

ALPINE MOSSES FROM NEW GUINEA

H. N. DIXON

The mosses collected by the Netherlands Colijn Expedition to New Guinea, 1936, were submitted to me by the Botanical Gardens, Buitenzorg, for determination. They were collected by F. J. Wissel, on Mt. Carstensz, from altitudes above 4000 m. Though the collection was not large, it was of extraordinary interest. In fact, out of about twenty species collected, at least fifteen were new to science, three were indeterminate species, but fragmentary, all probably undescribed, and the remaining two have probably been collected only in their original habitat.

For these I have given Wissel's collecting numbers, and have added the reference numbers under which they were sent from the Herbarium at Buitenzorg (abbreviated as BZ).

Mosses collected by the late C. E. Carr, in Papua, mostly at altitudes above 2000 m., above Port Moresby, have from time to time been sent me by Dr. Verdoorn. These also contained a considerable number of species new to science, as well as some known, but hitherto not recorded from New Guinea. These also I have included, as well as a small number sent by other collectors; the last not so distinctly alpine.

The contents of these collections reveal what a great addition to bryological knowledge remains to be made by intensive collection in New Guinea, especially at high altitudes. The relationship between this flora and that of Borneo, Celebes, Sumatra, etc., becomes still clearer, the interest perhaps being all the greater from the occurrence of alpine species already known from, or closely related to species from those regions.

SPHAGNACEAE

Sphagnum sericeum C. Müller

Supra Port Moresby, Papua, 1600-2100 m., 1935-36; coll. *C. E. Carr*, 15190, c. fr. The fruit, I believe, has not been recorded. The pseudopodia are long, over 5 mm., from long fruiting branches with very large, broad perichaetial leaves.

FISSIDENTACEAE

Fissidens subspathulatus Dix. sp. nov.

Semilimbidium. Caulis simplex vel sparse ramosus, circa 3 mm. altus; folia circa 5-juga, inferiora minima, subsquamosa, superiora multo longiora, patentia, percomplanata, sicca valde crispata, late oblonga vel leniter spathulata, rotundato-obtusa, raro minute apiculata, ubique crenulata; lamina dorsalis infra angustata, apud basem folii oriunda; lamina vaginalis circa dimidiam partem folii aequans, anguste, sed distincte limbata, limbidio potius viridi quam hyalino. Costa sat debilis, concolor, sub vel cum apice desinens. Cellulae propter chlorophyllam et tenuitatem parietum subobscurae, unipapillosae, parvae, irregulares, versus basem laxiores.

Dioicum. Flos ♂ terminalis in cauli brevior, turgidus. Seta geniculata, tenuis, 3-4 mm. longa. Theca erecta, angusta, in setam defluens; operculum rubellum, longe

recte rostellatum. Kanosia, Papua, terrestres ad basem arborum, 22 Feb. 1935; coll. C. E. Carr, 11469, **type**.

Distinct in the subspathulate, obtusely rounded leaves, much crisped when dry, the cells rather obscure, but not opaque. The margin is sharply crenulate, at apex even subdenticulate. *F. rupicola* Broth. & Par. is a much more rigid plant, with leaves narrowed above, as in *F. geniculatus* Thér., where the cells also are very opaque and the nerve pellucid.

Fissidens kurandae Broth. & Watts.

Prope Port Moresby, Papua, 1935, coll. C. E. Carr, 12507. c. fr. New to New Guinea. DISTR.: Queensland.

The fruit has not been described. Seta 2–3 mm. Capsule erect, small, narrowly elliptic.

DITRICHACEAE

Ditrichum Colijnii Dix. sp. nov.

Elatum, robustum, atro-fuscum. *D. spinuloso* Dix. borneensi affine et simile; differt foliis *magis sensim* e basi attenuata, subula tenuiore, haud compressa, *confertius, tenuius* denticulata, costa *perlata* et *pessime definita*, cellulis basilaribus elongatis, linearibus, parietibus *valde incrassatis et fortiter sinuosis*. Zuidwand, Geele Dal, Mt. Carstensz; coll. *Wissel*, 65 (BZ, 3999), **type**. Meerendal, Mt. Carstensz, 4000–4100 m.; *Wissel* 29 p. p. (BZ, 4006b).

A fine species, allied to *D. spirale* Dix. from S. Africa, and *D. spinulosum* Dix. from Mt. Kinabalu. The latter differs in the broad, flattened subula, very coarsely and distantly toothed for some way down; here the excurrent nerve is finely subulate, terete, sharply but finely toothed only near the apex. It shares with these the glossy, spirally twisted subula when dry. The nerve is very broad, occupying often three-fourths the width of the base, but very ill defined; in section showing 2–3 rows of subhomogeneous, much thickened cells.

DICRANACEAE

Microdus papuanus Dix. sp. nov.

M. brasiliensi (Duby) habitu et foliis simillimus, fructu autem sat distinctus. Theca *multo angustior*, e collo distincto *anguste elliptica* vel subcylindrica, deoperculata circa 1.5 mm. longa, vix .5 mm. lata, vetustate sub ore contracta. Peristomium *minus*, dentibus et videtur brevioribus, integris. Port Moresby, Papua, 1935; coll. C. E. Carr 12,506, **type**. Koitaki, Papua, in road cutting, circa 450 m., soc. cum *Garckeia phascoides*, May, 1935; coll. C. E. Carr 12,243.

No. 12,243 was distributed as *M. brasiliensis* (Duby) Fleisch., on my determination, by Verdoorn (*Musci Selecti et Critici*, No. 189); it agrees with that species vegetatively altogether; the fruit was very sparse and in poor condition. The later gathering, however, showed the fruit in good condition, and it was at once obvious that it could not be referred to Duby's plant, *M. pomiformis* (Grif.) Besch., where the capsules are turgidly ovate or subglobose. Here they are constantly markedly elliptic

or fusiform, the collum is very distinct, and the peristome seems to be less developed. Fleischer describes the teeth as "nicht langsgestreifte," but he figures them as indistinctly striolate, which is the case also here.

