

XXXV. *On some new Brazilian Plants allied to the Natural Order
Burmanniaceæ. By JOHN MIERS, Esq., F.L.S.*

Read March 3rd and 17th, 1840.

I VENTURE to present to the notice of the Linnean Society the following observations on some new and interesting plants found by me in Brazil, and bearing a close affinity to *Burmannia*. They appear to constitute the types of new genera; and though at first sight they would seem to belong to *Burmanniaceæ*, I think it will be admitted that the differences they present entitle them to be considered as forming, if not a new natural order, at least a very distinct subfamily. We are already indebted to the learned Dr. Von Martius for a knowledge of several *Burmannias* indigenous to Brazil. In his *Nova Genera et Species Plantarum Brasiliensium* not only are the characters of the genus *Burmannia* ably detailed, but five Brazilian species, which he met with in the interior provinces, are there fully described. The same genus has also been met with in North America, two species having been found to which the name of *Tripterella* was given by Michaux. Seven other species have likewise been found in Africa, India, and New Holland. These are all the plants, as far as I can learn, that correspond with the character hitherto given of *Burmanniaceæ*. The North American plant described by Mr. Nuttall under the name of *Apteria setacea*, as well as two new species discovered by Dr. Blume in Java and called by him *Gonyanthes candida* and *Gymnosiphon aphyllum*, will be hereafter mentioned.

I have had no opportunity of examining any species of *Burmannia*, except *B. bicolor*, Mart., which was first discovered in 1818 by Dr. Von Martius in the province of Minas Geraës. Mr. Gardner also found the same species in 1837 in his ascent to the higher portions of the Organ Mountain-range in the province of Rio de Janeiro; and to him I am indebted for a specimen which has enabled me to comprehend more correctly the relation which my plants bear

to the genus *Burmannia*. The plants I am about to describe will be found to possess entirely the habit of *Burmannia* in their thickened rhizoma with branching fibres, an erect stem almost naked, or at most furnished with a few bracteiform leaves, and terminal flowers with a tubular petaloid perianthium, having a six-parted border composed of three sepals and three petals; stamens three, almost sessile in the mouth of the tube of the perianthium below the petals; anther-cells disjoined, opening transversely; style simple; three stigmata; capsule surmounted by the withered perianth bursting irregularly; and seeds minute, resembling those of *Orchideæ*. *Burmannia*, however, possesses a trilocular capsule, with numerous seeds attached to a central placenta formed by the united margins of the dissepiments, while in all my plants the capsule is always one-celled, the seeds being attached to three thickened parietal placentæ,—a difference of no small amount. They vary moreover from *Burmannia* in the mode of dehiscence of the capsule, and in other respects, as will shortly appear.

Before entering on the description of the plants which form the subject of this paper, I will notice those before-mentioned recorded by Mr. Nuttall and Dr. Blume. That of the former is described in the “*Journal of the Academy of Natural Sciences of Philadelphia*,” vii. p. 64, under the name of *Apteria setacea*. Having seen it only in a dried state, Mr. Nuttall was not able to ascertain the particular structure of the stamens, but he describes it as having a similar petaloid perianthium, without the winged appendages of *Burmannia*, an inferior ovary, a simple style, a three-lobed stigma, an erect stem with a few scattered bracteiform leaves: the difference from *Burmannia*, however, is striking in the structure of the capsule; for instead of its being trilocular with central placentation, it is unilocular with parietal placentation.

Dr. Blume's plants are described in his *Enumeratio Plantarum Javæ*. *Gymnosiphon*, from its unilocular capsule and parietal placentation, will arrange with the plants which I am about to describe. In regard to *Gonyanthes*, I confess that I could not clearly comprehend that author's definition of it until I had examined some species of the genus. The following is his character, slightly modified from my own observations:—

GONYANTHES. *Blume.*

Perianthium petaloideum, superum, tubulosum: *tubo* triquetro: *ore* trifido, (in sinibus laciniaë tres minores sitæ). *Stamina* Burmanniæ, laciniis (exterioribus majoribus) perianthii alterna. *Ovarium* dilatato-trigonum, trilobulare; receptacula angulis perianthii opposita, semibifida. *Stylus* 1, trisulcus. *Stigmata* 3, dilatata, staminibus cohærentia. *Capsula* perianthio coronata, latè trigona, fenestrata, valvis nempè tribus lateralibus excisa, post dehiscentiam ob solutionem dissepimentorum valvis correspondentium unilocularis, polysperma. *Semina* minima, arillo membranaceo setiformi inclusa.

1. *G. candida*. Blume, Enum. Plant. Jav. p. 29.

To this may be added three unrecorded species which are contained in Dr. Wallich's Herbarium belonging to this Society. As they are not mentioned in his Catalogue, it is probable they had not been examined by that distinguished botanist. I therefore propose to characterize them as follows:—

2. *G. nepalensis*, caule erecto triquetro subaphyllo, foliis squamiformibus acutis, floribus subcymosis, perianthio 3-alato: alis rotundatis. TAB. XXXVIII. fig. 1.

Hab. in Nepaliâ.

Planta 3—4-pollicaris, albicans.

3. *G. Wallichii*, caule capillari erecto, foliis plurimis alternis bracteiformibus, floribus solitariis vel subtrichotomè cymosis pedicellatis bracteatis, perianthio angustè tubuloso: alis sublinearibus. TAB. XXXVIII. fig. 2.

Hab. in Regno Burmanico ad Kilaben.

Planta 3-pollicaris, purpurascens. *Flores* purpurei.

4. *G. pusilla*, caule capillari 1—3-floro, foliis radicalibus fasciculatis lanceolatis cuspidatis; caulinis bracteiformibus, perianthio tricarinato: alis dilatatis semiovatis. TAB. XXXVIII. fig. 3.

Tripteranthus pusillus. Wall. in Herb.

Hab. in Regno Burmanico ad Tavoy.

Planta 3-pollicaris. *Perianthium* albicans.

Dr. Blume makes no mention of petals in his generic character; but as they certainly exist in the Indian species, I have included a notice of them in a parenthesis. This genus will be seen to differ but little from *Burmannia*, except in the separation of the dissepiments from the pericarpium, which is hence enabled to split from wing to wing, transversely upon each face, presenting three widely-gaping apertures; and as the dissepiments become almost wholly contracted upon the central column, there results a clear passage across the capsule from one opening to the other: hence the meaning of the term “capsula fenestrata.” From what I have elsewhere shown relative to the structure of the walls of the capsule in Burmanniaceous plants, it will be easy to conceive the origin of this peculiar kind of dehiscence. In like manner as in *Burmannia*, owing to the complete inflection of the margins of the carpels into one central axis, the placentæ are thrown into a position alternating with their normal one, and are consequently placed upon the axile line in the inner angle of the cells, opposite to the wings of the perianth, and of course opposite to the sepals. This explains the meaning of Dr. Blume’s expression, “receptacula angulis perianthii opposita, semibifida,” a definition which exactly applies to *Burmannia* also.

