NOTES FROM THE
ROYAL BOTANIC GARDEN
EDINBURGH

VOLUME XXIX · No. 2 · 1969

SARAWAK PLANTS: I

B. L. BURTT

Two collecting trips to Sarawak (Burtt & Woods in 1962; Burtt & Martin in 1967) have yielded a number of interesting plants in addition to Gesneriaceae, which were the main objective of the visits and will be published in the current series of papers dealing with that family.* A few papers, by Burtt & R. M. Smith**, have already been based on other collections of the first trip and the series now commenced will bring together further miscellaneous notes as they become available.

The visit of 1962 was officially sponsored by the Royal Botanic Garden, Edinburgh, (Ministry of Public Building & Works), that of 1967 became possible through the great generosity of the late Stanley Smith, Esq. The success of both trips owed an enormous amount to the help and participation of the Sarawak Forestry Department, and in particular to Dr. J. A. R. Anderson. Inche Ilias bin Paie, in charge of the Forest herbarium, was a tower of strength and the cheerful hard work and companionship of the Iban tree-climbers was a continuous joy.

I am greatly indebted to P. J. B. Woods and A. M. Martin for their unstinted efforts on the trips in which they participated and to Miss R. M. Smith, for her work on these collections and for the illustrations.

The map (fig. 1) shows the main areas in which collections were made: there are a few specimens made in transit from one place to another but these are fairly easily located, being near to towns.

The plants are arranged by families in alphabetical order.

ACANTHACEAE (B. L. Burtt & R. M. Smith)

1. Linariantha bicolor Burtt & Smith in Notes R.B.G. Edinb. 26:328 (1965). Fig. 2.

Type. Sarawak, Third Division, Pelagus Rapids, Rejang River, 2° 10′ N, 113° E, 19 vii 1962, *Burtt & Woods* B. 2548; cult in R.B.G. Edinburgh, fl. 1 x 1963, C 4123.

* Studies in the Gesneriaceae of the Old World: I–XXX in Notes R.B.G. Edinburgh 1954–1969, continuing.

** A new species of Zingiberaceae from Sarawak. Trans. Bot. Soc. Edinb. 39:502–511 (1964). A new genus of Acanthaceae from Sarawak. Notes R.B.G. Edinb. 26:325–329 (1965). Cosmianthemum: a Bornean genus of Acanthaceae. Notes R.B.G. Edinb. 26: 365–382 (1966).

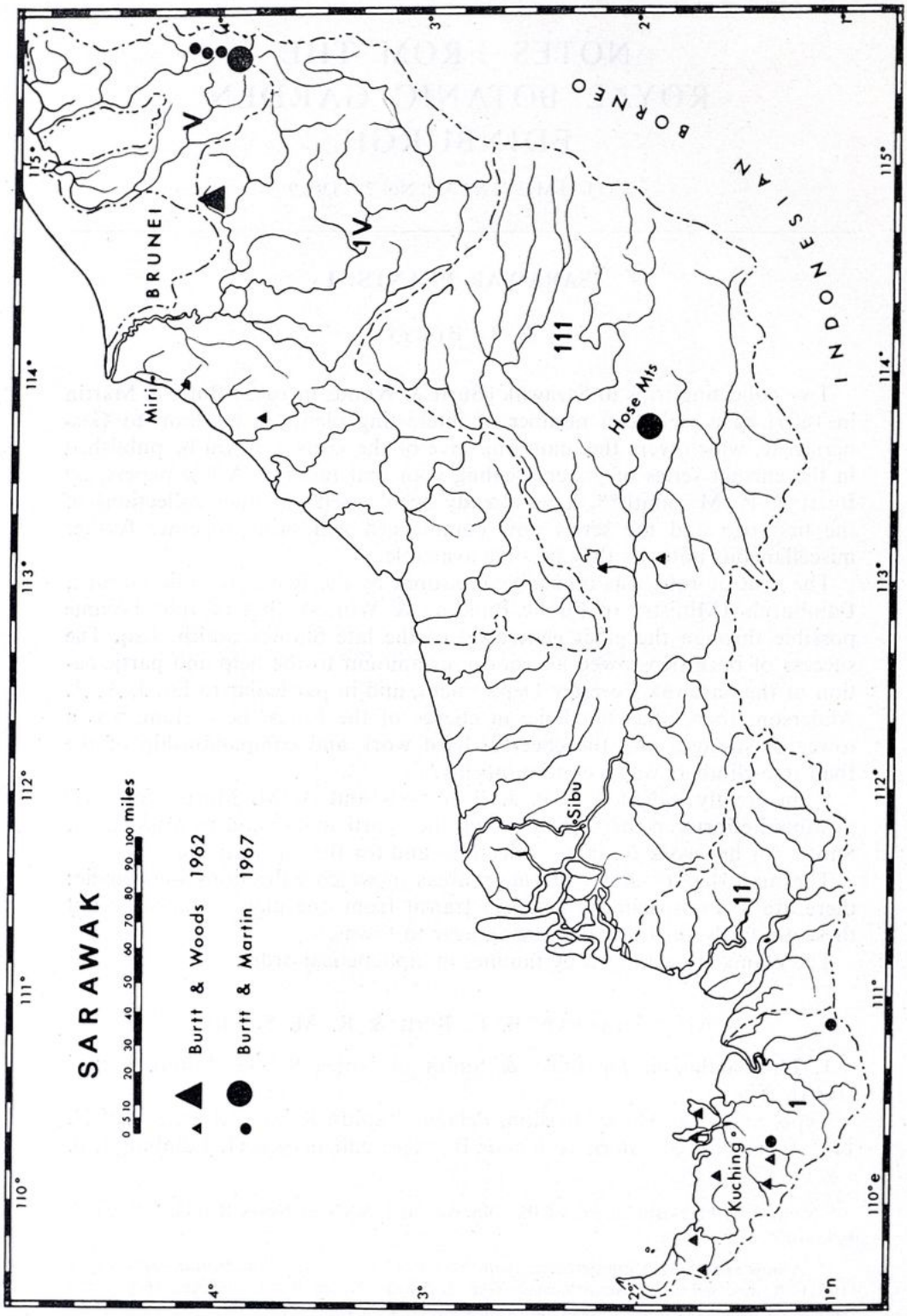

FIG. 1. Map of Sarawak.