Dicranoweisia papuana Dix. sp. nov.

Gracilis; caules dense conferti, *per tomentosi*, inter muscos alios intermixti. Folia dense conferta, sicca crispata, e basi *parum latiore* lingulato-lanceolata, 2.5–3 mm. longa, flexuosa, pellucida, sensim angustata, apice *saepe raptim cuspidato*, marginibus *planis*, costa pro latitudine folii sat valida, superne angustata, *pellucida*, percurrentes. Cellulae quadratae vel rotundae, *valde incrassatae, perdistinctae*, laeves, basilares anguste lineares, parietibus incrassatis, porosis. Folia perichaetialia majora, e basi lata convoluta erecta in subulam patulam lanceolatam attenuata. Seta *brevis*, vix 5 mm.; theca erecta, parva, oblonga, pallide fusca; exothecii cellulae *laxae*, subisodiametricae, irregulares; operculo subulato-rostrato. Peristomii dentes breves, aurantiaci, sat remoti, e basi latiore lanceolati, sat remoti, irregulares, tenuiter trabeculati, papilloso. Cum *Schlotheimia emarginato-pilosa* Herz., supra Port Moresby, Papua, 1600–2000 m., coll. C. E. Carr, **type**.

This was mixed with the *Schlotheimia* in No. 237, Verdoorn, Musci Selecti et Critici, and was detected in his specimen by Mr. G. O. K. Sainsbury, and sent to me for determination. Only a few scraps occurred, which would hardly have justified publication if it had not been for the peculiar interest of the discovery, since no species of the genus is known either from New Guinea or from any near region; it is a genus of almost entirely temperate or arctic distribution of both hemispheres, or in the few occurrences in lower latitudes, of alpine stations; and the present plant must take its place side by side with the alpine *D. alpina* Dix. from Mt. Elgon and *D. fastigiata* (Tayl.) from Mt. Pichincha.

Holomitrium novae-guineae Dix. sp. nov.

E speciebus asiaticis *H. Griffithiano* Mitt. proximum. Differt foliis e basi *latiore* longius, angustius subulatis, apice acuminato, acuto, haud cucullato, *fragillimis*; areolatione basilari valde diversa, e cellulis medianis parietibus *valde porosis, sinuosis*, marginalibus seriebus numerosis pellucidis, parietibus tenuibus, limbum latum altum subhyalinum instruentibus. Cellulae alares haud diversae. Fructus ignotus. Meerendal, Mt. Carstensz, 4000–4100 m., coll. *Wissel*, 7; (BZ, 3990b), **type**. Ibidem, coll. *Wissel*, 15, 32; (BZ, 4003, 4008).

Small quantities and sterile only. Quite distinct from *H. Griffithianum* in the longer, narrower, more acuminate leaves from a broader base, which is slightly widened above, and the very different basal areolation. In *H. Griffithianum* the juxtacostal basal cells are narrowly linear, with firm, scarcely sinuose walls; the small, isodiametrical lamina cells descend at the margins in a broad belt, reaching nearly to the base, but becoming more elongate there, and forming a band of more opaque cells than the median. Here the juxtacostal cells have very porose and sinuose walls and are coloured, while the basal marginal form a broad band of thin-walled, *almost hyaline* cells, reaching as a pale border to near the shoulder. The extreme fragility of the leaves is also a character. The leaf apex is sometimes slightly rough.

Braunfelsia dicranoides (Doz. & Molk.) Broth.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 14454, cum setis. New to New Guinea. DISTR.: Java; Philippines; Malay Peninsula; Celebes.

Dicranoloma laevifolium (Broth. & Geh.) Par.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 13705.

Dicranoloma novo-guinense (Broth. & Geh.) Par.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 15229. c. fr.

The fruit has not been described. The perichaetial leaves are closely convolute, all apparently quite muticous, seta 2–3 cm., capsule rather small, smooth, strongly arcuate, not strumose. Peristome mostly lost, but well developed.

Campylopus (Pseudo-campylopus) **novae-guineae** Dix. & Thér. sp. nov.

Gracilis, flavescens; caules densissime intertexti, infra rufo-tomentosi, caespites densos, altos, subsericeos, molles instructos. *C. austro-subulato* Broth. & Geh. affinis; differt foliis comalibus longioribus, *subfalcatis*, minus strictis, *longioribus* (4–5 mm.) tenuius subulatis; costa *latiore*, circa $\frac{2}{3}$ latitudinis folii apud basem. Dajakweide, circa 4400 m. Mt. Carstensz; coll. *Wissel*, 128 p. p. (BZ, 3992a), **type**.

Certainly near *C. austro-subulatus*, and structurally similar, but Mons. Thériot has compared it with an original specimen, and finds it to differ in the above clearly defined, if not very important, characters.

Atractylocarpus dicranoides Dix. sp. nov.

A. comoso Dix. Celebensis peraffinis. Differt habitu *rigidior*, foliis *falcatis*, *dicranoides*, foliis perichaetialibus *longe infra apicem argute denticulatis*, seta brevior, peristomii dentibus supra *papillosis*. Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 13718, **type**. Dajakweide, circa 4400 m., Mt. Carstensz; coll. *Wissel*, 126 (BZ, 3995).

Very near my *A. comosus*, but differing in its more rigid, dicranoid habit, shorter seta, often less than and rarely above 1 cm. (compared with 1 to 2 cm. in *A. comosus*), a slightly different peristome (the teeth in *A. comosus* are smooth above), and perichaetial leaves sharply toothed for some way down (in *A. comosus* they are, like the stem leaves, very finely subulate and entire or slightly toothed at the apex only).

Brotherobryum Dekoekii Fleisch.

Meerendal, Mt. Carstensz, 4000–4100 m.; coll. *Wissel*, 16, (BZ, 4007). Only known, I believe, from the original locality, on Mt. Goliath.

DICNEMONACEAE

Dicnemos undulatifolius Dix. sp. nov.