Of the Brazilian plants I am about to describe, the first species was found by me in the neighbourhood of Rio de Janeiro in April 1837, and then named *Dictyostega orobanchioides*; not long after which Mr. Gardner sent specimens to England in the dried state, gathered from the same spot. I had good opportunities of examining this in a living state, and of making drawings and details of it as well as of the other species which were subsequently found.

1. DICTYOSTEGA.

Char. Diff. *Perianthium* tubulosum, ovario adnatum, supernè liberum: *limbo* 6-fido: laciniis tribus alternis minoribus. *Stamina* 3, filamentis brevissimis, antherarum loculis disjunctis transversim dehiscentibus. *Stylus* simplex. *Stigmata* 3. *Capsula* 1-locularis, sub-3-valvis, polysperma, apice dehiscens: *valvulis* medio placentiferis. *Semina* minuta, scobiformia, testâ laxâ, reticulatâ, diaphanâ, nucleo quintuplò longiore.

Char. Nat. *Perianthium* monophyllum, tubulosum, petaloideum, persistens, infernè ovario adnatum: *tubo* brevi, medio constricto: *limbo* 6-diviso;

laciniis inæqualibus; 3 exterioribus (sepalis) erectis, acutis; 3 interioribus (petalis) minoribus, obovatis, concavis, erectis, subunguiculatis, marcescentibus. *Stamina* 3, e tubo infra petala orta; *filamenta* brevissima, cornuta, crassiuscula, triangularia, subsaccata, apicibus mucronatis liberis, utrinque loculum antheralem distinctum ferentibus. *Antherarum loculi* disjuncti, ovales, subbilobi, dorso affixi, anticè medio transversim dehiscentes. *Pollen* granulosum, subcereaceum, flavidum, demùm ad fecundationem idoneum (tubo longissimo ex unoquoque granulo exiliente) flocculosum. *Ovarium* adhærens, subtrigonum, suburceolatum, apice libero rotundato-trilobo, uniloculare; placentis tribus parietalibus, multiovulatis. *Stylus* rectus, tenuis, trigonus, longitudine staminum. *Stigmata* 3, divaricata, brevia, apice clavato-cyathiformia, ore cyathi subtrigono, marginibus inflexis, et tunc quasi punctis tribus glutinosis instructo. *Pericarpium* capsulare, perianthii limbo marcescente coronatum, cylindraceum, trisulcum, uniloculare, nunc evalve apice dehiscens, nunc tri-valve ad basin dehiscens, marginibus irregularitè laceris, valvulis medio placentiferis. *Semina* numerosissima, minuta, oblonga, subcompressa, scobiformia; testâ laxâ, nucleo ampliori, liberâ, membranaceâ, diaphanâ, reticulatâ, areolis magnis elongatis. *Nucleus* obovatus, inversus, processu papillæformi ad hilum spectante, in medio testæ filo complanato suspensus. Cætera ignota.

Plantæ (*brasilienses*) *rhizocarpæ*, *radice fibrosâ squamis membranaceis imbricatis ciliatis incanis tectâ*. *Caulis erectus, subflexuosus, simplex, vel rariùs ramis 1—3 erectis, alternis, cauli consimilibus*. *Folia subsessilia, adpressa, bracteiformia*. *Inflorescentia terminalis, dichotomè racemosa, vel subumbellato-cymosa, floribus pedicellatis purpurascens*.

Nomen e *δικτυον*, *rete*, et *στεγη*, *membrana*, propter seminis testam notabiliter reticulatam.

1. *D. orobanchioides*, caule erecto subsimplici, racemis geminis, floribus nutantibus unibracteatis, bracteis cum pedicellis alternantibus, capsulâ subvalvatâ ecostatâ longitudinalitèr dehiscenti. TAB. XXXVII. fig. 1.

Apteria orobanchioides. *Hook. Ic. Pl. t.* 254.

Plant herbaceous, almost leafless, with a simple or branching stem, altogether
VOL. XVIII. 4 B

glabrous, subhyaline or opaque: *root* consisting of a subligneous, somewhat fleshy, irregularly fusiform tuber, covered with numerous imbricate, obovate, acute, whitish, reticulated scales, fringed with long cilia: the root also throws out numerous threadlike branching fibres of considerable length. *Stem* erect, slender, cylindrical, subflexuose, spirally twisting, white, of rather softish texture, about ten inches in height, sometimes simple, less frequently branched. *Branchlets* erect, furnished at distant intervals with minute bracteiform leaves, and all terminated by a double spike of flowers. *Leaves* alternate, obovate, with acute tips, entire, reticulate, without any longitudinal nerve, erect and adpressed against the stem, about a line long, white, bearing a resemblance to small bractes, persistent, and distant about half, or rarely an inch, from each other. *Racemes* double, with alternate simple pedicellate flowers; pedicels first ascending, then recurved, so that each flower is pendent, four times the length of the bractes, three times the length of the flower at maturity, each furnished with a bracte similar in size and form to the stem-leaves, always either lateral or opposite, and usually a little below the origin of each pedicel. *Perianthium* adnate to the ovarium at base, above tubular, contracted below the mouth; border six-cleft, three segments or sepals being more exterior, and overlapping the alternating inner segments or petals in æstivation, white, persistent and withering, but deciduous on the bursting of the capsule. *Sepals* oblong, acute, erect. *Petals* obovate, somewhat smaller, shorter and rounder than the sepals, erect, concave, whitish, and often deciduous. *Stamens* three, arising from below the centre of each petal; *filament*, or what may rather be considered as connective, an uncinate, projecting, fleshy process, forming a sort of very small pouch attached to the perianth, and on its margin, on each side of the point, are suspended two distinct parallel anther-cells, which are ovate and rounded, somewhat two-lobed, attached by their back, of a pale yellow or almost white, bursting transversely across the middle, and displaying the pollen, which is of a dark yellow colour, composed of closely-packed somewhat waxy granules, coarser than the ordinary grains of pollen, and approximating in appearance to the pollinia of *Orchideæ*. *Ovarium* inferior, urceolate, white, hyaline, unilocular, with three parietal