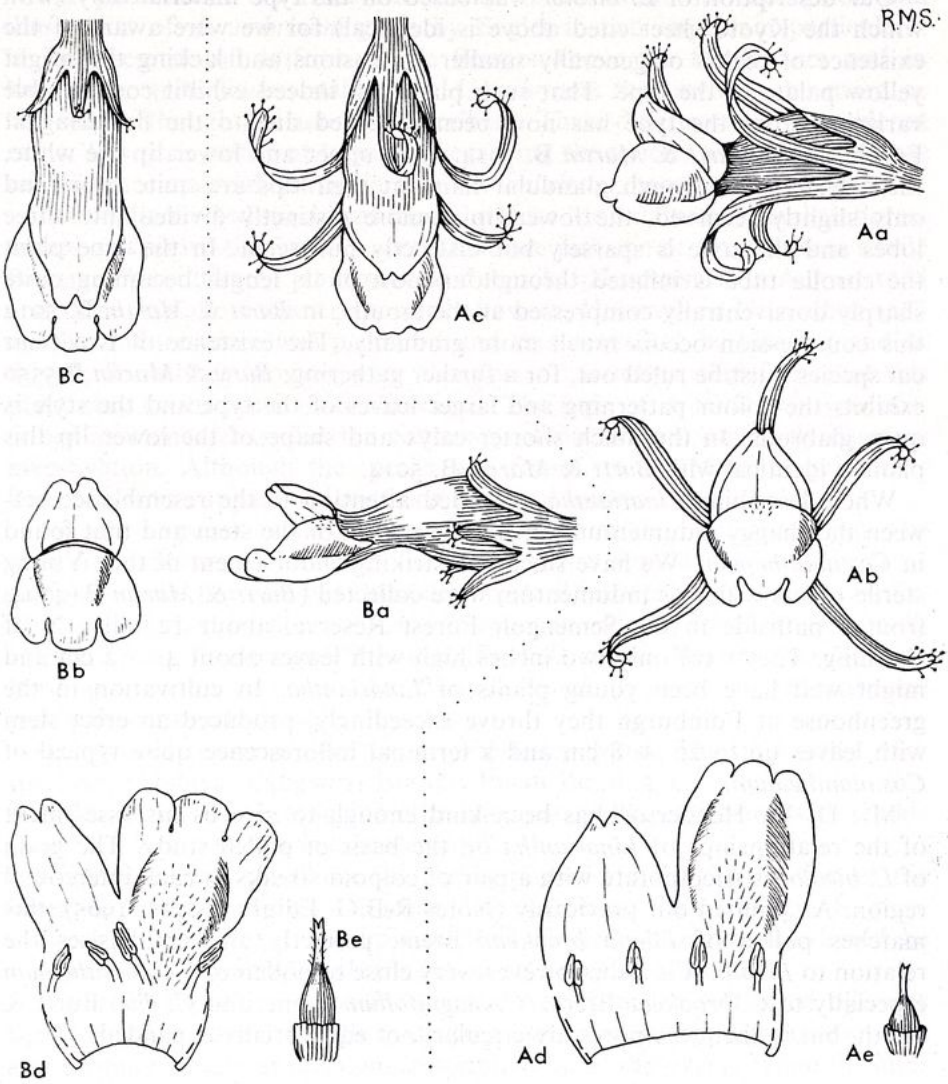

FIG. 2. *Linariantha bicolor* Burtt & Smith. A. *Burtt & Woods* B.2548; B. *Burtt & Martin* B.5014 a, b, c, lateral, frontal & dorsal views of flowers; d, corolla dissected; e, gynoecium. All × 4.

Additional material:—

SARAWAK. Fourth Division, Bintulu district, along the valley of Sungai Keyan, a branch of Ulu S. Kakus, 50–150 m, 9 xi 1963, *Kyoto University Borneo Expedition* 484 (KYO, E); Third Division, Hose mountains near falls, Ulu Melinau (Camp VI), 2° 6′ N, 113° 42′ E, c. 1060 m, creeping, flowers white, 21 viii 1967, *Burtt & Martin* B. 5014; cult. in R.B.G. Edinburgh, fl. v 1968, C. 5829; Fifth Division, Bakelalan to Long Ugong, c. 4° 5′ N, 115° 36′ E, not uncommon in damp ground at path side through forest and forming a sprawling carpet, flowers yellow and white, 17 x 1967, *Burtt & Martin* B. 5550.

Our description of *L. bicolor* was based on the type material only (with which the Kyoto sheet cited above is identical) for we were aware of the existence of plants of generally smaller dimensions and lacking the bright yellow palate of the type. That such plants do indeed exhibit considerable variation from the type has now been observed due to the flowering at Edinburgh of *Burtt & Martin* B. 5014. Both upper and lower lip are white, the calyx-lobes although glandular hairy at their tips are quite short and only slightly recurved, the lower lip is more distinctly divided into three lobes and the style is sparsely but distinctly pubescent. In the type plant the corolla tube is inflated throughout most of its length becoming quite sharply dorsiventrally compressed at the mouth; in *Burtt & Martin* B. 5014 this compression occurs much more gradually. The existence of two clear cut species must be ruled out, for a further gathering, *Burtt & Martin* B.5550 exhibits the colour patterning and larger leaves of the type and the style is quite glabrous. In the much shorter calyx and shape of the lower lip this plant is identical with *Burtt & Martin* B. 5014.

When describing *Linariantha* we called attention to the resemblance between the shaggy indumentum on the lower part of the stem and that found in *Cosmianthemum*. We have since had striking endorsement of this. Young sterile plants with this indumentum were collected (*Burtt & Martin* B. 4704) from a pathside in the Semengoh Forest Reserve, about 12 miles N of Kuching. They were only two inches high with leaves about 4 × 2 cm and might well have been young plants of *Linariantha*. In cultivation in the greenhouse at Edinburgh they throve exceedingly, produced an erect stem with leaves up to 20 × 8 cm and a terminal inflorescence quite typical of *Cosmianthemum*.

Mr. D. M. Henderson has been kind enough to give us his assessment of the relationships of *Linariantha* on the basis of pollen study. The grain of *L. bicolor* is tricolporate with a pair of colpoid streaks in each intercolpal region. As pointed out previously (Notes R.B.G. Edinb. 26:325, 1965), this matches pollen of *Filetia brookeae* Brem. perfectly and emphasises the relation to *Filetia*. It is also, however, very close to pollen of *Cosmianthemum* especially to *C. brookeae* Brem., *C. magnifolium* Brem. and *C. dido* Burtt & Smith, but in them the pores are circular, not equatorially expanded.

ARACEAE

2. Arisaema umbrinum Ridley in Journ. Straits Br. Roy. As. Soc. 44:711 (1905); Engler in Pflanzenr., Heft 73, Araceae-Aroideae 159, fig. 27 A–D (1920).

Type. Sarawak, First division, Mt Matang, c. 500 m, *Ridley* 12412 (SING.—not seen).

The following collection may belong to this species:—

SARAWAK. Third division, Hose Mountains, c. 2° 6′ N, 113° 42′ E, gorge of Sungei Simpurai, c. 420 m, rocky forest floor, outside of tube of spathe greenish white, cap closely mottled and veined dull purple, lower part of appendix red, tail green, 13 viii 1967 *Burtt & Martin* B. 4913; cult. in R.B.G. Edinburgh, fl. viii–xi 1968, C. 6026.

Engler placed *A. umbrinum* in his series *Attenuata*, but he clearly describes and figures the base of the spathe-limb as being auriculate and the species should be transferred to the series *Auriculata*.

The plant from the Hose Mountains differs from the description and illustration of *A. umbrinum* given by Engler in two important particulars: in the presence of setiform sterile flowers above the fertile ones and in having the male flowers stalked (in *A. umbrinum* they seem to be more or less sessile, though not actually described). These differences are considered rather less than sufficient to justify regarding the species as distinct, at least until further material, particularly of *A. umbrinum*, becomes available.

