

NEW, RARE OR INTERESTING LICHENS FROM THE SOUTHERN HEMISPHERE

II

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RESUMEN

Líquenes nuevos, raros o interesantes del hemisferio austral. II. — 1. Descripción de *Diploschistes diffractus* Müll. Arg., una especie conocida hasta ahora solamente de los cerros tucumanos de la República Argentina, e interesante por su biología, por iniciar su crecimiento sobre el talo de otros líquenes crustáceos, que paulatinamente destruye.

2. Descripción de *Psoroma calophyllum* Müll. Arg., descrito en el siglo pasado de Chile, y descubierto por segunda vez por A. Castellanos en la Patagonia argentina (Chubut). Notas sobre la estructura de la corteza en esta especie y en *Ps. pulchrum* Malme.

3. El género *Psoromaria* Nyl. se distingue de *Psoroma* por sus apotecios netamente biatorinos, formados sin participación de algas simbióticas, según la revisión de los ejemplares tipos de las dos especies *Ps. descendens* (Nyl.) Nyl. y *Ps. subdescendens* (Nyl.) Nyl., de Nueva Zelanda y de Tierra del Fuego respectivamente.

4. *Biatorina prasinella* Jatta, de Tasmania, pertenece, según la revisión del ejemplar tipo, al género *Micarea*, que es filogenéticamente distinto de *Catillaria*, siendo un líquen ascolocular en el sentido de Nannfeldt, y probablemente derivado de la familia *Arthoniaceae*. Es estrechamente relacionada a la especie boreal *M. melaena* (Nyl.) Hedl.

5. *Stereocaulon capense* M. Lamb y *St. Esterhuysenae* M. Lamb, dos especies nuevas sudafricanas perteneciendo al subgén. *Enteropodium*, sect. *Eustereocaulon*.

6. El género *Cladoniopsis* Zahlbr., de Nueva Zelanda, tiene afinidad con *Baeomyces*, del cual se distingue mayormente por sus podocios ramificados. La esterilidad de los apotecios, que por fin se cubren de una capa de tejido talino, sugiere la posibilidad de una conexión filogenética entre *Baeomyces* y ciertas especies colocadas en el género *Siphula*. Se corrigen algunos apuntes erróneos en la descripción original de Zahlbruckner.

7. *Cladonia rangiferina* var. *patagonica* Kphbr., de la región magallánica, se

muestra idéntica con *Cl. (Cladina) laevigata* (Vain.) Gyeln., según la revisión del ejemplar tipo preservado en el herbario de Krempelhuber.

8. *Phlyctis pulveracea* M. Lamb, una nueva especie cortícola de la R. O. del Uruguay, donde la coleccionó W. G. Herter en el año 1938.

9. Apuntes sobre *Teloschistes nodulifer* (Nyl.) Hillm., una especie de distribución andina y preandina, encontrándose desde Bolivia al norte hasta Mendoza al sur, con varios lugares en la República Argentina (Salta, Catamarca, Córdoba y Mendoza). *T. Dabusi* B. de Lesd. (1936) se refiere a la misma especie. Descripción de la especie australiense *Teloschistes excelsior* (Stirt.) M. Lamb, asignada erróneamente al género *Physcia* en el Catálogo de Zahlbruckner; se distingue por su crecimiento radial y por las hebras ciliares en las lacinias de su talo, y tiene afinidad con *T. chrysocarpoides* Vain., *T. subcanaliculatus* Vain., y *T. Hosseianus* Gyeln. Se nota la formación de células hinchadas y oleíferas en los parafisos, parecidas a estiloporas en el sentido de Schmidt.

10. La especie antártica conocida bajo el nombre de *Buellia indissimilis* (Nyl.) B. de Lesd., basándonos sobre la determinación de Vainio, no pertenece en realidad a esta especie portuguesa, sino puede llamarse *B. russa* (Hue) Darb., siendo endémica a la región antártica. Estas conclusiones se basan sobre las investigaciones hechas por el autor en una de las localidades antárticas citadas para *B. russa*, y sobre la revisión de material de la verdadera *B. indissimilis* coleccionado en el lugar clásico en Portugal.

11. *Rhizocarpon compositum* M. Lamb, descrito en la primera parte de estos apuntes (Lilloa, 1948), se refiere a *Buellia (Diplotomma) excellens* H. Magn. (1947), según el examen de una parte del ejemplar tipo de ésta, facilitada posteriormente por su autor.

Especies nuevas : *Stereocaulon capense* M. Lamb, *Stereocaulon Esterhuysenae* M. Lamb, *Phlyctis pulveracea* M. Lamb.

Combinaciones nuevas : *Micarea prasinella* (Jatta) M. Lamb (Syn. *Biatorina* (errore « *Biatorina* ») *prasinella* Jatta, en *Bull. Soc. Bot. Ital.*, 1911, pág. 257). *Teloschistes excelsior* (Stirt.) M. Lamb (Syn. *Physcia excelsior* Stirt. apud Bailey, en *Queensland Agric. Journ.*, V, 1899, pág. 40).

1. DIPLOSCHISTES DIFFRACTUS MÜLL. ARG.

(Plate I. figs. 1 and 2)

Krempelhuber, in his treatment of the lichens collected in the mountains of Prov. Tucumán, Argentina, by Lorentz and Hieronymus (*Flora*, LXI, 1878, pp. 433-439, 461-464, 476-480, 492-496, 516-523), described a new species of *Urceolaria*, *U. bispora*, with two forms, « a. terricola » and « b. saxicola ». Müller Arg. subsequently (in *Flora*, LXXII, 1889) revised Krempelhuber's determinations, and raised Krempelhuber's *Urceolaria bispora* b. *saxicola* to the status of a proper species, which he named *Urceolaria diffracta* Müll. Arg. (*loc. cit.*, p. 65), remarking : « Thalli areolis, margine demum sublecidino

et sporis crebre (nec laxe) multilocellosis insignita est. » Zahlbruckner, in *Hedwigia*, XXXI (1892), p. 35, made the combination *Diploschistes diffractus* (Müll. Arg.) Zahlbr., without giving any description.