placentæ, each formed of a bundle of descending vessels, the only longitudinal fibres to be seen in the whole structure. *Style* a short trigonous, trisulcate column, arising out of the convex six-grooved free summit of the ovarium, having its angles as well as the stigmata continuous with the placentary lines, and opposite to the petals. *Stigmata* three, sigmoid, divaricate, short, each terminated by a sort of cup with its margin compressed on three sides, leaving only three open points at the angles, appearing like as many glandular dots, in which is seen the thick viscous fluid with which the cup is filled: they wither with the flower, but the style is always persistent. *Capsule* rather ovate, double the size of the ovarium when the flower first expands, yellowish white, nerveless, three-valved, bursting by laceration of the membranes, each valve submembranaceous, showing in its centre the elastic horny placenta crowned by a portion of the style. *Seeds* very numerous, filling the whole cavity of the capsule, and densely radiating in close series round the placentations, very minute, scobiform, similar to those of some *Orchideæ*. *Testa* oblong, somewhat curved, truncated at the base, swelling a little in the middle, and tapering much towards the apex, consisting of an exceedingly thin transparent membrane, composed of long, rhomboidal or hexagonal cells, of which the partitions are strong and very prominent, and the intervening membrane is transparent and colourless: it presents in its centre a much smaller pyriform nucleus, which is opaque, and seemingly free within the testa, inverted, and suspended by a compressed cord from the apex of the latter; the end pointing towards the hilum is contracted into a sort of nipple.

This species was found by me, at the period already stated, in the woody range of the Corcovado Mountain in the vicinity of Rio de Janeiro, at an elevation of nearly 2000 feet above the level of the sea, growing upon decaying timber, particularly on the decayed roots of palms.

2. *D. umbellata*, caule erecto simplicissimo, foliis erecto-patulis, umbellâ simplici 6—9-florâ, floribus erectis, pedicellis basi bracteatis, ovario ecostato. TAB. XXXVII. fig. 2.

Plant similar in habit to the former species, but smaller. The root is more

fibrous; the stem simple in every specimen I met with, and scarcely exceeding four inches in height. The leaves are also bracteiform, erect, but not so much adpressed. The umbel consists of six to nine pedicellated flowers; it can hardly be said to be forked, as the pedicels all possess nearly one common origin; these are somewhat erect and spreading, furnished at their base with bractes somewhat larger than the stem-leaves; the flowers are smaller, of rather a deep lilac or rose colour. The stem and leaves are likewise slightly tinged with a rosy hue.

I met with this species in February 1839, only in one spot, in a dense wood on the Organ Mountains, in the province of Rio de Janeiro, growing in loose fibrous mould; but it was at that time not sufficiently advanced to ascertain the dehiscence of the capsule or form of the seed.

3. *D. costata*, caule erecto simplici, floribus erectis, cymâ bibracteâtâ, pedicellis ebracteatis, capsulâ evalvi 6-costatâ apice dehiscenti.

This plant was found on the Corcovado Mountain near Rio de Janeiro, growing near the same spot with *D. orobanchioides* and *Cymbocarpa*. It is scarcely more than three inches high, 6—7-flowered, with an aspect very similar to the last species, but the umbel is rather more forked, it has fewer bractes, the leaves on the stem are smaller, the flowers are not so large and are nearly white, and there are six distinct rounded striæ or ribs upon the pedicel and capsule. The capsule does not separate into valves, but its free conical summit bursts into three equal segments crowned by portions of the persistent style, which still remains united at its apex.

I am indebted to George Bentham, Esq. for a specimen of another very distinct species of *Dictyostega* lately collected by Mr. Schomburgk in British Guiana. The inflorescence is in a double raceme of few flowers; the perianthium is proportionally broader and shorter, not so much contracted at the middle, and the segments are more obtuse: it is marked by six ribs, and the capsule, as in the last-mentioned species, opens only at the apex. There is a bracte to each flower, not placed at the base of the pedicel, but opposite to it.

4. *D. Schomburgkii*, caule erecto subsimplici, racemis geminis paucifloris,

floribus unibracteatis, bracteis pedicellis oppositis, perianthio medio haud constricto: laciniis obtusioribus, capsulâ 6-costatâ apice dehiscenti.

Sir William Hooker, in his *Icones Plantarum*, tab. 254, has figured the first-mentioned species of *Dictyostega* under the name of *Apteria orobanchioides*; but it will be seen that this eminent botanist was under a mistake in referring the plant to *Apteria*, owing perhaps to the imperfect description given of that genus by Mr. Nuttall.

2. CYMBOCARPA.

Char. Diff. *Perianthium* tubulosum, ovario adnatum, supernè liberum: *limbo* 6-fido, *laciniis* tribus alternis minoribus. *Stamina* omninò *Dictyostegæ*. *Stylus* simplex. *Stigma* trilobum; *lobis* gibboso-rotundatis, corniculis 2 subulatis erectis instructis. *Ovarium* gibboso-trigonum, uniloculare, placentis tribus parietalibus. *Capsula* 1-ocularis, latere unico ad angulum superiorem tantùm dehiscens. *Semina* numerosissima, scobiformia; testâ reticulatâ nucleum vix superante.

Char. Nat. *Perianthium* monophyllum, tubulosum, petaloideum, subgibbosum, persistens, infernè ovario adnatum, supernè liberum, angustatum, ore ampliato: *limbo* 6-diviso, laciniis erectis, inæqualibus, 3 exterioribus (sepalis) acutis, sinubus rotundatis, 3 interioribus (petalis) subunguiculatis, brevioribus, ovalibus. *Stamina* 3, omninò *Dictyostegæ*. *Stylus* rectus, tenuis, trigonus, persistens, longitudine staminum. *Stigma* trilobum; *lobis* gibboso-ovatis, divergentibus, utrinque appendice longo subulato erecto incurvato auctis. *Ovarium* adhærens, subpyriforme, inæqualitèr trigonum, apice libero conico, uniloculare, placentis tribus parietalibus multi-ovulatis. *Pericarpium* capsulare, perianthio marcescente obtectum, oblongum, gibbosum, trigonum, angulis rotundatis, uniloculare, seminibus minutissimis e placentis tribus parietalibus radiantibus densè refertum, angulo superiore lacerato hians. *Semina* minuta, oblonga, scobiformia, apice attenuata; testâ nucleo conformi, reticulatâ, areolis elongatis angustissimis, costis valdè prominulis; funiculo tenui ejusdem longitudinis.

Plantæ (brasilienses) rhizocarpæ, radice fibrosâ, caule simplici subflexuoso erecto. Folia sessilia, bracteiformia, erecta, aut adpressa. Inflorescentia dichotomè

racemosa, pauciflora, floribus flavescenti-albidis basi bracteatis, pedicellis brevissimis apice abruptè declinatis subgeniculatis.