D. rugoso (Hook.) affinis; differt colore *pallido*, foliis *lterioribus*, *profundius rugosis*, marginibus superioribus involutis, costa *validiore*, siccitate valde *carinata*, in *cuspidem*

validum flexuosum longum excurrente, cellulis alaribus multo magis numerosis, alas magnas, aurantiacas, ad costam attingentes instruens. Supra Port Moresby, Papua, 1600–2000 m., 1935–36; coll. C. E. Carr, 13787b, **type**.

Nearly allied to the rare and peculiar *D. rugosus* (Hook.), but differing quite distinctly in the characters emphasized above, especially in the acuminate leaves with the nerve excurrent in a stout, flexuose cuspidate point.

Eucamptodon novae-guineae Dix. sp. nov.

Robustus, fuscus; caules plus minusve prostrati, dense ramosi, ramis erectis, usque ad 2 cm. altis, *turgidis, siccis julaceis*, 2 mm. latis, subobtusis. Folia *densissime conferta*, magna, 2.5–3 mm. longa, 1.5 mm. lata, late cordato-ovata, perconcava, ad insertionem contractam amplexicaulia decurrentia, supra marginibus fortiter involutis convoluto-acuminata, *abrupte in pilum longum capillare flexuosam subintegrum* contracta. Margines erecti, integerrimi. Costa *nulla*. Cellulae tenerrimae, *angustissimae*, elongate lineares et fusiformes, conflatae, valde incrassatae, ad insertionem pulchre aurantiacae, alares plurimae, majusculae, late hexagono-rectangulares, perincrassatae, lumine saepe minimo.

Perichaetia *praelonga*, 1.5 cm., nitida, convoluta; bractea ad apicem breviter spatulato-acuminata. Theca vix emergens, magna, e basi strumoso cylindrica, leniter curvata, laevis; operculum e basi alt conico longe, acute rostratum. Peristomium vetustum tantum unicum visum dentes lati, solidi, opaci, atro-fusci, dense humillime trabeculati, laeves, nec papilloso, ? integri. Spori 48 μ , sphaerici ? Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. C. E. Carr, 15104, **type**.

The generic position is uncertain, as the two possible genera, *Dicnemos* and *Eucamptodon*, are separated on peristome characters, and the single old peristome seen leaves it uncertain whether the teeth are entire, or possibly cleft above when perfect. The piliferous leaves suggest *Eucamptodon*, while the fructification, with the strumose capsule, closely resembles that of *Dicnemos calycinus*. The robust habit with turgid, julaceous branches, is very marked; the leaves when dry are appressed, and indeed incurved at apex, and the margins being involute above give them a claw-like appearance.

LEUCOBRYACEAE

Arthrocormus Schimper Doz. & Molk.

Koitaki, Papua; on tree trunk in forest, circa 400 m., 1 May, 1935; coll. C. E. Carr, 12108. New to New Guinea. DISTR.: Ceylon; Malaysia; Pacific; Queensland.

Leucobryum stenophyllum Besch.

Rotten logs, Koitaki, Papua, 26 Apr., 1935; coll. C. E. Carr, 12059.

Leucobryum sp.

A plant collected by Carr, 15229b, supra Port Moresby, 1600–2000 m., is probably a new species, but the quantity is insufficient. It is a rigid plant, with the leaves when dry rigidly divergent, in habit, etc., very like *L. arfakianum*, but with much blunter leaves, rather widely bordered at base, and toothed apex.

CALYMPERACEAE

Syrrhopodon bornensis (Hampe) Jaeg.

Supra Port Moresby, Papua, 1935–36, 1600–2000 m.; coll. *C. E. Carr*, 13898. New to New Guinea. DISTR.: Borneo; Java; Malay Peninsula; Amboina.

A beautiful plant, with the vivid colouring that is characteristic of most forms of this species.

Syrrhopodon albo-vaginatus Schwaegr.

S. asper C. Müller (nec Mitt.)

S. Beccarii Par.

Low down on tree trunks, Kanosia, Papua, 22 Feb., 1935; coll. *C. E. Carr*, 14478 (Verdoorn, Musci Selecti et Critici, Ser. IV, No. 192).

Fleischer describes *S. Beccarii* as differing from *S. albo-vaginatus* in having a flatter leaf margin, but I can find no difference in this or any other respect.

Syrrhopodon (Thyridium) **Wallisii** C. Müller

Koitaki, Papua, circa 400 m., on trunks of forest trees, 10 May, 1935; coll. *C. E. Carr*, 12245 (Verdoorn, Musci Selecti et Critici, Ser. IV, No. 199). New to New Guinea. DISTR.: Malay Peninsula; Philippines; Great Natunas; Celebes.

POTTIACEAE

Leptodontium erectifolium Dix. sp. nov.

Dense, alte caespitosum, circa 5 cm. altum; caules graciles, flexuosi, *densifolii*, subsimplices. Folia *sicca appressa*, *madida erecto-patula*, parva, 1–1.5 mm. longa, leniter decurrentia, late oblonga, haud acuminata, plus minusve obtusa vel apiculata, sicca et madida *valde complicato-undulata*, marginibus planis vel leniter recurvatis, supra irregulariter *sat teneriter distanter denticulatis*. Costa e basi dilatata sat tenuis, *longe infra apicem* desinens, sectione duces medianos exhibens. Cellulae parvae, per papillas minutas, denas, humiles, *perobscurae*, apud basem sensim majores, subquadratae, pellucidiores, paucae ad insertionem late rectangulares, laeves, sat pellucidae. Fructus ignotus. Dajakweide, circa 4400 m., Mt. Carstensz; coll. *Wissel*, 128 (BZ, 3992b).

L. kinabaluense Dix. has different habit, much more acute leaves and much stronger and more acute toothings, stouter nerve, etc., and *L. Warnstorffii* Fleisch. differs in the same way.

