade of developed leaves 110–125 × 65–78mm, elliptic or ovate-elliptic, apex acute, base more or less rounded, abruptly cuneate, margins irregularly serrate, 5 lateral veins each side of midrib, sharply ascending, looping near margin and merging with it, both surfaces almost hirsute [*subdense hirsuta*]; petiole 25–30mm long, thickly clad in spreading hairs. *Inflorescence* a many-flowered cymose cluster, peduncle c.35mm long, 4mm in diam., well clad in spreading acute hairs. *Bracts* 6–9 × 4–6mm, ovate, both surfaces hirsute. *Pedicels* c.10mm long, densely puberulous. *Calyx* c.8mm long, divided roughly halfway into 5 subequal lobes, puberulous outside, lobes oblong, obtuse (deltoid, subacute in fig. 6A, but whole illustration poor). *Corolla* c.45mm long, tube 35mm, funnel-shaped, lobes c.10mm long, lobes oblong, truncate-obtuse, fringed with minute gland-tipped hairs, corolla bright cherry colour (*laete kermesini*), outside pilose, inside an annulus of 5 discrete tufts of acute hairs. *Stamens* 4, inserted about the middle of the tube, not exceeding the corolla, filaments c.20–25mm long, glabrous, anthers c.3mm long. *Ovary* and *style* c.35mm long before anthesis, shortly puberulous. *Stigmatic lobes* c.2mm long. *Capsule* not seen.

Kyushu University does not lend its herbarium specimens, and unfortunately no isotype of *Dichrotrichum multiflorum* has been found nor anything to match the illustration given; the area in which the plant was found seems never to have been

revisited by a botanist. The description above is therefore based on the authors' Latin description (which was copied almost verbatim from that of *Dichrotrichum torricellense* Schltr.) and the little that can be deduced from the illustration, in which the flowers are crudely drawn and do not always agree in detail with the authors' description.

Kanehira & Hatusima distinguished their new species from *D. torricellense* by 'its larger leaves and denser inflorescences with shorter peduncles and longer calyces'. *Dichrotrichum torricellense* is conspecific with *Agalmyla elegans*, from much further east, in Papua New Guinea. Kanehira & Hatusima had not seen the type of *D. torricellense* and based their diagnosis upon Schlechter's description. In reality, there is no difference in any of these characters. We have maintained *A. multiflora* as distinct from *A. elegans* by its having only 5 lateral veins each side of the midrib, calyx 'puberulous' (as opposed to short hairs mixed with much longer ones) and corolla slightly smaller, pilose outside.

See also 58. *A. wondiwoiana*.

**92. *Agalmyla gjellerupii* (Schltr.) Hilliard & B.L. Burtt, **comb. nov.****

Type: West New Guinea, Gautier Mountains, c.500m, 4 xi 1911, *Gjellerup* 833 (holo. L).

Syn.: *Dichrotrichum gjellerupii* Schltr. in Bot. Jahrb. 58: 289, 294 (1923) and in Nova Guinea 14(2): 311 (1927).

Epiphyte, stems of indeterminate length (at least 3m), loosely branched, c.3mm in diam. on flowering part, rooting along internodes, moderately well clad in acute appressed hairs to 1.5–2mm long, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.3–6 × 2–3mm, petiole c.1mm, few short appressed hairs; blade of largest developed leaves 81–85 × 42–45mm, elliptic, apex acute, base cuneate, very shortly decurrent, margins coarsely doubly serrate, lateral veins 6–7 each side of midrib, ascending at angle of c.45°, looping near margin and linking to vein above with short side vein running out into adjacent tooth, both surfaces very sparsely hairy even in extreme youth, hairs acute, to 0.5mm long, appressed, most over veins especially on lower surface and near margins; petiole 50–75mm long, relatively well clad in acute hairs to 1–1.5mm long, upward-pointing to appressed. *Inflorescence* a 4–7-flowered cymose cluster, peduncle 45–60mm long, thinly clad in acute appressed hairs to 1mm long. *Bracts* (outermost, only 1 seen) 5 × 2.6mm, elliptic tapering into a broad petiolar part, margins with 2 small teeth, glabrous above, few acute hairs to 0.3mm on lower surface at base and along margins. *Pedicels* c.10mm long, clad in acute appressed hairs to c.0.5mm long. *Calyx* tube 3mm long, lobes 5, subequal, 2.3–3.2 × 1.7–2mm at base, more or less oblong, apex broadly rounded, margins entire or with 2 or 3 very obscure teeth, outside scattered acute hairs to 0.25mm long, mainly on tube, few hairs to 0.15mm on margins, inside minute globular glands. *Corolla* c.43mm long, tube 32mm, narrowly funnel-shaped, mouth more or less round, posticous lobes 11 × 8.5mm, subrotund,