Derivatio ex κυμβη, *cymba*, et καρπος, *fructus*, propter figuram cymbiformem capsulæ post dehiscentiam.

1. *Cymbocarpa refracta*. TAB. XXXVIII. fig. 4.

Native of the Corcovado Mountain, near Rio de Janeiro.

This plant resembles *Dictyostega* very much in habit, but the singular form of the stigma and the remarkable dehiscence of the capsule sufficiently distinguish it. It grows to the height of from three to six inches, and is altogether white with a yellowish hue: it has delicate fibres branching from a simple root: the stem is generally simple, very slender, erect, often flexuose, sometimes even tortuose. The bracteiform leaves are erect and free, rather acute, and very small. The stem is terminated by a pair of few-flowered racemes, each generally with from three to six flowers upon short pedicels, with a single small bracte on its summit, where the flower is suddenly bent back at a right angle. The tubular perianthium above the portion investing the oval-shaped ovarium is very short, and gradually contracted a little below the mouth, where it again expands, and its border is divided into six unequal segments, the three erect acute sepals being alternate with the three shorter petals, which are of an oval form, and somewhat concave, more interior, and fixed by a short claw in the rounded spaces intervening between the sepals. The stamens resemble those of *Dictyostega* in all respects. The ovarium is oblong, rounded, slightly conical at its summit, where it is free from the perianthium, and from it rises an erect, slender, short style; the stigmata, each with two long subulate erect horns, according to the description given in the generic character, are of a whitish colour; they nearly fill the mouth of the tube, and are contiguous to the stamens. The somewhat trigonous capsule, crowned by the persistent withered perianthium and style, bursts only on one of its angles in the singular manner described, displaying a great number of yellowish, opaque, scobiform seeds, which are crowded upon the three longitudinal, horny, parietal placentæ. It was found in the Corcovado Mountain, close to the spot where the *Dictyostega orobanchioides* occurs.

3. APTERIA. *Nuttall*; olim STEMOPTERA *mihi*.—*Character reformatus*.

Char. Diff. *Perianthium* ovario adnatum, suprâ liberum, subinfundibuliforme; fauce turgidâ, sacculis 3 interioribus auctâ; limbo 6-partito, laciniis acutis, æstivatione marginibus induplicatis, 3 alternis brevioribus. *Stamina* 3, fauci adnata, filamentis complanatis, e margine sacculorum ortum ducentibus, bifurcatis, ramulo singulo antherifero alato. *Ovarium* turbinatum, 1-loculare, placentis 3 parietalibus. *Stylus* longitudine staminum. *Stigmata* 3, recurvata, apice glandulifera. *Capsula* 1-ocularis polysperma, sub- 3-valvis, apice 3-fido dehiscens. *Placentæ* 3, parietales. *Semina* numerosissima, scobiformia; testâ nucleum vix excedente, reticulatâ, areolis elongatis obliquè dispositis.

Char. Nat. *Perianthium* monophyllum, tubulosum, petaloideum, persistens, infernè ovario adnatum, supernè infundibuliforme; fauce prominentiis tribus (sacculis totidem interioribus conformibus) ampliâtâ; limbo 6-partito, laciniis erectis, acutis, persistentibus; æstivatione sepalis tribus, marginibus basi subinflexis, supernè imbricatis, petalis tribus alternis, marginibus induplicatis, brevioribus, latioribus, submucronatis, minùs acutis: infra petala, in medio tubo sacculis tribus infundibuliformibus staminiferis ore rotundato subemarginato. *Stamina* 3, e margine sacculorum orta. *Filamenta* erecta, brevia, apice bifurcata; ramis divaricatis ejusdem longitudinis, singulis apice loculum antheralem gerentibus, alis duabus magnis petaloideo-membranaceis auctis. *Antherarum loculi* ovati, subbilobi, transversim irregularitèr dehiscentes; *polline* granuloso, subcereaceo, cohærente. *Stylus* filiformis, trigonus, erectus, persistens, longitudine staminum. *Stigmata* tria, divaricata, sigmoidea, apice clavata, subcrateriformia, ore glutinoso, discoideo, lateribus compresso. *Ovarium* inferum, oblongum, subtrigonum, apice libero, conico, uniloculare; placentis tribus parietalibus multi-ovulatis. *Pericarpium* capsulare, perianthio marcescente obtectum, 3-sulcatum, 1-loculare, enerve, apice trifariâ dehiscens, interdùm subtrivalve, ab apice ad basin irregularitèr fissum, valvulis medio longitudinalitèr placentiferis. *Semina* numerosissima, minuta, oblonga, funiculo suspensa, testâ nucleo conformi, apice subumbilicatâ, reticulatâ, areolis elongatis obliquè dispositis.

Plantæ (*Bras. et Amer. Bor.*) *rhizocarpæ, radice fibrosâ. Caulis erectus, subdichotomè ramosus, ramis subflexuosis. Folia pauca, sessilia, erecta, bracteiformia, pallida. Inflorescentia terminalis, uniflora. Flores cæteris majores, erecti, ebracteati, purpurascetes.*

1. *A. setacea*, Nutt.

On this species I need only remark, in justice to Mr. Nuttall, that he states all his materials to have been derived from dried specimens, and that he could not distinguish the nature of the stamens. Had he been able to observe the plant in its living state, he would no doubt have witnessed the curious development of those organs so peculiar to the genus. From all that he had noted and recorded of *Apteria*, there was sufficient ground for concluding that my Brazilian plant constituted a distinct genus, and accordingly I had named it *Stemoptera* from the peculiar character of the stamens, although I confess that its close approximation to Mr. Nuttall's plant had forcibly struck me. While I was preparing these details, Mr. Brown examined a specimen of *Apteria setacea* in his possession from the original locality, and identified my plant with Mr. Nuttall's genus, of which Mr. Bentham also examined another species collected by Hartweg in Mexico; these observations were kindly communicated to me, and I was favoured with the sight of a specimen, when I could perceive by transmitted light the hollow sacs in the perianthium above described, and somewhat similar winglike expansions of the filaments. I did not hesitate, therefore, to suppress my generic name and substitute for it that of *Apteria*.

2. *A. lilacina*, caule ramoso, foliis plurimis acutis erecto-patentibus, perianthio urceolato-tubuloso: laciniis exterioribus 3 lanceolatis acuminatis; interioribus 3 ovatis mucronulatis. TAB. XXXVIII. fig. 5.

A native of the Serra dos Orgãos, near Rio de Janeiro.