The leaves in the present plant are curiously complicated and undulate at margin, especially just below apex, where they are constricted in much the same way as occurs in many species of *Chaetomitrium*; they also recall in form some species of *Thyridium*; they are short and broad, with no differentiation of leaf base, and no acumination above.

Barbula (Eubarbula) **Wisselii** Dix. sp. nov.

Gracilis; *rufescens*, *stricta*, circa 1.5 cm. alta. Folia erecto-patentia, sicca *erecta*, *appressa*, *minime mutata*, *stricta*, eis *B. acutae* (Brid.) forma subsimilia, e basi ovata sensim acuminata, acuta, saepe hyalino-apiculata, concava, marginibus superne

erectis, inferne anguste explicatis; costa sat valida, dorso laevis; cellulae hexagonae, *incrassatae*, *laeves*, basilares sensim elongatae, pellucidae, breviter rectangulares, $3 \times 1-4 \times 1$, marginales seriebus pluribus quadratae. Cetera ignota. Meerendal, 4000-4100 m., Mt. Carstensz; coll. *Wissel*, 32 p. p.; (BZ, 4003c).

Fairly well marked by the colour, strict habit, leaves erect and unaltered when dry, and quite smooth nerve and cells.

ORTHOTRICHACEAE

Desmotheca apiculata (Doz. & Molk.) Lindb.

On trees, circa 400 m. Koitaki, Papua, 13 May, 1935; coll. *C. E. Carr*, 12273. New to New Guinea. DISTR.: Malaya; Philippines; Borneo; Malay Peninsula; Siam; Burma.

It is exactly the Malayan plant, and therefore not *D. cymosa* (Mitt.), whatever may be the value of that species.

Macromitrium leucoblastum C. Müller

Rouffaer rivier, New Guinea, Aug. 1926; coll. *Docters van Leeuwen* (BZ, 2634). E descr. certainly this species.

Macromitrium brachystele Dix.

Supra Port Moresby, Papua, 1600-2100 m., 1935-36; coll. *C. E. Carr*, 13309.

Slightly differing from the original in the longer and narrower, less rigid leaves, with the cells at base mostly almost smooth. The capsules also are in better condition and show clearly the *Goniostoma* type; the affinity is therefore probably rather with *M. longipes* (Hook.) Schwaegr., and *M. lonchomitrium* C. M. The calyptra seems to be naked.

Macromitrium submegalocladum Dix. sp. nov.

M. megaloclado Fleisch. (*Hedwigia* 50: 282) simillimum et affine. Differt cellulis inferioribus fere ad basem grosse unipapillosis, superioribus minoribus, magis isodiametricis, $10-12 \mu$ longis, $8-10 \mu$ latis (ibi $15-20 \mu \times 10-12 \mu$). Fructus ignotus. Nova Guinea, summit of Mt. Wichmann, 3000 m., 8 Feb. 1913; coll. *A. Pulle*, 1032 p. p.; (BZ, 2124).

This may possibly be a variety only of Fleischer's species, but the difference in the cell structure is quite marked.

Macromitrium ruberrimum Dix. sp. nov.

Robustum, *rubrum*, ramis rigidis, 2-3 cm. longis, 4-5 mm. latis, turgidis. *M. elongato* Doz. & Molk. et *M. Braunii* C. M. affine. Folia conferta, e basi suberecta valde patentia, flexuosa; sicca valde flexuosa, vix crispata, *praelonga*, 7-8 mm. longa; e basi lanceolata sensim longe anguste ligulato-acuminata, sed apice latiusculo; margines saepe *sinuato-undulati*, ad apicem obtuse denticulati; costa angusta, carinata, sub apice dissoluta. Cellulae superiores valde irregulares et inaequales, *laeves*, *subrectangulares*, parietibus *perincrassatis et sinuosis*, saepe lumine latoribus; basilares omnes *praelongae*, *laeves*, conflatae, parietibus *incrassatis*, porosis. Fructus (in 3989) unicus visus, seta circa 1 cm.; theca vetusta elongata, 1.75 mm. longa, ad orem contracta. Meerendal, Mt. Carstensz, 4000-4100 m.; coll. *Wissel*, 8, 9; (BZ, 3988, 3989).

A fine species, distinct in the colour, robust habit, long leaves and areolation, the cells being highly incrassate, with narrow, often sinuose lumen, frequently narrower than the walls.

Schlotheimia subrubiginosa Dix. sp. nov.

S. rubiginosae C. H. Wright borneënsi affinis; differt foliis obtusis vel emarginatis, longe cuspidatis vel aristatulis, arista flexuosa, superne hyalina, marginibus apicalibus saepe leniter irregulariter erosis. Fructus ignotus. Meerendal, 4000–4100 m., Mt. Carstensz; coll. Wissel, 7, (BZ, 3990).

The form of the leaves in the Bornean *S. rubiginosa* varies considerably. Wright describes them as *ligulate*, but he probably intended *lingulate*, as they are certainly never ligulate (the proportions are about 3 x 1 to 4 x 1, rarely 5 x 1), and in another plant I have from Kinabalu they are even broader; oval-oblong would perhaps describe them; here they are mostly oblong, very rounded or emarginate, and with the nerve excurrent in a long cusp or arista, gradually longer higher up the stem. In *S. rubiginosa* the nerve is very shortly excurrent in an apiculus only.

Schlotheimia longiseta Dix. sp. nov.

S. Campbellianae Besch. et *S. Macgregorii* Broth. & Geh. affinis. Ab hoc differt calyptra laevi, ab ambabus foliis fortiter, regulariter, pulcherrime squarrosis, et seta longiore, 1.5 cm. Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. C. E. Carr, 13787, type; 13532; 14621.

A magnificent species, with large, beautifully regular, strongly squarrose leaves, which when dry are sometimes but not always arranged in spiral rows. The seta in *S. Campbelliana* is under 1 cm., and in *S. Macgregorii* only about 5 mm.

Schlotheimia emarginato-pilosa Herz.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. C. E. Carr, 14515, 14534, c. fr.

