

## SOME MALAYAN ORCHIDS, II.

With Plates I—IV.

By C. E. Carr.

The plants included in the present paper were collected on Gunong Tahan and on the Tahan and Teku rivers during the latter part of August and the beginning of September, 1928. A number of plants judged to be of special interest were brought back and put into cultivation at Tembeling, Pahang, since that district is more favourable than the drier climate of Singapore. Some of these plants prove to be hitherto undescribed.

The plants dealt with here include only those not previously found in the Tahan river or on the mountain itself, or those which, though reported before, possess any features of interest as yet unnoticed.

Plants marked with an asterisk have already been reported from the district.

**Oberonia subnavicularis**, King in Journ. As. Soc. Beng. LXVI. ii. 579; Ridl. Mat. I. 16; Fl. Mal. Pen. IV. 14. This rare plant, of which there were no examples in the Singapore herbarium, has only once been previously reported, namely by Scortechini from Perak. It was found on a tree overhanging the Tahan river at Kuala Teku, at an altitude of about 500 feet, No. 20809.

Upper sepal pale rose-white, laterals transparently pale yellowish. Petals transparently pale rose. Lip dark red-brown. Endemic.

Flowered in Nov.—Dec., 1928, and Mar.—April, 1929.

**Oberonia lampongensis**, J. J. S. in Bull. Jard. Bot. Buit. Ser. 2. XXV (1917) 22. This plant is new to the Peninsula. It was found on a tree by the Teku river at Kuala Teku, at an altitude of 500 feet. Distribution:—Sumatra.

Flowered in January, 1929.

**Liparis (Section Rachidibulbon) purpureo-viridis**, Burkill, mss.; Ridl. Fl. Mal. Pen. IV. 21. This plant, only previously reported from the main range at Fraser Hill, was found in a colony of about a dozen plants growing on the ground among damp rotting leaves near a tributary of the upper Teku at about 4500 feet altitude. No. 20753. It was just coming into flower but from Fraser Hill I have had it in flower in March. Endemic.

**Liparis (Section Coriifoliae) lacerata**, Ridl. in Journ. Linn. Soc. XXII. 284; Mat. I. 24; Fl. Mal. Pen. IV. 22. On a tree overhanging the Teku river at Kuala Teku, altitude 500 feet. Distribution:—Tenasserim, Borneo.

Flowered April, 1929.

**Dendrobium** (*Section Sarcopodium*) **citrino-castaneum**, Burkill in Gard. Bull. S.S. III. 12 (1923); *Sarcopodium citrino-castaneum*, Ridl. Fl. Mal. Pen. IV. 29.

This was originally described by Burkill from a plant found near Johore Bahru. On this occasion it was found on trunks of large trees and the branches of small trees beside the Tahan river at Kuala Teku, altitude 500 feet. Endemic.

Flowered January to April, 1929.

**Dendrobium** (*Section Desmotrichum*) **pallidiflorum**, Ridl. in Journ. Linn. Soc. XXXII. 240.; *Desmotrichum pallidiflorum*, Ridl. Mat. I. 37; Fl. Mal. Pen. IV. 31. Trees overhanging the Teku river at Kuala Teku at 500 feet altitude.

Distribution:—Siam and Sumatra.

**Dendrobium** (*Section Aporum*) **quadrilobatum**, Carr in Gard. Bull. S.S., V. (1929) 4. A single plant was found growing together with *D. rhodostele*, Ridl., which was locally abundant, on a tree overhanging the Tahan river at an altitude of about 400 feet. Endemic.

\* **Dendrobium** (*Section Distichophyllae*) **Hosei**, Ridl. in Trans. Linn. Soc. III. 363; Mat. I. 46; Fl. Mal. Pen. IV. 43. This plant was found on trees overhanging the Tahan river, as originally found, at an altitude of about 350 feet. It occurs also on other tributaries of the Tembeling river.

A number of plants were brought back and of the six inflorescences so far observed five were one-flowered, the other bearing two flowers. The sepals and petals on opening are greenish, turning however to pale ochre-yellow; the claw of the lip is white, the side lobes ochre-yellow veined orange, while the midlobe is yellow with 3 elevate orange main nerves and about 4 short elevate orange nerves on each side. The nerves are much paler when the flower opens and sometimes brownish in colour, while the whole lip is somewhat greenish yellow.

Plants may occasionally be found producing flowers with three anthers, the lateral ones reaching various stages of development. When a complete 1-celled lateral anther is formed its position on the side of the column and below the rostellum permits the 2 pollinia to gain contact with the stigma in the same manner as in *D. pandaneti*, Ridl. and fertilization ensues. The extent of dehiscence of sepals and petals varies from flowers hardly open to those fully expanded.

**Dendrobium** (*Section Distichophyllae*) **Hosei**, Ridl. *var. Pelor*, *var. nov.* Caules foliaque plantae typicae similia: Flores monstruosi. Labellum integrum aut inconspicue  
Vol. V. (1930).

3-lobulatum. Gynostemium breve, ventre lamella triangulari antheram superante donatum; stigma apicale, profunde conico-excavatum. Pes gynostemii brevissimus.

Stems, leaves, inflorescence, upper sepal and petals similar to type. Lateral sepals narrower than upper sepal, mentum very short straight. Lip adnate to apex of column foot, entire or inconspicuously 3-lobulate, very shortly clawed, irregularly obtuse, apex produced to a short fleshy conic acute papillose point, in upper  $\frac{3}{4}$  papillose towards margins and apex with an elevate median keel, margins erect undulate ciliolate denticulate, inside concave, 3-nerved with outer nerves branched, yellow-green, c. .67 cm. long, c. .60 cm. wide. Column short, monstrous, margins slightly elevate, a large lamella in front, lamella erect triangular sometimes dentate and ciliolate exceeding the anther, wings oblong truncate exceeding the anther elevate on back in a broad flattened keel produced at apex to an oblong truncate lobe, the whole c. .37 cm. long to apex of wings; stigma apical, deeply conico-excavate. Column foot very short making a right angle with the column, margins elevate in the form of keels. Anther filament short, broad, oblong, truncate.

This curious peloric form occurs with the type plants. In the structure of the column it very closely resembles *D. tetradon*, Rehb. f., var. *Pelor*, J. J. S. Common to both is the curious lamella on the face of the column occupying the normal position of the stigma. This lamella effectively prevents pollination in the manner common to the genus by almost completely covering the rostellum. The flower appears always to be self-fertilized, pollen tubes being emitted by the pollinia in situ from above.

Described from growing plants.

**Dendrobium** (*Section Distichophyllae*) **pahangense**, *sp. nov.* Rhizoma breve, repens. Caules approximati, erecti. Folia c. 10 lanceolata vel oblongo-lanceolata, subobtusae biloba. Inflorescentiae brevissimae, 1-florae. Sepala oblonga acuminata, acuta, lateralia falcata, mento gracillimo lineari acuminato anguste obtuso. Petala subfalcate linearia, acuminata, acuta. Labellum 3-lobum, unguiculatum; lobi laterales minimi, triangulares, apici rotundati; lobus intermedius spatulatus, apici in acumen productus, carinis 3 apicem attingentibus; unguis anguste linearis. Gynostemium rectum, alis in dentem productis. Anthera cucullata, rostro brevi, filamento longiore. Pollinia 4 anguste ovoidea.

Rhizome short, creeping. Stems approximate, erect, leafy above, c. 21 cm. long or longer, basal internode prostrate subglobose, c. 4 internodes above base slender terete dilate upwards and covered with dry tubular sheaths yellow-green up to c. 1.25 cm. long, a dark brown ring on

the node, upper internodes up to c. 46 or more swollen stout terete sinuous c. 4-grooved, entirely covered with dry sheaths yellow-green up to c. 1.25 cm. long, c. .45 cm. diam., a dark brown ring at the nodes. Leaves up to c. 10 from the upper nodes, vertically spreading, twisted above base, lanceolate or oblong-lanceolate, apex subobtusely bilobed, thinly coriaceous, above shiny bright green, grooved, below opaque paler keeled, c. 1.75 cm. long, c. .60 cm. wide, sheaths tubular many-ribbed c. 1.25 cm. long on back, in front divided up to c. .90 cm. long yellow-green soon drying. Inflorescences from base of internodes in upper  $\frac{2}{3}$  of stem, very short, 1-flowered. Bract very small, appressed to pedicel, broadly triangular, obtusely apiculate, margins slightly rounded, inside deeply concave, outside highly convex, pellucidly pale greenish with a conspicuous pale orange median keel, c. .12 cm. long, c. .18 cm. wide. Flowers strongly expanded, scentless, lasting a few days. Sepals and petals white. Upper sepal reflexed above base, almost erect, oblong, acuminate, acute, 3-nerved, inside convex, outside concave, margins slightly reflexed, c. .70 cm. long, c. .28 cm. wide. Lateral sepals spreading, falcate, oblong, acuminate, acute, 5-nerved, margins a little reflexed, the anterior margins connate at base for c. .10 cm., inside convex, outside concave, c. .80 cm. long, c. .28 cm. wide, anterior margin dilate at base to the mentum, mentum very slender, porrect, linear acuminate, narrowly obtuse spurlike slightly incurved, scarcely dilate on back, whitish c. .60 cm. long. Petals subfalcately linear, acuminate, acute, 3-nerved, margins erosulous, inside convex, outside concave, c. .70 cm. long, c. .18 cm. wide. Lip adnate to margins of column, 3-lobed, clawed, base and side lobes excepted entirely verrucoso-rugose, blade between side lobes grooved, including claw c. 1.80 cm. long; side lobes very small, horizontal, triangular, margins and apex rounded, whitish; midlobe shortly and broadly spatulate, produced at apex to a short triangular point, margins incurved undulate crenate, pale yellowish, keels 3 reaching the apex, orange at base greenish-ochre above, c. .60 cm. long and as broad; claw narrowly linear, inside concave, whitish, c. .65 cm. long. Column straight, narrowed towards apex, flat in front, rounded on back, wings produced to a falcately triangular acute recurved tooth as long as the anther, a minute globose tubercle below rostellum, whitish often suffused pale orange, in front below the stigma a median groove with an orange spot on each side, in all c. .45 cm. long; clinandrium semilunate, deeply conico-excavate; stigma excavate, oblong, narrowed towards apex. Anther cucullate, biloculate, grooved at base, papillose, orange, very shortly hairy towards apex, beak short truncate white shortly hairy and ciliolate, seen from above subquadrate, c. .11 cm. long, filament rather long subulate. Pollinia 4, narrowly ovoid, flattened inside, yellow, c. .09 cm. long.



Column foot linear, narrowed towards apex, c. .65 cm. long. Ovary whitish c. .45 cm. long, pedicel as long greenish-white.

A plant of this was found growing with the allied *D. rupicolum*, Ridl. on a tree on Skeat's Ridge at an altitude of about 5000 feet. It flowered in March 1929. During the same month it was also found by me in flower on Fraser Hill at an altitude of about 4000 feet. Here also it grew in conjunction with *D. rupicolum*, Ridl.

Described from living material.

**Dendrobium** (Section *Rhopalanthe*) **planibulbe**, Lndl. *Bot. Reg.* 1843 *Misc.* 54; *Ridl. Fl. Mal. Pen.* IV. 41; *D. tuberiferum*, Hook, f. *F. B. I. V.* 728,  *Ic. Pl.* 2025; *Ridl. Mat. I.* 48. Tahan river at an altitude of about 500 feet.

Distribution:—Java, Borneo.

**Dendrobium** (Section *Grastidium*) **salaccense**, Lindl. *Gen. & Sp. Orch.* 86; *Miq. Fl. Ind. Bat.* III. 635; *J. J. S. in Fl. Buit.* VI. (*Orch.* 1905) 348, *Atlas* (1908) f. CCLXIV; *D. intermedium*, T. & B. *Nat. Tijdsche. Ned. Ind.* V. (1853) 490; *Rchb.*, f. *Walp. Ann.* VI. 288; *D. gemellum*, Ridl. (not of Lndl.) in *Journ. Linn. Soc.* XXXII. 252; *Grastidium salaccense*, Bl. *Bijdr.* 355; *Callista salaccensis*, O. K. *Rev. Gen. Pl.* II. 655; *C. intermedia*, O. K. l. c. Tahan river at Kuala Teku on trees by the river at an altitude of 500 feet. A very fine form with pendulous stems up to 6 feet long. The flowers had a very faint tint of rose. Possibly this may be *var. major* of J. J. Smith.

Distribution:—Java, Sumatra.

**Dendrobium** (Section *Pedilonum*) **serpens**, Hook. f. *Ann. Bot. Gard. Calc.* V. 10. *Pl.* 16; *Ridl. Mat. I.* 51; *Fl. Mal. Pen.* IV. 47; *D. panduriferum var. serpens*, Hook. f. *F. B. I. VI.* 186. Tahan river at Kuala Teku on a tree overhanging the river, altitude 500 feet. Endemic.

**Bulbophyllum** (Section *Monilibulbum*) **tristriatum**, *sp. nov.* Rhizoma repens, gracile. Pseudobulbi moniliformes, prostrati. Folium oblongo-ellipticum, acutum. Inflorescentiae erectae, 1-florae, pedunculo longiusculo filiformi. Bractea tubulosa. Flos majusculus. Sepala acuminata, acuta, postico anguste lanceolato, lateralibus anguste oblongo-ovatis. Petala minima, oblongo-ob lanceolata, obtusa. Labellum 3-lobum, marginibus super basin in auriculas 2 erectas oblongas rotundatas productis; lobi laterales magni, triangulares, obtusi; lobus intermedius linearis. Gynostemium breve, rectum, stelidiis longis subulatis acutis sigmoidee curvis. Anthera cucullata, transverse oblonga. Pes gynostemii quam gynostemium multo longior. Ovarium clavato-dilatatum, pedicello gracillimo.