In our excursions in the Tucumán mountains we collected a number of specimens of this species, and were able to confirm their identity by comparison with the type specimen of « *Urceolaria bispora* b. *saxicola* », which was received on loan from the Krempelhuber herbarium at München through the courtesy of Prof. K. Suessenguth. As the species proves to be peculiar, not only in its morphology and appearance, but also in its biology, we will give the following description and remarks on it, based on four specimens (M. Lamb nos. 5164, 5350, 5354, and 5392) collected in Prov. Tucumán, Valle de Tafí, Carapunco-Infiernillo, altit. circ. 2800 m. s. m., in 1947. This locality is not far from Cienega, the classical locality where the species was first found by Lorentz.

On non-calcareous metamorphic rocks. Thallus forming effuse patches 2-6 centim. diam., not effigurate; no distinct hypothallus visible. It is thin (0.2-0.4 mm thick), smooth and even, diffract-areolate with angulose or obtusely angulose, plane or only slightly convex, contiguous areolae 0.2-0.8 (-1.3) mm diam., separated by fairly narrow cracks with \pm rounded-off edges. (See Pl. I, figs. 1 and 2). In color the thallus is usually dull mouse-brown to pale reddish-brown; the surface quite matt. The natural color seems to be pale dull brown, corresponding to Pl. XLVI, 17''-17'''i in Ridgway's *Color Standards* (1912); the more reddish tinge seen in some specimens, corresponding to Ridgway's Pl. XLVI, 15'', 17''-17'''b, is apparently a spurious coloration due to abundance of ferruginous substratum-particles taken up in the thallus. The medulla also is usually reddish macroscopically for the same reason. Thallus outwardly and inwardly KHO-, CaCl_2O_2 -, PD-, I-. Apothecia fairly numerous, immersed singly (rarely 2) in the areolae, 0.5-0.8 (-1.0) mm diam., persistently concave-scutelliform, with persistent, prominent, moderate, entire, black proper margin level with the thallus or slightly prominent above it. Disc black, matt, sometimes faintly reddish-suffused, but not distinctly pruinose.

Thallus without true cortex; it is covered by an outer layer of variable thickness (20-100 μ), \pm hyaline and colorless, of very indis-

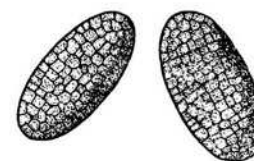


Fig. 1. — *Diploschistes diffractus* Müll. Arg. Spores.

tinnet structure, not paraplectenchymatic, consisting of mostly horizontally parallel, compacted and crushed, indistinct and gelatinised, thin-walled hyphae 2-3 μ thick. Algal stratum irregular, slightly interrupted, 100-170 μ deep; algae protococcoid, \pm globose, bright or yellowish-green, 10-18 μ diam., thin-walled; medulla colorless, but much interspersed with substratum-particles, \pm compact, composed of rather indistinct and gelatinised, thin-walled hyphae 2-4 μ thick interwoven in various directions. Lower part or nearly all of the medulla gradually confused with the substratum; no dark basal layer.

Proper margin (excipulum) of apothecia well developed at sides, brown-blackish in section, broad (120-140 or even 200 μ wide, 60-100 μ deep), \pm level with the thallus or slightly prominent, consisting of radiating, parallel, indistinct, dark brown hyphae 2.5-3.5 μ thick. Hypothecium a direct basal continuation of the excipulum, hence perhaps better considered as basal excipular stratum; shallow (30-40 μ deep), pale to dark brown (in the same apothecium), or sometimes nearly colorless, especially in younger apothecia; often \pm opaque from enclosed air, indistinctly paraplectenchymatic or with horizontally elongated cells 6-8 μ long and 3-4 μ wide; not subtended by algae. Subhymenial layer (true hypothecium?) 12-20 μ deep, colorless or pallid fumose, not nubilated, composed of indistinct, intricately, shortly septate hyphae about 3 μ thick. Whole depth of subhymenium + hypothecial layer not much over 40 μ . Thecium 80-100 (-110) μ high, in upper 10-13 μ dark brown to brown-blackish (not purplish or olivaceous), KHO-, HNO₃-, otherwise colorless and hyaline. Paraphyses concrete, involved in mucilage, about 1.5 μ thick, not stiff, not constricted at septa, simple or sometimes branched, at the tips gradually thickened to 2 (-3) μ and there obscured by the dark epithelial pigment. Asci ventricose-clavate, 60-70 \times 24-26 μ , with wall about 1.5 μ thick at sides, at apex thickened up to 3 or 4 μ (or up to 14 μ in immature asci). Spores 2 in ascus (rarely single), uniseriate or slightly overlapping, soon dark smoky-brown, finally brown-blackish and opaque (HNO₃-), subellipsoid to oblong, copiously muriform-cellulose, 26-37 \times 14-18 μ , usually non-halonate, rarely (in no. 5350) with a distinct gelatinous halo 6-8 μ thick. Both spores of ascus about the same shape and size; occasionally one of them remaining pale and abortive. Spores which are single in ascus are not larger than normal. With Iodine, thecium fulvous to wine-red (with or without a preceding aeruginose coloration); subhymenial layer I — or + blue.

The older apothecia, with their tumid black proper margins rising above thallus level, look quite lecideine, and this, together with the gelatinous halo occasionally present round the spores, might suggest a *Rhizocarpon*. The younger apothecia, however, are quite aspicilioid or diploschistoid in appearance, with deeply impressed, concave disc sunk below the thallus and directly surrounded by it, with the black proper margin invisible or indistinct.

Diploschistes diffractus is interesting biologically in that it seems always to commence its development epiphytically over the thallus of other crustaceous lichens (*Lecidea*, *Lecanora*, etc.), killing them off as it spreads, until finally it remains alone with its own direct attachment to the rock. Pl. I, fig. 1, shows a young plant growing over the thallus of *Lecidea* sp., which it is obviously destroying, as can be seen by the white color of the dying areolae of the *Lecidea* at the periphery. Pl. I, fig. 2 shows a larger plant now growing independently on the rock, associated with *Lecanora chlorophaeodes* Nyl.