anticous lobe  $10 \times 7$  mm, elliptic, corolla carmine red, outside rather thinly clad in broad-based acute hairs to 0.2 mm long, lobes fringed with gland-tipped hairs to 0.4 mm long, inside lobes broad-based acute hairs to 0.1 mm long together with scattered gland-tipped hairs to 0.2 mm long, these mostly near margins, inside tube minute scattered globular glands, conspicuous palate of globose papillae inserted adjacent to anticous filaments and extending along floor of tube, raised into 2 very small longitudinal keels at insertion of anticous filaments, annulus inserted c. 3 mm above base of tube, composed of 5 small discrete tufts of acute hairs c. 0.7 mm long. *Stamens* 4, anticous filaments inserted 16 mm above base of tube, 26 mm long, anthers 3 mm, not exceeding posticous lobes; posticous filaments inserted 18 mm above base of tube, 23 mm long, anthers 2.8 mm; staminode c. 3 mm. *Disc*  $0.8 \times 1.6$  mm, cupular, rim crenulate. *Ovary* (♀ phase)  $34 \times 1$  mm. *Style* 9 mm. *Stigmatic lobes*  $3 \times 1.8$  mm, papillose inside, outside acute hairs to 0.15 mm long near base, extending down style to ovary, conspicuous stipe glabrous. *Capsules* unknown. **Fig. 24: 92a, b.**

Schlechter diagnosed his new species *Dichrotrichum gjellerupii* against *D. torricellense* and *D. chrysostylum*, that is, *Agalmyla elegans* and *A. chrysostyla*, and this is surely where the relationship lies: all three have similar-looking calyces and corollas, and hairy gynoeceia. However, *A. gjellerupii* is easily distinguished by the much shorter, appressed hairs on stem, petioles and peduncles, the almost glabrous leaves, and calyx clad in few very short hairs. Also, *A. gjellerupii* has scattered gland-tipped hairs inside the corolla lobes, in addition to the usual acute hairs, an uncommon character shared with *A. angiensis*, though they accord in little else.

*Agalmyla gjellerupii* is known only from the type collection made in the Gautier Mountains well to the west of the areas of *A. elegans* and *A. chrysostyla*. Knud Gjellerup was a Dane who became a medical officer in the Dutch East Indian Army, and between 1909 and 1912 was a member of an exploration detachment in Dutch North New Guinea (*Flora Malesiana* 1: 193 (1950)). By November 1911, the expedition appears to have ascended the Tor river ( $1^{\circ}59'S$ ,  $138^{\circ}58'E$ ) to reach spurs of the Gautier Mountains.

**93. *Agalmyla chrysostyla* (Schltr.) Hilliard & B.L. Burtt, *comb. nov.***

Type: NE New Guinea [Papua New Guinea, c.  $4^{\circ}45'S$ ,  $142^{\circ}30'E$ ], Lordberg, 750 m, xi 1912, *Ledermann* 9858 (B<sup>†</sup>). Neotype (chosen here): Telefomin subdistrict, Oksapmin,  $5^{\circ}20'S$ ,  $142^{\circ}15'E$ , 5200 ft, 17 x 1968, *Henty et al.* NGF 41592 (E; iso. A, CANB, L).

Syn.: *Dichrotrichum chrysostylum* Schltr. in *Bot. Jahrb.* 58: 289, 295 (1923).

Epiphyte, stems of indeterminate length, loosely branched, c. 3–6 mm in diam. on flowering part, rooting along internodes, thickly clad (shaggy) in patent acute hairs to 4–7 mm long, very few short gland-tipped ones as well, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves  $11\text{--}20 \times 9\text{--}18$ , ovate, abruptly contracted into a petiolar part 3–5 mm long, hairy as developed leaves; blade of largest developed leaves  $77\text{--}170 \times 37\text{--}90$  mm, ovate or elliptic, apex

acute, base rounded to cuneate, sometimes oblique, margins coarsely and sharply doubly serrate, lateral veins 6 each side of midrib, ascending at angle of c.45°, looping near margin and running out into adjacent teeth, both surfaces thickly clad in acute hairs to 2–3mm long; petiole 35–110mm long, well clad in patent acute hairs to 3.5–5mm long. *Inflorescence* a cymose cluster, flowers (4–7–)10–many, peduncle (70–80–)180–450mm long, clad in scattered patent acute hairs to 3.5–5mm long, underlain by very short (to c.0.5mm) acute hairs, these often sparse. *Bracts* (outermost pair) 9–19 × 6–13mm, broadly ovate, apex subacute, margins toothed, acute hairs to 1.7–2.5mm on both faces. *Pedicels* 10–23mm long, well clad in patent acute hairs to 1.5–2mm long. *Calyx* tube 5–7mm long, lobes 5, subequal, (2.5–)5–7 × (2–)2.5–3.4mm at base, usually roughly equalling the tube in length, more or less oblong but often broadened a little about the middle, margins often few-toothed, outside well clad in acute hairs to 1.3–2.2mm long, inside to 0.3mm at tips only, margins to 0.5–0.8mm. *Corolla* 50–58mm long, tube 38–45mm, more or less broadly cylindrical widening slightly towards apex, slightly arcuate, mouth nearly round, posticous lobes 12–13 × 10–12.5mm, subrotund, anticous lobe 14–19 × 10–14mm, broadly spatulate, apex rounded, corolla dark red, outside thickly clad in broad-based acute hairs to 0.4–0.5mm, often to 1mm near posticous sinuses and there sometimes gland-tipped, lobes fringed with gland-tipped hairs to 0.4–0.5mm long, inside lobes acute hairs to c.0.3mm, conspicuous palate of globose papillae at insertion of anticous filaments, there slightly raised into 2 small keels, annulus inserted c.4mm above base of tube, comprising 5 tufts of acute hairs 1–1.5mm long. *Stamens* 4, anticous filaments inserted 19–23mm above base of tube, 23–27mm long, anthers 4.5–5mm, not exceeding posticous lobes; posticous filaments inserted 20–24mm above base, filaments 20–24mm long, anthers 4–4.5mm; staminode 1.5–10mm long. *Disc* 1 × 2.2–2.5mm, cupular, rim crenulate. *Ovary* (♀ phase) c.45 × 1.5mm. *Style* 6–10mm. *Stigmatic lobes* 3–4 × 2.8–3mm, minutely papillose inside, outside few to many small gland-tipped hairs or these wanting, together with minute globular glands and acute hairs to c.0.5mm long, the last two descending down style and ovary, stipe glabrous. *Capsules* 100–250mm long, glabrous or a few hairs persisting. *Seeds* c.1 × 2mm, appendages c.4mm long. **Fig. 25: 93a, b.**