Rhizome rather long, slender, creeping, branched, entirely covered with approximate or subapproximate

pseudobulbs. Pseudobulbs moniliform, prostrate, adnate to rhizome, seen from above oblong, flattened on back, minutely longitudinally wrinkled, apex recurved, base surrounded with dry fibres, green, up to c. .80 cm. long, c. .40 cm. wide, c. .30 cm. thick, 1-leaved. Leaf erect, oblong-elliptic, acute, grey-green, up to 2 cm. long, .40–.70 cm. wide, petiole up to .30 cm. long. Inflorescences from base of pseudobulbs, erect, 1-flowered, peduncle filiform with a tubular sheath at base, green suffused red, up to c. 6 cm. long. Bract tubular, c. .15 cm. long. Flower rather large, lasting for several days, scentless. Upper sepal narrowly lanceolate, long-acuminate, acute, margins minutely ciliolate and denticulate, papillose in upper  $\frac{1}{4}$ , 3-nerved, 3 conspicuous narrow keels on back, pale yellow with a semitransparent base and 3 short longitudinal dull red striae, c. 2 cm. long, c. .21–.25 cm. wide. Lateral sepals spreading, running almost to apex of column foot, falcate, narrowly oblong-ovate acuminate, acute, anterior margin slightly dilate at base, papillose in upper  $\frac{3}{4}$ , margins minutely toothed and ciliate, 3 narrow conspicuous keels outside towards base, pale yellowish white with 3 dull red basal longitudinal striae, base semitransparent, 2.20–3 cm. long, .23–.30 cm. wide. Petals very small, spreading, oblong-oblongate, obtuse, thin, whitish with a broad median dark red stria, c. .25 cm. long, c. .10 cm. wide. Lip adnate to apex of column foot, mobile, fleshy 3-lobed, base erect, above base about rightangularly recurved and deeply concave with margins produced backwards to 2 erect oblong rounded auricles, inside shortly grooved, outside shortly keeled, dull red-purple, spread out c. .50 cm. long, across side lobes c. .25 wide; side lobes large, triangular, obtuse, margins rounded strongly reflexed and revolute, almost contiguous and forming a tube below the lip; midlobe linear, narrowed towards the obtuse apex, margins reflexed and revolute. Column short, broad, straight, produced on back to a large ovate obtuse lobe, dull red. c. .05 cm. long, wings porrect oblong produced at apex to a long subulate acute S-curved c. .04 cm. long stolidium; rostellum broad, pale yellow; stigma large, oblong, base convex, excavate above. Anther cucullate, 2-celled, seen from above transversely oblong curved with a median elevation. Pollinia 4 yellow. Column foot much longer than column and forming a right angle with it, apex shortly free slightly incurved and dilate, inside concave with a median keel with a strongly thickened base, dull red, c. .15 cm. long. Ovary clubbed, green, c. .12 cm. long, pedicel very slender terete red.

This plant is of the same affinity as *B. cernuum*, Lndl. and *B. Stormii*, J. J. S. from Sumatra. From the short description it also resembles *B. araniferum*, Ridl. but the specimens of this in Herb. Singap. are flowerless and the colour notes in the description differ.

Tahan river at Kuala Teku, altitude 500 feet, on mossy branches of a tree overhanging the river. The flowers close each night, opening again the following morning.

Described from living material.

**Bulbophyllum** (*Section Monilibulbum*) **ignevenosum**, *sp. nov.* Rhizoma gracillimum. Pseudobulbi moniliformes, dorso compressi, dimidio antico recurvi. Folium lanceolatum aut elliptico-lanceolatum, acutum. Inflorescentiae erectae, 1-florae, pedunculo filiformi. Bractea infundibuliformis. Sepala oblonga, breviter apiculata. Petala oblongo-oblancheolata vel oblongo-elliptica, acuminata, obtusa. Labellum mobile, inconspicue 3-lobum, lamina sulcata; lobi laterales breves, lati rotundate curvi; lobus intermedius ovatus, obtusus. Gynostemium breve, vix rectum, stelidiis subulatis, rostello breviter rostrato, stigmatate oblongo. Anthera vix plana, supra elevata. Pollinia subovalia.

Rhizome creeping branched, very slender, entirely covered with approximate or subapproximate pseudobulbs. Pseudobulbs adnate to rhizome, moniliform, seen from above subquadrate strongly flattened, upper half recurved grooved beneath, densely and minutely wrinkled, pale yellow-green, c. .50 cm. long, c. .40 cm. wide, c. .15 cm. thick, 1-leaved. Leaf erect, lanceolate or elliptic-lanceolate, acute, green, up to c. 1.20 cm. long, c. .30 cm. wide, petiole c. .10 cm. long. Inflorescences from base of pseudobulb, erect, 1-flowered; peduncle filiform, slightly dilate towards apex, sparsely scurfy, c. 3 tubular sheaths at base, yellow suffused orange, c. 1.60 cm. long. Bract funnel shaped, produced and keeled on back, apex acute. Flower fairly expanded, lasting a few days. Upper sepal oblong, very shortly apiculate, base 3- above 5-nerved, inside concave, outside convex, transparently yellow with flame coloured elevate nerves, c. .30 cm. long, c. .15 cm. wide. Lateral sepals running to apex of column foot, oblong, very shortly acuminate, shortly apiculate, the apiculus sparingly papillose, base 3- above 5-nerved, anterior margin a little dilate at base, transparently yellow with elevate flame coloured nerves, c. .40 cm. long, c. .23 cm. wide. Petals oblong-oblancheolata or oblong-elliptic, acuminate, truncate-obtuse, 1-nerved, margins and apex subsinuate, transparently yellow, median nerve elevate flame coloured, c. .18 cm. long, c. .08 cm. wide. Lip adnate to apex of column foot, mobile, inconspicuously 3-lobed, blade between side lobes grooved, dull red, beneath lower half convex, upper half concave, grooved to apex, spread out c. .26 cm. long, across side lobes c. .22 cm. wide; side lobes short, broad curved, margins erect; midlobe ovate, obtuse, margins recurved, c. .13 cm. long. Column short, nearly straight, yellow, c. .07 cm. long, stelidia subulate as long; rostellum produced



to a short beak; stigma large, excavate, oblong. Anther almost flat, an elliptic elevation above. Pollinia 2 (? 4), suboval, pale yellow. Column foot making a right angle with column, narrowed towards apex, apex itself incurved and dilate. Ovary c. .09 cm. long, pedicel terete thicker than peduncle sparsely scurfy c. .80 cm. long.

Skeat's Ridge at about 4800 feet altitude, forming masses on a mossy tree trunk.

Described from living material.

**Bulbophyllum** (*Section Monilibulbum*) **biseriale**, *sp. nov.* Rhizoma repens, gracillimum. Pseudobulbi approximati, suberecti, conici, obtusi, biseriales. Folium lineari-lanceolatum, acutum. Inflorescentiae erectae, fasciculatae, 1-florae, pedunculo filiformi. Bractea infundibuliformis. Sepalum dorsale lanceolatum, acutum. Sepala lateralia ovato-oblonga, acuta. Petala linearia, obtusa, superne leviter dilatata. Labellum mobile, 3-lobum, basi profunde concavum marginibus erectis; lobi laterales breves, lati, triangulares, apici truncati; lobus intermedius oblongus, marginibus recurvis. Gynostemium breve, latum, curvum, steliidiis longissimis subulatis, stigmatem maximo transverse oblongo. Anthera cucullata. Pollinia triangulari-ovata. Pes gynostemii linearis, apici incurvus. Capsula immatura ovoidea.

Rhizome creeping, very slender, entirely covered with approximate and biserial pseudobulbs, up to c. 3 cm. long or longer. Pseudobulbs conic, obtuse, suberect, apex slightly recurved, longitudinally wrinkled and costate, conspicuously grooved beneath, pale green, .20-.40 cm. long, .15-.20 cm. diam., 1-leaved. Leaf erect, often slightly recurved towards apex, linear-lanceolate, acute, thinly coriaceous, above grooved green, beneath paler convex with an inconspicuous median keel, 1-2.25 cm. long, .15-.33 cm. wide, petiole minute thick grooved up to .05 cm. long. Inflorescences from base of pseudobulbs, c. 5 from each, fascicled, erect, 1-flowered, peduncle filiform pale yellow-green .75-1.50 cm. long. Bract funnel-shaped, back produced acute, pale greenish, c. .12 cm. long. Upper sepal porrect, lanceolate, very shortly narrowed below the acute apex, 3-nerved, margins roundly papillose except at base, golden yellow, outer nerves elevate on back, c. .50 cm. long, c. .17 cm. wide. Lateral sepals adnate to column foot, scarcely spreading, ovate-oblong, acute, 3-nerved, outer nerves branched, posterior margin slightly dilate, margins roundly papillose, golden yellow, nerves outside elevate darker, c. .55 cm. long, c. .25 cm. wide. Petals linear, slightly dilate above, apex obtuse, 1-nerved, yellow, c. .15 cm. long, c. .02 cm. wide. Lip adnate by an oblong thin lamella to apex of column foot, mobile, 3-lobed, fleshy, above at base deeply concave with



erect margins, above base grooved between side lobes, beneath highly convex at base, orange-red, spread out c. .27 cm. long, across side lobes c. .12 cm. wide; side lobes short, broad, triangular, truncate, strongly recurved beneath the blade; midlobe oblong, margins recurved, convex above, concave below. Column short, broad, curved, produced on back to an oblong-ovate subacute lobe, stelidia very long porrect subulate, twice as long as the anther or longer, sub-sigmoidly curved, yellow, base orange-suffused, c. .08 cm. long, stelidia as long, rostellum large ovate, stigma very large, deeply excavate, transversely oblong. Anther cucullate, connective long subulate. Pollinia 4, triangular-ovate, laterally flattened, yellow. Column foot linear, apex incurved, orange-red, c. .10 cm. long. Ovary dilate, 6-sulcate, up to c. .09 cm. long, pedicel terete pale green .40-.70 cm. long. Immature capsule ovoid, keels 6 strongly elevate, green, c. 1 cm. long.

Padang woods at an altitude of about 5500 feet, on branches of trees.

Remarkable for the margins of the sepals, which appear, under the microscope, to be fringed with minute drops of liquid.

This plant is, I think, best included in the section *Monilibulbum*, the structure of the flowers, with particular reference to lip and column, being quite in keeping with those members of the section not possessing long acuminate sepals.

The pseudobulbs are adnate to the rhizome only at the base and are almost erect and arranged in two series, whereas in the typical members of the section they are prostrate and moniliform with only the portion below the apex upcurved. The usual median groove on the front of the pseudobulbs is very conspicuous in *B. biserialis*.

Described from living material.

**Bulbophyllum** (*Section Micromonanthae*) **tekuense**, *sp. nov.* Rhizoma repens, gracile. Pseudobulbi moniliformes, ovals, apices leviter recurvi. Folium lineari-lanceolatum aut oblongo-lanceolatum, acutum. Inflorescentiae erectae, 1-florae, pedunculo filiformi. Bractea infundibuliformis. Sepalum dorsale lineare, acuminatum, conico-apiculatum. Sepala lateralia falcate oblonga, brevissime acuminata, sub-obtusa. Petala basi linearia, fere medio spathulate dilatata, apices abrupte truncata, margine apicali medio rotundate dilatato. Labellum mobile, integrum, oblongum, obtusum. Gynostemium breve, validum, steliis subulatis. Anthera cucullata, basi biloba, apices breviter rostrata. Pes gynostemii basi valde incrassatus, apices attenuatus incurvus.

Rhizome rather long-creeping, branched, slender, entirely covered with approximate pseudobulbs. Pseudobulbs adnate to rhizome, moniliform, seen from above oval, slightly

rounded on back, apex slightly recurved, green, c. .60 cm. long, c. .30 cm. wide and as thick, 1-leaved. Leaf erect linear-lanceolate or oblong-lanceolate, acute, above grooved, green, beneath paler, 1-1.75 cm. long, .30-50 cm. wide. Inflorescences from base of pseudobulbs, erect, 1-flowered; peduncle filiform, dilate towards apex, sparsely scurfy above, an arched tubular sheath at base c. .30 cm. long, another sheath above base broadly funnel-shaped, produced on back, acute, outside scurfy, c. .28 cm. long. Bract funnel-shaped, c. .30 cm. long. Upper sepal porrect at base, about middle recurved, linear, acuminate, apex conic-apiculate, 3-nerved, nerves strongly elevate on back, outside scurfy, c. .85 cm. long, c. .25 cm. wide. Lateral sepals running almost to apex of column foot, subparallel, falcately oblong, very shortly acuminate, subobtuse, 3-nerved, outer nerves branched strongly elevate outside, anterior margin slightly dilate at base, scurfy outside, c. .88 cm. long, c. .28 cm. wide. Petals base linear, about in middle spatulately dilate, apex abruptly truncate, apical margin roundly dilate in middle, c. .26 cm. long, c. .17 cm. wide. Lip adnate to apex of column foot, mobile, entire, oblong, obtuse, rather thickly fleshy, base erect, recurved about middle, 3-nerved, entirely densely papillose and minutely hairy, inside in lower  $\frac{2}{3}$  concave with erect fleshy slightly recurved ciliolate margins, in upper  $\frac{1}{3}$  convex, outside convex in lower  $\frac{2}{3}$  with a strongly elevate median keel, margins concave, c. .30 cm. long, c. .12 cm. wide. Column short, stout, stolidia short porrect subulate, rostellum produced to an oblong-ovate obtuse beak, stigma transversely oval. Anther cucullate, base bilobed, apex produced to a short papillose beak. Pollinia 4 unequal, inner ones smaller, yellow. Column foot longer than column, base strongly thickened, apex thin incurved. Ovary and pedicel sigmoidly curved, ovary scurfy c. .30 cm. long, pedicel terete dilate towards apex, scurfy, c. 1 cm. long.

Kuala Teku at 500 feet altitude on mossy branches of a tree overhanging the Teku river. The colour notes were unfortunately lost upon the mountain. Described from material preserved in alcohol.

The plant is well characterised by the curious structure of the petals. It is similar in habit to plants of the section *Monilibulbum* but differs distinctly in the structure of the flowers. The section *Micromonanthe* embraces some very diverse forms and will have to be split when more species are known.

**Buibophyllum** (*Section Globiceps*) **apiferum**, *sp. nov.*  
Rhizoma repens. Pseudobulbi approximati, prostrati, ovoidei, apici recurvi. Folium oblanceolatum, subacutum. Inflorescentia erecta, apici dense c. 14-flora pedunculo terete, rachide nutante incrassata. Bracteae late ovatae, acuminatae, subacutae. Sepala oblonga, acuminata, acuta, laterali-

bus marginibus anticis contiguis. Petala oblonga, obtusa. Labellum integrum, oblongo-spathulatum, retusum. Gynostemium breve, alis bilobis. Anthera cucullata, subquadrata, Pollinia 4. Pes gynostemii apici incurvus.