The wild-collected specimens from the Hose Mountains have male inflorescences and above the fertile flowers there are just one or two setiform sterile flowers. The cultivated plant produced female inflorescences in August 1968 and these had more numerous sterile flowers. However in November 1968 another inflorescence was produced and this proved to be bisexual and in this sterile setiform flowers were also present. It seems, therefore, that this plant may be monoecious or dioecious. The type of *A. umbrinum* was described as monoecious, but the constancy of this feature obviously deserves investigation. Although the species was found on Mt Matang, quite near Kuching, it has apparently not been collected again.

An allied species is *A. filiforme* Blume (Rumphia 1: t. 28, 1835). The illustration shows rudimentary anthers on the female spadix as well as setiform sterile flowers; but there are no sterile flowers on the male spadix. This is confirmed by plants of *A. filiforme* var. *chlorospatha* Hall. f. now in cultivation at Edinburgh (Sarawak, First Division, Poi Range, Gunong Berumput, 1050 m, 13 viii 1962, *Burtt & Woods* B. 2817): all are male and lack setiform sterile flowers.

It is worth referring here to *A. fimbriatum* Mast. The field notes of a specimen (Malaya, Langkawi Islands, Pulau Bunting, c. 150 m, 28 iv 1962, *Burtt & Woods* B. 1752) include the information "largest plant with female flowers at base, smaller with male only".

Evidently there is no little variability possible in the distribution of the sexes in these species of *Arisaema*. The statement that a species is monoecious (or dioecious), not infrequent in Engler's monograph, should be treated with reserve unless clearly based on a wealth of material.

When the first female spadix was removed from the cultivated plant of the Hose Mountains collection, it was observed that the stigma was small and forming a more or less conical termination of the ovary. When the later bisexual spadix was examined, however, it was found to have a tuft of spreading hairs, just as illustrated for *A. anomalum* Hemsley (see Hooker in Bot. Mag. t. 7611, 1891 & Engler, Pflanzenr., Arac.–Aroid., Heft 73:165, 1920). The earlier observation was obviously made when the stigma was immature and observations are needed on related species to see if the tufted stigma is more widespread than is believed at present.

The epithet *anomalum* was chosen by Hemsley not because of the stigmatic characters but because of the vegetative growth of the species, which came from an island near Penang. Hemsley observed that the rootstock was rhizomatous instead of forming an annual tuber as in most species of *Arisaema*. He correlated this with the fact that the plant was always in leaf and did not die down for a resting season. *Arisaema* is essentially a warm temperate, not a tropical genus, associated with climates having a distinct unfavourable season of drought or cold. A dormant period is therefore necessary. This is found even in *A. fimbriatum* from the Langkawi Islands: in the northern part of the Malay Peninsula there is a well marked dry season.

Both *A. umbrinum* and *A. filiforme* resemble *A. anomalum* in having a rhizomatous rootstock and a continuous growing season.

There are only five species of *Arisaema* in Borneo. *A. filiforme* and *A. umbrinum* have already been discussed. *A. microspadix* Engl. was recorded for Sarawak (without locality) by Ridley (Journ. Bot. 51:202, 1913): it belongs to series *Fimbriata*, having setiform sterile male flowers to the tip of the appendix. *A. laminatum* Bl. was reported from Borneo by Miquel (Ann. Mus. Lugd. Bot. 3:80, 1870) but without any details and the record is not repeated by Engler. The original illustration (Blume in Rumphia 1: 99, t. 27, 1835) shows a plant with a distinctive spathe and short appendix. *A. simplicifolium* Ridl. (Journ. Linn. Soc. Bot. 42:171, 1914) came from Mt Kinabalu; it apparently has the leaf constantly simple and setiform sterile flowers are found above the males.

The species on record for Borneo (where the genus clearly needs much more critical attention) could therefore be keyed thus:—

1a. Leaf always simple . . . . . *A. simplicifolium*
1b. Leaf (at least the adult) compound 2
2a. Leaves all trifoliolate 3
2b. Leaves, at least the larger ones, quinquefoliolate; appendix much exceeding limb of spathe which overarches the mouth and is either plain green (var. *chlorospatha* Hall. f.) or mottled and veined with dull purple (var. *filiforme*) . . . *A. filiforme*
3a. Upper part of the spadix fimbriate with setiform sterile flowers *A. microspadix*
3b. Upper part of the spadix smooth 4
4a. Appendix not exceeding limb of spathe which is green in the upper part and more or less erect, the lower part and tube being white and divided from the green area by a purplish line *A. laminatum*
4b. Appendix much longer than limb of spathe which is arched over the mouth and like the tube has a green ground . *A. umbrinum*

3. Homalomena sagittifolia [Junghuhn ex] Schott, Prodr. 311 (1860); Engler, Pflanzenr. Heft 55, Araceae–Philodendroideae–Philodendreae, 73, fig. 48 (1912).

Types. Borneo, *Motley* (K), *Junghuhn* (L).

SARAWAK. Fourth Division, banks of small tributary of Sungei Melinau, c. 4° 5′ N, 114° 50′ E, 25 vi 1962, *Burtt & Woods* B. 2291; cult. R.B.G. Edinburgh, fl. viii 1968, C.6019.

The flowering of this handsome aroid at Edinburgh permitted a series of photographs to be taken in colour. The results give such an admirable record of these plants that black and white prints were made from the transparencies and are reproduced here (plate 5 and 6a). For all this photographic work we are indebted to Mr. Ross Eudall, photographer at the Garden.

In identifying this plant with the help of Engler's monograph, one was inevitably impressed by the small differences between some of the species. For instance *H. raapii* Engl. differs from *H. sagittifolia* only in the shape of the staminode and in the male part of the inflorescence being less than twice the length of the female part. *H. gigantea* Engl. comes into a different

part of the key, but only because the spathe lacks a medial constriction. Both *H. raapii* and *H. gigantea* are, like *H. sagittifolia*, found in Borneo; they have only been collected once or twice. It is to be hoped that collectors will not ignore these plants if they happen to be out of flower, but will try to get back living material for cultivation. Until many more plants have been examined it is profitless to speculate whether these three species are really distinct.

Schott attributed *H. sagittifolia* to "Junghuhn (in schedula)" but quotes at the end of his description "Borneo, *Motley*—v.v. et s. in Herb. Hooker". It seems that the Motley specimen is the proper lectotype and as this was not seen by Junghuhn it would probably be better to drop his name from the citation altogether.

BURMANNIACEAE (B. L. Burtt & R. M. Smith)

4. Burmannia sphagnoides Beccari in Malesia 1:246, tab. 15, f. 8–11 (1877); Jonker in Med. Bot. Mus. Utrecht 51:135 (1938). Fig. 3.
Lectotype. Sarawak, First Division, Kuching, *Beccari* 86 (FI).
Additional material:—
SARAWAK. Fourth Division, Lambir Hills c. 4° 7′ N, 113° 55′ E, saprophyte, white stem, brown scales; corolla lobes spreading flat and bright yellow; in humus on top of sandstone rocks, 5 vii 1962, *Burtt & Woods* B.2392.