I have already observed, that in general habit and appearance this plant bears much resemblance to the figure Mr. Nuttall has given of his *Apteria setacea*: the singular expansion of the filaments and the swellings in the mouth of the perianthium give to *Apteria* a very distinct character from all the related genera. Its flowers are greatly larger than those of *Dictyostega* or

Cymbocarpa. It is from three to five inches in height, of a uniform whitish colour, but slightly tinged with purple. The root is composed of small fibres, close to which the stem divides, somewhat dichotomously, into several erect branches, which are sometimes flexuose; the leaves are alternate, sessile, acute, bractelike, and not quite so much adpressed as those of *Dictyostega*. The terminal solitary flowers are three-fourths of an inch long; above the ovary the tube of the perianthium narrows into a long slender form, somewhat widening upwards, and the upper portion is suddenly enlarged to three times the diameter of the lower, and marked by three roundish oblong swellings a short distance beneath the petals: the perianthium is of a lilac colour, somewhat darker below; the border being divided into six unequal erect teeth, of which the three outer are longer and more acute, the three inner ones (petals) being somewhat broader, more obtuse, and slightly mucronulate; they show the markings of the æstivation, as described in the generic character: the three hollow cavities corresponding with the external protuberances are funnel-shaped, and terminate acutely towards the base of the tube, the margin of their orifices being rounded and deeply notched in front, whence the stamens proceed: this saccate tube bears some resemblance to the small saccate filaments of *Dictyostega* and *Burmannia*, and may be supposed by analogy to constitute part of the stamen. The filament, which appears in the emargination of the sac, is at first erect, short, round and slender, being somewhat swollen at its apex, where it is suddenly bifurcated, its arms being divaricated almost horizontally, and somewhat thrown back upon one another; at their origin they are no thicker than the simple portion of the filament, and are about the same length, but they gradually enlarge towards their summit, and terminate abruptly each by a single anther-cell, which is adnate to it by its back; attached to the rear of the filament, and originating at its base, are two membranaceous winglike appendages, joined by their inner sides just above its bifurcation, and expanding to three times its length into a gibbous oblong body on each side, erect, and somewhat connivent in a direction corresponding with the mouth of the sac: the whole stamen is of the same colour as the perianthium, but quite pale. The anther is of a pale yellowish-white, and bursts in a transverse direction, separating, as it were, its two lobes, and displaying the pollen in closely-packed cohering subcereaceous granular

masses, according with the description given of that of *Dictyostega*. That portion of the ovarium invested by part of the perianthium is of an oblong shape, tapering at its base, and of a deep reddish-purple colour, but the upper portion is free, of a pale colour, and tapers upwards in the form of a sharp cone, from the summit of which rises the erect filiform style, which attains the height of the stamens, and then divides into three very divaricate, sigmoid stigmata, each of which forms at its extremity a somewhat upright funnel-shaped cup, with an oval orifice, drawn together on the two sides, and filled with a yellowish viscid fluid. The capsule very much resembles that of *Dictyostega*, but the seeds are different: they are oblong, quite opaque, of a yellowish-brown colour, and suspended by a slender umbilical cord. The testa is marked with very prominent reticulations, appearing by a common lens as if covered with twisted longitudinal lamellæ; but under a higher power it is seen to consist of elongated, hexagonal cells.

The plant was found by me in the Organ Mountains, in March 1838, in a swampy situation under the shade of a large block of granite.

I cannot close the enumeration of these plants without alluding to the two species regarded by some as distinct from *Burmannia* under the name of *Tripterella*; the one is *Tripterella capitata* of Michaux, which Von Martius considers to be the same as his Brazilian *Burmannia capitata*; but judging from the specimen in the Herbarium of the British Museum, I am inclined to believe they are two distinct species: the other is *Tripterella cœrulea* of Elliott and Nuttall, which is the same as *Burmannia bifida* of Linnæus. It is chiefly on the authority of Mr. Nuttall that *Tripterella* has been retained distinct from *Burmannia*; but as I cannot find that he has offered any evidence of an existing difference, there seems no good ground for this separation.

From the facts now adduced, we find that the *Burmanniaceæ* comprise two very distinct groups of plants, namely, those having a trilocular ovarium with central placentation, and those having a unilocular ovarium with parietal placentation. The first consists only of the two genera, *Burmannia* and *Gonyanthes*; the second contains four genera, viz. *Dictyostega*, *Cymbocarpa*, *Apteria* and *Gymnosiphon*: that they are all very closely related there cannot be any

doubt; but it appears to me, that if we adopt the principle on which *Apostasiæ* have been separated from *Orchideæ* and *Xyrideæ* from *Restiaceæ*, we are bound to class the second section as distinct from the first. If this view be admitted, I should propose to adhere to the suggestion offered by me in 1837, to arrange these new genera into a separate family, which might be called *Apteriaceæ*; but if, on the contrary, the difference of structure of the ovarium be not thought a distinction of sufficient importance to warrant their separation into two families, they must then be associated with *Burmanniaceæ*, giving to the first section the title of *Burmanniææ*, and to the second that of *Apteriææ*. But I fear that the former view, which at first sight would seem to rest on a wide and well-founded distinction, will on mature consideration be found of less value, since the extensive order of *Gentianeæ*, for instance, presents many instances of gradual transition, beginning with the unilocular capsule with parietal placentation, the margins of the valves being ovuliferous, and ending in complete central placentation and a bilocular fruit, showing numerous cases of intermediate degrees of inflection of the ovuliferous margins.

The only other observation that I shall add respecting these plants relates to the striking resemblance of their seeds with those of most orchideous plants, and the similarity in texture and structure of the pericarpium, which in both families will be found to consist of a series of closely-packed transverse ribs, seldom interrupted, proceeding from the intermediate lines where dehiscence takes place, to the placenta. Mr. Brown has clearly demonstrated the structure of the ovarium of *Orchideæ* to consist of three carpellary leaves united by their ovuliferous inflected margins. In *Dictyostega* a similar structure is evident, only that the margins are not inflected, but are directly united by their edges, where they appear to be conjoined by an intervening, opaque, reticulated line, running from the base to the apex, and forming a support to the horizontal, transverse, crowded ribs that compose the walls of the ovarium; immediately within this line is a compact bundle of longitudinal fibres forming the placenta, upon which the numerous closely imbricate ovula are attached. The same structure of the walls of the ovarium is especially visible in many species of *Pleurothallis*, though in most other *Orchideæ* the structure of the walls is very reticulate. In *Orchideæ*, the thick fleshy substance which fills