Rhizome shortly creeping, copiously rooting. Pseudobulbs approximate, prostrate, appressed to rhizome, ovoid, apex recurved, wrinkled, dark green, c. 1 cm. long, c. .70 cm. wide, 1-leaved. Leaf erect, oblanceolate subacute, rather thickly fleshy, coriaceous, narrowly grooved above, inconspicuously keeled beneath, dark green, c. 12 cm. long, c. 2.50 cm. wide. Inflorescence from base of pseudobulb, erect, densely c. 14-flowered at apex; peduncle stout, terete, dilate and laterally flattened towards apex, 2 tubular sheaths at base and 2 more above, c. 14 cm. long; rachis incrassate, nodding, making an obtuse angle with peduncle, angulate with concave sides, quadrate in transverse section, c. 1.50 cm. long. Bracts not alternate, appressed to ovary, broadly ovate, acuminate below the subacute apex, margins shortly erose, 3-nerved, inside concave furfuraceous, outside convex warty furfuraceous-punctate conspicuously keeled, c. .35 cm. long, c. .30 cm. wide. Flowers sessile, scarcely expanded. Sepals rather fleshy. Upper sepal continuing the ovary, oblong, shortly acuminate below the acute apex, nerves 5 branched, a shorter nerve on each side, inside concave sparsely furfuraceous, densely papillose in upper half, outside warty furfuraceous-punctate papillose towards margins, margins ciliolate except at base, nerves elevate, c. .67 cm. long, c. .42 cm. wide. Lateral sepals running down to about middle of column foot, horizontally porrect below lip, oblong, shortly acuminate below the acute apex, posterior margin recurved, anterior margins contiguous, margins ciliolate except at base, nerves similar to those of upper sepal, inside densely papillose except at the concave and furfuraceous-punctate base convex towards posterior margin and apex, outside warty furfuraceous-punctate, c. .85 cm. long, c. .47 cm. wide. Petals parallel, oblong, obtuse, thin, 3-nerved, papillose towards apex, margins erose in lower half ciliolate, in upper half, outside very sparingly scurfy keeled, c. .35 cm. long, c. .18 cm. wide. Lip adnate to apex of column foot, entire, oblong-spathulate, shortly retuse, base erect, above base recurved porrect, margins recurved produced at base to a short rounded lobe, above papillose except at base, grooved in lower 2/3, keels 2 from margins above base converging towards apex of median groove convex towards apex, beneath conspicuously keeled in lower 1/3, keel grooved, 3-nerved, outer nerves branched, spread out c. .58 cm. long, c. .42 cm. wide. Column short, wings bilobed, lower lobe triangular obtuse, upper one much longer subulate acute very fleshy with rather erose posterior margin, without wings c. .08 cm. long, wings as long, clinandrium excavate trans-



versely oblong, stigma excavate short broadly ovate. Anther cucullate, 2-celled, rather flat, papillose towards apex, seen from above subquadrate, grooved apex shortly ciliate, Pollinia 4, yellow. Column foot making a right angle with ovary, inside convex base broad, narrowed towards the incurved apex, c. .35 cm. long. Ovary 6-sulcate, curved, dilate towards apex, furfuraceo-punctate, c. .45 cm. long.

Padang woods at an altitude of about 5,500 feet, one plant only seen. Described from the living plant and an inflorescence preserved in alcohol. Unfortunately the colour notes were lost on the mountain.

**Bulbophyllum** (*Section Sestochilos*) **foetidolens**, *sp. nov.*

Rhizoma longe repens, validum. Pseudobulbi dissiti, erecti, anguste cylindrici, lateraliter compressi. Folium lineari-oblancheolatum, acuminatum, acutum, tenue, petiolo sulcato tortoque. Inflorescentia erecta, dense multiflora, pedunculo terete valido longiusculo, rachide nutante. Bractee ovatae, acuminatae, acutae. Sepala oblong-lanceolata, acuta, lateralibus falcatis. Petala linear-oblancheolata, obtusa. Labelum mobile, integrum, ligulatum. Gynostemium breve, alis in dentem brevissimum subulatum productis. Anthera cucullata, supra apicem versus in incrassationem conicam papillosam elevata. Pollinia 4, valde inaequalia.

Rhizome long-creeping, covered with dry sheaths, up to c. .45 cm. diam. Pseudobulbs up to c. 6 cm. distant, erect, narrowly cylindrical, laterally flattened, longitudinally wrinkled, dark green, up to c. 5 cm. long, c. .60 cm. wide, c. .45 cm. thick, 1-leaved. Leaf linear-oblancheolate, acuminate acute, thin, recurved towards apex, base narrowed to the petiole, grooved above, conspicuously keeled beneath, green, 11-22 cm. long 1.50-3.25 cm. wide, petiole grooved twisted green 1-2.50 cm. long. Inflorescence from base of pseudobulb, erect, densely many-flowered; peduncle terete, stout, some tubular sheaths at base and c. 3 loosely tubular distant acute keeled sheaths above, dark red, up to c. 13 cm. long; rachis nodding, similar in colour, up to c. 5 cm. long. Bracts appressed to pedicel, ovate, acuminate, acute, inside concave, outside convex, green, purple-spotted and suffused, up to c. .40 cm. long, c. .27 cm. wide. Upper sepal oblong-lanceolate, acute, 3-nerved, outer nerves reaching the middle, incurved above middle, inside concave, outside convex, nerves elevate in lower half, semitransparently whitish densely spotted and suffused purple, c. .75 cm. long, c. .30 cm. wide. Lateral sepals shortly running down the column foot, pendulous, parallel, falcately oblong-lanceolate, acute, 3-nerved, outer nerves reaching to about middle, anterior margin roundly dilate from base to about middle, margins incurved at apex, inside concave, outside convex, nerves elevate, whitish densely spotted and suffused purple, c. .75 cm. long, c. .32 cm. wide. Petals strongly spreading, base twisted, linear-ob-



lanceolate, obtuse, 3-nerved, outer nerves reaching to about middle, semitransparently whitish, in upper half and on margins laxly, in lower half densely spotted purple, c. .50 cm. long, c. .10 cm. wide. Lip adnate to apex of column foot, mobile, entire, fleshy, ligulate, curved, margins at base erect, produced on each side to an oblong obtuse lobe, inside concave below middle, above middle recurved convex, sides slightly concave, below convex grooved almost to apex, a short transverse groove above point of insertion, brown-purple, cinnamon colour towards apex, c. .30 cm. long, c. .18 cm. wide. Column short, nearly straight, pale yellowish, inside densely, remainder sparsely purple spotted, c. .18 cm. long, wings produced to a very short subulate tooth, clinandrium excavate transversely oblong, stigma suborbicular. Anther cucullate, 2-celled, a conic papillose projection above towards apex, c. .08 cm. long. Pollinia 4, very unequal, cohering in 2-suborbicular laterally flattened bodies, yellow. Column foot making a right angle with column, obtusangularly incurved in middle, linear, apex produced to 2 very short diverging teeth, whitish densely spotted purple, c. .30 cm. long. Ovary 6-grooved, tumid, furfuraceous, with pedicel sigmoidly curved, dark red, c. .70 cm. long.

Wray's Camp at an altitude of about 3,500 feet.

This is a close ally of *B. densiflorum*, Ridl. As Doctor J. J. Smith points out, the original section *Pahudia* cannot be maintained as it was created to embrace those species of the section *Sestochilos* bearing more than one flower on the inflorescence and which, apart from this, agree in every way with the latter section.

*B. maximum*, Ridl. which is included in *Fl. Mal. Pen.* under *Pahudia* should be transferred to the section *Sestochilos*.

Described from a living plant.

*Bulbophyllum dryas*, Ridl. in *Journ. F.M.S. Mus. VI.* (1915) 175; *Fl. Mal. Pen. IV.* 62. Rhizome long-creeping, very slender, covered with dry sheaths, sparsely branching, rooting from the pseudobulbs and more sparsely from the nodes, c. .06 cm. diam., internodes .60-.75 cm. long. Pseudobulbs c. 1.50-2.50 cms. distant, obsolete, minute, disciform, c. .01-.12 cm. long, c. .08-.10 cm. diam., 1-leaved. Leaf suberect or parallel to the rhizome, elliptic-lanceolate, subacute, apex recurved, thickly fleshy, often minutely rugulose, above concave on the median line, convex on each side, shiny dark green, below convex opaque and paler, .75-1.25 cms. long, .60-.70 cm. wide, petiole minute grooved c. .05 cm. long. Inflorescence from base of pseudobulb or from nodes, erect, 1-flowered; peduncle filiform, dilate towards apex, sparsely furfuraceous-punctate, 2 tubular sheaths at base and 1 longer tubular sheath above, c. 2.50-4 cms. long.

Bract infundibuliform, produced on back acute, c. .20 cm. long. Upper sepal lanceolate, shortly obtusely apiculate, above the middle slightly incurved, 3-nerved, inside concave, outside convex, semitransparently yellow, nearly 1 cm. long, c. .45 cm. wide. Lateral sepals running down to about the middle of the column foot, spreading, triangular oblong, obtusely apiculate, 3-nerved, anterior margin above the base slightly rotundately dilate, semitransparently yellow, c. 1 cm. long, c. .47 cm. wide. Petals narrowly spathulate, subacute, 1-nerved, semitransparently pale yellow, c. .35 cm. long c. .18 cm. wide. Lip adnate by a thin lamella to apex of column foot, mobile, entire, above the middle recurved, above the narrow base ovate, narrowly obtuse, margins recurved, above convex on each side of a shallow median groove, below concave on each side of a median keel reaching to about the middle, base and median groove whitish, remainder pale yellow suffused dull red, c. .40 cm. long, c. .26 cm. wide. Column short, stout, slightly curved, whitish, c. .18 cm. long, wings rather wide short broadly triangular obtuse with rounded margins; clinandrium suborbicular, slightly excavate; rostellum very small, oblong, erect; stigma very small, oval. Anther, cucullate, whitish. Column foot linear, forming an acute angle with the column, narrowed towards the apex, apex itself slightly dilate and incurved, c. .27 cm. long. Ovary 6-sulcate, furfuraceo-punctate, c. .15 cm. long; pedicel terete, furfuraceo-punctate, c. .60 cm. long. Capsule ovoid, pendulous, flattened beneath, green, c. .80 cm. long, c. .40 cm. diam.

Upper Teku valley at about 4,500 feet altitude on exposed stunted bushes, in flower. I found this also in flower during March and April 1929 on branches of trees on Fraser Hill at an altitude of about 4,000 feet.

This plant is of interest owing to the very minute pseudobulbs and it appears at first sight as though there were none at all. It clings closely to the substratum and with its small fleshy leaves spaced some distance apart is easily overlooked.

The species cannot be placed in any of the existing sections of the genus, and, having regard to the long-creeping rhizome, the obsolete pseudobulbs and the absence of stielidia I consider a new section should be created and I here propose the name *Aeschynanthoides*. As pointed out by Ridley the plant, when first seen growing on a branch of a tree, somewhat resembles some species of the genus *Aeschynanthus*. *B. peperomiifolium*, J. J. S. might be best placed here. It occurs in the hills of Java.

**Bulbophyllum** (Section *Epicrianthes*) **papillosofilum**, *Carr in Gard. Bull. S.S. V. 9, pl. V.* A single plant found on a tree overhanging the Teku river just above its mouth, about 500 feet altitude. Endemic.

**Bulbophyllum** (*Section Dialeipanthae*) **Stella**, *Ridl. in Journ. Linn. Soc. XXXI. 297; Fl. Mal. Pen. IV. 96.* Rhizome creeping, branched. Pseudobulbs approximate, quadrilaterally conic, apex slightly recurved, sides slightly concave, rather shinily green, fuscous towards apex, c. 1-2 cms. long, and about as broad, 1-leaved. Leaf oblong-elliptic, shortly acuminate, acute, rather fleshy, apex a little recurved, above obtusangularly concave median nerve depressed, below obtusangularly convex median nerve conspicuously elevate, base narrowed to a petiole, green or yellow-green, 9-13 cms. long, 3-4 .60 cms. wide, petiole grooved green 1-2 cms. long. Inflorescence from base of pseudobulb, erect, very many-flowered, peduncle elongate, terete, thickened towards apex, dark dull purple almost black, some tubular sheaths at base and about 2 more at intervals above, up to about 24 cms. long; rachis thickened, terete, dense, gradually lengthening, dark green, up to about 6 cms. long. Bracts triangular, acuminate, acute, dry when mature, 5-nerved, appressed to pedicel, outside keeled convex, inside concave, up to c. 1.10 cms. long, c. 1 cm. wide. Flowers appearing singly at intervals of a few weeks and lasting for several days, inodorous, widely expanded, about 4.30 cms. long. Upper sepal erect, incurved below middle, lanceolate, acute, 5-nerved, margins above base triangularly dilate, inside concave, outside convex keeled furfuraceous ochreous densely spotted red, c. 2.35 cms. long, c. .60 cm. wide. Lateral sepals running down almost to apex of column foot, spreading, falcately ovate-lanceolate, acute, 5-nerved, posterior half above base twisted and strongly incurved, inside acutangularly concave, outside acutangularly convex furfuraceous with a tall laterally compressed median keel produced beyond the apex, ochreous densely spotted and suffused red, c. 2.50 cms. long, c. .70 cm. wide. Petals very small, strongly recurved from base, appressed to ovary, triangular-oblong, apex produced to a minute point, anterior margin strongly dilate at base, 3-nerved, margins minutely erosulous, outside at base minutely papillose, ochreous spotted red, c. .20 cm. long and at base about as wide. Lip adnate by a short broad triangular lamella to apex of column foot, base erect apex recurved, entire, mobile, ligulate, fleshy, apex acute, below the middle slightly decurved, above in basal  $\frac{1}{3}$  deeply concave with a median groove, a verrucous keel running from the margins to the apex of the median groove, in upper  $\frac{2}{3}$  convex verrucous and minutely papillose, margins at base erect, above the base produced to a minute dentate auricle (side lobe ?), above the auricle abruptly decurved, beneath subverrucous narrowly concave on each side of a wide median grooved keel with the groove produced nearly to the apex of the lip, ochreous spotted red and suffused red towards the base, c. 1.60 cms. long, c. .60 cm. wide. Column slightly curved, flattened on back, a



little laterally dilate towards apex, dark wine colour, c. .58 cm. long, arms very short broad truncate; clinandrium semilunate, deeply excavate with a median keel, margins truncate, dark wine colour; rostellum broad, whitish; stigma scarcely excavate, broadly ovate, c. .30 cm. wide. Anther cucullate, biloculate loculi separate diverging towards apex, seen from above transversely oblong, base rounded with a short median groove above, ochreous spotted dark wine colour, c. .18 cm. long, c. .22 cm. wide. Pollinia 4, unequal, cohering in 2 obpyriform bodies, yellow, c. .10 cm. long. Column foot forming at base an obtuse angle with column, broad, linear, narrowed towards apex, apex produced to a triangular diverging lobes, dark wine colour, c. .70 cm. long c. .28 cm. wide. Ovary 6-sulcate, furfuraceous, green suffused dark wine colour, c. .52 cm. long, pedicel furfuraceous, in colour similar, c. 1.10 cms. long.