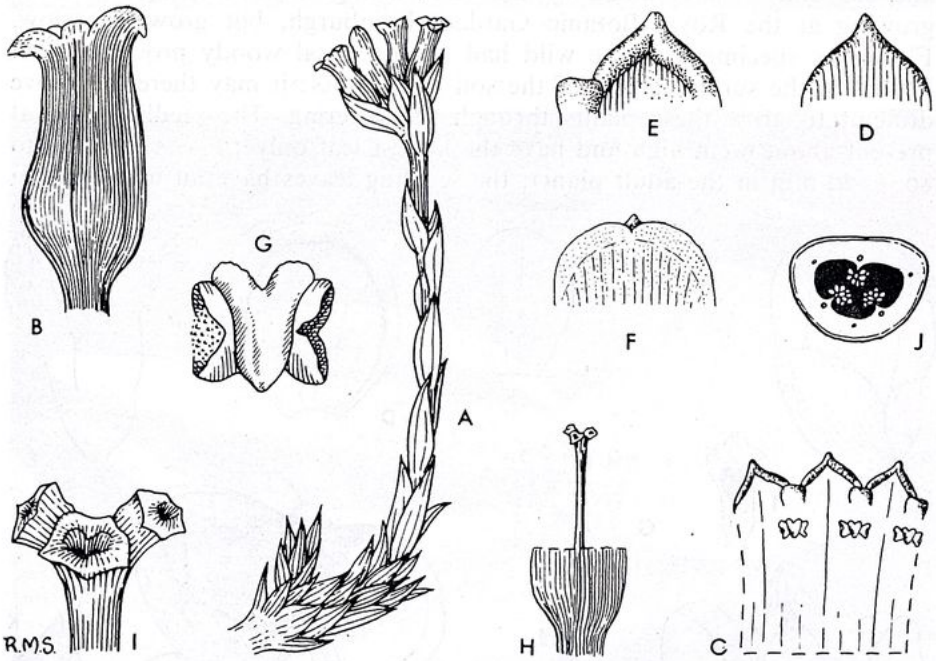

FIG. 3. *Burmannia sphagnoides* Beccari. A, habit × 1; B, flower × 4; C, corolla dissected × 4; D, outer perianth segment of newly opened flower, viewed from outside × 9; E, outer and inner perianth segments of newly opened flower viewed from inside × 9; F, outer perianth segment of old flower viewed from inside × 9; G, stamen × 16; H, gynoecium × 4; I, stigma × 16; J, ovary in T.S. × 6.

The determination of *Burtt & Woods* B. 2392 has been confirmed by Professor Jonker of Utrecht but examination of spirit material has enabled

us to make a few additional observations on the species. The outer perianth lobes are flat and spreading each with a short sub-apical appendage and the fleshy margins become unrolled as the plant ages. The nerves on the outside of the perianth are quite indistinct in our plant and the anther connective rounded rather than acute at the base.

POLYGALACEAE

5. Polygala oreotrephes B. L. Burtt, **nom. nov.** (Fig. 4).

Syn.: *P. monticola* Ridley in Journ. Linn. Soc. Bot. 38:303 (1908) & Fl. Malay Penins. 1:138 (1922)—non H.B.K. (1823).

Types. Malay Peninsula, Pahang, Gunong Tahan, 1500–1800 m, *Wray & Robinson* 5456, 5384 (BM).

MALAY PENINSULA. Collected on the mountains of Pahang, Perak and Selangor, the lowest recorded station being at 1260 m on Frazer's Hill.

SARAWAK. Gunong Murud (borders of 4th and 5th divisions), c. 3° 54′ N, 115° 45′ E, 1800–2250 m, 30 ix 1968, *Burtt & Martin* B. 5324.

This very striking species of *Polygala* has not previously been recorded outside the Malay Peninsula. It has a simple terminal erect raceme of small pinkish flowers, but in fruit it becomes more conspicuous: then the almost black capsules split to extrude the black seeds which hang by their funicles and are almost surrounded by the vivid orange aril. Seedlings are now growing at the Royal Botanic Garden, Edinburgh, but growth is slow. Flowering specimens in the wild had a long basal woody prostrate stem buried in the surface layers of the soil or in moss: it may therefore prove difficult to grow these plants through to flowering. The seedlings are at present about 6 cm high and have the largest leaf only 17 × 5 mm (up to 80 × 20 mm in the adult plant); the seedling leaves have an indumentum

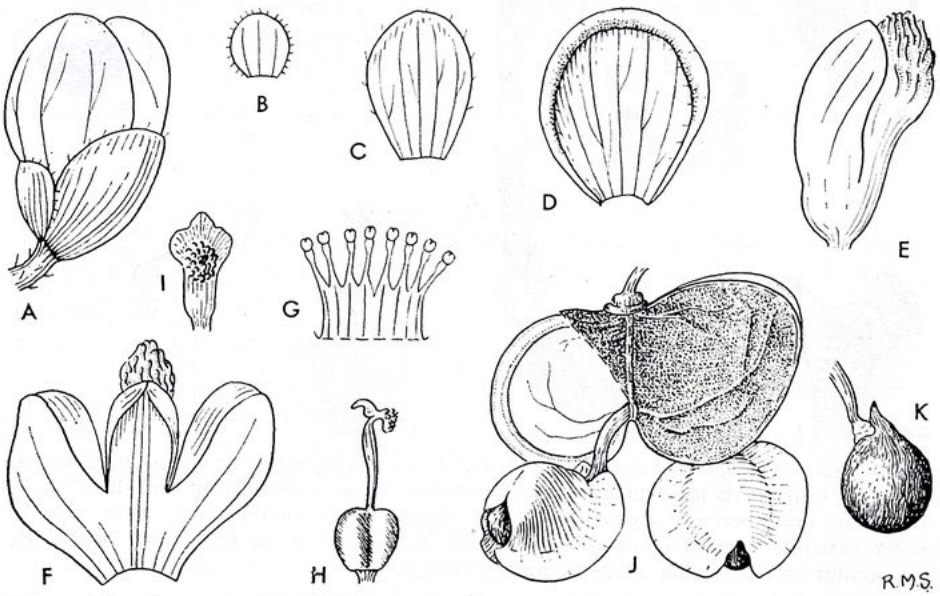

FIG. 4. *Polygala oreotrephes* B. L. Burtt. A, flower × 4; B, C, outer sepals × 4; D, inner sepal × 4; E, corolla × 4; F, corolla dissected, androecium removed × 4; G, androecium × 6; H, gynoecium × 4; I, stigma × 12; J, fruit × 3; K, seed × 3.