2. PSOROMA CALOPHYLLUM MÜLL. ARG., WITH A NOTE ON PS. PULCHRUM MALME

(Plate II, figs. 3 and 4)

Psoroma calophyllum was described by Müller Arg. in *Hedwigia*, XXXI (1892) 278, on a small specimen in the Kew Herbarium from Chile, exact locality and date not stated, coll. E. O. Reed, and has not since then been recorded or mentioned in the literature. Through the courtesy of Sir Edward Salisbury, Director of the Royal Botanic Gardens, Kew, England, we received on loan the type specimen and were able to confirm its identity with two well developed specimens from Argentina which we had tentatively determined as this species.

The Argentine specimens were collected in Patagonia, Chubut: Lago Menéndez, on tree branches, by A. Castellanos in 1945 (Herb. Inst. Miguel Lillo, n° 2459), and Lago Verde, on twigs, by O. Kühnemann in 1941 (Herb. Mus. Argent. Cienc. Nat. n° 5462).

The appended photographs of part of the Lago Menéndez specimen and of the type fragment in the Kew Herbarium (Pl. II, figs. 3 and 4) will give a better impression of the characteristic habitus of this species than any long description. *Ps. calophyllum* is related to *Ps. pallidum* Nyl. and *Ps. pulchrum* Malme, differing from these in its almost *Sticta*-like, slightly concave, sometimes faintly scrobiculate

fronds which are strongly incised at the edges, often in a pinnatifid manner, and furthermore by the presence of conspicuous cephalodia on the pale, fibrose-tomentose underside. In the more recently gathered Argentine material the color of the upper side is glaucous-stramineous to impure yellowish, corresponding in Ridgway's *Color Standards* (1912) approximately to « Citrine Drab » or « Dark Olive-Buff » on Pl. XL, 21'', and is matt; the underside is lighter, whitish to yellowish-white (« Pale Olive-Buff » to « Olive-Buff » on the same plate of Ridgway), the shaggy tomentum of rhizinae being concolorous or pallid sordid yellowish. The cephalodia on the underside are tumid to subglobose or obsoletely placodioid, 0.5-1.0 mm. in diam., pallid or brownish, containing pale greenish Nostocoid algae (not in distinct chains). The apothecia are nearly all marginal along the edges of the laciniae, and are 0.8-2.0 mm. diam., well constricted at the base, with testaceous or reddish-brown, plane to slightly convex, matt, naked disc and persistent, moderate, lobulate-crenate thalline margin.

The following anatomical details are taken from the type specimen in the Kew Herbarium :

Thallus corticate on upper side only. *Cortex* 50-70 μ thick, faintly sordid yellowish in outermost $\frac{1}{3}$ - $\frac{1}{2}$, the inner part colorless. The outer yellowish part is of « decomposed » structure, with gelatinously fused, intricate, indistinct, thick-walled hyphae, but the inner colorless part is distinctly paraplectenchymatic, with isodiametric or vertically oblong cells 7-17 μ diam. (or up to 24 μ long when oblong), their walls of variable thickness, 1.5-3.0 μ . In sections of younger peripheral parts of the thallus these paraplectenchymatic cells tend to be smaller than in the older central parts. *Algal stratum* 35-60 μ deep, \pm continuous; algae bright green, thin-walled, globose, 7-12 μ diam. *Medulla* interspersed with minute sordid yellowish granules, semi-opaque in section; composed of thin-walled hyphae about 3 μ thick loosely or \pm closely intricate in various directions. *Rhizinae* produced from the lower medulla, in the form of fasciculate bundles of colorless hyphae, not interspersed. Loosely tangled, colorless tomentum-hyphae are also present on the underside of the thallus. *Apothecial margin* containing algae (scattered groups of which are also present below the hypothecium), corticate with a clear to sordid yellowish-interspersed, « decomposed » cortex 28-45 μ thick similar to the outer cortical layer of the thallus, in places also with development of inner paraplectenchyma of cells 6-10 μ diam. *Hypothecium* 75-95 μ deep, colorless in lower third, in upper two-thirds faintly

yellowish in section or partly grayish-grumose; composed of hyphae about 3 μ thick compactly intricate in various directions. *Thecium* 120-135 μ high, gradually fulvescent in uppermost 13-24 μ , otherwise colorless and hyaline. *Paraphyses* \pm conglutinated; but separable under pressure, 2.0-2.5 μ thick, simple or branched, often slightly constricted at the septa, at the tips not or hardly thickened, there cemented together into a \pm amorphous, gelatinised, yellowish epithecium. *Asci* clavate to cylindric-clavate, 100-115 μ long, 10-17 μ broad, with gelatinous wall about 1.5 μ thick at sides (or up to 5 μ in young asci), at the apex thickened up to 9 μ . *Spores* 8, uniseriate or subuniseriate in ascus, appearing globose whilst in the ascus, but when mature and freely extruded subglobose-ellipsoid to ellipsoid, rounded at ends, with smooth or finely scabrid-exasperated wall 1.5-2.0 μ thick; 17.0-18.5 \times 10.0-13.5 μ . Thecium I + blue, then brownish-vinose.

The Argentine specimens collected by Castellanos and Kühnemann show good agreement in their anatomical characters with the type specimen described above, only the paraplectenchymatic inner part of the cortex is less well developed, or even quite absent, so that in places the cortex may be entirely of the « decomposed » type, especially in the younger parts of the thallus; where the inner paraplectenchyma is developed, the cells are somewhat smaller than in the type specimen, 4.0-8.5 (-10.0 μ diam. The thecium is 135-170 μ high, I + greenish-blue then wine-reddish, and the spores globose to subglobose-ellipsoid, 13-16 μ diam., or 17.0-18.5 \times 11.0-15.0 μ ; rarely ellipsoid, about 22 \times 11.5 μ . Spore-wall scabrid-exasperated and up to 2 μ thick.

The type specimen in the Kew Herbarium is associated with *Parmeliella Gayana* (Mont.) Müll. Arg.; the specimens of Castellanos and Kühnemann are without accompanying species.