Below Wray's Camp by a tributary of the Reriang on trunks of trees, altitude about 3,300 feet.

**Bulbophyllum** (*Section Dialeipanthé*) **cleistogamum**, *Ridl. in Journ. Linn. Soc. XXXI. 297; Fl. Mal. Pen. IV. 69.* Rhizome creeping, branched, covered with dry tubular sheaths, fully .33 cm. diam., internodes .20-.40 cm. long. Pseudobulbs 1-2 cms. distant, cylindrical-conic, curved, at first smooth and covered with membranous sheaths soon breaking up into fibres, later longitudinally wrinkled, green, 1.50-3 cms. long, up to 1 cm. diam. at the base, 1-leaved. Leaf linear to linear-oblongate, apex acute, above base recurved, above dark green, the median nerve sulcate, below opaque paler, the median nerve conspicuously elevate, 19-13 .50 cms. long, 2-4.50 cms. wide, petiole grooved 1-2 cms. long. Inflorescence from base of pseudobulb, erect, many flowered; peduncle terete, thickened upwards, with about 2 tubular sheaths at base and about 4 tubular sheaths scattered above, green suffused black-purple, up to 30 cms. or more long; rachis thickened, zigzag, gradually lengthening, up to about 5 cms. long, internodes rounded on back flattened or slightly concave inside .30-.40 cm. long. Bracts alternate, triangular, acute, on back strongly keeled with the keel produced beyond the apex, inside acutangularly concave with the sides infolded and almost contiguous, base for c. .15 cm. embracing the rachis, green, base and keel darker, c. .90 cm. long, spread out c. .70 cm. wide. Flowers appearing singly at intervals of many weeks, widely expanded or more rarely closed and cleistogamous. Sepals spreading yellowish green tinted red, veins and margins red with red reticulation. Upper sepal erect, oblong-lanceolate, apex acutely apiculate often incurved, 7-nerved, inside deeply concave, outside highly convex furfuraceous, nerves elevate median nerve strongly elevate, c. 2.50 cms. long, c. .80 cm. wide. Lateral sepals falcately triangular, acute,



nerves 7 reticulate with 2 short extra nerves outside in basal half, inside deeply concave, outside highly convex furfuraceo-punctate, keels elevate median fully 1 cm. wide. Petals very small, subfalcately ovate 1-nerved with a very short nerve on each side, margins in upper half lacinate and serrate, apex produced to a long cusp with a shorter subulate diverging irregularly margined lobe on each side, transparently pale yellow-green with 3 dark red striae not reaching the base, without cusp c. .33 cm. long, .35 cm. wide cusp c. .30 cm. long, apical lobes c. .07 cm. long. Lip adnate by a short broad lamella to apex of column foot, mobile, entire, tongue-shaped, fleshy, margins at base erect produced above to a short denticulate auricle, above at base concave shiny with a short median grooved keel and a much shorter thicker keel on each side, above the median keel convex and tumid-rugulose grooved, the groove reaching almost to the apex, 2 short keels running from the auricles transversely to the median groove and there evanescent, below in basal 1/3 convex, above rather flattened and tumid-rugulose, dark red, 1.50-2 cms. long, c. .70 cm. wide. Column continuing the ovary, nearly straight, stout, yellow, on back c. .50 cm. long; arms subhorizontally spreading subquadrate, apex produced to 2 yellow lobules, upper one short triangular, lower one much longer subulate sigmoidly curved, c. .10 cm. long; clinandrium excavate, narrowly transversely elliptic; rostellum minute, incomplete, transversely oblong; stigma large, slightly excavate, produced below to 2 oblong divergent lobes. Anther cucullate, grooved, seen from above suborbicular, pale yellow with a large median dull red spot, c. .15 cm. long. Column foot forming at base a right angle with column, towards apex recurved, apex itself slightly dilate, dark red, c. .67 cm. long. Ovary 6-sulcate, furfuraceous, green, c. .70 cm. long, pedicel terete about as long.

The name is perhaps a little unfortunate since the great majority of the flowers seen by me expand widely. The flower is nearly always self-fertilized though this is not invariably the case. The rostellum is reduced to the central area of paste-like substance which is present in all species of this genus and the genus *Dendrobium*, the remaining part being entirely suppressed. When therefore the stigmatic fluid attains its maximum development, the pollinia gain contact with it towards the sides of the stigma and fertilization ensues.

Tahan river on tree overhanging the water, altitude about 350 feet.

**Bulbophyllum** (*Section Aphanobulbum*) **vaginulosum**, *sp. nov.* Rhizoma repens. Pseudobulbi remoti, depressi, disciformi. Folium oblongo-lanceolatum, acuminatum, obtusum aut minute bidentatum. Inflorescentiae erectae

laxe multiflorae, pedunculo terete basi vaginulis c. 6 arcte tubulosis tectis. Bractee quaquaversae, lineari-lanceolatae, acuminatae, acutae. Sepalum dorsale lineare vel e basi longe unguiculata elliptico-lanceolatum, acuminatum, acutum. Sepala lateralia subfalcate oblonga, brevissime caudata. Petala rhombeo-elliptica vel e basi unguiculata lanceolata, acuta obtusave, intus in  $\frac{2}{3}$  partibus superioribus dense papillosa et ciliolata. Labellum mobile, inconspicue 3-lobum; lobi laterales rotundati, marginibus basi excepta minute papillosis; lobus intermedius triangulari-oblongus, obtusus, dense minute papillosus. Gynostemium breve, alis apici in dentem brevem subulatum productis. Pes gynostemii elongatus, sub apice in gibba magnum latum humile elevatus.

Rhizome creeping, c. .40 cm. diam. covered with dry sheaths, internodes more or less 1 cm. long. Pseudobulbs remote, very small, depressed, disciform, longitudinally wrinkled, covered with dry sheaths, c. .18 cm. long, c. .30 cm. diam., 1-folii. Leaf erect, oblong-lanceolate, acuminate obtuse or minutely bidentate, rather thickly fleshy, margins very shortly recurved, base abruptly narrowed to the petiole, green, c. 13 cm. long, c. 2.66 cm. wide, petiole oval in transverse section, grooved, c. 5 cm. long, .18-.20 cm. diam. Inflorescences from base of pseudobulb, erect, laxly many-flowered; peduncle terete, green, c. 6 loosely tubular green sheaths at base, often a lanceolate acute one above, 3-8 cm. long; rachis pale green up to c. 14 cm. long. Bracts much exceeding pedicel and ovary. linear-lanceolate, acuminate, acute, furfuraceo-punctate, whitish, c. .60 cm. long, c. .14 cm. wide. Sepals and petals semitransparently pale yellow, apex darker. Upper sepal linear or elliptic-lanceolate from a long-clawed base shortly acuminate, acute, base slightly dilate and thickened, 3-nerved, inside concave, outside convex, c. .55 cm. long, c. .18 cm. wide, claw c. .25 cm. long. Lateral sepals running down almost to apex of column foot, subfalcately oblong, narrowed shortly caudate below apex, anterior margin dilate at base to a short broad conic obtuse roundly dilate mentum, 3-nerved, inside concave, outside convex keeled, c. .55 cm. long, c. .30 cm. wide. Petals porrect above back of column, rhombeo-elliptic or lanceolate from a clawed base, acute or obtuse, 1-nerved, inside densely papillose in  $\frac{2}{3}$  upper part margins ciliolate, c. .28 cm. long, c. .10 cm. wide, claw c. .08 cm. long. Lip adnate to apex of column foot, mobile, inconspicuously 3-lobed, sides erect margins recurved, inside grooved in lower half, a wide grooved keel reaching the apex beneath, yellow base paler, spread out c. .35 cm. long, across side lobes c. .20 cm. wide; side lobes rounded, margins papillose except at base; mid-lobe recurved, triangular-oblong, obtuse, fleshy, convex above, keeled below, densely minutely papil-

lose. Column short, straight, wings broad produced at apex to a short subulate tooth, clinandrium small transversely oblong, rostellum short broad truncate, stigma deeply excavate narrowly oblong. Anther cucullate, yellow. Pollinia 4, yellow. Column foot elongate, making a right angle with column, apex incurved, a large broad low gibba below apex. Ovary and pedicel sigmoidly curved, clubbed, pale yellow, with pedicel c. .50 cm. long.

This belongs to the group possessing a distinct gibba on the column foot.

The main ridge at an altitude of about 6,000 feet.

Described from living plants.

**Bulbophyllum tahanense**, *sp. nov.* Rhizoma repens. Pseudobulbi conici vel elongato-conici, dimidio inferiore ad rhizoma adpressi. Folium oblongo-ellipticum ad lineari-oblongum, apici recurvum breviter angusteque retusum. Inflorescentiae laxae multiflorae, pedunculo gracili rigido, rachide multo longiore. Bractee minimae, ovatae, acuminatae, obtusae. Flores subsecundi. Sepalum dorsale oblongo-lanceolatum, acuminatum, anguste obtusum. Sepala lateralia falcate oblonga, acuminata, subacuta. Petala subfalcata, late lanceolata, anguste obtusa. Labellum integrum, panduriforme, breviter acuminatum, anguste obtusum. Gynostemium breve, alis in dentem brevem erectum productis. Anthera cucullata, in rostrum breve triangulare subacutum producta.

Rhizome creeping, covered with dry sheaths, c. .35 cm. diam., internodes .40-.60 cm. long. Pseudobulbs 1-3 cm. distant, conic or elongate-conic, basal half prostrate and appressed to rhizome, in middle recurved, longitudinally wrinkled, yellow-green, 1.25-2 cm. long. 1-leaved. Leaf erect, oblong-elliptic to linear-oblong, apex recurved shortly narrowly retuse, base narrowed to the twisted grooved petiole, rather thickly fleshy, grooved above, keeled below, greenish yellow, 2.50-8.50 cm. long, .90-1.75 cm. wide petiole .20-1 cm. long. Inflorescence from base of pseudobulb, erect or erecto-patent, laxly many-flowered above, pale yellow; peduncle terete, slender, rigid, some tubular sheaths at base, 2-4.50 cm. long; rachis terete, a tubular sheath at base and some empty bracts above, 7.50-15 cm. long, upper part for 5-7 cm. laxly 7-20 flowered. Bracts very small, ovate, acuminate, obtuse, inside concave, outside convex, c. .12 cm. long, c. .09 cm. wide. Flowers fairly expanded, subsecund, lasting for several days, scentless. Upper sepal porrect, oblong-lanceolate, acuminate narrowly obtuse, 3-nerved, cucullately incurved above middle, inside concave, outside convex keeled, keel pale orange, yellow, scarcely 1 cm. long, c. .28 cm. wide. Lateral sepals running down to below middle of column foot, base slightly diverging, recurv-



ed in middle, falcately oblong, acuminate, subacute, anterior margin slightly dilate in lower  $\frac{1}{3}$ , 3-nerved, yellow, inside concave especially towards apex, outside convex with a pale orange keel, some minute purple dots at base of posterior margin, c. 1 cm. long, c. .30 cm. wide. Petals subparallel, apex recurved, subfalcate, broadly lanceolate, narrowly obtuse, thin, 1-nerved, pale yellow a pale orange keel outside, fully .50 cm. long, c. .28 cm. wide. Lip adnate to apex of column foot, mobile, entire, panduriform, shortly acuminate, narrowly obtuse, 5-nerved, margins at base erect produced to a rounded lobe recurved except at the acuminate part, sides deeply concave at base, above grooved with a conspicuously elevate keel on each side running from base to the acuminate part, convex towards apex, dark red, spread out c. .35 cm. long, c. .20 cm. wide. Column short, stout, pale yellow margins red, wings minutely red-dotted produced to a short erect tooth, the whole c. .10 cm. long, clinandrium excavate, triangular-ovate, stigma deeply excavate oblong produced below to a long linear lobe. Anther cucullate, produced to a short triangular subacute beak, c. .04 cm. long. Column foot incurved, narrowed to apex, above convex pale yellow red-spotted, c. 4 red striae beneath, c. .20 cm. long. Ovary 6-sulcate, furfuraceous, c. .30 cm. long, pedicel c. .70 cm. long.

On the ridge at the foot of Gunong Gedong, altitude c. 5,000 feet, No. 20,649. Flowered during August and September, 1928.

This plant has no near relative in this country. It appears best placed in Schlechter's section *Ischnopus* and is the first species of that section to be reported from the Peninsula.

**Bulbophyllum** (*Section Cirrhopetalum*) **lepidum**, *J.J.S. in Fl. Buit. VI. (Orch. 1905) 471; Atlas (1908) fig. CCCLXI.* On a tree overhanging the Teku River at Kuala Teku, altitude about 500 feet. This plant is new to the Peninsula.

Distribution:—Java, Borneo.

**Bulbophyllum** (*Section Cirrhopetalum*) **corolliferum**, *J.J.S. var. atropurpureum, J.J.S. in Bull. Jard. Bot. Buit. Ser. 2 XXV. (1917) 82; Bulbophyllum pulchellum, Ridl. var. purpureum, Ridl. Fl. Mal. Pen. IV. 80.* On a tree overhanging the Tahan river at Kuala Teku, altitude about 500 feet.

Distribution:—Sumatra, Borneo.