PAPUA NEW GUINEA. 5°07'S, 141°30'E, Telefomin, Tifalmin Valley, c.4500ft, iii/iv 1965, *Steinkraus* 10 (E). 5°22'S, 142°33'E, 9mi from Kopiago, off Tari road, Batane, 4450ft, 30 x 1968, *Womersley et al.* NGF 37224 (A, CANB, E, K, L). 5°22'S, 142°33'E, Lake Kopiago, 4400ft, 29 x 1968, *Vandenburg, Womersley & Galore* NGF 39924 (E, L).

The type of *Dichrotrichum chrysostylum* was destroyed in the Berlin fire and no duplicate has been found. The type locality, Lordberg, is in the vicinity of the April river (see *Flora Malesiana* 1: 318 (1950)), which rises in the Central Range of Papua New Guinea and flows north to join the Sepik. No further collections appear to have been made in this area. The specimen chosen as neotype came from the southern flank of the Central Range, south of the western tributaries of the April river; Kopiago lies south of the eastern tributaries, while the Tifalmin valley lies to the

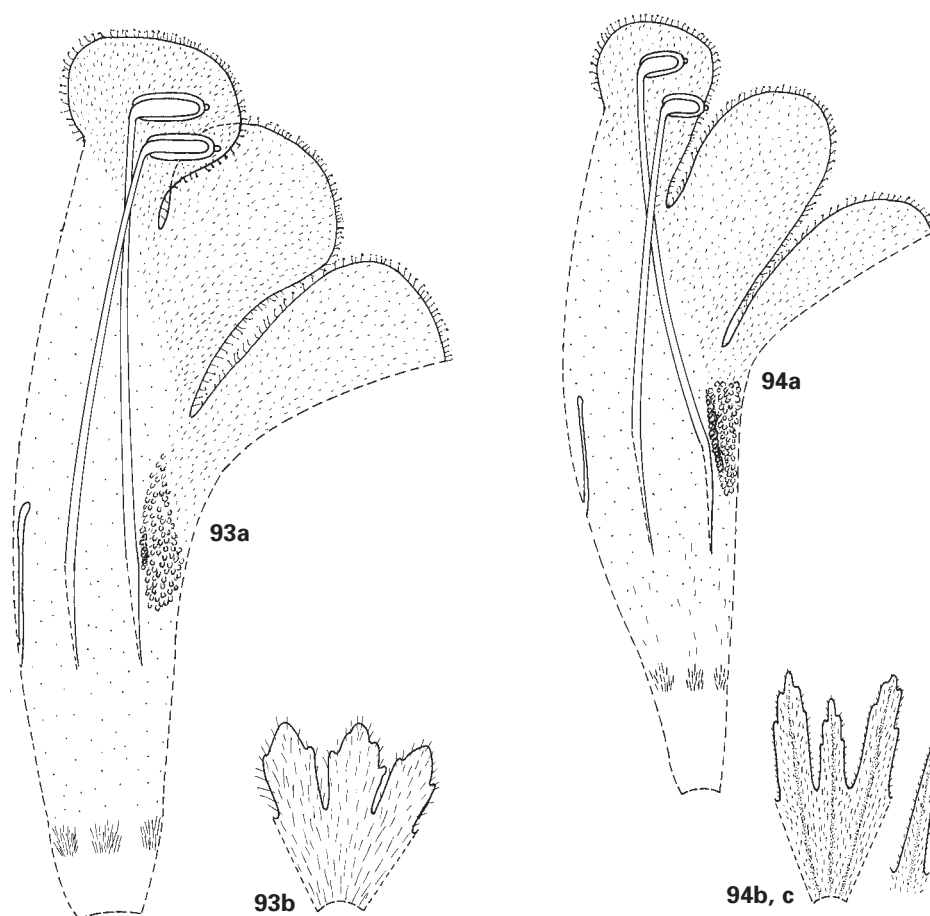


FIG. 25. Part of calyx and longitudinal section of corolla: 93a, b, *Agalmylea chrysostyla*; 94a-c, *A. nervosa*. All  $\times 2$ .

west, in the Victor Emmanuel Range. These specimens, which agree well with one another, do not precisely fit the original description of *D. chrysostylum*; they differ in the length of the peduncle (180–450mm versus 70–80mm) and number of flowers in the inflorescence (many (at least 10) versus 4–7). Both these characters can be of doubtful diagnostic value. In *Agalmylea elegans*, for instance, peduncle length varies from 10 to 190mm and the inflorescence carries few to many flowers. The epithet *chrysostyla* derives from the golden-yellow ('goldgelben') hairs on the gynoeceum; no difference in colour of these hairs exists between species.