The variability in the cortical structure noted above is also found in the related species *Ps. pulchrum* Malme (*Ark. f. Bot.* XX A, n° 3, 1925, p. 12). In this species Malme describes the cortex as being formed of pachydermatic, partly vertical, partly irregularly intertexted hyphae with lumina hardly 3 μ wide, and uses this character in his key as one of the main features distinguishing *Ps. pulchrum* from *Ps. pallidum* Nyl., in which the cortical stratum is said to be « manifeste parenchymaticum ». In the type specimen of *Ps. pulchrum*, however (Fuegia, Ushuaia, Dusén n° 257), which was received on loan for study through the courtesy of the Stockholm State Museum

authorities, the cortical structure was found to be exactly similar to that described in *Ps. calophyllum* above, viz. : 40-70 μ thick, clear, in its uppermost $\frac{1}{3}$ faintly yellowish and of « decomposed » structure (formed of conglomerated, highly gelatinised, pachydermatic hyphae intertexted in various directions and completely fused together, the lumina 1.0-1.5 μ wide), but in its inner $\frac{2}{3}$ colorless and distinctly paraplectenchymatic, with \pm isodiametric, obtusely angulose cells 5-10 (-16) μ diam., their walls of variable thickness (1.5-3.0 μ); see Text-fig. 2.

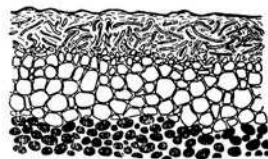


Fig. 2. — *Psoroma pulchrum* Malme. Section of upper cortex and upper part of the algal layer in the type specimen.

Another feature in which, according to Malme, *Ps. pulchrum* differs from *Ps. pallidum* is the height of the thecium, given as 200-250 μ in *pulchrum*, 140-160 μ in *pallidum*. This however is hardly the case, for in the type specimen of *Ps. pulchrum* we found the thecium to be only 120-170 μ high, with asci 100-120 μ long; the base of the thecium is produced downwards

without sharp limit into the hypothecium, for which reason its height is apt to be overestimated, unless the actual length of the asci be also taken into consideration. The characters used by Malme to separate the species therefore break down to a large extent, and *Ps. pulchrum* Malme is probably best distinguished from *Ps. pallidum* Nyl. by its more narrowly lacinate thallus, its globose or subglobose spores with very distinctly and coarsely verruculose-scabrid wall¹, and possibly also the different reaction of the thecium with Iodine.

3. THE GENUS PSOROMARIA NYL.

(Plate III, figs. 7 and 8)

The genus *Psoromaria* was first tentatively proposed by Nylander in *Lich. Nov. Zeland.* (1888) p. 55, to accommodate the two species *Psoroma descendens* Nyl. and *Ps. subdescendens* Nyl., which were found to differ from other species of *Psoroma* in their biatorine apothecia. He did not however there make the formal combinations

¹ Malme in his original description of *Ps. pulchrum* gives the spore diameter as 12-15 μ ; in the type specimen we found them to be mostly globose, 13.5-17.0 μ diam., with a few subglobose-ellipsoid, about 18.5 \times 13.5 μ .

under *Psoromaria*; this was done later, *apud* Hue in *Nouv. Arch. Mus. Hist. Nat. Paris*, sér. 3, III (1891) p. 45.

Hue, in the appendix to his monograph of *Solorina*, in *Mém. Soc. Sci. Nat. Cherbourg*, XXXVIII (1911/1912), deals with this genus *Psoromaria* on p. 48 *et seq.*, and comes to the conclusion that the genus is to be deleted, as it is allegedly based on a false interpretation of the apothecial structure. He claims that, according to his examination of type specimens of the two species, the apothecia are not biatorine as stated by Nylander, but lecanorine, « c'est-à-dire que leur tégument extérieur est formé par le cortex du thalle qui se courbe pour les entourer ». As pointed out on a previous occasion in these *Notes* (*Lilloa* XIV (1948) p. 228), Hue's conception of the « lecanorine » apothecium was at variance with the commonly accepted definition, in that he regarded the presence in the apothecial margin of thalline cortex, and not necessarily that of symbiotic algae, to be the sole criterion. In other words, many apothecia described by Hue as « lecanorine » would be classified as superleceideine in modern anatomical nomenclature (see Frey in *Ber. Schweiz. Bot. Ges.* XLV (1936) p. 198). Hue's description of the anatomy of the two *Psoromaria*-species, *loc. cit.*, indicates that their apothecia are of the superleceideine type, as no algae were found in the margin, although in *Ps. subdescendens* they were present under the point of juncture of the apothecium to the thallus. Hue places the two species in question in the genus *Pannaria*, section *Psoroma*, in a category « c. — Apotheciorum excipulum coloratum et margo nec sulcata, nec crenulata ».

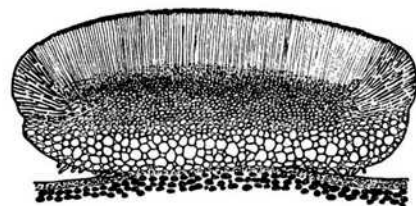
Among a collection of lichens made in Argentine Patagonia by O. Kühnemann in 1940 was found a specimen of *Psoroma*, agreeing closely in its outward morphological characters with *Psoromaria subdescendens* Nyl., but containing symbiotic algae both in the margin of the apothecia and below the lower excipular stratum¹. It therefore seemed advisable to reexamine the types of the *Psoromaria*-species in respect of their apothecial anatomy, and this was made possible by the kind cooperation of the University Botanical Institute at Helsingfors in lending the two types from Herb. Nylander. The examination of these specimens showed that in both these species the apothecium is completely biatorine, as originally stated by Nylander, and contains no symbiotic algae whatever. The genus

¹ *Psoroma internectens*, n. sp., to be published shortly elsewhere.

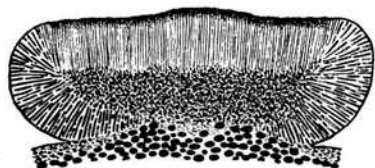
Psoromaria is therefore not to be deleted, as suggested by Hue, and its segregation from *Psoroma* as a separate genus is justified.

Hue, in the paper mentioned above, gives detailed descriptions of *Psoromaria descendens* and *Ps. subdescendens* based on the type specimens, and so no lengthy revision of these two species is here necessary. The following notes on the types, and the appended figures of sections of their apothecia, may however be found useful.