The fruit has not been described. Hitherto only known sterile, from Ceram. Seta circa 3 mm., perichaetial leaves longer than the stem leaves but otherwise similar. Calyptra smooth. Capsule ribbed. Peristome teeth opaque, solid, with a thin, pellucid median line; red, curled when dry, processes pale, erect when dry. Spores very large, variable, more or less cubic in outline, up to 40 μ , opaque, very finely granulated.

BRYACEAE

Webera rubripila Dix. sp. nov.

Tota planta pulchre rubra; caules circa 2 cm. alti, sicci stricti, plerumque simplices, infra radiculosi. Folia laxiuscula, erecto-patentia, sicca anguste constricta, anguste ovato-oblonga, perbreviter acuminata, integerrima; costa intense rubra, apud basem parum latior, in aristam rubram integram vel subintegram strictam, circa 3 mm. longam excurrans. Cellulae ad infimam basem paucae late rectangulares, supra rhomboideae (circa 60 μ x 10 μ), parietibus firmis, rubris; margines versus seriebus pluribus angustissimae, limbum rubrum latum perdistinctum instruantes. Cetera

ignota. Dutch New Guinea; on *Ischnea*, M. Oranje, prope Meerbivah, alt. 3600 m., Feb. 1913, collected for A. Pulle (Tertia Exped. Neerlandica in Nov. Guin. Meridionalem).

A strikingly pretty plant in the colour, its affinity doubtful in the absence of fruit, but very distinct in the leaf form and the long, excurrent, red nerve.

Brachymenium nepalense Hook.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. C. E. Carr, 13309 p. p. New to New Guinea. DISTR.: India; Malaysia.

Bryum (Trichophora) **crispo-capillare** Dix. sp. nov.

Pusillum; dense caespitosum, fuscum, vix ultra 1 cm. altum. Folia sicca et madida valde crispata, haud spiraliter contorta, madida difficillime emollita, parva, 1.5–2 mm. longa, decurrentia, ovata, breviter acuminata, acutissime hyalino-cuspidata vel subpiliformia; costa sub apice soluta; margines plerumque plani, distincte limbati; cellulae laxae, hexagonae, pellucidae, inanes. Cetera ignota. Meerendal, 4000–4100 m., Mt. Carstensz; coll. Wissel, 30; (BZ, 4005).

A peculiar little species, with the leaves much crisped when dry, and also when moist; in fact I have found it practically impossible to regain their normal form.

Bryum (Rosulata) **sclerodictyon** Dix. sp. nov.

Robustum, fuscum, 5 cm. vel ultra altum, rigidum, caulibus dense intertextis, turgidis, siccis subjulaceis, apice subcuspidatis. Folia confertissima, patula, 2–2.5 mm. longa, 1 mm. lata, fusco-purpurea, cochleariformia, latissime ovata. brevissime acute acuminata, apice nonnunquam subcucullato, apiculo reflexo. Margines infra fortiter recurvi, integri. Costa ad basin sat valida, purpurea, sub apice soluta. Cellulae superiores angustissime rhomboideae, fusiformes, parietibus valde incrassatis, saepe porosis, ad margines haud mutatae, versus basin longiores, angustiores, basillares purpureae, paullo latiores, lineares vel rectangulares, seriebus rectis, parietibus transversalibus angustis, longitudinalibus valde incrassatis, porosis. Meerendal, 4000–4100 m., Mt. Carstensz; coll. Wissel, 29; (BZ, 4006).

A remarkable species, in habit somewhat approached by the South Indian *B. pachycladum* Card., but quite different in the areolation from any species known to me; the cells indeed are so narrow and incrassate that it is not absolutely certain that it can belong to *Bryum*.

BARTRAMIACEAE

Bartramia (Vaginella) **cubica** Dix. sp. nov.

Robusta, olivaceo-viridis, caules ad 5 cm. alti, densifolii; folia sicca erecto-patentia, stricta, e basi erecta, albida, late oblonga, superne dilatata, abrupte lanceolato-subulata; margines plani, brevissime, conferte; subula fortius denticulati; costa superne angusta, difficiliter distinguenda; cellulae elongatae, obscurae, conflatae, dorso dense, grossiuscule verrucosae. Seta circa 1 cm., arcuata, sat crassa; theca immatura cubica, 1.5 mm. longa; operculum umbonatum. Fructus unicus visus. Zuidwand, Geele Dal, Mt. Carstensz, 4500–4700 m.; coll. Wissel, 65, type. Ibidem (66); (BZ, 3999b, 3998).

The single capsule is immature, but on boiling the seta remains arcuate, and the capsule takes a distinctly cubic form, so that I think it may be

assumed that these characters are normal. They recall *B. quadrata* Hook. from South Africa, but on a much more robust scale.

The genus has not been recorded from New Guinea hitherto.

Philonotis Thwaitesii Mitt.

Prope Port Moresby, Papua, 1935; coll. *Carr*, 12399. New to New Guinea. DISTR.: Ceylon.

Breutelia Römeri Fleisch.

Meerendal, Mt. Carstensz, 4000–4100 m.; coll. *Wissel*, 4; (BZ, 3991).

This fine species has, I believe, only been collected before in the original station.

HYPNODENDRACEAE

Sciadocladus novae-guineae Dix. sp. nov.

Stirps pulcherrima, 10–15 cm. alta et ultra, laete ochracea, subnitida, fronde flabellata, bipinnata, complanata usque ad 10 cm. longa, 4 cm. lata stipitem strictam simplicem 5 cm. longam terminante. Folia stipitis conferta, magna, longa, arcte appressa, longe acute acuminata. A *S. celebensi* Dix. fronde multo longiore, latiore, complanata, pinnata, flavida, foliis brevius, acuminatis, dentibus marginalibus multo brevioribus, confertioribus, cellulis paullo angustioribus, alaribus haud diversis, seta brevior, differt. Seta 2–3.5 cm. alta; theca suberecta vel inclinata, laevis, superne leniter angustata, deoperculata usque ad 8 mm. longa, operculo acuto, conico-curvirostro. Supre Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 14184, **type**. Gunong Goh Lemboeh, Gajolanden, Atjeh, Sumatra, 3000 m., summit zone, 22 Feb. 1937; coll. *van Steenis*, 10201; (BZ, 4046).