*Agalmylea chrysostyla* is undoubtedly very close to *A. chalmersii* and *A. elegans* (which now includes *Dichrotrichum torricellense* against which Schlechter diagnosed *D. chrysostylum*). It differs from *A. chalmersii* in the base of the leaf (usually rounded, not usually cuneate), the lateral veins running out into the marginal teeth, and mostly longer hairs on both surfaces (2–3mm versus 1.5mm), outermost bracts broadly

ovate, margins toothed, margins of calyx lobes often toothed, and long hairs more or less evenly distributed over the outside of the calyx. It differs from *A. elegans* in hairs on the stem 4–7mm long (versus 3–4mm), leaves more densely hairy, the hairs often longer (2–3mm versus 1.5–2mm), and outside of calyx more or less evenly clad in hairs to 1.3–2.2mm long (versus very short hairs with longer ones (0.6–1.5mm) scattered among them).

The habitat has been recorded as ‘degraded fagaceous forest’ and ‘*Castanopsis* forest’, between 750 and 1585m above sea level, similar to the habitat of *A. chalmersii*.

**94. *Agalmyla nervosa*** Hilliard & B.L. Burt, **sp. nov.** ex affinitate generali *A. formosae* sed indumento foliorum bractearum pedicellorum denso et arcte appresso, petiolis inflorescentias circiter aequantibus vel eas multo superantibus, inflorescentiis fere sessilibus, venatione in pagina folii inferiore, in bracteis (fere striatis) et in calycis lobis prominente statim distinguenda.

Type: Papua New Guinea, 5°50'S, 141°05'E, Ningerum, 370ft, 29 viii 1970, *Henty & Barlow* NGF 42991 (holo. L, iso. E).

Epiphyte, stems of indeterminate length, c.5mm in diam. on flowering part, rooting along internodes, thickly clad in acute hairs to 4–5mm long, more or less appressed, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 20–32 × 10–13mm, petiole 10–20mm, otherwise as developed leaves; blade of largest developed leaves 100–205 × 40–90mm, elliptic or ovate, apex acute, base cuneate, shortly decurrent, margins coarsely serrate or doubly serrate, lateral veins (7–)8–9 each side of midrib, ascending at angle of c.45°, looping near margin and running into it, upper surface very densely hairy, almost velvety, hairs acute, to 1–1.5mm long, strongly appressed, lower surface similar with veins even more densely hairy, prominent; petiole 50–120mm long, densely clad in appressed acute hairs to 2–3mm long. *Inflorescence* a few- to many-flowered cymose cluster, peduncle 2–8mm long, densely appressed-hairy. *Bracts* (outermost pair) 23–35 × 7–10mm, lanceolate contracted to a petiolar part, both surfaces thickly clad in acute hairs to 0.8–1.3mm long, lower surface prominently 3–5-veined, these paler than the intervening blade. *Pedicels* 4–8mm long, densely appressed-hairy. *Calyx* tube 4–7mm long, lobes 5, subequal, 6–10 × 2–2.8mm at base, oblong to deltoid, subacute, margins entire or few-toothed near apex, outside thickly clad in strongly appressed acute hairs to 1–2mm long, to 0.3–0.8mm on margins, median vein in each lobe prominent, inside lobes acute hairs to 0.2–0.3mm long at tips, elsewhere minute globular glands. *Corolla* 50–60mm long, tube 38–48mm, funnel-shaped, slightly arcuate, mouth nearly round, posticous lobes 11–14 × 7–7.5mm, oblong below, subrotund above, anticus lobe 16–17 × 8mm, more or less elliptic, apex broadly rounded, corolla ‘red’, ‘pale scarlet’, ‘orange-red’, outside thickly clad in acute hairs mostly to 0.5mm long, to 0.8–1.3mm on posticous side and there sometimes a few gland-tipped on upper part, lobes fringed with gland-tipped hairs to 0.4–0.5mm long, inside lobes acute hairs to 0.2mm, sometimes a few near margins gland-tipped, conspicuous

palate of globular papillae inserted above and below point of insertion of anticous filaments, weakly raised into 2 small longitudinal keels, elsewhere inside tube minute scattered globular glands, annulus inserted 5–7mm above base of tube, composed of 5 tufts of acute hairs to 1–2mm long, a few of these sometimes dispersed upwards. *Stamens* 4, anticous filaments inserted 23–28mm above base of tube, 24–30mm long, anthers 3–3.5mm long, about equalling posticous lobes; posticous filaments inserted 24–30mm above base, 21–25mm long, anthers 2.8–3mm; staminode 3–6mm. *Disc* c.1 × 2mm, cupular, rim crenulate. *Ovary* (♀ phase) c.40–48 × 1.5–2mm. *Style* 5–9mm. *Stigmatic lobes* 3 × 2.8mm, papillose inside, outside acute hairs to 0.8mm long, running back down style and ovary to stipe, stipe glabrous. *Capsules* (old and shredded, 2 seen) 100–165mm long. *Seeds* shed. **Fig. 25: 94a–c.**

PAPUA NEW GUINEA. c.6°26'S, 142°50'E, Mt Bosavi, northern side, NW of mission station, 600–700m, 8 x 1973, *Jacobs* 9082 (CANB, L). [6°21'S, 143°17'E], near Tage, Lake Kutubu, c.2700ft, 20 ix 1961, *Schodde* 2180 (CANB). Lake Kutubu [6°23'S, 143°19'E], Inu–Tugiri road, 900m, 8 xi 1982, *Reeve* 5310 (E). Lake Kutubu, 7 x 1988, cult. Glasgow Botanic Garden G3–87 PNG, from Glasgow New Guinea expedition (E).