The type specimen of *Psoromaria descendens*, from New Zealand, no exact locality stated, on bark, coll. C. Knight (Herb. Nyl. no. 30799),



A



B

Fig. 3. — A, *Psoromaria descendens* (Nyl.) Nyl. Section of apothecium in the type specimen; B, *Psoromaria subdescendens* (Nyl.) Nyl. Section of apothecium in the type specimen.

is shown on Pl. III, fig. 8. It forms a patch up to 8 centim. across, consisting of crowded and imbricated, minute, rounded squamules not over 0.5 mm. in diameter, buff or brownish-buff in color, matt, often with very narrow lighter margins, conerescent and forming a diffract crust on a moderately thick, slightly spongy, black or greenish-black hypothallus. Apothecia numerous, sessile on the clusters of squamules, often aggregated, 0.4-1.0 mm. diam., dark brown to brown-blackish, matt or subnitid, at first with a slightly prominent, thin, entire, *concolorous* proper margin, then

soon convex and immarginate. In section, they contain no algae, either in the margin or below the hypothecium (Fig 3, A). Hypothecium pale yellow-brownish (fulvescent), becoming gradually colorless in upper subhymenial part. Thecium 90-100 μ high, *dark olivaceous or greenish-blackish* in uppermost 4-7 μ , otherwise colorless and hyaline. Paraphyses \pm conglutinated, but separable under pressure, 1.5-2.5 μ thick, the dark pigmented apices more conglutinated and slightly swollen (up to 3.5 μ). Asci 70-75 μ long. Spores 8, biseriate or subbiserial in ascus, ellipsoid or elongate-ellipsoid, rounded or bluntly apiculate at ends, with smooth or slightly scabrid wall about 1 μ thick or slightly over; seen 10.0-13.5 \times 5 μ (acc. to Nylander

11-15 \times 5-6 μ). Symbiotic algae pale green, globose, 8.5-16.0 μ diam. thin-walled (*Pleurococcus*?).

The type specimen of *Psoromaria subdescendens*, from Argentina, Tierra del Fuego, Ushuaia, on bark of *Nothofagus antarctica*, coll. Spegazzini, 1882 (Herb. Nyl. no. 30798), is shown on Pl. III, fig. 7. It is very small; the thallus (on an indistinct blackish hypothallus) consists of minute, \pm imbricated, sordid alutaceous, microphylline squamules, not over 0.5 mm. diam., narrowly paler at the edges. Apothecia 0.5-0.7 mm. diam., plane, with dark reddish, naked disc and persistently prominent, *entire reddish-brown* margin, which is lighter than the disc, but much darker than the thallus. The apothecia contain no algae, either in the margin or below the hypothecium (Fig. 3, B). Hypothecium faintly sordid brownish-yellow. Thecium about 100 μ high, pale sordid brown in uppermost 8-12 μ . Paraphyses separable under pressure, somewhat gelatinous, 2.5 (-3.0) μ thick. Asci 75-80 μ long. Spores 6-8, biseriate or subbiserial in ascus, abundantly produced, ellipsoid, with thickish, finely scabrid wall, 13.5-15.0 (-17.0) \times 6.5-8.5 μ ; this observed size differs somewhat from that given by Nylander and Hue, *ll. cc.*

4. MICAREA PRASINELLA (JATTA) M. LAMB, WITH REMARKS ON THE GENUS MICAREA

Jatta, in *Bull. Soc. Bot. Ital.* (1911) 257, described a new species of *Biatorina* (« *Biarotina* » by a printer's error) from Tasmania, *B. prasinella*, collected by W. A. Weymouth in 1899. The locality given is « *Cubdillbarril in monte Lyell* ». It was considered by Jatta to be closely related to *B. prasina* Hepp. Dr. C. Sbarbaro kindly obtained for us the loan of the type specimen from Herb. Univ. Firenze, where it was lying in the herbarium of E. Levier.

From the label the locality is seen to be W. Tasmania, Dubbilbarril, Mt. Lyell railway; Weymouth n° 977. This is in the West Coast Range, near Macquarie Harbour. The plant was growing over a Jungermanniaceae hepatic, not directly on bark.

Thallus effuse, in small, ill-delimited patches up to 1 centim. diam., very thin, pulverulent-furfuraceous, here and there efflorescent with small soredial lumps up to 0.25 mm. diam.; now whitish to alutaceous (in fresh state, acc. to Jatta, « *cinereo-virescens* », « *humectus prasinus* »), not now green when moistened. No visible hypothallus.

Apothecia not very numerous, scattered, sessile, round, constricted at base, entirely black, matt or subnitid, small, 0.25-0.50 (-0.70) mm. diam., sometimes in the youngest stages with a \pm distinct, moderate, entire, slightly raised proper margin, then becoming slightly to moderately convex and immarginate, or commonly immarginate from the first. Disc not pruinose.

Thallus in section ecorticate, of sorediose structure, of scattered or crowded soredial lumps 28-65 μ diam., each of which consists of a mass of algae surrounded and penetrated by colorless, thin-walled, shortly septate hyphae about 2 μ diam., forming a \pm smooth, not floccose surface. Thinner, colorless hypothalline hyphae (1.0-1.5 μ thick), with few septa, penetrate downwards into the interstices between the cells of the liverwort. Hypothalline and soredial hyphae I —. Thalline tissues KHO — (under the microscope). Symbiotic algae now pale yellowish-green, distinctly protococcoid, but small, 2.5-5.0 μ diam., globose, thin-walled, not concatenate, without slime-sheaths. Thallus PD.

Excipulum \pm reflexed, becoming indistinct towards the center below, 50-70 μ thick, colorless and hyaline except in outermost 10-17 μ , where yellowish-gray-nubilated (without visible granules), in the upper part purple-brown-blackish in the outer 10-14 μ ; composed of conglutinated, gelatinised, thick-walled hyphae in more or less distinct parallel palisade-arrangement, only their tubular, branching lumina visible, 1.0-1.7 μ wide. *Hypothecium* 70-120 μ deep, dark purple-brown-blackish, \pm dense and opaque in section, the color fading out gradually on the underside; of indistinctly paraplectenchymatic structure, with \pm isodiametric, thin-walled cells 3.5-5.0 μ diam., the purple-brown pigment heavily deposited between their walls. *Thecium* 70-80 μ high, entirely \pm purple-brownish-pigmented, in the upper 7-17 μ irregularly purple-brown-blackish. *Paraphyses* inconspicuous and not abundant, involved in the mucilage surrounding the asci, not discrete, thin and filiform (about 1 μ thick), sinuose, copiously branched and often anastomosing, without thickened or colored apices; the epithecium consisting of an amorphous layer of dark purple-brown pigment lying over and between the thecium, which consists almost entirely of closely packed asci. *Asci* very abundant, clavate, 65-78 μ long, 11.0-15.5 μ broad, with \pm gelatinous wall up to 1.7 μ thick at the sides, at the apex thickened up to 7 μ . *Spores* abundantly produced and easily liberated from the asci, 4-6 (-8?) in ascus, uniseriate or biseriate, elongate-ellipsoid or often \pm arthonioid (with one cell slightly broader