\* **Dendrochilum angustifolium**, *Ridl. in Journ. Roy. As. Soc. S. Br. 39. 77; Mat. I. 85; Fl. Mal. Pen. IV. 82.* This plant occurred freely on the drier ridges such as Skeat's Ridge. It is worthy of notice that as far as could be judged

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somewhere in the neighbourhood of 75% of the plants seen were growing in conjunction with the fern *Lecanopteris carnososa*, Bl., the old rhizome of the fern forming a shelter for the roots. On these dry ridges a large proportion of the plants were practically completely exposed to the sun, which had caused the pseudobulbs to take on a rich orange colour, but the rhizome of the fern formed a close mat over the substratum and retained sufficient moisture to enable the plants to thrive. Every fern examined was tenanted by ants.

This endemic species occurs commonly on the mountains of the Peninsula. No. 20655, altitude about 5,000 feet.

**Eria** (Section *Eriura*) **Ridleyi**, Rolfe in *Journ. Linn. Soc. XLII* 150; *Ridl. Fl. Mal. Pen. IV.* 87; *E. major*, *Ridl. Mat. I.* 90 (not of *Trans. Linn. Soc. IV.* 237); *E. Kingii*, Hook. f. *F. B. I. VI.* 790; *Ic. Pl.* 2066; *E. tahanensis*, *Ridl. in Journ. F. M. S. Mus. VI.* 177; *Fl. Mal. Pen. IV.* 87. Padang woods, and W. of the Upper Teku valley, at about 4,500 feet altitude, in flower No. 20741.

There is no authentic specimen of *E. tahanensis*, *Ridl.* in Singapore. If No. 16162 from Gunong Tahan and labelled in Ridley's writing as *Eria n. sp.* is intended for the type plant I can find no possible difference between it and *E. Ridleyi*, Rolfe. Endemic.

**Eria** (Section *Hymeneria*) **punctata**, J. J. S. in *Bull. Dep. Agr. Ind. Neerl. XIII.* (1907) 38; *Bull. Jard. Bot. Buit. Ser. 3 VI. t. 3. f.* 14. On a tree trunk on Observation Hill, at about 5,000 feet altitude. It occurs, less rarely, on the main range at Fraser Hill, but, as Dr. Smith points out, it is not often met with in flower.

Distribution:—Java.

**Eria** (Section *Hymeneria*) **suaveolens**, *Ridl. in Journ. Linn. Soc. XXXII.* 292., etc. on trees by the Tahan and Teku rivers at an altitude of about 500 feet. Endemic.

**Porpax meirax**, King and Pantling in *Ann. Bot. Gard. Calc. VIII.* 115; *Ridl. Mat. I* 105; *Fl. Mal. Pen. IV.* 104; *Eria meirax*, N. E. Br. in *Gard. Chron.* 1880. 603; Hook. f. in *Fl. Brit. Ind. VI.* 786. This plant has been found once previously in the Peninsula, on Kedah Peak. It was found on Gunong Tahan low down on mossy tree trunks in damp jungle by the side of a tributary of the Reriang below Wray's Camp at about 3,300 feet altitude.

Distribution:—Tenasserim and the Himalayas.

**Agrostophyllum longifolium**, Rehb. f. in *Bonpl. V.* 41; J. J. S. in *Fl. Buit. VI.* (*Orch.* 1905) 290; *Agrostophyllum majus*, Hook. f. in *Fl. Brit. Ind. V.* 824; *Ic. Pl.* 2096; *Ridl. Mat. I.* 108; *Fl. Mal. Pen. IV.* 107; *Appendicula longifolia*,

*Bl. Bijdr.* 304; *Lindl. Gen. & Sp. Orch.* 240; *Miq. Fl. Ind. Bat.* III. 704. A common plant throughout the Peninsula at all altitudes, it was found on trees in the neighbourhood of Kuala Teku at an altitude of about 500 feet.

Distribution:—Java, Sumatra, Ambon.

**Agrostophyllum glumaceum**, *Hook. f. in Fl. Brit. Ind. V.* 821;  *Ic. Pl.* 2095; *Ridl. Mat.* 108; *Fl. Mal. Pen.* IV. 107; This plant was found on the branches and trunks of small trees by the side of the Teku river at Kuala Teku, at an altitude of about 500 feet (No. 20558). Endemic.

**Ceratostylis** (*Section Pleuranthemum*) **eriaeoides**, *Hook. f. Ic. Pl.* 2,074; *Ridl. Mat.* I. 110; *Fl. Mal. Pen.* IV. 110; *Eria pygmaea*, *Hook. f. in Fl. Brit. Ind. V.* 804. A rare endemic species occurring on the hills of the Peninsula. On Gunong Tahan it was found on Skeat's Ridge at about 4,500 feet altitude (No. 20648) and also on the main ridge at about 6,000 feet altitude.

It is noteworthy that, as far as all events as we are concerned, a large number of the species of this genus are xerophytic, thriving on the more or less dry and exposed ridges of the mountains of the Peninsula. They are most difficult of cultivation in the plains.

**Calanthe** (*Section Styloglossum*) **rigida**, *sp. nov.* Caulis cylindrico-conicus. Folia c. 5, lanceolata, acuminata, acutissima, costis 6–7 prominentibus, petiolo longiusculo. Inflorescentiae dense multiflorae. Bractee lanceolatae, acuminatae, acutissimae. Sepala brevissime acuminata, acutissima, sepalo dorsali oblongo-oblancheolato, sepalis lateralibus lanceolatis. Petala subfalcate lineari-obovata, breviter acuminata, acuta. Labellum marginibus basi gynostemio in forma tubae adnatum, 3-lobum, calcaratum, basi carinis 2 brevibus ornatum; lobi laterales falcate triangulares, subacuti; lobus intermedius apici bilobus lobis late rotundatis marginibus erosulis, in sinu loborum in dentem triangularem acutum productus; calcar pendulum, cylindricum, lateribus sub apicem anguste obtusum dilatatis, carinis 3 conspicue elevatis. Gynostemium dorso rotundatum, lateribus perplanum, alis truncatis, rostello in rostrum subulatum acutissimum productum.

Stems approximate or subapproximate, erect, thick, cylindrical-conic, internodes narrowed towards apex, green, up to c. 5 cm. long, base c. 2.50 cm. diam., internodes .20–.70 cm. long, apical internode very small. Leaves erecto-patent, lanceolate, acuminate below the very acute apex, green, below paler with 6–7 yellow-green prominent nerves, base narrowed to petiole, 50–60 cm. long, or longer up to c. 7 cm. wide, petiole grooved 20 cm. long or longer. Inflorescence

from nodes of stem, erect, stout, glabrous densely many-flowered, peduncle terete with some tubular sheaths, pale green c. 25 cm. long, rachis pale green c. 12 cm. long. Bracts caducous, lower ones largest, lanceolate, acuminate, very acute, pale green. Sepals and petals fairly expanded, bright golden. Upper sepal oblong-ob lanceolate, very shortly acuminate below the very acute apex, 3-nerved nerves branched and reticulate, cucullately incurved above middle, margins recurved towards apex, inside concave, outside convex, c. 1.33 cm. long, c. .60 cm. wide. Lateral sepals lanceolate, very shortly acuminate below the produced very acute apex, 3-nerved, nerves branched and reticulate, incurved towards apex, margins incurved towards apex, inside concave, outside convex, c. 1.33 cm. long, c. .55 cm. wide. Petals subfalcately linear-obovate, shortly acuminate below the acute apex, 3-nerved, nerves branched and reticulate, midnerve grooved outside almost to apex, almost 1.20 cm. long, c. .60 cm. wide. Lip 3-lobed, spurred, margins at base for about .33 cm. adnate to column in form of a tube, 5-nerved, nerves branched, a short orange keel at base on each side of the midnerve, golden, blade orange, spread out 1.15-1.50 cm. long, across side lobes c. .75 cm. wide; side lobes erect, falcately triangular, subacute, 3-nerved, nerves branched, posterior margin roundly erosulous c. .40 cm. long, anterior margin c. .15 cm. long; midlobe cuneately dilate at base, slightly narrowed towards apex, apex bilobed, lobes broadly rounded, margins erosulous, a triangular acute tooth in sinus, 7-nerved, nerves branched, .50-.60 cm. long; spur pendulous, making an acute angle with ovary, slightly incurved beyond middle, cylindrical, sides dilate below the narrowed obtuse apex, keels outside 3 conspicuously eleviate, scarcely 1 cm. long, c. .40 cm. wide. Column entirely adnate to margins of lip blade, continuing the ovary, dilate towards apex, rounded on back, sides rather flat, concave inside, wings broad truncate broadly subcarinate, yellow, c. .60 cm. long, at apex c. .38 cm. wide, clinandrium conic-excavate suborbicular c. .20 cm. wide, rostellum triangular with a short median keel apex produced to a subulate very acute c. .18 cm. long beak. Anther cucullate, seen from above ovate, acute, white. Pollinia 8, narrowly linear-obpyriform, joined to a subulate gland. Ovary 6-sulcate, green, scarcely 1.10 cm. long, pedicel terete green about as long.

Padang woods by streams on damp rotting humus (No. 20684) at an altitude of about 5,500 feet.

I mistook this at first for a small state of *C. speciosa*, Lndl. as the spur is somewhat similar. It differs, however, from this in the structure of the lobes of the lip, in this respect much more resembling the succeeding species.

Described from spirit material and field notes.



**Calanthe** (*Section Styloglossum*) **angustifolia**, Lindl. *Gen. & Sp. Orch. Pl.* 251; *Fol. Orch.* 5; *Miq. Fl. Ind. Bat.* III. 710; *Rchb. f. Walp. Ann.* VI. 914; *Ridl. Mat.* I. 121; *Fl. Mal. Pen.* IV. 120; *J. J. S. in Fl. Buit.* VI (Orch.) 205; *Atlas f. CLII*; *C. phajoides*, *Rchb. f. Bonpl. V.* 37; *Xen. Orch. I.* 207. t. 79. II; *Hook. f. Ic. Pl. IX. t.* 1864; *Amblyglottis angustifolia*, *Bl. Bijdr.* 369; *Alismorchis angustifolia*, *O. K. Rev. Gen. Pl. II* 650; *A. phajoides*, *O. K. l. c.* A fairly well distributed plant throughout the hills in the central and northern parts of the Peninsula. On Gunong Tahan it occurred in the Padang woods at 5,500 feet altitude (No. 20683, the *var. flava* of Ridley), while both forms occurred on the main ridge at about 6,000 feet altitude.

Distribution:—Sumatra and Java.

**Calanthe** (*Section Styloglossum*) **aurantiaca**, *Ridl. in Journ. Roy. As. Soc. Str. Br. XXXIX.* 80; *Mat. I.* 122; *Fl. Mal. Pen.* IV. 120. An endemic species occurring on the hills of the Peninsula. On Gunong Tahan it was found (No. 20583), together with the succeeding species, in damp woods below Wray's Camp at about 3,300 feet altitude.

**Calanthe** (*Section Styloglossum*) **pusilla**, *sp. nov.* Rhizoma repens. Caules ad c. 3.50 cm. dissiti, brevissimi, c. 5-folii. Folia lineari-lanceolata vel lineari-oblancheolata, acuminata, acuta, plicata, petiolo sulcato. Inflorescentiae erectae, laxae 2–20-florae. Bractee quaquaversae, mox caducae, lanceolatae, acuminatae, acutissimae. Sepalum dorsale oblongo-obovatum, breviter acuminatum, acutum. Sepala lateralia oblongo-elliptica, brevissime acuminata, acuta. Petala basi lineariter unguiculata, superne ovato-oblonga, brevissime acuminata, acuta. Labellum 3-lobum, calcaratum, marginibus laminae gynostemio adnatis, carinis 2 brevibus inter lobos laterales; lobi laterales quadrati, margine apicali vix rotundati; lobus intermedius lineari-oblongus, brevissime acuminatus, obtusus; calcar pendulum, teres, satis lateraliter compressum, apicem versus leviter incurvum. Gynostemium intus valde concavum, clinandrium transverse quadratum conico-excavato in carinam mediam elevato, rostello subulatim rostrato. Anthera cucullata, triangulari-ovata, acuta. Pollinia 8, anguste lineari-obpyriformia, glandula anguste subulata.

A dwarf plant. Rhizome creeping, up to .45 cm. diam., internodes up to c. .80 cm. long. Stems up to c. 3.50 cm. distant, erect, very short, cylindrical, narrowed to apex, green, .75–1.25 cm. long, internodes c. 5 up to c. .25 cm. long. Leaves c. 5, lower 2 reduced to sheaths, linear-lanceolate or linear-oblancheolate, acuminate, acute, plicate, thinly flaccid, margins undulate, above concave grooved opaque grey-green, below convex conspicuously keeled paler, up to c. 18 cm. or more long, 3–6 cm. wide, petiole grooved green up to c. 4 cm.

long. Inflorescences erect, laxly 2-20-flowered; peduncle terete, rather slender, about 2 tubular sheaths at base and c. 5 loosely tubular sheaths above, pale green, up to c. 2.5 cm. long; rachis ribbed, up to c. 9 cm. long. Bracts soon caducous, lower ones largest, lanceolate, acuminate, very acute, base 5-above 3-nerved, inside concave sparsely pubescent, outside convex, pale green. Tepals fairly expanded, snow white. Upper sepal oblong-obovate, shortly acuminate, acute, nerves 5 outer ones short all branched and reticulate, incurved towards apex, inside concave, outside convex, c. 1.10 cm. long, c. .45 cm. wide. Lateral sepals oblong-elliptic, very shortly acuminate, acute, nerves 5 branched and reticulate, inside concave, outside convex, c. 1.10 cm. long, c. .45 cm. wide. Petals clawed at base, claw linear c. .25 cm. long c. .30 cm. wide, above claw ovate-oblong, very shortly acuminate, acute, nerves 3 branched and reticulate, the whole c. 1.10 cm. long, c. .55 cm. wide. Lip 3-lobed, spurred, margins of yellow blade adnate to column, 2 short yellow keels between side lobes, spread out from ovary to apex of midlobe c. 1.15 cm. long, across side lobes c. .60 cm. wide; side lobes quadrate, apical margin scarcely rounded, white, base yellow, c. .15-.20 cm. long, .20-.30 cm. wide; midlobe linear-oblong, very shortly acuminate, obtuse, snow white, scarcely .30 cm. long, c. .33 cm. wide; spur pendulous, making a right angle with ovary, terete, rather laterally flattened, slightly incurved towards the subclavate apex, c. 1.40 cm. long. Column adnate to margins of lip blade, continuing ovary, dilate towards apex, inside very concave, c. .50 cm. long, c. .25 cm. wide, c. .30 cm. thick; clinandrium large, transversely quadrate, conic-excavate with a median keel; rostellum triangular, produced to a long narrowly subulate beak c. .18 cm. long; stigma small, semilunate. Anther cucullate, white, seen from above triangular-ovate, acute, a median keel near base, c. .28 cm. long, c. .15 cm. wide. Pollinia 8, narrowly linear-obpyriform, c. .15 cm. long, gland, narrowly subulate c. .15 cm. long. Ovary 6-sulcate, c. .85 cm. long, pedicel terete c. 1.10 cm. long.