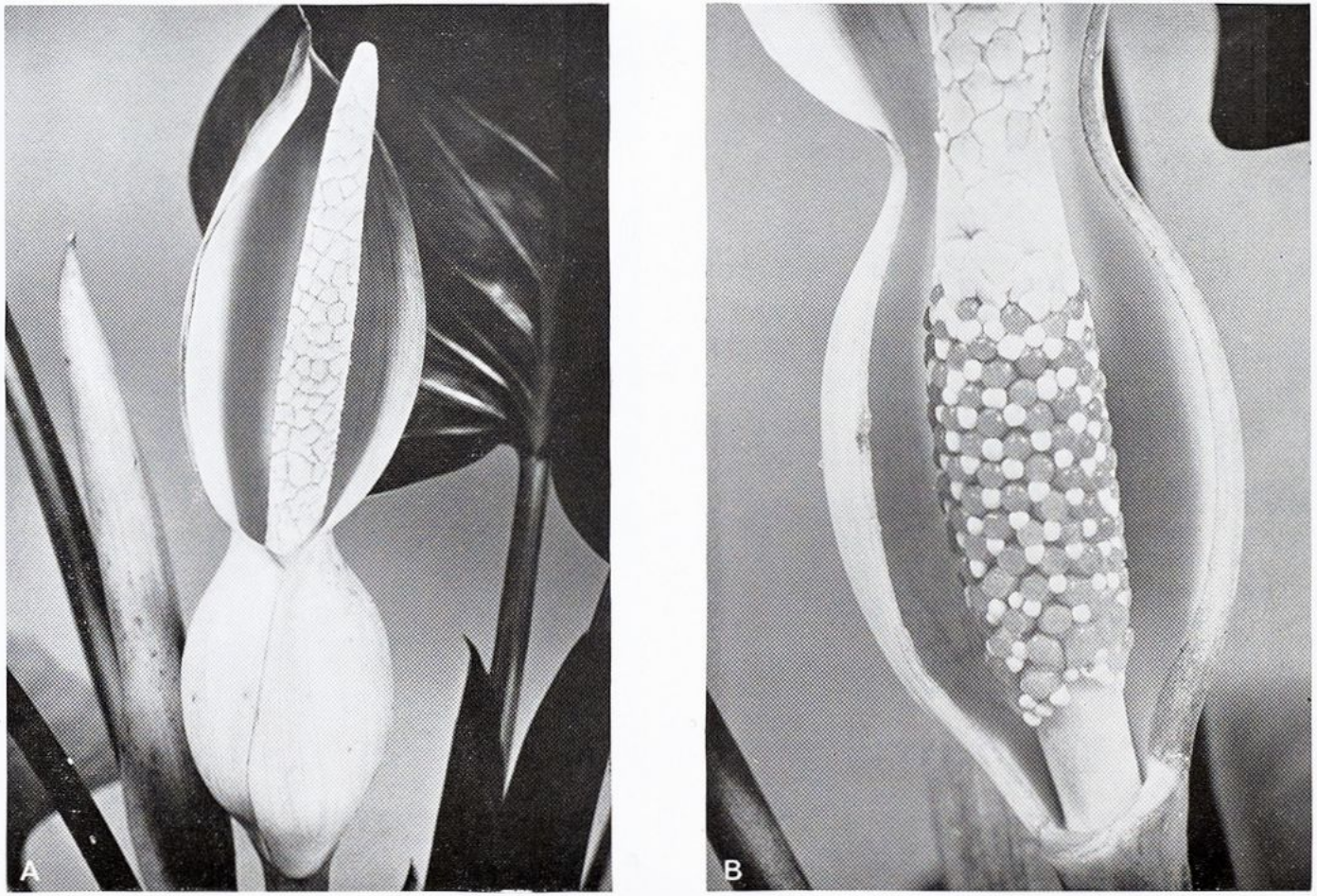

PLATE 5. *Homalomena sagittifolia* Schott. A. Inflorescence. B. Lower part of inflorescence with spathe removed to show female flowers and staminodes (white).

A

Homalomena sagittifolia Schott. Old inflorescences.

B

Zingiber incomptum Burtt & Smith.

PLATE 6

of rather thick blunt hairs lacking in the adult but one of the type specimens from Malaya is hairy.

P. oreotrephes is a member of section *Chamaebuxus* whose species are widely but thinly distributed both in the Old World and the New. In Malesia its best known representatives are *P. venenosa* Poir. and *P. pulchra* Hassk., but these are shrubs with axillary racemes of larger flowers, as are allied species in Thailand, Indo-China and the Sino-Himalayan region. *P. oreotrephes* is thus very distinct from any of these. A superficial resemblance to *P. mannii* Oliv. from the Sierra del Crystal, Gabon, in central Africa is probably of little significance, for that species has a differently shaped hairy seed and much reduced aril. In addition to the species itself Ridley originally described forma *major* with leaves 6 × 2 inches as against 3–4 × 1½ inches in the type, and petiole 1 inch as against ½ inch. In the *Flora of the Malay Peninsula* he even raised this to varietal rank, but there seems no useful purpose in maintaining it unless it is put on a much firmer basis by field records.

VERBENACEAE

6. Callicarpa anomala (Ridley) B. L. Burtt, **comb. nov.** (Fig. 5, Aa–Aj).

Syn.: *Geunsia anomala* Ridley in Kew Bull. 1929, 260.

Type. Sarawak, First Division, Penkulen Ampat, in young jungle, *Haviland* 760 (K).

The following material seems to belong here:—

SARAWAK. First Division, Semengoh Forest Reserve, 12 miles south of Kuching, c.1° 24′ N, 110° 18′ E, in rather open low lying forest near stream, 24 vii 1967, *Burtt & Martin* B.4720.

The transfer of this species from *Geunsia* to *Callicarpa* is not to be interpreted as an expression of a taxonomic opinion on the genera. The problem of *Geunsia* and *Callicarpa* needs, as van Steenis pointed out recently (Blumea 15:147, 1967) a new study. In the meantime, however, it is difficult to make sure that the relationship of *Geunsia anomala* to species in *Callicarpa* is recognized if they have to be called by different generic names: and as this seems to be the only *Geunsia* without an available name in *Callicarpa* the transfer may be justified.

The new material cited here differs from Ridley's type in certain details. In the first place in its leaf indumentum, which consists of simple hairs, those of the type being dendroid-stellate. However, in both plants the hairs are of the same ferrugineous harsh bristly nature and on the stem of B.4720 the main hairs have tufts of branches arising at the base; the differences are probably not fundamental. Another point, that Ridley describes the free part of the filament as short whereas in our material it is long, may be due to Ridley's misinterpretation of Stapf's sketches on the type sheet.