than the other), rounded or bluntly pointed at the ends, with one distinct median septum of the same thickness as the spore-wall (about 1 μ), occasionally seen also simple or 3-septate; variable in shape and size, 15-18 (-20) \times 4.0-5.5 (-6.8) μ . Thecium staining blue then dark sordid greenish with Iodine. With KHO, the dark purple-brown pigment of thecium and epithecium becomes more distinctly purple-violet or crimson-purple; the hypothecium remains brown, not purpurascens.

The arthonioid or opegraphine structure of the paraphyses is best seen after treatment with KHO, HCl, and I, which reveals them as much branched and anastomosing, sinuose, thread-like filaments, without thickened apices (Fig. 4). Jatta was wrong in describing

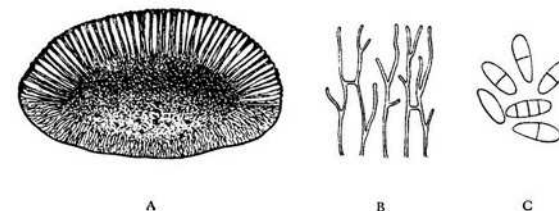


Fig. 4. — *Micarea prasinella* (Jatta) M. Lamb, type specimen: A, section of apothecium; B, paraphysoid interthecial filaments (after treatment with KHO, HCl, and I); C, spores.

them as «ad apices incrassatis et fuscis». From their structure they are obviously not true paraphyses, but *paraphysoid interthecial filaments*, and this species therefore belongs to the *ascolocular lichens* in the sense of Nannfeldt (1932), and would be placed in the family Lecanactidaceae (in *Lecanactis* sect. *Arthoniactis*) were it not for the non-Trentepohlioid symbiotic algae.

The plant is a typical *Micarea* as defined by Hedlund (1892), possessing the characteristic small Gloeocapsoid symbiotic algae (only 2.5-5.0 μ diam.), and for reasons given below is now placed under that genus as *Micarea prasinella* (Jatta) M. Lamb, comb. nov.

Hedlund (*op. cit.*, pp. 5-7) separated the genus *Micarea* on the grounds of its peculiar symbiotic algae, which, although protococcoid, are unusually small, of Gloeocapsoid appearance, and penetrated by haustoria. The type-species is *M. prasina* Fr. (Syn. *Lepraria collemoides* Fr., as stated by Fries in his original description of the genus, *Syst. Orb. Veget.*, pars 1, 1825, p. 256). In reality, the most important character of the genus is that it belongs to the *Ascoloculares*, and not

to the *Ascohymeniales* (which include the true *Catillariae*), and has obviously been derived from a different phylogenetic source, near to *Arthoniaceae*. This is shown by the presence of paraphysoid interthecial filaments in place of true paraphyses. Hedlund, *op. cit.*, p. 27, noticed this peculiarity, and defined the paraphyses of *Micarea* as « saepissime plus minus ramosae et saepe anastomosantes, apicibus haud incrassatis », although some of the species included by him under *Micarea* are described as having mostly simple paraphyses (e. g. *M. incrassata*), and on revision may therefore have to be excluded as being true *Catillariae*.

On phylogenetic grounds, therefore, *Micarea* must rank as a distinct genus of Arthonioid derivation. Previous authors have also inclined to the same view; thus Malme (*Ark. f. Bot.* XVIII, n° 12, 1923, p. 3) considers *Micarea* to be a very natural grouping, although he places it under *Catillaria*; he describes thin, very branched and connected paraphyses in his two new species *C. (Micarea) americana* and *C. (Micarea) itacolumitica*. Vainio (*Lichenogr. Fennic.* IV, 1934, p. 421) also separates *Micarea* as a distinct section of *Catillaria*, defining the paraphyses as « partim ramoso-connexae », whereas in sect. *Biatorina* he states them to be simple.

The peculiar character of the paraphyses (paraphysoid interthecial filaments) in the *Arthoniaceae* was noticed as far back as 1879, when Müller Arg. (*Flora*, LXII, p. 169) wrote that they are always present in *Arthonia*, « at valde tenellae, clathratim pauciramosae ». Redinger, in his diagnosis of the family *Arthoniaceae* in *Rabenhorst's Kryptogamenflora* (1937), describes the paraphyses as « sehr dünn, netzig verzweigt und verbunden ». Nannfeldt, *op. cit.*, p. 35, confirmed the presence of paraphysoid interthecial filaments in two members of the *Arthoniaceae* examined, *Arthonia punctiformis* and *Allarthonia patellulata*.

It would seem that originally *Micarea* has been derived from ancestral forms in or near the *Arthoniaceae* similar to *Allarthonia*, chiefly by the development of a definite excipulum. In the genus *Allarthonia*, one species, *A. patellulata* (Nyl.) Zahlbr., has rudimentary indications of a lateral excipulum, formed by the lateral extension of the hypothecium (Redinger, *op. cit.*, p. 133, fig. 32). Such a species as *A. patellulata* might well give rise in the course of evolution to *Micareoid* forms with a distinctly developed lateral excipulum. It is of interest to note also that according to Redinger's descriptions *A. patellulata* is furthermore distinguished by possessing unusually

small *Pleurococcus*-algae, 6-8 μ in diameter; in the other species they measure mostly 10-15 μ . Certainly the character of the symbiotic algae in *Micarea*, although in itself, according to the modern taxonomic viewpoint, not a valid criterion for the delimitation of higher groups, is correlated with the diagnostic features of ascolocular development in this genus, and the occurrence of similar types of algae in related groups is not without phylogenetic significance. Another Arthonioid character is the tapering of the spores at one end, with unequally sized spore-cells, often seen in *M. prasinella* and other species, e. g. *M. melaena*. There is no place for *Micarea* in the 'obsolescent' « gonidial » system of Zahlbruckner; it comes between the families *Arthoniaceae* and *Lecanactidaceae*, but is excluded from the first by the possession of an excipulum and from the second by its non-Trentepohlioid symbiotic algae. Probably the best arrangement at present would be to include it in the *Arthoniaceae* next to *Allarthonia*, emending the definition of the family to include also members showing development of a distinct excipulum.