An ally of *C. rajana*, J.J.S. from West Borneo, this plant occurred not uncommonly in moist forest along the valley of a tributary of the Reriang below Wray's Camp at an altitude of about 3,300 feet (No. 20590) together with the preceding species.

Described from living plants, inflorescences preserved in alcohol and colour notes taken in the field.

*Cymbidium* (Section *Eucymbidium*) *Dayanum*, *Rchb. f. in Gard. Chron.* 1869. 710; *Ridl. Fl. Mal. Pen.* IV. 146; *C. acutum*, *Ridl. in Journ. Linn. Soc.* XXXII. 334; *Mat.* I. 140; *C. Simonsonianum*, *King & Pantling, in Ann. Bot. Gard. Calc.* VIII. 188. Pl. 250. Kuala Teku on trees overhanging the river, at an altitude of about 500 feet.

Distribution:—Sikkim and Assam.

*Cymbidium* (Section *Cyperorchis*) *roseum*, J. J. S. in *Fl. Buit. VI. (Orch. 1905)* 475; *Bull. Jard. Bot. Buit. Ser. 3. VI. (1924).* t. 11. f. 1; *Cyperorchis rosea*, Schltr. in *Fedde Rep. XX. (1924)* 107; J. J. S. in *Bull. Jard. Bot. Buit. Ser. 3. IX (1927)* 57. On the main ridge from Gunong Gedong (Skeat's Barrier Mountain) to the summit at 7,100 feet growing in peaty humus in open spots or among very thin dwarfed scrub, in flower and fruit (No. 20681).

This is the plant found here in fruit in July 1911 by Ridley, (No. 16163), and reported by him in *Journ. F. M. S. Mus. VI (1915)* 182 under No. 221.

Distribution:—Java.

I do not well see how Schlechter's genus *Cyperorchis* can be maintained. The chief characteristics of that genus appear to be the unity of the base of the margins of the lip with the column and the caudicle of the pollinia which in the case of *Cyperorchis* is said to be longer and narrower than is the case in *Cymbidium*. This can undoubtedly be said of such plants as *Cymbidium sigmoideum*, J. J. S. *Cymbidium roseum*, J. J. S., however, which Schlechter himself places under his genus *Cyperorchis*, appears to me to unite the latter genus with *Cymbidium*, for while the margins of the lip are shortly adnate at the base to the column, the pollinia appear to be quite characteristic of the latter genus. In regard to habit and the structure of the flowers of the present plant other than the lip it would be most difficult generically to separate it from *Cymbidium*.

*Thrixspermum* (Section *Orsidice*) *tahanense*, *sp. nov.*  
Caulis longiusculus, erectus aut ascendens, validus. Folia oblonga ad oblongo-lanceolata, apici biloba, supra convexa sulcata, subtus concava conspicue carinata, vaginis tubulosis carinatis. Inflorescentiae multi-(ad c. 35-) florum, pedunculo longiusculo inconspicue carinate, rachide longiuscula valde lateraliter compressa. Bractee alternatim bifariae, basi tubulosae, parte libera valde carinata a latere visa falcate triangulari. Flores majusculi. Tepala haud caudata, lactea. Sepalum dorsale oblongum, longe acuminatum, acutum. Sepala lateralia falcata, lineari-ovata, longe acuminata, acuta. Petala lineari-ovata, longe acuminata, acuta. Labellum 3-lobum, basi profunde lateque saccatum, inter lobes laterales in callum magnum oblongo-ovatum obtusum elevatum, lobi laterales erecti, triangulari-ovati, obtusi, extus apicem versus papilloso; lobus intermedius conico-cylindricus, conico-papilloso; saccus late oblongus, medio dilatatus, apici retusus, intus papilloso et pilosus in carinam mediam elevatus. Gynostemium breve, rectum, intus linea media sulcate-concavum, alis latis rotundatis, clinandrio suborbiculari medio convexo, rostello brevi



triangulari acuto. Anthera cucullata. Pollinia 4, in corpusculis 2 oblongis cohaerentia, stipite oblongo-elliptico, glandula oblonga. Pes gynostemii triangular-oblongus.

Stem rather long, erect or ascending, stout, slightly sinuous, strongly laterally flattened, elliptic in transverse section, base branched, up to c. 30 cm. long, including sheaths up to c. .80 cm. wide, c. .50 cm. thick, internodes up to c. 3 cm. long. Leaves spreading, recurved towards apex, oblong to oblong-lanceolate, apex broadly unequally obtusely bilobed, rather thickly fleshy, above rather shiny convex on each side of the median groove, below opaque concave on each side of the conspicuous median rib, green often spotted dull purple, up to c. 9 cm. long, 2.50-3.50 cm. wide, sheaths tubular keeled in front and on the slightly rounded back, rather shinily green often spotted dull purple. Inflorescences from base of sheaths behind leaves, porrect or suberect, many- (up to c. 35-) flowered; peduncle rigid, narrowly elliptic in transverse section, inconspicuously keeled in front and on back, dilate towards apex, yellow-green, up to c. 15 cm. long; rachis thickened, strongly laterally flattened, internodes excavate on side facing the flower, a bracteiform but much smaller sheath at base, up to c. 15 cm. long, with bracts c. 1.30 cm. wide. Bracts alternate, base tubular, above middle free, spreading, laterally flattened and conduplicate, strongly keeled on back, free part seen from side falcately triangular, yellow-green often spotted and suffused dull purple, margins c. 1 cm. back c. 1.20 cm. long, tubular part .50-.60 cm. long. Flowers opening 1 or 2 at a time, lasting 1 day, rather large, scentless, c. 6.70 cm. wide. Tepals not caudate, semitransparently cream coloured. Upper sepal oblong below, above narrowed and long-acuminate, acute, 5-nerved, inside concave outside convex fairly conspicuously keeled, 4-4.75 cm. long, c. .55 cm. wide. Lateral sepals adnate to column foot, falcate, sigmoidly curved above, linear-ovate, long-acuminate, acute, 5-nerved, inside concave, outside convex fairly conspicuously keeled, 4-5 cm. long, c. .60 cm. wide. Petals linear-ovate, long-acuminate, acute, sigmoidly curved above, 3-nerved, outer nerves short, inside slightly concave, outside slightly convex, 3.75-4.25 cm. long, c. .40 cm. wide. Lip adnate to apex of column foot, 3-lobed, base deeply and broadly saccate, obtusangularly recurved in middle, a large oblong-ovate obtuse fleshy white palely and dully fusco-suffused callus between side lobes, spread out c. 1.85 cm. long, across side lobes c. 1.50 cm. wide; side lobes erect, rather fleshy, triangular-ovate, obtuse, posterior margin roundly curved and incurved over column, white, shiny inside, outside papillose towards apex; midlobe obtusangularly recurved, conic-cylindric, fleshy, conic-papillose, above triangularly depressed at base, beneath flat, whitish, c. 1 cm. long, base c. .60 cm wide; sac short, broadly oblong, dilate in middle, apex retuse, inside papillose and ochre-hairy with a median keel, yellow-

white, a large brown-purple spot at base. Column making an obtuse angle with ovary, short, straight, apex truncate, inside sulcato-concave on the median line, white, c. .17 cm. long, c. .22 cm. wide, wings broad rounded fleshy white; clinandrium scarcely excavate, suborbicular, convex in middle, white; restellum short, triangular, acute; stigma small, deeply excavate, transversely oval, basal margin produced in middle to a triangular obtuse lobule. Anther cucullate, biloculate, white, c. .17 cm. long, c. .20 cm. wide. Pollinia 4, cohering in 2 oblong bodies, pale yellow-white, anterior 2 c. .12 cm. posterior 2 c. .10 cm. long; stipe (caudicle) oblong-elliptic, incurved above middle, recurved below apex, convex above, concave below, white, c. .10 cm. long, c. .05 cm. wide; gland (disc) small, oblong, pale yellow. Column foot continuing column, triangular-oblong, dilate above the slightly narrowed base, apex narrowed, inside concave, c. .30 cm. long, c. .40 cm. wide. Ovary 6-sulcate, yellow-green, c. 1.60 cm. long.

On the stones of the drain of one of the huts on the Padang, about 3,400 feet altitude. Described from living plants.

**Thrixspermum** (*Section Dendrocolla*) **recurvum**, *comb. nov.* *Thrixspermum brevicaule*, Carr in Gard. Bull. S. S. V. (1929) 35. t. XV; *Sarcochilus recurvus*, Hook. f. Fl. Brit. Ind. VI. 39; Ic. Pl. I have little doubt that this species is referable to Hooker's plant since the inflorescence and bracts are most distinctive.

It was found at Kuala Teku on branches of trees overhanging the Teku river, about 500 feet altitude. In the Teku plants the sepals were distinctly apiculate and the brown markings were much paler than in the Tembeling and Krambit plants.

**Pennilabium struthio**, *sp. nov.* *Caulis brevis, ascendens. Folia 4-5, falcata, lineari-lanceolata, apici inaequaliter biloba, vaginis tubulosis apicem versus recurvis. Inflorescentiae pauciflorae, pedunculo lateraliter compresso, rachide latiore valde lateraliter compressa facie antica dorsoque canaliculata. Bractae alternatim bifariae, rachidem amplectantes, late et breviter triangulares, acutae, extus carinatae. Sepalum dorsale e basi brevissime unguiculata reflexum, ellipticum, breviter apiculatum, marginibus dimidio superiore minute erosulis, extus sparse verrucosum. Sepala lateralia e basi unguiculata oblique oblonga, breviter apiculata, marginibus dimidio superiore minute erosulis, extus sparse verrucosa. Petala breviter unguiculata, subfalcata, super basin elliptico-obovata, obtusa, marginibus in 1/3 parte superiore irregulariter dentatis. Labellum 3-lobum, calcaratum, super faucem calcaris in lamellas 2 erectas triangulares bidentatas parallelas*

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marginibus anticis lamella transversa simili conjunctas conspicue elevatum; lobi laterales falcati, lineari-cuneati, truncati, marginibus apicem versus laciniatis, laciniis in appendices multas cylindricas breviter pilosas productis; lobus intermedius valde lateraliter compressus, omnino papillosum, a latere visus linearis, super medium abrupte incurvus linearis sub apice subulato-acuminatus anguste obtusus; calcar majusculum, anguste cylindricum, sub apice obtuso dilatatum. Gynostemium breve, clinandrio suborbiculari, rostello in rostrum subulatum producto, stigmato maximo suborbiculari. Anthera cucullata, supra visa transverse subquadrata. Pollinia 2, subglobosa, stipite anguste lineari apicem versus triangulariter dilatato, glandula minuta anguste ovali. Ovarium breviter clavato-pilosum.

Stem short, ascending, 6-5-leaved, rooting below, 1-2 cm. long. Leaves spreading, falcate, linear-lanceolate, apex unequally bilobed, longer lobe obtuse, shorter one obtuse or acute and tooth-like, base narrowed and slightly twisted, rather fleshy, above convex on each side of the median groove rather shinily green, beneath opaque paler fairly conspicuously keeled, 4-6.50 cm. long, .90-1.30 cm. wide, sheaths tubular recurved towards apex dull green up to c. .50 cm. long. Inflorescences from base of sheaths behind leaves, porrect, few-flowered; peduncle terete, laterally flattened, bearing a few distant bracteiform sheaths, green, c. 1 cm. long; rachis broader, strongly laterally flattened, keeled in front and on back, green, c. 2.50 cm. long, c. .25 cm. wide. Bracts alternate, half embracing the rachis, broadly and shortly triangular, acute, inside acutangularly concave, outside highly convex keeled. Flowers opening 1-2 at a time and lasting 1 day, c. 1.70 cm. long, c. 1 cm. wide. Sepals strongly spreading, semitransparently ochreous, inside spotted dark red except at base and apex. Upper sepal reflexed from the very shortly clawed base, incurved above middle, elliptic, shortly apiculate, apiculus conic acute, 5-nerved, margins in upper half minutely erosulous, inside concave, outside convex sparsely warty, c. 1 cm. long, c. .48 cm. wide. Lateral sepals adnate to base of column, recurved from the very shortly clawed base, above base obliquely oblong, apex shortly apiculate, apiculus conic acute, 5-nerved, margins in upper half minutely erosulous, inside concave, outside convex sparsely warty, c. 1 cm. long, c. .50 cm. wide. Petals spreading, incurved about middle, base shortly clawed, subfalcate, above base elliptic-obovate, obtuse, 3-nerved, margins in upper 1/3 irregularly toothed, inside concave, outside convex, ochreous spotted red, margins very thin paler, c. .85 cm. long, c. .50 cm. wide. Lip adnate to base of column, 3-lobed, spurred, lamellae 2 above mouth of spur, erect triangular 2-toothed parallel, transparently yellowish, margins dark red c. .18 cm. long c. .20 cm. wide, joined on



anterior margins by a similar transverse lamella; side lobes reflexed from base, anterior margins often contiguous in middle, large, falcate, linear-cunecate, truncate, margins lacinate towards apex, laciniae produced into very many cylindrical shortly hairy .10-.15 cm. long appendages, rather shiny, semitransparently snow white, c. 1 cm. long, c. .35 cm. wide; midlobe above the broad base fleshy, strongly laterally flattened, entirely papillose, seen from the side porrect, linear in basal half, above middle abruptly and obtus-angulantly incurved, in upper half linear, subulate-acuminate below the narrowly obtuse apex, white, c. .35 cm. long, c. .15 cm. wide; spur rather large, porrect, nearly parallel to column, straight, narrowly cylindrical, dilate below the narrowly obtuse apex, yellowish, fully 1 cm. long. Column short, dilate in middle, yellowish with a transverse pale red streak at base, c. .23 cm. long; clinandrium slightly excavate, suborbicular, produced on back; rostellum produced to a beak long subulate apex incurved c. .17 cm. long; stigma very large, suborbicular. Anther cucullate, seen from above transversely subquadrate, a short broad median keel at base, 2-celled, cells slightly elevate on back transversely oval separated by a median groove, opercula 2 suborbicular inside at base, apex produced to a beak large triangular shortly truncate convex above concave below. Pollinia 2, subglobose, yellow, joined to the caudicle by a rather stout highly elastic filament; caudicle very long, narrowly linear, triangularly dilate towards apex, below apex abruptly incurved elevate in a median keel bearing the filaments of the pollinia, margins above base revolute, white, c. .25 cm. long; disc minute, narrowly oval, yellowish. Ovary shortly clubbed-hairy.