Sciadocladus Wisselii Dix. sp. nov.

Habitus formarum robustiorum *S. Kerrii* (Mitt.) Jaeg., sed rigidior, crassior. Stipes 7–8 cm. altus, ad basem tantum tomentosus, foliis confertis, fuscis, magnis, latis, amplexantibus, appressis, acutis nec acuminatis, obtectus. Rami in capitulo densissimo, circa 3–4 cm. lato, congesti, crassi, obtusi, vix nitidi, parce, breviter ramulosi. Folia circa 3 mm. longa, late cordato-ovata, breviter acutata, fere a basi dense, fortiter sed haud argute dentata. Costa validiuscula, sub apice soluta, superne leniter sinuosa, dorso parcissime, argute spinosa; cellulae parvae, breviter angustissime lineares, laeves, infimae laxiores. Cetera ignota. Grassy slopes, Dajakweide, Mt. Carstensz, 3800–4300 m.; coll. *Wissel*, 138; (BZ, 3993).

Somewhat resembling robust, stout forms of the New Zealand *S. Kerrii*, but differing from that and other allied species in the dense, very shortly pointed stiped leaves, giving the stem a stout appearance. From *S. celebensis* Dix. it differs in the much stouter, straighter branches, the leaves much shorter and broader in the points, and the toothing of the margins, which is much closer, and not at all spinulose. *S. novae-guineae* is totally different.

Mniodendron Hellwigii Broth.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 13021.

LEUCODONTACEAE

Forsstroemia rigida Dix. sp. nov.

Ab omnibus speciebus cum foliis costatis differt foliis siccis dense *imbricatis*, *appressis*, valde *plicatis*, *fortiter carinatis*, *marginibus fortiter recurvatis et undulatis*. Robusta; caules pinnati, 3–5 cm. alti, ramis *longis*, *teretibus*, subsimplicibus. Folia e basi late ovata, ad insertionem valde contracta, sensim acute sed haud anguste acuminata, *valde plicata*, marginibus *planis*, *undulatis*, inferne minute, apud apicem urgute grossiuscule dentatis. Costa sat valida, *paullo sub apice* soluta. Cellulae minutae, distinctae, pellucidae, incrassatae, irregulares, plerumque brevissime ovaes, marginales saepe 2–3-seriebus *elongatae*, *angustae*, inferne sensim paullo *elongatae*, basilares breviter lineares, sigmoideae, ad insertionem flavae. Propagula filamentosa fasciculata axillis foliorum rameorum superiorum saepe inveniuntur.

Perichaetii folia longe, stricte acuminata, appressa. Seta circa 2 mm. longa; theca vetusta elliptica, ore contracto; gymnostoma videtur. Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. C. E. Carr, 13559.

A very distinct species, in habit and leaf structure, but especially in the foliation when dry; the leaves are closely appressed, and are strongly plicate, partly through the carinate nerve and much reflexed borders, and these being at the same time strongly undulate the resulting appearance is very marked and peculiar.

CYRTOPODACEAE

Bescherellea Cyrtopus F. Mull.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. C. E. Carr, 13305. Not var. *papua* Broth. & Geh., in fact a rather small form.

PRIONODONTACEAE

Neolindbergia falcifolia Dix. sp. nov.

Robusta; rufescens; caules curvati, densi, hic illic ramosi, ramis *densifoliis*, *foliis fortiter falcato-secundis*, eis *N. rugosae* forma subsimilibus sed longius, tenuis, *canaliculato-acuminatis*; rugosis, integerrimis, marginibus *arcte angustissime recurvis*. Costa *sinuosa*, supra multo attenuata, circa $\frac{2}{3}$ folii altitudinem aequans. Cellulae brevissime lineares, angustae, per totum folium subaequales nisi ad angulos ubi multo breviores, seriebus plurimis irregulares, parietibus sinuosis. Fructus ignotus. Zuidwand, Geele Dal, Mt. Carstensz, 4500–4700 m., coll. Wissel, 58; (BZ, 4000).

A very distinct species in the red color, and strongly falcate leaves. This and the undulation of the leaves gives it somewhat a resemblance to some forms of *Trachypodopsis auriculata*.

TRACHYPODACEAE

Trachypus perplicatus Dix. sp. nov.

Robustus; *atrofuscus*. Caules rigidi, intertexti, dense irregulariter pinnati, densifolii, ramis plerumque sat brevibus, obtusis, turgidis. Folia sicca rigide patula, *profunde plicata*, *fortiter undulata*, magna, circa 4 mm. longa, e basi lata, cordata, minute auriculata, sensim in acumen longum, filiformi-cuspidatum, *fortissime undulatum*, minute denticulatum angustata; costa ad basem sat valida, medio folio in plica condita desinens. Cellulae omnes perangustae, lineares, valde incrassatae, *per papillas humiles*, *seriatae*, *omnino tectae perobscurae*; versus basem pallidiores, longiores,

minus minus papillosae, conflatae, incrassatae. Cetera ignota. Meerendal, Mt. Carstensch, 4000–4100 m.; coll. *Wissel*, 14; (BZ, 3987).

The areolation, composed of extremely narrow cells, the walls entirely covered, and hidden by the dense, seriate papillae, is similar to what is found in some of the *Meteoriaceae*, as well as in *Trachypodaceae*, and the strongly undulate leaves also suggest *Aerobryopsis*. The robust, rigid habit, however, and the rather broad nerve, seem to indicate *Trachypus*, and I have no doubt that it belongs to that genus, of which it is one of the most robust, and most remarkable members.

PTEROBRYACEAE

Endotrichella arfakiana C. Müller

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 13309 *bis*.

Endotrichella Campbelliana Hampe.