the space between the true pericarpium and the cohering perianthium consists of a mass of long, transverse cells; excepting that upon the three placentæ, as well as on two longitudinal lines in the middle of each intervening space, the membranes approach each other with scarcely any cellular tissue between them, and upon these lines the fruit easily separates (from its being necessarily weaker at those points as the capsule dries and ripens) into three broad and three narrow valves, without exhibiting any trace of those longitudinal nerves which usually form a distinct margin to capsular valves. In *Dictyostega* and the related genera there exists but a small quantity of cellular tissue between the true ovary and adnate perianthium, and hence the capsule is almost membranaceous when ripe; but in a similar position to that exhibited in *Orchideæ*, is to be seen only a single line where the two membranes closely approximate, and which in like manner sometimes become ruptured from a similar cause, when the capsule ripens, and hence the separation into three imperfect valves is effected not by any regular fissure, but by an irregular laceration of the adhering membranes at those points where they are not strengthened by intervening tissue. On comparing also the seeds of *Pleurothallis pectinata* with those of *Dictyostega orobanchioides*, there appears scarcely any difference between them either in shape or structure, both possessing a diaphanous reticulated testa many times larger than the nucleus: in *Pleurothallis*, however, the reticulations are much smaller and more regular, and the cells constituting the areolæ are marked with spiral fibres bearing some resemblance to the spiral cells occurring in the leaves of that genus: on the other hand, the areolæ of the seeds of *Dictyostega* are much larger, longer, more transparent, and destitute of fibres. In regard to the included nucleus, the two genera offer a striking analogy, as it is in both inverted, and suspended by an elongated base from the attenuated apex of the rostelliform seed, and in both presents its nipple-like apex towards the hilum.

Besides the points of resemblance already mentioned, these plants present in other respects a striking approximation to *Orchideæ*, especially to the section of *Pleurothalleæ*, which often possess a simple erect stem with imperfectly developed leaves, and are not unfrequently destitute of the pseudobulbs, so characteristic of the tribe: they often exhibit also a regular six-

parted petaloid perianthium. An aphyllous erect stem, with imperfectly developed leaves, is also a character not uncommon to many terrestrial *Orchideæ*. Besides this, several instances are now recorded of the full development of three perfect stamens and three stigmata in orchideous plants. If these considerations alone were held in view, omitting the very material one of the stamens and stigmata, it would be difficult to draw a line of distinction between the structure of these plants and that of *Orchideæ*; but the position of the stamens, and other characters, sufficiently remove them apart.

Another analogous fact is deserving of notice: on examining the stigma of *Dictyostega* after flowering, it will be found to be crowded with bundles of white cottony filaments, which may be seen even with a common lens to consist of pollen-tubes issuing in a body from the cells of the anthers and penetrating the stigma, leaving their ends exserted, and clavately terminated by their respective grains, thus displaying in a very beautiful manner the singular mode of fecundation so ably illustrated by Mr. Brown in his admirable paper on that subject, published in the 16th volume of the Transactions of this Society. The pollen also in its texture presents great resemblance to that of the *Orchideæ*, its component granules cohering in like manner into a solid waxy mass previous to the dehiscence of the anthers.

The position of the several parts of the flower in *Dictyostega* and the allied genera will be seen to offer very peculiar characters, to an examination of which I was led by the suggestions of Mr. Brown. This profound botanist was, I think, the first who observed* that the pistilla, when distinct, or their component parts, when united, are generally placed opposite to the petals in *Dicotyledones*, while he believed the cells of the trilocular ovary, or the component parts of the unilocular ovary with three parietal placentæ in *Monocotyledones*, to be situated uniformly opposite to the divisions of the outer series of the perianthium; and in his learned Memoir on *Cyrtandraceæ*, lately published ("Plantæ Javanicæ," p. 110), he has given a very interesting demonstration of the structure of the ovary, and the relation which placentæ and stigmata bear to the segments of the perianthium in several different families.

Mr. Brown considers that in *Orchideæ* the stigmata alternate with the

* Appendix to Denham's Travels, p. 243.—1826.

placentæ, a relation most usual in cases of compound unilocular ovaria where the number of stigmata and placentæ is equal; and that such is really its relation appears to him to be proved by tracing to their origin their vascular cords, which are found to coalesce with those of the three outer foliola of the perianthium. This view of the composition of the ovarium in *Orchideæ*, he observes, is confirmed by finding that it agrees with the ordinary arrangement of Monocotyledonous plants, viz. the opposition of the double parietal placentæ to the three inner divisions of the perianthium, while in *Apostasia* the three placentæ of the trilocular ovarium are opposite to the three outer divisions. The same agreement, he further observes, is found in *Scitamineæ*, both in the placentæ of the trilocular ovarium, which in this family is its ordinary structure, and in the unilocular, which is the exception. My observations upon the structure of *Burmanniaceæ* afford to that order a different arrangement as regards the position of stigmata. Dr. Von Martius, in illustrating the genus *Burmannia*, has given a figure of the pistillum of *B. bicolor*, in which the stigmata are placed opposite to the wings, and therefore alternate with the inner segments of the perianthium; but this probably may have been an error of the draughtsman, since no such position is alluded to in the text. I have in several instances opened with the utmost care the flowers of *Burmannia*, and have found the stigmata manifestly placed as I have constantly observed them in *Dictyostega* and the allied genera with unilocular capsules, viz. opposite to the stamens, and to the inner segments of the perianthium, with which the placentæ also correspond, all being alternate with the outer segments: in *Burmannia*, however, owing to the complete inflection of the carpellary leaves to form the trilocular ovarium, the placentæ thus extended to the axis will be seen directed towards the middle of the cells, and opposite to the outer segments of the perianthium, at the same time that all other parts remain as before mentioned, in a similar position to that existing in *Dictyostega*.

This deviation from the usual order of relation may probably be accounted for by the very ingenious views of Mr. Brown relative to the original composition of stigma, founded on the supposition that each simple pistillum or carpel has necessarily two stigmata, which are to be regarded not as terminal, but lateral, in the same manner that the placentæ of each carpellary leaf are

to be considered as marginal; and although a confluence of the two stigmata of each carpel is the more usual structure, he adduces some cases, of comparatively rare occurrence, in which the stigmata of the adjoining carpels are confluent, as in *Parnassia*, many *Cruciferae*, and *Papaveraceæ*, as well as in the majority of *Irideæ*, such cases of deviation being often, according to him, obviously connected with adaptation of surface to the more complete performance of function*. These views may in like manner be applied to *Burmanniaceæ*; thus in *Dictyostega* we may conceive that there exists a confluence, not only of the ovuliferous margins of the adjoining carpellary leaves, but of the adjacent stigmata of the several carpels, differing thus from *Orchideæ*, where, in cases of their complete development, the stigmata of each carpel are united and remain distinct from those of the adjoining component part of the pistillum. The probability of this conclusion is strengthened by the appearance of the lateral lobes of the stigmata of *Dictyostega*, and by the two horn-like appendages of those of *Apteria*, as shown in the figures illustrative of these parts. Although the trilocular *Burmanniaceæ* will be seen to agree with those *Irideæ* to which Mr. Brown has referred, by having the stigmata alternate with the placentæ, they still differ from that order in having their stamens constantly opposite to the inner segments of the perianthium; and notwithstanding the close affinity shown to exist between this family and *Orchideæ*, we have here, independent of all other considerations, a sufficiently well-defined character in the position of stigmata, to establish a line of complete distinction between them.