This is a very odd little tree and one or two additions to Ridley's original description are worth noting, with the warning that they are taken from B.4720 not from the type. In the first place the disposition of the leaves is curious, as it often is in this group of plants. The internodes are alternately short (c. 1 cm) and long (c. 12 cm), which means that the leaves appear to be borne in groups of four. More than that however, the leaves of a group are not equal in size: one leaf of the lower pair is much smaller than its partner and the upper pair are both somewhat larger again, although still

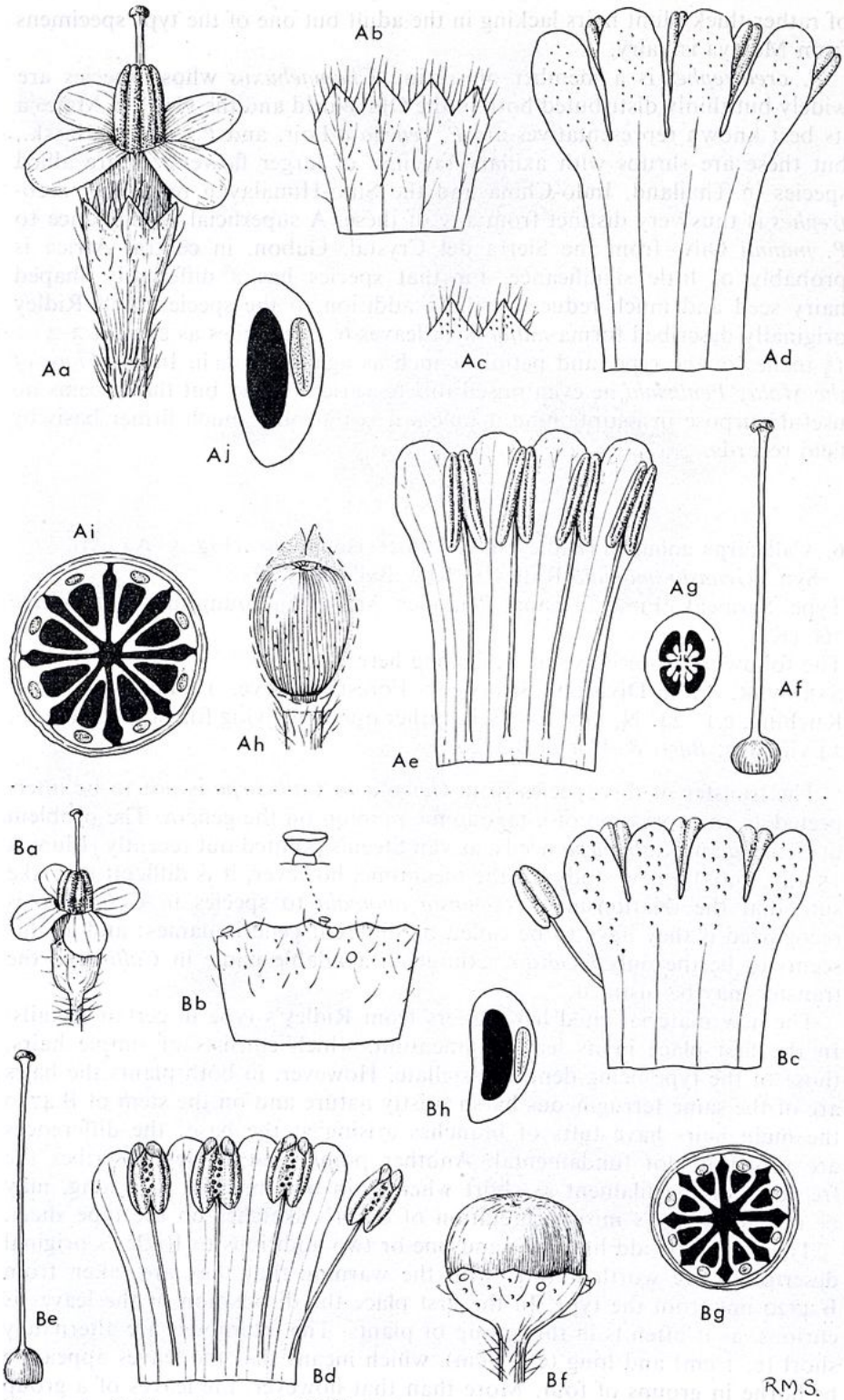

FIG. 5. A. *Callicarpa anomala* (Ridl.) B. L. Burtt. a, flower × 3; b, calyx from outside × 3; c, calyx lobes from inside × 3; d, corolla dissected from outside × 3; e, corolla dissected from inside × 3; f, gynoecium × 3; g, ovary in T.S. × 9; h, capsule showing position within persistent calyx × 3; i, T.S. of capsule × 6; j, L.S. of pyrene × 9. B. *Callicarpa havilandii* (King & Gamble) H. J. Lam. a, flower × 3; b, calyx from outside × 6; c, corolla dissected from outside × 6; d, corolla dissected from inside × 6; e, gynoecium × 6; f, capsule × 6; g, capsule in T.S. × 6; h, L.S. of pyrene × 9.

not quite equal. Three sets of measurements in centimetres and numbering the lower pair of leaves 1 and 2 and the upper 3 and 4, read:—

1	2	3	4
11·5 × 5·75	23 × 10·5	29 × 11·5	32·5 × 12·5
12 × 7	27 × 12	30 × 12·5	31 × 13
14 × 8	30 × 12·5	32 × 13	33 × 15

Callicarpa anomala seems to belong to a group of Bornean and Philippine plants characterized by their harsh bristly ferrugineous indumentum (though the leaves are almost glabrous in *C. involucrata* Merrill). The inflorescences of these species are particularly interesting. The open dichotomous cyme, normal for *Callicarpa*, is found in *C. havilandii* (King & Gamble) H. J. Lam (see below) these cymes being axillary on the young leafy branchlets. From this there are two types of specialization to cauliflory: in *C. barbata* (see below) and *C. involucrata* there is a thickened condensed peduncle but the flowers are borne on slender well-developed pedicels and give the general impression of being fasciculate. In *C. anomala* the inflorescence is again cauliflorous on a stout peduncle, but this is continued as the central axis of the pendulous inflorescence which has numerous lateral cymules so congested on to one another that the whole forms a stout cylindrical cone up to 12 cm long. The lateral cymules are about 8-flowered, spread at right angles from the main axis, and are so well co-ordinated in their growth that the outline of the inflorescence is quite even.

At Semengoh *C. anomala* is a small tree about 5 m high with a trunk about 5–7 cm in diameter. On this the very dense pendulous inflorescences are borne on short woody stalks. The whole structure becomes covered with mucilage as it matures, just as happens in the very different plant *Plagiostachys* (Zingiberaceae), which grows nearby. The flowers are tetramerous, white, with a cone of anthers and exserted stigma; the fruit eventually ripens to a bright red berry.

7. Callicarpa barbata Ridley in Kew Bull. 1929, 260.
Type. Sarawak, Third Division, Rejang Kapit, iii 1893, *Haviland* 3043 (K).
SARAWAK. Fourth Division, Long Kapa, Mt Dulit (Ulu Tinjar), below 300 m, probably secondary forest, small tree about 3 inches in diam., cauliflorous, flowers pink, 10 viii 1932, *Oxford Univ. Exp. native collector* (*Richards* 1210—*K*).

At the time Bakhuizen examined this material (1934) *C. barbata* was evidently unknown to him, for he was driven to suggest that the inflorescences might belong to *C. involucrata* Merr., the leaf to the (then unpublished) *C. kinabaluensis* Bakh. f. & Heine. The species described by Ridley is, however clearly a good and distinct one, allied to *C. involucrata* in its fasciculate flowers. The much bigger leaf also differs from that of *C. involucrata* in its indumentum of dendroid hairs. For further discussion see under *C. anomala* above.