On branches of trees in forest, Koitaki, Papua, circa 400 m., 6 May, 1935; coll. *C. E. Carr*, 12174.

Garovaglia Pauerlenii (Geh.) Par.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 13309 p. p.

Garovaglia papuana Dix. sp. nov.

Stirps habitu fere *Endotrichellae elegantis*, sed gracilior, foliis brevioribus, laxioribus, *divergentibus*. Caules secundarii rigidi, lignosi, atro-fusci, per destructionem foliorum plerumque nudi. Folia *laxe patentia, complanata*, 2.5–3 mm. longa, 1 mm. lata, *angusta, oblonga, sensim breviter acuminata*, acuta, longitudinaliter plicata, marginibus planis, (uno latere ad basem saepe breviter recurvato), parte superiore argute sat regulariter dentatis; *ecostata*. Cellulae anguste lineares, *sigmoideae*, finitibus rotundatis, parietibus sat tenuibus sed ad apices cellularum conspicue incrassatis, ad basem longiores et paullo latiores, ad insertionem *aurantiacae*, alares *vix ullae*.

Perichaetium in ramulo brevi terminale, majusculum, bracteis thecam amplexantibus, et arista robusta dentata longe superantibus. Theca subsessilis, elliptica, ad orem paullo everta. Peristomii dentes flavidi, tenues, papilloso, lanceolati, processus *capillares, nodosi, laeves*, aequilongi. Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 13605.

Distinct in the narrow, oblong leaves, gradually shortly acuminate, not cuspidate, the plane margins, absence of nerve and alar cells. The toothings of the leaves is regular, and usually consists of stronger teeth alternating with minute, intermediate ones.

Garovaglia subintegra Dix. sp. nov.

Sat robusta, *densifolia*, vix complanata. Folia ab insertione contracta, amplexicauli, ovato-oblonga, *haud acuminata, abrupte breviter tenui-cuspidata*, profunde plicata, *ecostata*, marginibus *planis, prope apicem tenerrime inconspicue denticulatis*; cuspidate sparse denticulata. Cellulae anguste rhomboideae, ad apices incrassatae, ad angulos folii seriebus pluribus *laxae, pellucidae, numerosae*, alas notatas instruente.

Fructus generis. Bracteae perichaetii *integrae vel subintegrae*. Peristomium fere omnino destructum. dentes papillosos, processus lineares, *fuscis, dense papillosos* exhibens. Spori magni. On branches of forest trees, Koitaki, Papua, circa 450 m., 6 May, 1935; coll. *C. E. Carr, 12124b*.

Not remarkable in habit, or leaf form, but structurally distinct in the margins, very finely and inconspicuously denticulate at apex only.

NECKERACEAE

Orthorrhynchium philippinense (Hampe) C. Müller

Low down on tree trunks in wood by stream, Koitaki, Papua, circa 400 m., 19 Apr. 1935; coll. *C. E. Carr, 11944*. New to New Guinea. DISTR.: Philippines; Malay Peninsula. (Perlis, isthmus south of Siam); East Java (coll. *Johannes Gandrup, 1922*). I received the Perlis plant under the name of *O. Ridleyi* Broth. sp. nov., but I am unable to separate it from the Philippine species.

Himantocladium cyclophyllum (C. Müller) Fleisch.

Rouffaer Rivier, Dutch New Guinea, Sept. 1926; coll. *Docters van Leeuwen, 10183C*, c. fr.

Two fruits were found; the plant has hitherto been known only in the sterile state. Seta very short, about equalling the capsule, circa 1 mm. long; perichaetial bracts divaricate, short, ovate-acuminate. Capsule erect, elongate elliptic, brown. Peristome well developed. Operculum not seen.

HOOKERIAACEAE

Daltonia Macgregorii Broth.

Hellwig-gebergte, Dutch New Guinea, 1700 m., 15 Dec. 1912; coll. *A. Pulle, 689* p. p. I have determined this from the description, but there is hardly a doubt of its identity.

Hookeriopsis utacamundiana (Mont.) Broth.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr, 14185*. This, so far as I am aware, has only once been collected in New Guinea, before.

Chaetomitrium torquescens Bry. jav. nov. var. **barbatum** Dix.

Calyptra ad basem breviter. sparse ciliata, ciliis setulosis, supra curvatis. On branches of forest trees, Koitaki, Papua, circa 400 m., 6 May, 1935; coll. *C. E. Carr, 12176*.

The typical form has naked calyptra. The present plant agrees with it in all respects except in having the lower part of the calyptra sparsely hairy with stiff hairs curving upwards from a spreading base.

BRACHYTHECIACEAE

Cirriphyllum novae-guineae Dix. sp. nov.

Pallide stramineum, habitu *C. cirrosi* (Schwaegr.) sed *strictius*; irregulariter ramosum, ramis strictis, *teretibus, subjulaceis*. Folia sicca erecta, dense imbricata,

sicca subplicata, *latissime ovata*, *cochleariformia*, in acumen *longiusculum*, *lanceolatum*, *peracutum*, saepe undulatum, contracta. Margines plani, *integerrimi*. Costa *perbrevis*, circa tertiam partem folii aequans, ad insertionem crassa, inde valde attenuata. Cellulae perangustae, versus basem sensim latiores, ad insertionem et praecipue ad alas laxae, pellucidae, breviter ovaes. Cetera ignota. Zuidwand, Geele Dal, Mt. Carstensz; coll. *Wissel*, 6; (BZ, 3996), **type**. Dajakweide, Mt. Carstensz; coll. *Wissel*, 77; (BZ, 3997), forma foliis angustioribus, costa saepe obsoleta.

A remarkable extension of the distribution of the genus, which belongs to the temperate alpine zones of both hemispheres. The Himalayan *C. cameratum* (Mitt.) is very different. A Chinese species, *C. subnerve* Dix., has somewhat similar leaves, but much finer points, and very numerous and distinct alar cells.

Rhynchostegium menadense (Bry. jav.) Jaeg., forma **gracilis**.