EXPLANATION OF THE PLATES.

TAB. XXXVII.

Fig. 1. *Dictyostega orobanchioides*.

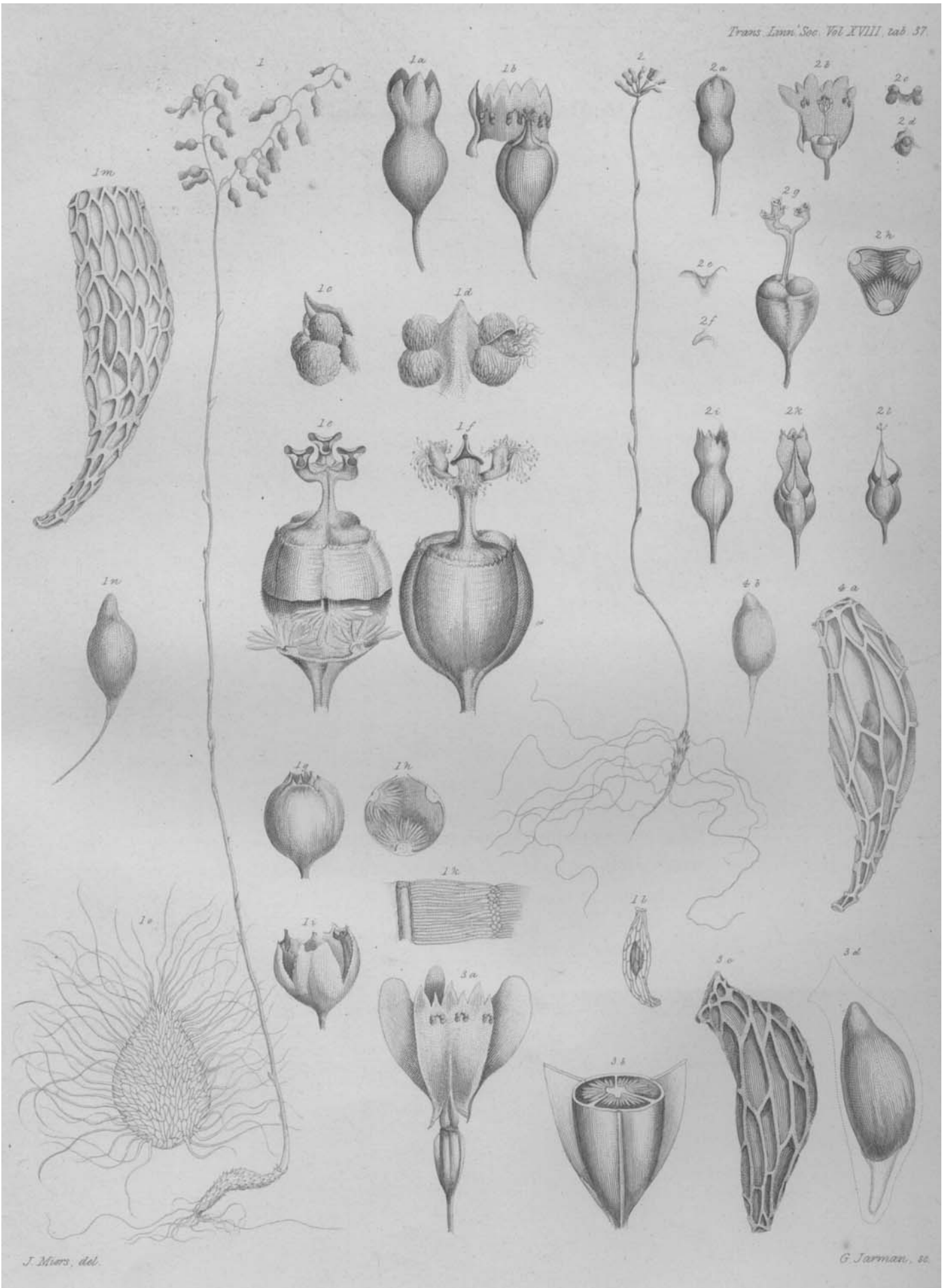
- a. Flower, magnified, to show the æstivation.
- b. Ditto, with the perianthium cut open, to show the stamens and pistillum.
- c. Stamen, seen sideways.
- d. Ditto, seen in front, with one of the cells of the anther burst.