Kuala Teku on a branch of a tree overhanging the Teku river at an altitude of about 500 feet.

A distinct species remarkable for the structure of the lip. The side lobes are particularly interesting with their curious fringe, quite unlike any plant of the group known to me. The specific name refers to the side lobes which show a passable resemblance to the tail feathers of an ostrich. The erect lamellae at the entrance to the spur are quite transparent and probably serve as guides to the maxillae of moths. The midlobe is curiously curved in the form of a hook.

Described from living plants in cultivation at Tembeling, Pahang.

## PLATE I.

Fig. 1. *Oberonia subnavicularis*, King & Pantling.

- a. Bract.
  - b. Upper sepal.
  - c. Lateral sepal.
  - d. Petal.
  - e. Flower, from the side.
  - f. Flower, from the front.
  - g. Lip, spread out.
  - h. Column, from the side.
- All enlarged.

Fig. 2. *Oberonia lanpongensis*, J.J.S.

- a. Bract.
  - b. Upper sepal.
  - c. Lateral sepal.
  - d. Petal.
  - e. Anther, from above.
  - f. Flower, from the front.
  - g. Lip, spread out.
- All enlarged.

Fig. 3. *Dendrobium pahangense*, Carr.

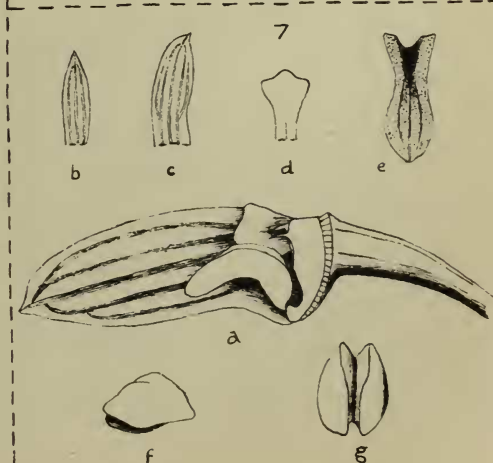
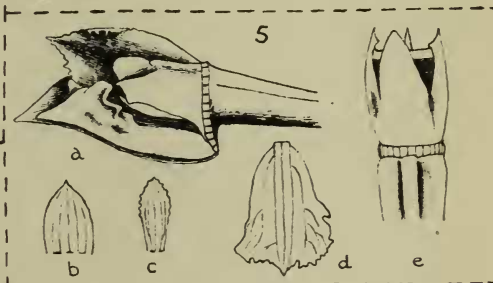
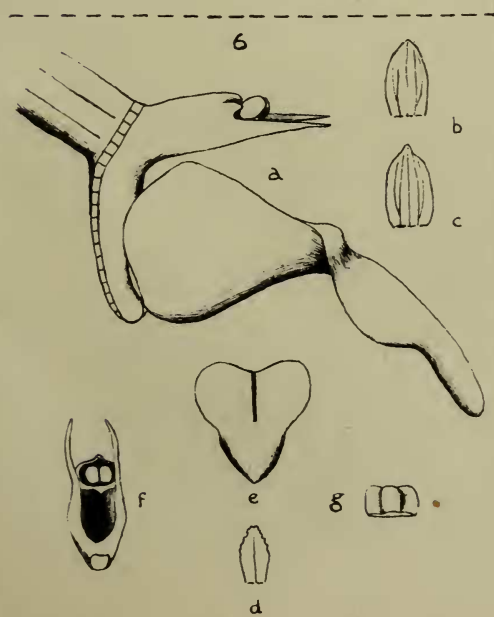
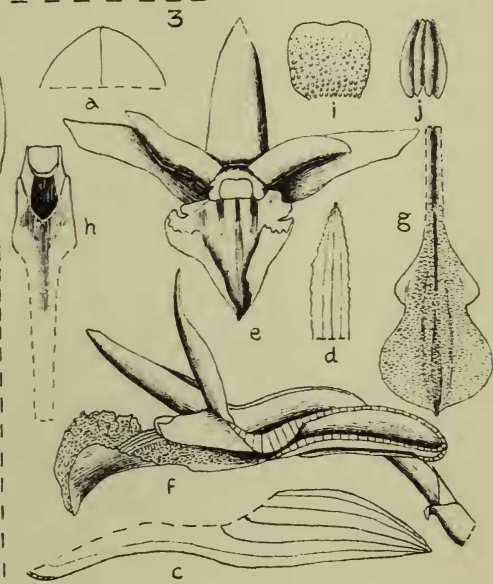
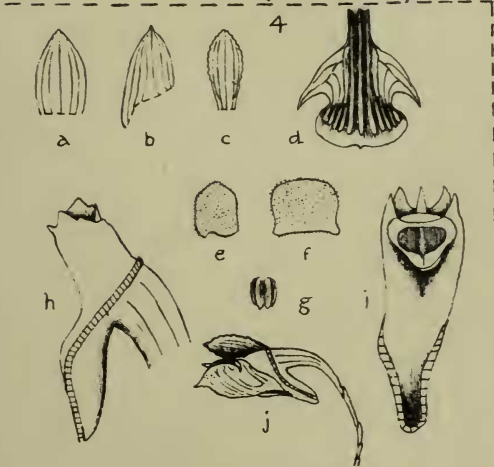
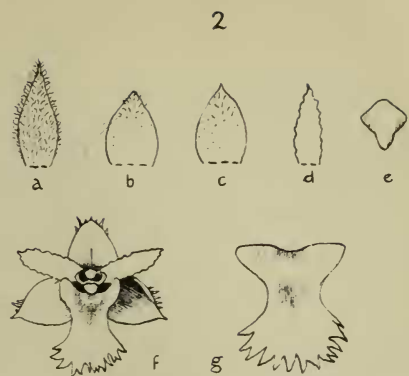
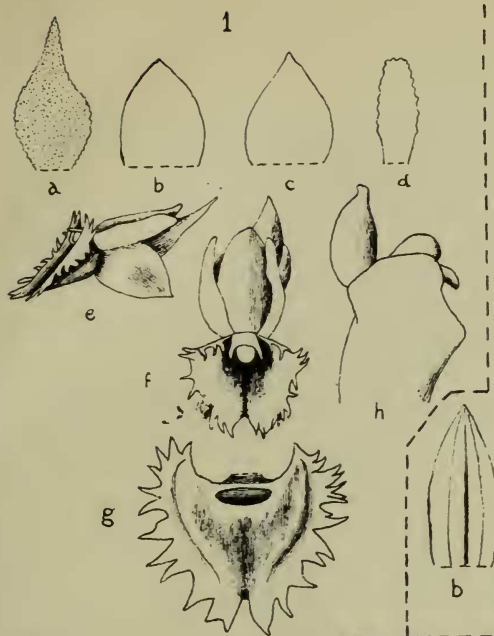
- a. Bract.
- b. Upper sepal.
- c. Lateral sepal.
- d. Petal.
- e. Flower, from the front.
- f. Flower, in section.
- g. Lip, spread out.
- h. Column, from the front.
- i. Anther, from the front.
- j. Pollinia.

Fig. 4. *Dendrobium Hosei*, Ridl.

- a. Upper sepal.
  - b. Lateral sepal.
  - c. Petal.
  - d. Lip, spread out.
  - e. Anther, from the side.
  - f. Anther, from the front.
  - g. Pollinia.
  - h. Column, from the side.
  - i. Column, from the front.
  - j. Flower, from the side.
- a-i* enlarged, *j*. nat. size.

Fig. 5. *Dendrobium Hosei*, Ridl. var *Pelor*, Carr.

- a. Flower, from the side.
  - c. Lateral sepal.
  - e. Petal.
  - d. Lip, spread out.
  - e. Column, from the front.
- b*. *c*. about nat. size, remainder enlarged,



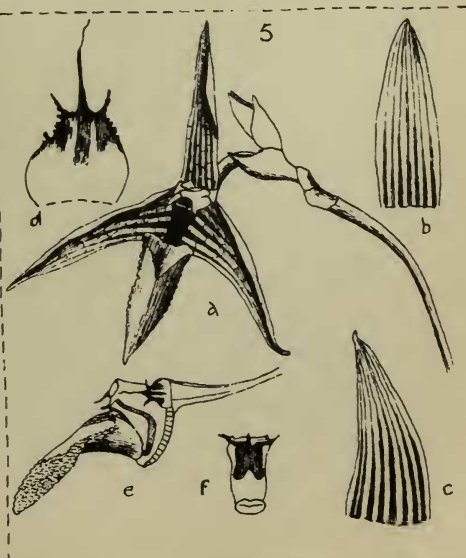
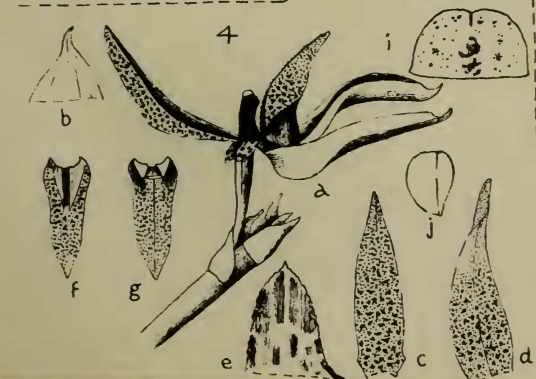
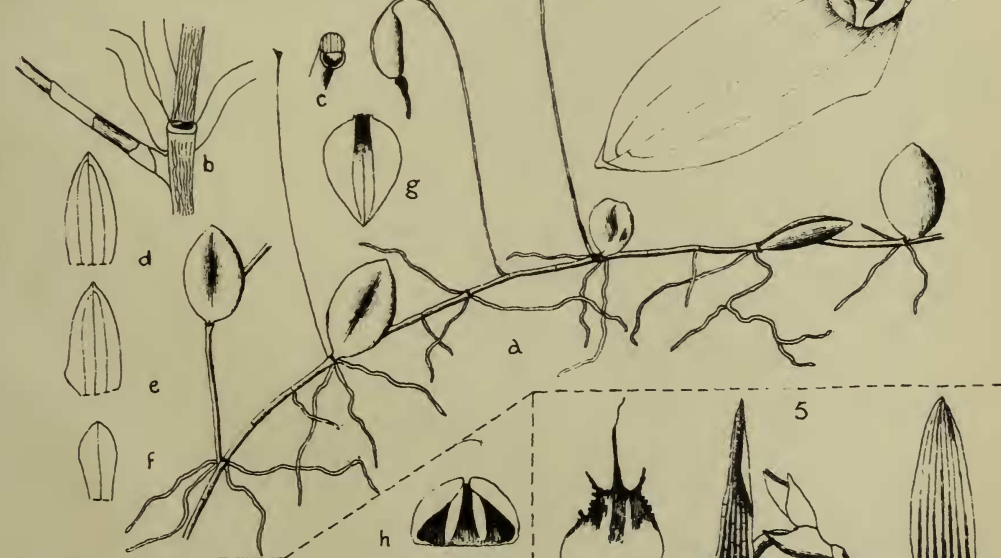
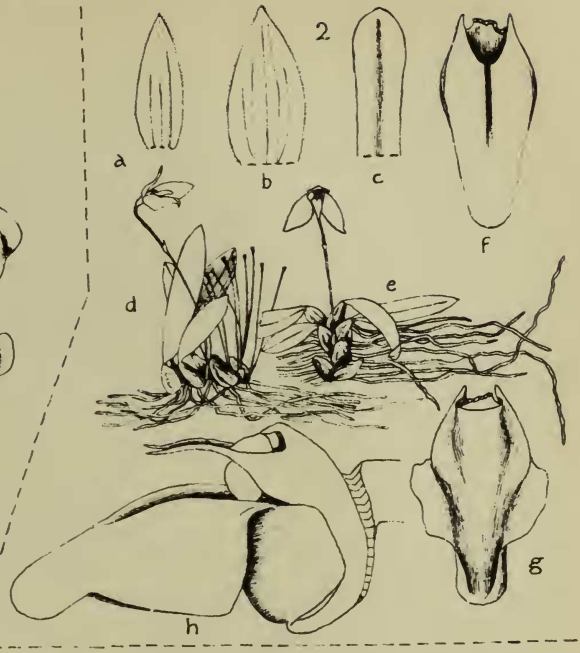
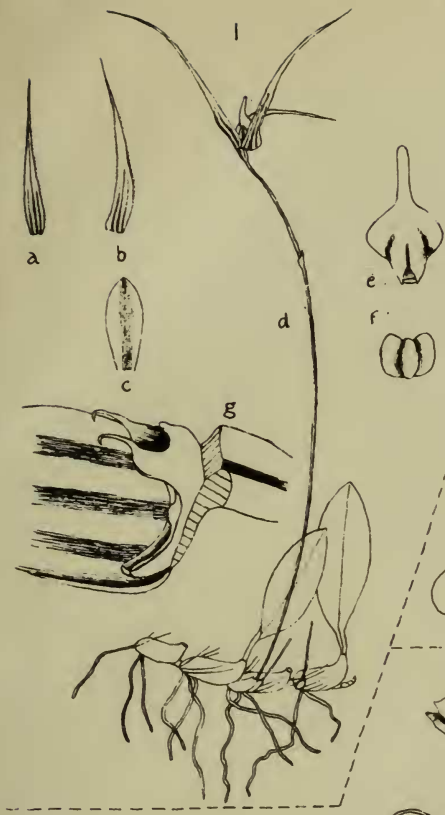


- Fig. 6.** *Bulbophyllum ignevenosum*, Carr.  
*a.* Lip and column, from the side.  
*b.* Upper sepal.  
*c.* Lateral sepal.  
*d.* Petal.  
*e.* Lip, spread out.  
*f.* Column, from the front.  
*g.* Anther, from above.  
 All enlarged.