On forest tree, Koitaki, Papua, circa 400 m., 29 Apr. 1935; coll. *C. E. Carr*, 12084. New to New Guinea. DISTR.: Malaysia; New Hebrides.

SEMATOPHYLLACEAE

Mastopoma Armitii (Broth. & Geh.) Broth.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 15033a, 15202.

Rhaphidostichum Pullei Dix. sp. nov.

Habitu *R. percomplanato* Dix. *sumatrano*, subsimile, sed strictius, caulibus nigrescentibus, ramis confertioribus, minus complanatis. Folia forma subsimilia, sed angustiora, minus abrupte acuminata, acumine saepe parce denticulata, marginibus (saepe uno latere tantum) anguste revolutis, argute denticulatis; cellulae angustissime lineares, laeves, alares pulchre fusco-purpureae. Propagula parva pyriformia substipitata pluricellulareia purpurea in foliorum axillis parce inveniuntur. Fructus ignotus. Dutch New Guinea, 1912–13, ad *Ochnaceas*; coll. *A. Pulle*, 980.

In the absence of fruit this might be placed almost equally in *Warburgiella*, but it seems clearly allied to *Sematophyllum revolutum* Broth., which Brotherus now places in *Rhaphidostichum*. It differs from that species in the much more flexuose, finely pointed leaves, with longer, narrower cells, much more distinct alar cells, more distinctly revolute margins, toothed acumen, etc.

Warburgiella leptocarpa (Schwaegr.) Fleisch.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 13581. New to New Guinea. DISTR.: Wide in Malaysia; Ceylon; South India.

Warburgiella subpapuana Dix. sp. nov.

W. papuana Reimers (Hedwigia 69: 127) peraffinis. Differt habitu *robustiore*, foliis haud pennaeformiter patentibus sed *fortiter falcato-secundis* (*Trichosteleum hamatum* referentibus), atque marginibus *longe infra subulam* denticulatis, subula ipsa *fortius*, perargute denticulata. Cellulae alte papillosae. Seta 2 cm. alta, paullo crassior, *omnino laevis*. Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 13872, **type**.

Very near to *W. papuana* Reimers, but differing quite distinctly in the characters emphasized above.

Acroporium diminutum (Brid.) Fleisch.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 15033*b*, c. fr. New to New Guinea. DISTR.: Malay Is.; Philippines; Malay Peninsula; Siam, Laos.

Taxithelium nepalense (Schwaegr.) Broth.

On decayed log in forest, Koitaki, Papua, near sea level, 5 Feb. 1935; coll. *C. E. Carr*, 11142. New, I believe, to New Guinea. It has a very wide distribution in South-east Asia.

This may possibly be the *T. selenithecium* of C. Müller, but, if so, it certainly cannot be separated from *T. nepalense*. Fleischer, indeed, separates the two mainly on the ground of the latter having the seta rough above, but this is an error, as C. Müller describes it as having "pedunculo laevi."

Taxithelium nitidulum Broth. & Par.

On branches of forest trees, circa 400 m., Koitaki, Papua, 6 May, 1935; coll. *C. E. Carr*, 12176*b*. New to New Guinea. DISTR.: New Caledonia. A little more robust than the New Caledonian plant, but otherwise agrees well.

Taxithelium capillarisetum (Dix.) Broth.

Rouffaer Rivier, Dutch New Guinea, on *Eugenia*, Sept. 1926; coll. *Docters van Leeuwen*, 10183*c* p. p.

Taxithelium novae-guineae Dix. sp. nov.

T. glossoidei (Bry. jav.) affine; magis diffusum, percomplanatum, folia apice minus late rotundata, multo tenerius denticulata, cellulae paullo latiores, alares et basilares (serie una) majores; perichaetii folia multo longius sed late acuminata, denticulata, lingulata, patentia. Cellulae laeves vel dorso perindistincte prominentes. Seta juvenilis laevis. Nova Guinea Britannica. Kanosia, on stilt roots of *Rhizophora* in swamp, 22 Feb. 1935; coll. *C. E. Carr*, 11470.

Very near *T. glossoides*, but distinct as described above. *T. dimorphophyllum* Dix. & Herz. is also near it, but has more dimorphous leaves, the dorsal much narrower and more acute, and the perichaetial leaves sharply toothed.

HYPNACEAE

Ectropothecium laticuspes Broth.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 13057.

Ectropothecium dentigerum Dix.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 14291.

Ectropothecium plumosum Dix. sp. nov.

Dense late caespitosum. Caules prostrati, dense, regulariter, breviter pinnati, anguste plumosi, frondes plures cm. longos, 4–5 mm. latos instructos. Folia decurvo-falcata, sicca leniter plicata, omnia conferta, caulina ab insertione sensim angustata, oblongo-lanceolata, longe tenuiter flexuose acuminata, e medio argute denticulata; costa nulla. Cellulae latiusculae, basem versus sensim laxiores, basilares late rectangulares, alares sat numerosae, inanes, breviter rectangulares, majusculae. Folia ramea minora, angustiora, subula fortiter argute denticulata.

Dioicum. Perichaetium magnum, bracteis magnis, longe subulatis, subdenticulatis. Seta circa 3 cm. longa, tenuissima; theca parva, sicca sub ore valde constricta, turbinata. Nova Guinea, Rouffaer R., Sept. 1926; coll. *Docters van Leeuwen*, 10315; (BZ, 2605).

A very regularly and prettily plumose species, more slender in habit than *E. Moritzii*, and more like *E. eleganti-pinnatum* (C. M.) The leaves are sharply and rather distantly toothed, not as in *E. Moritzii*; the very thin seta and minute capsule are also distinct. *E. aureum* Dix. has wider leaves and much shorter acumen.

Vesicularia elegantula Dix. & Herz.

Supra Port Moresby, Papua, 1600–2100 m., 1935–36; coll. *C. E. Carr*, 13057 p. p.

NORTHAMPTON, ENGLAND



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