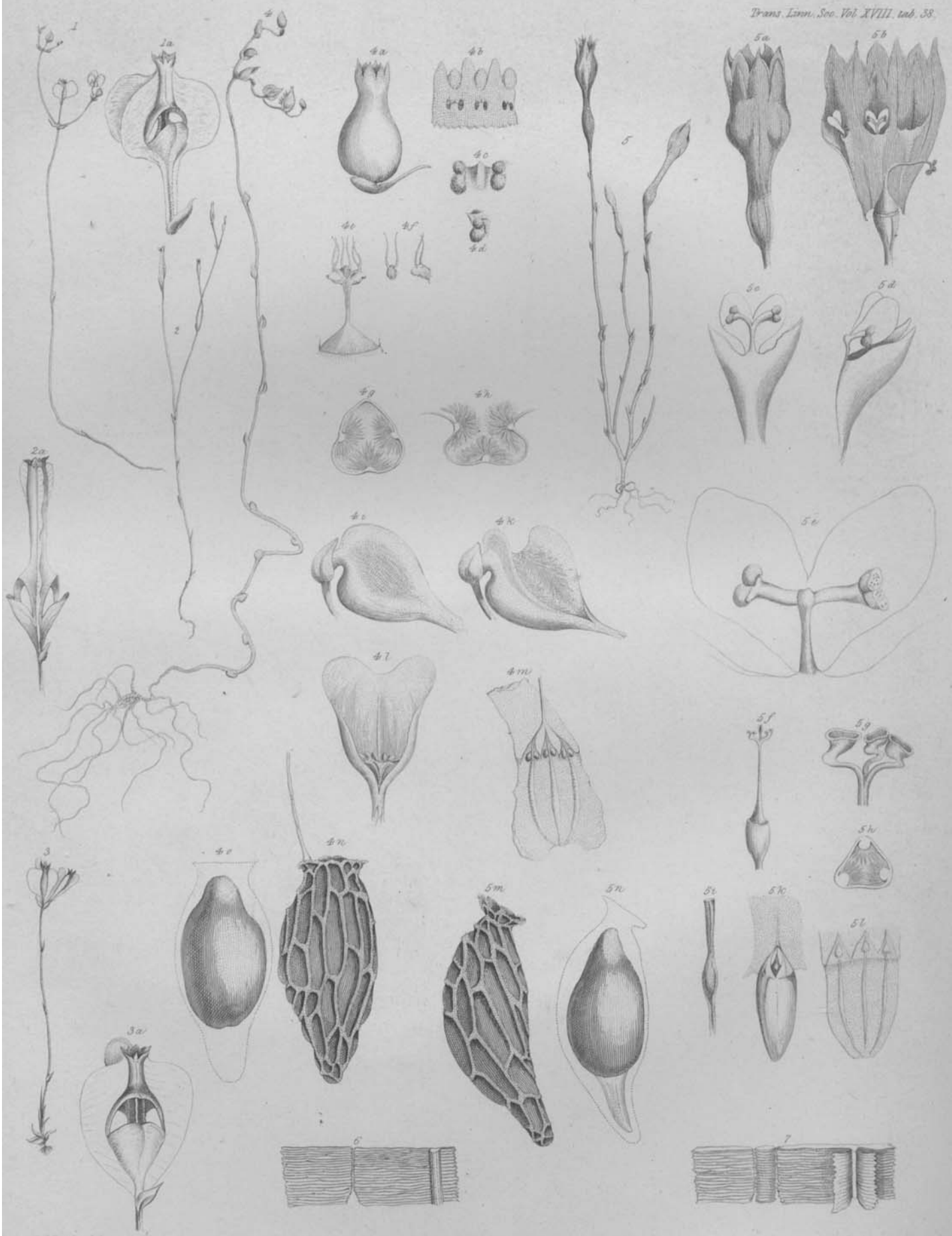
* *Plantæ Javanicæ*, p. 110.

- e. Pistillum, with the lower portion of the ovary and some of the seeds removed, to show the parietal placentation and mode of attachment of the seeds.
- f. Ditto, with clusters of pollen-tubes escaped from the anthers penetrating the stigmata.
- g. Capsule, with the limb of the perianthium fallen off, in the act of bursting at the apex.
- h. Ditto, cut transversely, to show the placentation and disposition of the seeds.
- i. Ditto, after dehiscence, showing the lacerated margins of the valves.
- k. Portion of the capsule, showing the longitudinal fibres of the placenta, the texture of the pericarpium, and the part which by laceration forms the margins of the valves.
- l. Seed, magnified.
- m. Seed, highly magnified, showing the transparent reticulated testa, and the included embryo; the upper end is that by which it is attached to the placenta.
- n. Nucleus, showing the cord by which it is suspended from the attenuated apex of the testa.
- o. One of the scales of the fleshy root, fringed with long ciliary hairs, seen from the inside, to show the reticulated structure; the outer surface presents hairs like those of the margin.—All more or less magnified.

Fig. 2. *Dictyostega umbellata*.

- a. Flower, magnified, to show the æstivation.
- b. Ditto, with the perianthium cut open, to show the stamens and pistillum.
- c. Stamen, seen in front.
- d. Ditto, seen sideways.
- e. Filament, seen in front.
- f. Ditto, seen sideways.
- g. Pistillum, showing the three-lobed summit of the ovary, the style and stigmata.
- h. Ovary, cut transversely, to show the placentation and disposition of the seeds.





J. Miers, del.

G. Jarman, sc.

- i. Capsule, with the adhering perianthium.
- k. Ditto, with a portion of the perianthium removed, to show the mode of dehiscence.
- l. Ditto, with the perianthium wholly removed.—All more or less magnified.

Fig. 3. *Burmannia bicolor*.

- a. Flower, cut open, to show the stamens and pistillum.
- b. Ovarium, cut transversely, to show its three-celled structure and central placentation.
- c. Seed.
- d. Nucleus.—All magnified.

Fig. 4. *Pleurothallis pectinata*.

- a. Seed, with its transparent reticulated testa and included nucleus, suspended by its base from the attenuated apex, to show its resemblance to the seed of *Dictyostega orobanchioides*.
- b. Nucleus.

TAB. XXXVIII.

Fig. 1. *Gonyanthes nepalensis*.

- a. Capsule, showing the mode of dehiscence.

Fig. 2. *Gonyanthes Wallichii*.

- a. Capsule.

Fig. 3. *Gonyanthes pusilla*.

- a. Capsule.

Fig. 4. *Cymbocarpa refracta*.

- a. Flower, expanded, with its pedicel and bracte.
- b. Perianthium, cut open.
- c. Stamen, seen in front.
- d. Ditto, seen sideways.
- e. Free summit of the ovarium, with the style and stigmata.
- f. Stigmata, seen in front and sideways.
- g. Capsule, cut transversely, to show the placentation and disposition of the seeds.
- h. Ditto, ditto, to show the mode of dehiscence.
- i. Capsule, ripened.

- k. Capsule, in a state of dehiscence.
- l. Ditto, having shed all its seeds.
- m. Ditto, with the persistent perianthium cut open, to show the cohesion of the summit of the style. In these last two figures the placentæ are seen, as well as the peculiar protuberances at their summit in the conical portion of the ovarium, which assist in the dehiscence of the apex: these protuberances are also present in the capsules of *Dictyostega* and *Apteria*.
- n. Seed, greatly magnified; the testa being opake.
- o. Nucleus.—All more or less magnified.

Fig. 5. *Apteria lilacina*.

- a. Flower, expanded.
- b. Ditto, cut open, to show the stamens and pistillum.
- c. Stamen, with its supporting hollow sac cut away from the perianthium, seen in front.
- d. Ditto, ditto, seen sideways.
- e. Ditto, with its winged appendages, still further magnified, showing the mode of dehiscence of the anther.
- f. Pistillum.
- g. Stigmata, still more magnified.
- h. Ovarium, cut transversely, to show the placentation and disposition of its seeds.
- i. Capsule, with the marcescent perianthium.
- k. Ditto, with the perianthium removed, to show the mode of dehiscence.
- l. Ditto, cut open, to show the placentæ and the protuberances at their summit.
- m. Seed, greatly magnified.
- n. Nucleus.—All more or less magnified.

Fig. 6. View of the inner wall of the capsule of *Dictyostega orobanchioides*.

Fig. 7. Ditto of the capsule of a species of *Chloræa* from Chili.