In spite of the discocarp appearance of the fructification, ascolocular genera like *Micarea* and *Lecanactis* are obviously not to be included in the *Cyclocarpineae*, which are, as has been shown by Nannfeldt (1932), typical *Ascohymeniales*, at least in by far the greatest part; in fact, Nannfeldt definitely rejects the supposition that any of the true *Discomycetes* (corresponding to *Cyclocarpineae* in the lichen classification) have arisen from primitive ascolocular forms (*op. cit.*, p. 57). But it cannot be denied that in the *Ascoloculares*, as defined by Nannfeldt, an evident progression towards a discocarpoid type of fructification can be traced in certain orders. Thus in the order *Myriangiales* we can see the sequence from forms with asci scattered at various levels in an undifferentiated stroma (*Angatia*, *Stevenssea*) to those in which the asci are arranged at the same level in a distinct hymenioid layer (*Atichia*), and similarly the origin of a more or less well differentiated sterile marginal excipuloid layer, well seen for example in *Angatia*. The same tendencies, coupled also with elongation of the asci to clavate form¹, is seen in the *Pseudosphaeriales*, e. g. *Dothioraceae*, and

¹ One of the main characteristics of the *Ascoloculares* is stated to be the thick-walled asci; see Nannfeldt, *op. cit.*, p. 27. But in many species of *Arthonia*, in addition to *Micarea*, the asci are relatively thin-walled at the sides and strongly thickened at the apex only, not or hardly distinguishable from those of the ascolymenial *Cyclocarpineae*; cfr. Redinger, 1937, fig. 14 b on p. 51. A positive

perhaps here, rather than among the Arthoniaceae-Celideaceae, which lack any excipuloid layer, should we seek for the closest relatives, lichenized or otherwise, of *Micarea*.

M. prasinella, with its densely and darkly pigmented hypothecium, is not very closely related to *M. prasina*, as Jatta claims, but comes very near to *M. melaena* (Nyl.) Hedl. (Syn. *Lecidea melaena* Nyl., *Bacidia melaena* Zahlbr.), which is a typical *Micarea*, with paraphysoid interthecial filaments seen (after treatment with KHO, HCl, and I) as very thin, branched and anastomosing threads, not thickened at the apices, running through the hymenial mucilage. Especially the f. *catillarioides* (Vain.) Hedl. of *M. melaena* resembles *M. prasinella* on account of the persistently 1-septate (rarely 2-septate), ovoid-oblong spores. But *M. prasinella* differs from *M. melaena* in its leprose, pulverulent-furfuraceous, ecorticate thallus (verruculose-granulose and \pm corticate in *M. melaena*), in the colorless inner part of the excipulum (in *M. melaena* the excipulum is entirely purplish or subviolaceous), and the higher thecium (only 35-55 μ high in *M. melaena*).

5. TWO NEW STEREOCAULA FROM THE CAPE OF GOOD HOPE

Stereocaulon capense M. Lamb. sp. nov.

(Subgen. *Enteropodium*. Sect. *Eustereocaulon*)

(Tabl. II, fig. 5)

Pseudopodetia substrato arcte adfixa, satis erecta, gregatim caespitosa, ramosa, pulvinulos ad 1.4 centim. altos et 1.0-1.8 centim. latos formantia, habitu dorsiventrali (phyllocladiis uno latere majoribus et copiosius evolutis); 0.4-0.6 mm. crassa, teretia, decorticata, laevigata, haud lignosa, glaberrima, albida aut leviter roseolo-aut ochraceo-albida, opaca. Ramuli terminales vulgo latere superiore cortice vestiti laevigato et dein areolato-diffracto-vel squamuloso. Phyllocladia e cortice diffracto-squamuloso oriunda, irregularia, 0.5-0.8 (-1.0) mm lata, demum crenato-squamulosa, conferta, albido-cinerea, opaca, medio haud obscuriora; in altero latere pseudopodetiorum parciora, minora, verruculosa. Cephalodia parce evoluta, pseudopodetiis lateraliter adnexa, pallida

Iodine reaction of the ascus wall, as here described in *Micarea prasinella*, is not common in the Ascoloculares, but occurs in some species of *Arthonia* and *Opegrapha*.

(albicantia vel ochraceo-albicantia), opaca, minuta (0.4-0.8 mm lata), irregulariter pulvinuliformia, mox verruculoso-tuberculata et fere botryosa. Soredia desunt. (Apothecia haud evoluta). Phyllocladia (et cortex) KHO + leviter flavescens, PD + persistenter pallide sulphurea. Formas quasdam Ster. evolutoidi (H. Magn.) Frey in memoriam revocans, sed pumilius, fere erectum, haud late et dorsiventraliter extensum, et dein pseudopodetiis pallidis, laevigatis et glaberrimis et cephalodiis aliis diversum. Status juveniles Ster. sphaerophoroidi Tuck. habitu fere refert. Africa australis, Western Cape Province, Tulbagh Division, Great Winterhoek, altit. 5000 ped., saxicola: E. Esterhuysen, anno 1951, n° 19862 pr. p.

Stereocaulon Esterhuysenae M. Lamb., sp. nov.