*Agalmyla nervosa* is a highly distinctive species without close allies, though the form of the calyx and corolla and the hairy gynoeceum point to the general affinity of *A. formosa*, which occurs in the same area. The major characteristics of the species are dense appressed indumentum on the leaves (including petioles), bracts and peduncles, the prominence of the veins on the lower surface of the leaf, on the backs of the bracts (which suggested the epithet *nervosa*) and on the calyx, where each lobe has a median keel, and the almost sessile inflorescence; the peduncles are so short and the petioles so long that at least the leaf blade overtops the flowers.

The plant is known from three localities in south-central Papua New Guinea, near the border with West New Guinea, then further east on the lower slopes of Mt Bosavi, and around Lake Kutubu. The altitudinal range is great, from only c.112m above sea level to c.900m, in 'disturbed forest on undulating land' at the lowest altitude, 'well drained volcanic soil, primary forest' on Mt Bosavi, and 'margin of primary forest' around Lake Kutubu.

**95. *Agalmyla formosa* Hilliard & B.L. Burtt, sp. nov.** ab *A. chrysostryla* caulibus pilis multis glandulosis ad 2–3mm longis aliis acutis intermixtis (nec pilis glandulosis paucis brevissimis) indutis, pilis paucis glandulosis saepe ad apicem foliorum juvenilium praesentibus (nec pilis glandulosis semper absentibus), pedicellis pilis acutis ad 4mm longis (nec 1.5–2mm), calyce pilis patentibus 3–4mm longis (nec 1.3–2.2mm) induto distinguenda.

Type: Papua New Guinea, Tari district, Komo subdistrict [6°04'S, 142°51'E], Tabaiye, 1560m, 21 xii 1982, *Reeve* 5970 (holo. E; iso. NSW, n.v.).

Epiphyte, stems of indeterminate length, c.4mm in diam. on flowering part, rooting along internodes, thickly clad in acute hairs to 5–6mm long, together with gland-tipped hairs to c.2–3mm long, many much shorter (best seen on young parts), bark



pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves c.7–11 × 5–9mm, ovate, hairy as developed leaves, petiole c.2–3mm; blade of largest developed leaves 85–95 × 42–60mm, ovate to elliptic, apex acute, base cuneate, very shortly decurrent, margins coarsely doubly serrate, lateral veins 5–6 each side of midrib, ascending at angle of c.45°, looping near margins, obscurely linking to vein above, upper surface well clad in acute hairs to 2.5mm long, overlapping but blade clearly visible, a few gland-tipped hairs to 1.5mm long often present at apices of young leaves, lower surface similar but hairs mostly to 1mm long, to 2mm over veins; petiole 40–50mm long, thickly clad in patent acute hairs to 3–6mm long. *Inflorescence* a few (up to c.11)-flowered cluster, peduncle 65–200mm long, well clad in patent acute hairs to 4–6mm long. *Bracts* (outermost pair, few seen) c.5–8 × 3–4mm, ovate contracted to a broad petiolar part, outside plentiful acute hairs to 3.5mm long, shorter towards tips and there sometimes a few short gland-tipped hairs, inside acute hairs to 2–2.5mm on upper half. *Pedicels* 6–8mm long, well clad in patent acute hairs to 4mm long. *Calyx* tube 6mm long, lobes 5, subequal, 5–6 × 2.8–4mm at base, more or less elliptic, subacute, outside well clad in strongly patent acute hairs to 3–4mm long, shorter towards tips of lobes and there a few hairs sometimes gland-tipped, inside globular glands, a few acute hairs to c.1mm near tips. *Corolla* 54–60mm long, tube 41–46mm, funnel-shaped, slightly arcuate, mouth nearly round, posticous lobes 13–15 × 13–15mm, subrotund, anticous lobe 15–18 × 11–12mm, elliptic, apex broadly rounded, corolla scarlet to deep red, outside thickly clad in broad-based acute hairs to 0.5mm long, often gland-tipped hairs to 1mm long on posticous side on upper part, lobes fringed with gland-tipped hairs to 0.4–0.8mm long, inside lobes acute hairs to 0.2mm running short distance down floor of tube, conspicuous palate of globose papillae on floor of tube above and below insertion of anticous filaments, at point of insertion raised into 2 very small longitudinal keels, elsewhere inside tube minute globular glands, annulus inserted 5mm above base of tube, comprising 5 tufts of acute hairs 1–2mm long. *Stamens* 4, anticous filaments inserted 21–25mm above base of tube, 28–32mm long, anthers 4–5mm, not exceeding posticous lobes; posticous filaments inserted 22–28mm above base, 22–28mm long, anthers 3.6–4.4mm; staminode 4–5mm or rarely a 5th stamen developed. *Disc* 1 × 3mm, cupular, rim crenulate. *Ovary* (♀ phase) 43 × 2mm, including stipe, clad in acute hairs to 0.5–0.7mm long, only stipe glabrous. *Style* 7mm, hairy as ovary. *Stigmatic lobes* 4 × 3.5mm, papillose inside, outside hairy as ovary (a few gland-tipped hairs present on margins of young stigmatic lobes). *Capsules* unknown. **Fig. 26: 95a, b.**