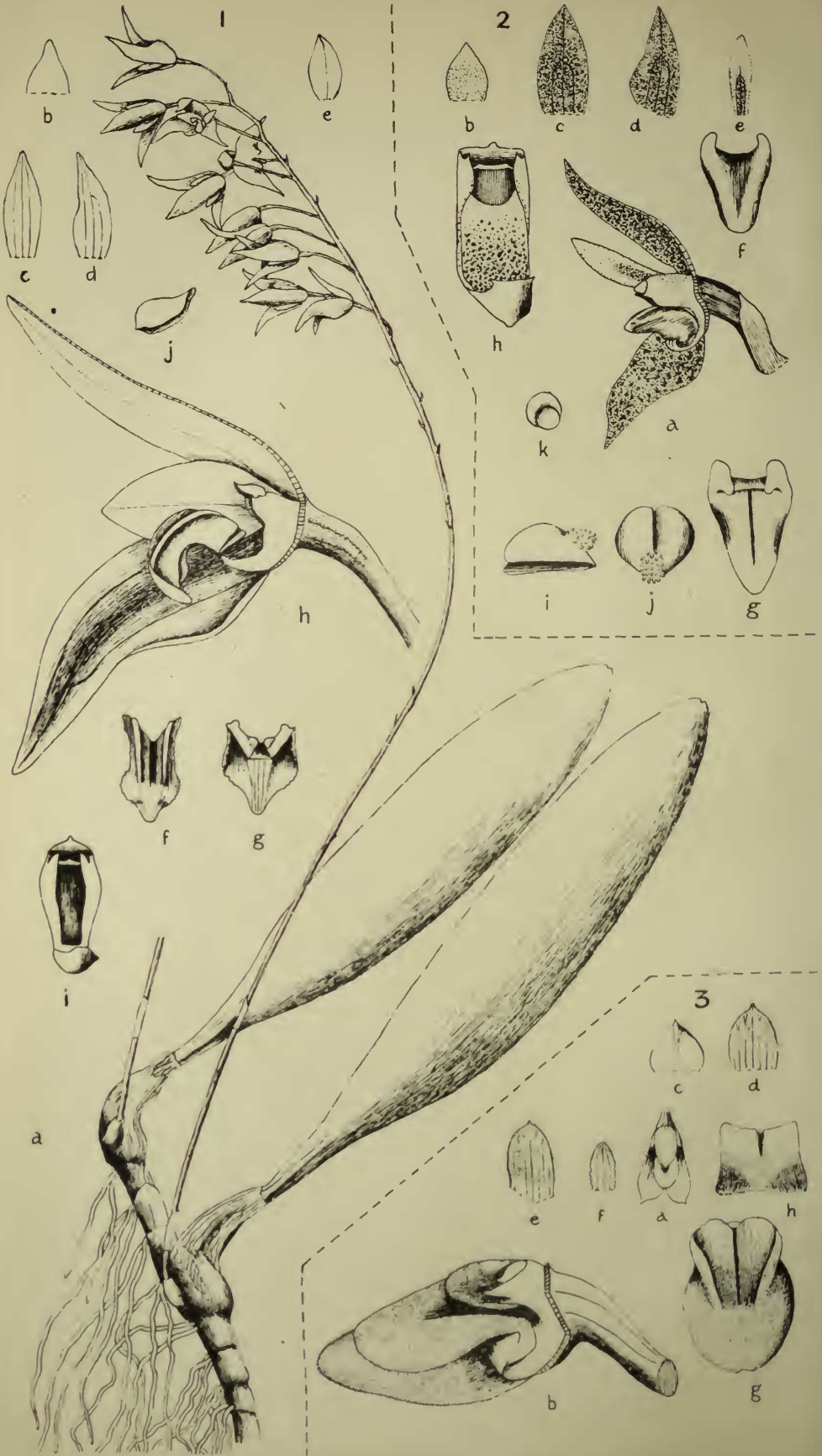
- Fig. 7.** *Bulbophyllum tekuense*, Carr.  
*a.* Flower, from the side.  
*b.* Upper sepal.  
*c.* Lateral sepal.  
*d.* Petal.  
*e.* Lip, spread out.  
*f.* Anther, from the side.  
*g.* Pollinia.  
 All enlarged.

## PLATE II.

- Fig. 1. *Bulbophyllum tristriatum*, Carr.  
*a.* Upper sepal.  
*b.* Lateral sepal.  
*c.* Petal.  
*d.* Plant, nat. size.  
*e.* Lip, spread out.  
*f.* Anther, from above.  
*g.* Column, from the side.  
*a, b, d* nat. size, remainder enlarged.
- Fig. 2. *Bulbophyllum biseriale*, Carr.  
*a.* Upper sepal.  
*b.* Lateral sepal.  
*c.* Petal.  
*d.* Plant, nat. size.  
*e.* Plant, from above.  
*f.* Lip, from above.  
*g.* Lip, from below.  
*h.* Lip and column, from the side.  
*d, e* nat. size, remainder enlarged.
- Fig. 3. *Bulbophyllum dryas*, Ridl.  
*a.* Plant.  
*b.* Portion of rhizome and inflorescence.  
*c.* Pseudobulb.  
*d.* Upper sepal.  
*e.* Lateral sepal.  
*f.* Petal.  
*g.* Lip, spread out.  
*h.* Flower in section, from the side.  
*a* nat. size, remainder enlarged.
- Fig. 4. *Bulbophyllum Stella*, Ridl.  
*a.* Flower, from the side.  
*b.* Bract.  
*c.* Upper sepal.  
*d.* Lateral sepal.  
*e.* Petal.  
*f.* Lip, from above.  
*g.* Lip, from below.  
*h.* Anther, from below.  
*i.* Anther, from above.  
*j.* 2 pollinia.  
*a, b, c, d, f, g* nat. size; *e, h, i, j*, enlarged.
- Fig. 5. *Bulbophyllum cleistogamum*, Ridl.  
*a.* Flower, from the front.  
*b.* Upper sepal.  
*c.* Lateral sepal.  
*d.* Petal.  
*e.* Lip and column from the side.  
*f.* Column, from the front.  
*d* enlarged, remainder nat. size.







## PLATE III.

Fig. 1. *Bulbophyllum tahanense*, Carr.

- a. Plant.
  - b. Bract.
  - c. Upper sepal.
  - d. Lateral sepal.
  - e. Petal.
  - f. Lip, from above.
  - g. Lip, from below.
  - h. Flower, in section.
  - i. Column, from the front.
  - j. Anther, from the side.
- a natural size, remainder enlarged.

Fig. 2. *Bulbophyllum foetidolens*, Carr.

- a. Flower, from the side.
  - b. Bract.
  - c. Upper sepal.
  - d. Lateral sepal.
  - e. Petal.
  - f. Lip, from above.
  - g. Lip, from below.
  - h. Column, from the front.
  - i. Anther, from the side.
  - j. Anther, from above.
  - k. 2 pollinia.
- All enlarged.

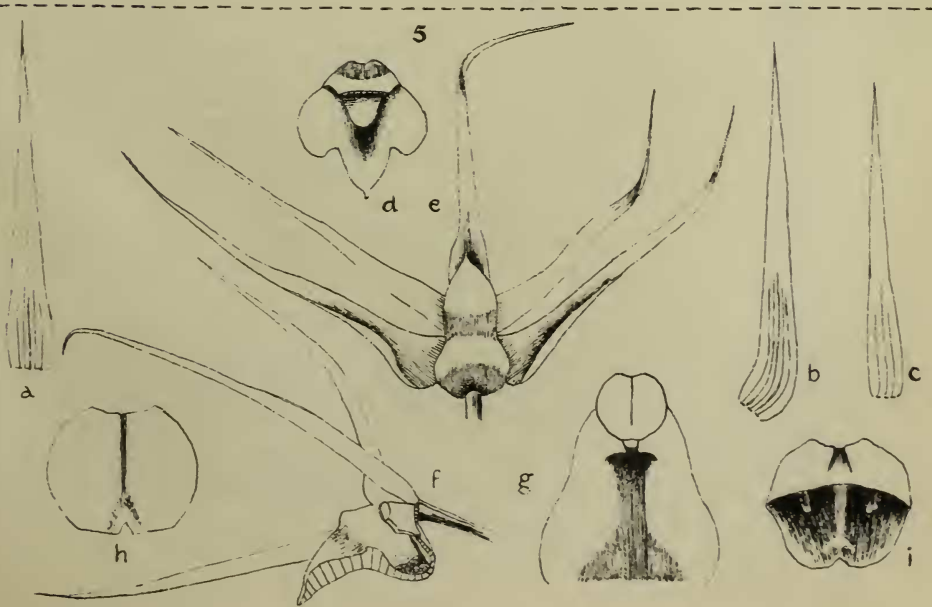
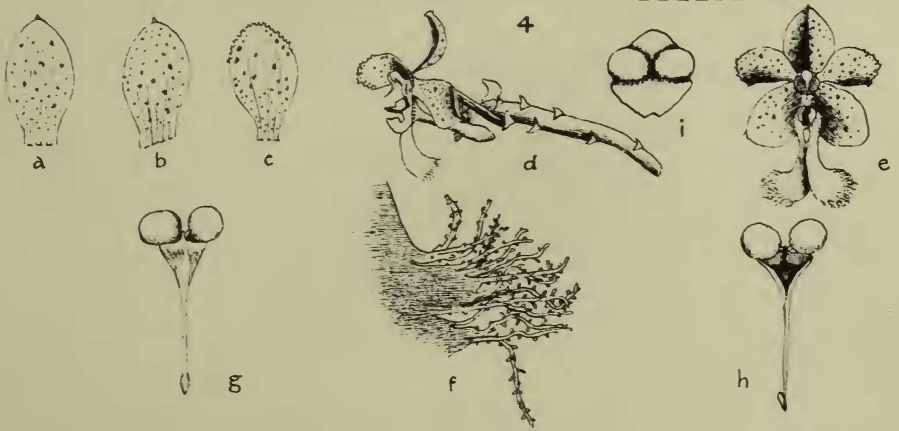
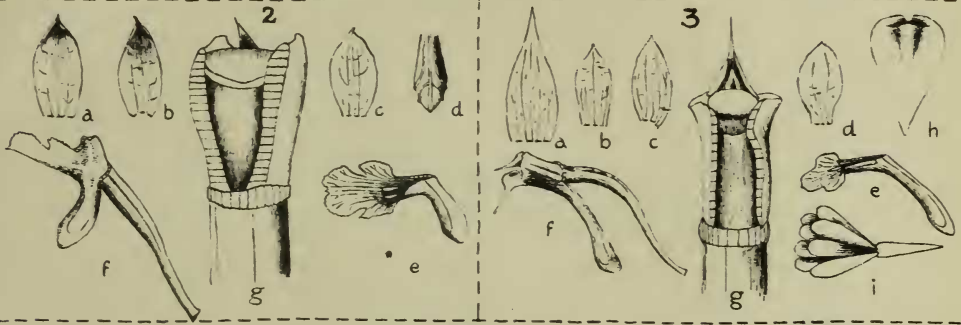
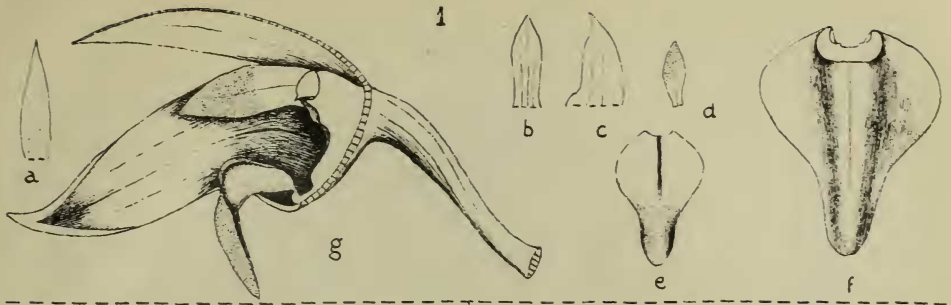
Fig. 3. *Bulbophyllum apiferum*, Carr.

- a. Flower, from above.
  - b. Flower, from the side.
  - c. Bract.
  - d. Upper sepal.
  - e. Lateral sepal.
  - f. Petal.
  - g. Lip, from above.
  - h. Anther, from above.
- a natural size, remainder enlarged.

## PLATE IV.

- Fig. 1. *Bulbophyllum vaginulosum*, Carr.  
*a.* Bract.  
*b.* Upper sepal.  
*c.* Lateral sepal.  
*d.* Petal.  
*e.* Lip, from above.  
*f.* Lip, from below.  
*g.* Flower, from the side.  
 All enlarged.
- Fig. 2. *Calanthe rigida*, Carr.  
*a.* Upper sepal.  
*b.* Lateral sepal.  
*c.* Petal.  
*d.* Spur, from above.  
*e.* Lip, spread out.  
*f.* Lip and column, from the side.  
*g.* Column, from below.  
*g* enlarged, remainder natural size.
- Fig. 3. *Calanthe pusilla*, Carr.  
*a.* Bract.  
*b.* Upper sepal.  
*c.* Lateral sepal.  
*d.* Petal.  
*e.* Lip, spread out.  
*f.* Lip and column, from the side.  
*g.* Column, from below.  
*h.* Anther, from above.  
*i.* Pollinia.
- Fig. 4. *Pennilabium struthio*, Carr.  
*a.* Upper sepal.  
*b.* Lateral sepal.  
*c.* Petal.  
*d.* Flower and inflorescence, from the side.  
*e.* Flower, from the front.  
*f.* Portion of apical margin of side lobe of lip.  
*g.* Pollinia, from above.  
*h.* Pollinia, from below.  
*i.* Anther, from above.  
*d* and *e* natural size, remainder enlarged.
- Fig. 5. *Thrixspermum tahanense*, Carr.  
*a.* Upper sepal.  
*b.* Lateral sepal.  
*c.* Petal.  
*d.* Lip, spread out from above.  
*e.* Flower, from below.  
*f.* Flower, in section.  
*g.* Column, from below.  
*h.* Anther, from above.  
*i.* Anther, from below.





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