8. Callicarpa havilandii (King & Gamble) H. J. Lam, Verbenac. Mal. Arch. 52 (1919). Fig. 5, Ba–Bh.
Syn.: *Geunsia havilandii* King & Gamble in Kew Bull. 1908:105.

Types. Sarawak: *Beccari* 3240 (K); *Haviland* 3549 (K, L); near Kuching, *Haviland* 889 (K).
The following material seems to belong here:—
SARAWAK: Fifth Division, N. E. Gunong Murud, S Belapan, 4° N, 115° 38′ E, small tree 5 m overhanging stream, flowers white, 29 ix 1967, *Burtt & Martin* B.5290.

This material deserves mention in connexion with the two preceding species, *C. anomala* and *C. barbata*. It differs from the type specimens of *C. havilandii* particularly in having simple, not stellate, hairs on the underside of the leaf. It is interesting that the new material cited under *C. anomala* differs from the type of that species in just the same way.

ZINGIBERACEAE (B. L. Burtt & R. M. Smith)

9. Zingiber incomptum Burtt & Smith, **species nova** ob scapum brevem, bracteolam calycem excedentem, labellum ovato-oblongum plus minusve integrum *Z. acuminato* Valeton affinis; ob folia glabra, spicam breviorem crassiorem, apices bractearum recurvos distinguenda. (Plate 6B, fig. 6, Ba–Bf).

Herba rhizomatosa. *Caules foliati* glabri, (in culta) usque ad 0·75 m alti, folia ad 26 gerentes. *Folia* superiora sessilia, inferiora petiolo c. 5 mm longo praedita; ligula leviter biloba, lobis tenuibus late rotundatis 3 mm altis et 5 mm latis; lamina lanceolata, apice caudato-acuminata, basi rotundata vel attenuata, ad 23 × 6 cm. *Scapus* prostratus ad 6 cm longus, aphyllus sed vaginis 4 membranaceis lanceolato-acuminatis roseo-tinctis 3–3·5 × 1 cm extra parce albo-pubescentibus praeditus. *Inflorescentia* ellipsoidea, squarrosa, 7 cm longa et 3·5 cm diametro, multiflora. *Bracteae* primariae subcarnosae, pallide virides rubro-tinctae, ovato-acuminatae, apicibus valde reflexis et minute pubescentibus. *Bracteolae* translucentes, roseae, lanceolatae, acutae, glabrae, 2·5–0·75 cm. *Calyx* minute pubescens, translucens, roseus, acutus, uno latere alte fissus, 3 cm longus. *Corolla* pallide flavo-aurantiaca; tubus usque ad 3 cm longus; lobus posterior 3 × 1 cm, marginibus ad apicem leviter cucullatum versus involutus; laterales c. 3 cm longi quam posterior paullo angustiores, marginibus etiam involutis, basi ad labellum connati. *Labellum* 2·5 cm longum, flavo-aurantiacum, marginibus crispatis; lobus medius (staminodium medium) ad 2 cm longus, basi 1 cm latus ad apicem integrum obtusum sensim angustatus; lobi laterales (staminodia lateralia) 5 mm longi, basi 5 mm lati sursum ad apicem obtusum angustati. *Filamentum* c. 3 mm longum, 1·5 mm latum; anthera maxima 5 mm lata dorso alba fissuris 12 mm longis fusco-brunneis dehiscens; connectivum 1·25 cm longum, flavum. *Stylus* c. 5 cm longus, e connectivo vix exsertus, circa orem ciliatum, album. *Ovarium* 5–6 mm longum et 3–4 mm latum, breviter pubescens, triloculare, ovulis numerosis. *Glandulae epigynae* 7·5 mm longae, vix 1 mm crassae. *Fructus* ignotus.
SARAWAK. First Division, Poi Range, Gunong Berumput, c. 1° 40′ N, 109° 42′ E, c. 1066 m, 13 viii 1962, *Burtt & Woods* B. 2831 (living material only), cult. R.B.G. Edinburgh, fl. ix 1964, C. 4328 (holo. E).

The sprawling peduncle and the rather ragged appearance of the flowers justify the epithet *incomptum*, untidy, for this species.

In his treatment of the genus Schumann (in Engler, Pflanzenr., Zingib. 166, 1904) retained the section *Cryptanthium* Horaninov (Monogr. Scit. 27: 1862)