PAPUA NEW GUINEA. Tari district, Komo subdistrict, Tabaiye, c.1500m, 10 vii 1980, *Reeve* 2759 (E). Porgera district [5°29'S, 143°08'E], Paiela Census Division, 1600m, *Reeve* 1865 (E; NSW, n.v.). Nipa district, SW Lake Kutubu [6°23'S, 143°19'E], Mt Wagiribu, c.1200m, 10 xi 1982, *Reeve* 5431 (E, flowers malformed; NSW, n.v.).

A striking feature of *A. formosa* (Latin: handsome) is the remarkably long and strongly patent hairs on the calyx. These long hairs immediately distinguish it from

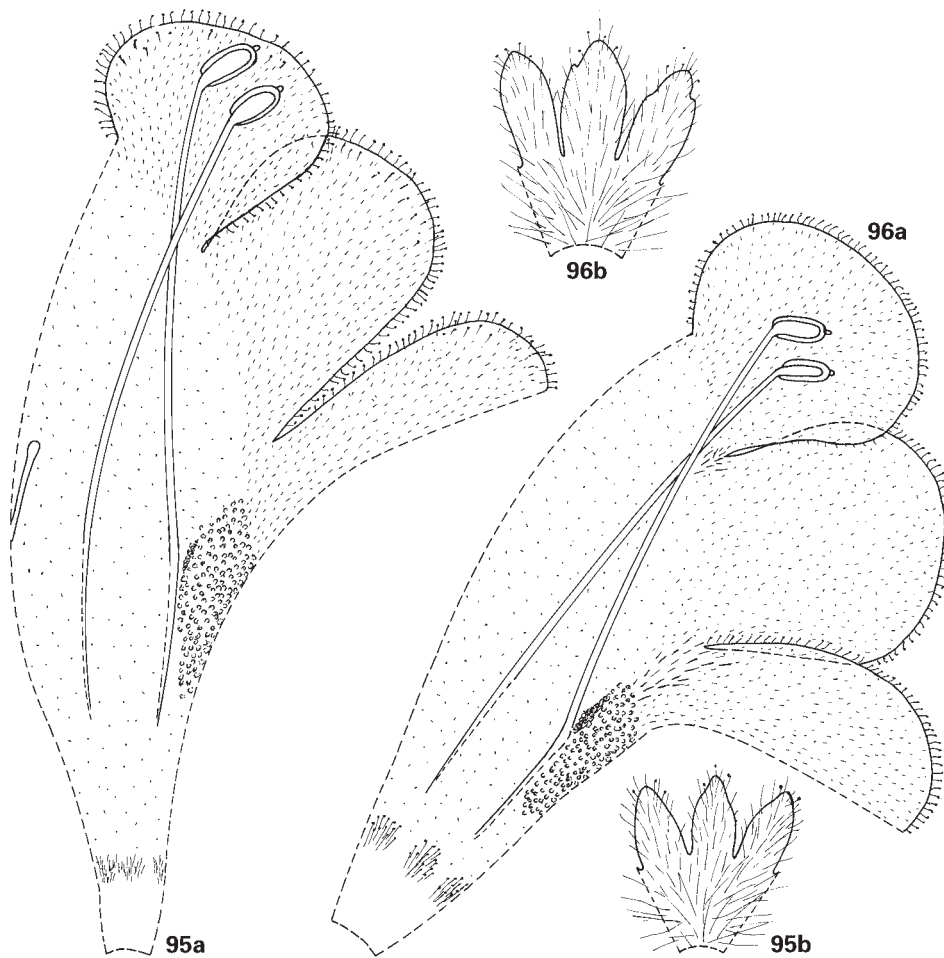


FIG. 26. Part of calyx and longitudinal section of corolla: 95a, b, *Agalmyla formosa*; 96a, b, *A. similis*. All  $\times 2$ .

*A. chrysostyla*, to which it is probably allied. It differs further in having more and often much longer gland-tipped hairs on the stem (particularly young parts), gland-tipped hairs often present at the apices of young leaves (sometimes on the bracts as well), and much longer hairs on the pedicels. The corolla tube is much broader in the upper part than in *A. chrysostyla*, but this difference is not easy to quantify. See also 96. *A. similis*.

Reeve collected the plant several times in a broad sweep around Lake Kutubu, but gave no ecological information other than altitude, c.1200–1600m above sea level. Twice he described the flowers as scarlet; on another occasion, when the flowers had passed into the female phase, he described them as deep red, which suggests the flowers may darken with age.

**96. *Agalmyla similis*** Hilliard & B.L. Burtt, **sp. nov.** ab *A. formosa* pilis foliorum longioribus (2.5–5mm, nec usque ad 2.5mm), pilis acutis pedunculi et pedicellorum aliis glandulosis intermixtis (nec pilis acutis tantum), marginibus calycis paucidentatis (nec integris), corolla tubo interne area pilorum acutorum 0.5–0.8mm longorum sub sinibus anticis (area pilorum longiorum absente), pilis annuli glandulosis (nec acutis), pilis in gynoecio 1–1.5mm longis acutis et glandulosis intermixtis (nec pilis 0.5–0.7mm omnibus acutis) distinguenda.

Type: New Guinea, Vogelkop Peninsula, Ije river valley [0°53'S, 132°38'E], Bamfot village, 850m, 2 xi 1961, *Royen & Sleumer 7642* (holo. L).

Epiphyte, stems of indeterminate length, c.2–4mm in diam. on flowering part, rooting along internodes, thickly clad in acute hairs to 5–7mm long mixed with shorter gland-tipped hairs, bark pale, glossy, brittle. *Leaves* opposite, strongly anisophyllous, blade of reduced leaves 6–9 × 4–6mm, ovate, hairy as developed leaves, petiole c.3mm; blade of largest developed leaves 65–115 × 27–55mm, narrowly ovate to elliptic, apex shortly acuminate, base rounded to cuneate, margins coarsely serrate or doubly serrate, lateral veins 5–6 each side, ascending at angle of c.45°, looping near margin and linking to vein above, upper surface thickly clad in acute hairs to 2.5–4mm long, longest mostly on and near margins, few gland-tipped hairs to 1.5mm long mainly scattered along upper margins, lower surface similar, hairs to 3–5mm long on midrib; petiole 20–70mm long, thickly clad in patent acute hairs to 3–5mm. *Inflorescence* 1–5-flowered, peduncle 15–90mm long, well clad in patent acute hairs to 2–5mm long together with a few shorter gland-tipped ones. *Bracts* (outermost pair when inflorescence several-flowered) 3–6 × 1.2–6mm, ovate, patent acute hairs to 2–2.5mm long on both faces, often a few gland-tipped ones at apex. *Pedicels* 5–11mm long, well clad in patent acute hairs to 2–4mm long, a few gland-tipped. *Calyx* tube 6mm long, lobes 6–8 × 2–4mm at base, more or less elliptic, subacute to obtuse, margins few-toothed near apex, outside plentiful patent acute hairs to 4–5mm long, slightly shorter upwards, often a few gland-tipped hairs at apex, inside minute globular glands, some acute hairs to 2mm as well. *Corolla* 42–56mm long, tube 33–39mm, funnel-shaped, slightly arcuate, mouth nearly round, posticous lobes 11–15 × 11–16mm, subrotund, anticous lobe 15–18 × 12–16mm, elliptic, apex broadly rounded, corolla dark carmine red, outside well clad in acute hairs to 0.5–0.8mm long, sometimes a few gland-tipped hairs to 1mm on posticous side near apex, also globular glands all over, lobes fringed with gland-tipped hairs to 0.6–0.8mm long, inside lobes acute hairs to 0.2mm long, below anticous sinuses to 0.5–0.8mm long, elsewhere inside tube minute globular glands, conspicuous palate of globose papillae above and below insertion of anticous filaments, scarcely raised into 2 keels, annulus inserted c.5mm above base of tube, comprising 5 tufts of gland-tipped hairs to 2mm long. *Stamens* 4, anticous filaments inserted 18–20mm above base of tube, 25–29mm long, anthers 3.2–3.5mm, not exceeding posticous lobes; posticous filaments inserted 20–23mm above base, 23–25mm long, anthers 3mm; staminode 5mm. *Disc* c.1 × 2.2mm, cupular, rim crenulate. *Ovary* (♀ phase)

40–45 × 1.5–1.8mm. *Style* 10–12mm. *Stigmatic lobes* 2.5–3.5 × 2–2.5mm, papillose inside, outside hairs to 1–1.5mm long, mixed acute and gland-tipped, these running down style and ovary, including or excluding stipe. *Capsules* c.150mm, a few hairs persisting. *Seeds* c.1.2 × 0.2mm, appendages c.4mm long. **Fig. 26: 96a, b.**

WEST NEW GUINEA. Vogelkop Peninsula, Aifat river valley [1°22'S, 132°36'E], path from Sururem to Son village, 750m, 27 x 1961, *Royen & Sleumer* 7547 (K, L). Central part of Tamrau Range, path from Sudjak village to Mt Kusemun, Aiwa river, 850m, 7 xi 1961, *Royen & Sleumer* 7753 (L).

*Agalmyla similis* bears a marked similarity to *A. formosa*, which occurs well over a thousand kilometres away, around Lake Kutubu in central Papua New Guinea: both have villous stems, very long patent hairs on the calyx and a broad corolla tube with a prominent limb, but the hairs on the leaves of *A. similis* are longer (to 2.5–5mm, not to 2.5mm), on the peduncle and petiole there are gland-tipped hairs as well as acute ones, the calyx margins are few-toothed, inside the corolla there is a patch of acute hairs to 0.5–0.8mm long below the two anticous sinuses, the hairs of the annulus are gland-tipped, and on the gynoeceum the hairs are not only longer (1–1.5mm, not 0.5–0.7mm) but also some (often most) are gland-tipped.

The plants are epiphytes in oak forest between 750 and 850m above sea level.