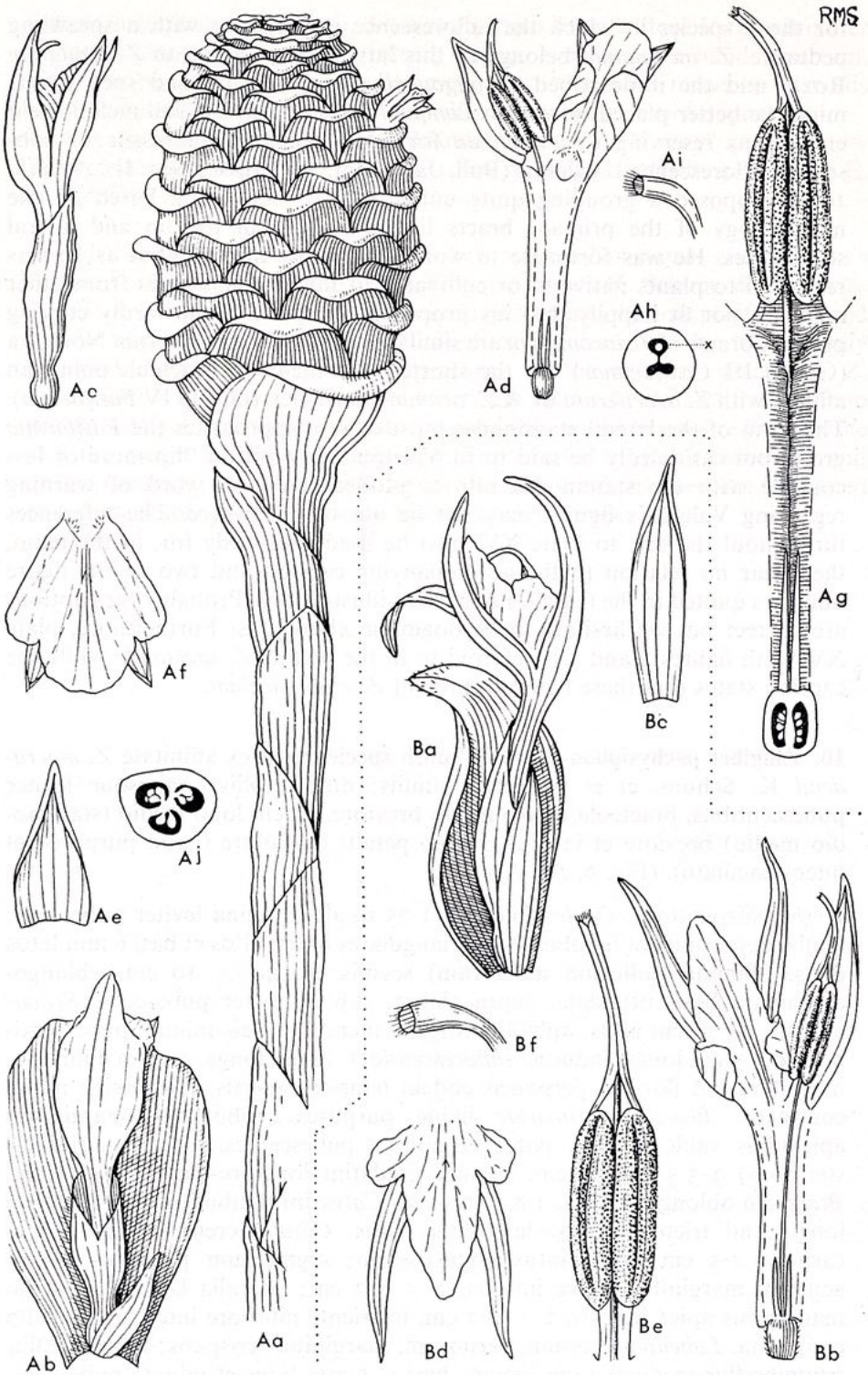

FIG. 6. A. *Zingiber pachysiphon* Burtt & Smith. a, habit × ½; b, position of flower and secondary bract within primary bract × 1; c, flower × 1; d, flower, dissected × 1; e, dorsal petal × 1; f, labellum and lateral petals × 1; g, anther and L.S. of corolla tube × 2; h, T.S. of corolla tube showing position of style (x) × 4; i, stigma × 4; j, ovary in T.S. × 3; B. *Zingiber incomptum* Burtt & Smith. a, position of flower and secondary bract within primary bract × 1; b, flower, dissected × 1; c, dorsal petal × 1; d, labellum and lateral petals × 1; e, anther × 2; f, stigma × 4.

for those species in which the inflorescence is sessile or with a sprawling peduncle. *Z. incomptum* belongs to this latter group, allied to *Z. ligulatum* Roxb. and the ill-described *Z. oligophyllum* K. Schum., and such plants might be better placed in section *Lampugium*, in which the peduncle is held erect, thus reserving *Cryptanthium* for those species with sessile or subsessile inflorescences. Valeton (Bull. Jard. Bot. Buitenzorg Ser. II, 27: 118, 1918) proposed a grouping quite unlike that of Schumann based on the morphology of the primary bracts linked to that of the lip and lateral staminodes. He was fortunate to work with living material but as he was restricted to plants native to or cultivated in Java many species from other areas do not fit happily into his proposed groups. The outwardly curving primary bracts of *Z. incomptum* are similar to those of *Z. gramineum* Noronha (Group III *Cassumunar*) but the shorter-than-the-calyx bracteole points an affinity with *Z. odoriferum* Bl. & *Z. acuminatum* Valet. (Group IV *Fusiformia*). The form of the lateral staminodes most closely approaches the *Fusiformia* group but can hardly be said to fit Valeton's description "lip more or less connate with the staminodes into a 3-lobed disc". A word of warning regarding Valeton's figures may not be out of place here. The references throughout the text to Plate XV must be used cautiously for, in the main, they bear no relation to the accompanying caption and two of the figure numbers quoted in the text do not exist as illustrations. Probably the captions are correct but we hesitate to be dogmatic about this. Furthermore, plate XVI with figures 4 and 5 is referred to in the text as *Z. spectabile* while the caption states that these figures represent *Z. macradenium*.

10. Zingiber pachysiphon Burtt & Smith **species nova** ex affinitate *Z. macradenii* K. Schum. et ei superficie similis; differt foliis vaginisque leviter pubescentibus, bracteola calyce multo breviore, labelli lobo medio (staminodio medio) breviore et labello cremeo petalis concolore (haud purpureo et luteo-maculato). (Fig. 6, Aa–Aj).

Herba rhizomatosa. *Caules* foliati c. 1·75 m alta; vagina leviter pubescens; ligula membranacea in lobos duos triangulares 8 mm altos et basi 6 mm latos divisa; lamina (foliorum mediorum) sessilis, ad 40 × 10 cm, oblongo-acuminata basi rotundata, supra glabra, subtus leviter pubescens. *Scapus* erectus, ad 25 cm altus, aphyllus, vaginis membranaceis minute pubescentibus ad 5·5 cm longis indutus. *Inflorescentia* 7–12 cm longa, 4–7 cm diametro, multiflora sed floribus perpaucis eodem tempore apertis, mucilagine multa continens. *Bracteae primariae* livide purpureae, obovatae, marginibus apicalibus valde reflexis, parce et minute pubescentes, inferiores (infimis sterilibus) 3–3·5 × 3·5 cm, sursum gradatim longiores ad 4·5 × 3 cm. *Bracteola* oblonga, glabra, 1·8 × 0·6 cm. *Calyx* infundibuliformis, 2–2·5 cm longus, ad trientem dorso-lateraliter fissus. *Corolla* cremea, tubo crasso carnoso 2·5 cm longo intus angustissimo; segmentum posterius ovato-acutum, marginibus apice inflexis, 2 × 1·2 cm; lateralia lanceolata acuta marginibus apice inflexis, 2 × 0·7 cm, in triente inferiore inter se et labello conjuncta. *Labellum* crassum, carnosum, marginibus crispatis; lobus medius (staminodius medius) 2 cm longus, basi c. 5 mm latus et minute pubescens, sursum ad apicem integrum rotundatum gradatim latior; lobi laterales (staminodia lateralia ad medium fere per totam longitudinem 1·4 cm adnata) c. 1·5 × 4 mm. *Filamentum* vix 1 mm longum, 3 mm latum. *Anthera* 11 ×

6 mm; connectivum 8–9 mm. *Stylus* c. 4·5 cm longus, flore longitudinaliter secto corollae tubo crasso occultus; stigma e connectivo haud exsertum, circa orem ciliatum. *Ovarium* glabrum 4 × 3–4 mm, triloculare, ovulis numerosis. *Glandulae epigynae* 9 mm, lineares, acutae. *Fructus* ignotus.
SARAWAK. Third Division, Hose Mountains, c. 2° 6′ N, 113° 42′ E, below Bukit Mabong, c. 450–550 m, 5 viii 1967, *Burtt & Martin* B. 4781 (holo E, iso SAR).

Z. pachysiphon belongs to Horaninov's section *Lampugum* and Valeton's Group II, *Inflexa*. The affinity with *Z. macradenium* K. Schum. & *Z. spectabile* Griff. (which Holttum has recently suggested may be conspecific) is based on the superficial resemblance of all three species given by the strongly recurved almost *Curcuma*-like appearance of the primary bracts. In *Z. macradenium* & *Z. spectabile* these bracts are yellow to red and the labellum purple with yellow spotting whilst in *Z. pachysiphon* the bracts are livid purple and the cream labellum is unspotted. The shorter bracteole, labellum and anther connective together with the corolla tube which has become thickened to a remarkable degree, all serve to distinguish the species.