#### ADDENDUM

**41a. *Agalmyla immersinervia*** Hilliard, **sp. nov.** ab *A. remotidentata* foliis maxime 12–20mm latis (nec c.50–130mm), venis lateralibus immersis (nec manifestis), calycis lobis c.5mm longis (nec 7–9mm) pilis appressis c.0.3mm longis (nec pilis 2–3mm longis villosis) indutis, corolla rubra (nec flava) externe pilis 1mm longis (nec 2mm), ovario glanduloso-puberulo (nec glabro) distinguenda.

Type: Sulawesi, 2km SW of Perbatasan (km 69 on road Wotu to Pendolo), c.2°13'S, 120°44'E, mountain forest, 19 viii 1993, *Wieringa* 1855 (holo. WAG; iso. K, L).

Epiphytic climber, stems of indeterminate length, rooting along internodes, young parts clad in acute hairs to c.0.8mm long, soon glabrescent, bark pale, glossy, brittle. *Leaves* opposite, 'succulent', strongly anisophyllous, smaller leaves up to one quarter size of larger, quickly caducous; largest leaves c.300–450 × 12–20mm, including petiolar part, linear-lanceolate, apex and base both long-attenuate, petiole scarcely developed, margins remotely denticulate, each tooth a hydathode, somewhat revolute, midrib immersed above, prominent below, lateral veins immersed, upper surface almost glabrous at maturity except for appressed hairs along midline, lower surface either with well-scattered strongly appressed acute hairs to 0.7mm on blade, plentiful on midrib and near margins, or nearly glabrous, glandular-punctate. *Flowers* in nearly sessile (peduncle 0–4mm) cymose axillary clusters. *Bracts* c.4–10 × 0.8–1mm, linear-lanceolate, acute strongly appressed hairs to 0.5mm on outside and margins, inside glabrous. *Pedicels* 10–12mm long, closely appressed-pubescent. *Calyx* tube 1.5–2mm long, lobes 5, c.5 × 1.2mm, deltoid, acute, glabrous inside, outside densely

appressed-pubescent, hairs c.0.3mm. *Corolla* c.37mm long, tube c.34mm, narrowly funnel-shaped, curved, mouth more or less round, posticous lobes 3 × 3mm, suborbicular, anticous lobe 8 × 4.5mm, narrowly ovate, outside of corolla 'bright red', well clad in hairs to 1mm long, most acute, some gland-tipped, margins of lobes fringed with minute acute hairs, inside lobes minute glandular hairs to c.0.15mm long, much shorter glandular hairs scattered all over inside of tube, palate of globular papillae c.0.1mm in diam. on floor of tube from base of anticous lobe to insertion of filaments, annulus wanting. *Stamens* 4, anticous filaments c.30mm long, inserted c.18mm above base of corolla tube, anthers 'dark green', c.3 × 1.8mm; posticous filaments c.25mm long, inserted 20mm from base of tube, anthers c.2mm long, all filaments glandular-puberulous in upper, well-exserted, part; staminode c.2mm long. *Disc* cupular, 1.2 × 2mm. *Ovary* c.17 × 1.2mm (late ♂ phase), densely glandular-puberulous, hairs c.0.5mm long. *Style* c.5mm, hairy as ovary. *Stigma* not fully developed. *Capsules* not seen.

*Agalmyla immersinervia* is a distinctive species having remarkably long narrow leaves in which the lateral veins are immersed (whence the epithet): the collector described them as 'succulent, upper side glossy, dark green, lower surface silky shining, pale green'. Furthermore, they are only very remotely denticulate and so strongly tapered at the base as to be virtually without a petiole. In these two characters they much resemble the leaves of *A. remotidentata*, though they are much narrower. In the key to species in sect. *Exannularia* (p. 69), the plant will run down to lead 17: the immersed veins will at once distinguish it from species nos. 38. *A. vogelii*, 39. *A. exannulata*, 40. *A. sp. nov.?* and 41. *A. remotidentata*, with which its affinity lies. In its calyx, *A. immersinervia* most resembles *A. exannulata*, but that species differs conspicuously in its long-petioled leaves; the leaves of both *A. vogelii* and *A. sp. nov.?* are also petioled. *Agalmyla remotidentata* differs not only in the dimensions of its leaves, but also in its calyx (villous, lobes longer), yellow, villous, corolla, and details of indumentum on filaments and gynoecium.

We received this plant too late for inclusion in the main text. It came from a part of Sulawesi from which we have seen no other species of *Agalmyla*, thus highlighting the inadequacy of botanical exploration in that country. Perbatasan, at 2°13'S, 120°44'E, lies well to the south-east of G. Roroka Timbu (roughly 1°30'S, 120°30'E), provenance of *A. remotidentata*.

#### *SPECIES EXCLUDENDAE*

*Agalmyla asperifolia* Blume = *Chirita asperifolia* (Blume) B.L. Burtt = *Didymocarpus asperifolius* (Blume) Bakh.f. [for misuse of this name see 2. *A. tuberculata*].

*Dichrotrichum griffithii* (Wight) C.B. Clarke, Comm. et Cyrt. Bengal.: 79 (1874) = *Loxostigma griffithii* (Wight) C.B. Clarke in A. & C. DC., Mon. Phan. 5(1): 60 (1883).

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