(Subgen. *Enteropodium*. Sect. *Eustereocaulon*)

(Tabl. II, fig. 6)

Pseudopodetia gregatim conferta, pulvinulos usque ad 3 centim. latos formantia, inferne partim in terram defossa, superne late, confluentem et fere crustose phyllocladiis squamulosis albido-cinereis tecta, proinde tantum latere inferiore pulvinulorum bene visibilia, ibi prostrata, cortice phyllocladiisque destituta, bene ramosa, teretia, 0.2-0.5 mm crassa, albida aut ochraceo-albicantia, laevigata, opaca, glaberrima. Phyllocladia e cortice diffracto ramulorum formata, albido-aut glauco-cinerea, marginibus pallidiora (sed medio haud obscure maculata ut in Ster. vesuvianum), conferta, sat imbricata, crenato-lobulata, 0.4-1.0 mm lata. (Cephalodia, soredia et apothecia desunt). Phyllocladia (et cortex) KHO + flavescens, PD + aurantiaco-rubescens. Praecedenti (quocum simul lectum) peraffine et potissime ejus variatio, sed terricola nec saxicola, magis dorsiventraliter deplanatum, et reactione alia. Cum priore: E. Esterhuysen n° 19862 pr. p.

Miss Elsie Esterhuysen collected these two species on a sloping sandstone rock surface projecting into a stream bed, a location which would be under snow in winter and probably have a small water flow over it at times in the winter months. There were no trees in the vicinity, but the rock would be in shade for part of the day. Both the species were much mixed with small mosses, and were growing so close together as to be practically intermixed, for which reason they were collected under one number.

St. capense is firmly attached to the rock, often with slightly expanded basal holdfasts, apparently \pm upright, caespitose, well

branched from the base and upwards to form small broad tufts up to 1.4 centim. high and 1.0-1.8 centim. broad; of \pm conspicuously dorsiventral habit, with the squamulose phyllocladia larger and more numerous on the upper side; the main stems and branches 0.4-0.6 mm diam., terete, smooth, not woody, decorticate, entirely glabrous, whitish with a faint roseate or ochraceous tinge, matt. The terminal branches commonly corticate on the upper side, with a continuous to cracked, finally diffract-areolate or squamulose, smooth cortex. Phyllocladia derived from the rupture of the pseudopodetial cortex into areolae or squamules; finally crenate-squamulose, irregular in outline 0.5-0.8 (-1.0) mm diam., crowded and contiguous, whitish-gray, matt. In places on the branches the cortex breaks down also into simple verrucular phyllocladial granules of small size (0.10-0.15 mm diam.). On the underside of the pseudopodetia the phyllocladia are scanty and minutely verrucular, the main development of cortex and phyllocladial squamules being on the upper side. Cephalodia not abundant, found in places on the underside, laterally sessile on the pseudopodetia; pale in color (whitish to ochraceous-whitish), matt, minute (0.4-0.8 mm diam.), irregularly pulviniform, soon becoming tuberculate-verruculose and \pm botryose, the verruculae sometimes with dark apical spots (the algae showing through). In section, the cephalodia are seen to be composed of a number of \pm discrete nodules, each with a bounding cortex 17-34 μ thick of heavily yellowish-gray-nubilated, indistinctly paraplectenchymatic tissue (the cells gelatinised and somewhat thick-walled, indistinct, 3.0-3.5 μ diam.). Interior of nodules hyaline, compact, without airspaces of completely gelatinised and confluent, thick-walled hyphae intricately in various directions, only the branching fistulose lumina (about 1 μ diam.) distinctly visible in the clear mucilaginous matrix. Algae not abundant, occurring irregularly in the upper parts of the outer nodules, of indeterminate identity (blue-green, rounded cells 4-9 μ diam., lying without distinct arrangement in thin, colorless or yellowish sheaths). Pseudopodetial cortex and phyllocladial squamules KHO + light yellow, PD + (slowly) persistent pale sulphur-yellow. (No apothecia present).

St. Esterhuysenae forms flat, very dorsiventral mats up to about 3 centim. diam. with the pseudopodetia on the underside half buried in soil. Upper side of tufts composed of a crustose covering of squamulose phyllocladia completely concealing the pseudopodetia. These phyllocladia are derived from the breaking up of the cortex covering

the upper side of the pseudopodetia; cracked patches of this undifferentiated cortical covering are still visible here and there, continuous with the phyllocladial squamules. The latter are glaucous whitish-gray, paler (whitish) at the growing edges, crowded and \pm overlapping, crenate-lobulate, 0.4-1.0 mm diam. Pseudopodetia visible only on underside of tufts; half buried in soil, prostrate, destitute of cortex and phyllocladia, or with only a few scattered, small, verruculose phyllocladial granules, copiously ramifying outwards in radiating fashion, terete, 0.2-0.5 mm thick, whitish or ochraceous-whitish, smooth, matt, completely glabrous. Pseudopodetial cortex and phyllocladia KHO + yellow, PD + (slowly) orange-red (especially at the growing margins and in the cracks). (No cephalodia found: no apothecia present).

The aspect of these two minute tufted species reminds one somewhat of certain states of *St. evolutoides* (H. Magn.) Frey, in which the pseudopodetia may occasionally be similarly diffract corticate on the upper side; but *St. capense* is distinct in its \pm upright, minutely tufted habitus (not forming large dorsiventral mats as in *St. evolutoides*) and its different cephalodia, and *St. Esterhuysenae* is habitually more like *St. evolutoides*, but its chemical constitution is different (probably Stictic acid, in distinction to Lobaric acid which is the unvarying constituent of *St. evolutoides*). Both differ from *St. evolutoides* furthermore in their pale, smooth, and perfectly glabrous pseudopodetia. *St. capense*, and to a lesser degree *St. Esterhuysenae*, has a rather striking resemblance to stunted or juvenile conditions of the Macaronesian species *St. sphaerophoroides* Tuck., the pseudopodetial branches, with their diffract-corticate covering which breaks down into squamulose or verruculose phyllocladia, being quite similar to the terminal branchlets of that species. The small stunted pseudopodetia of *St. sphaerophoroides* distributed in Bornmüller's Fl. Exs. Mader. n° 125, for instance, have quite a strong resemblance to *St. capense*, although not showing such an extensive development of undifferentiated cortex on the younger branches. The possibility of *St. capense* being in fact a very stunted or juvenile condition of *St. sphaerophoroides* seems to be ruled out, even in the absence of apothecia, by the morphological difference mentioned above, the different chemical constitution (*St. sphaerophoroides* is constantly PD + red), and the occurrence of cephalodia (*St. sphaerophoroides* appears to be constantly destitute of these bodies).

It is interesting and not a little mystifying to find these two

obviously very closely related and yet apparently distinct species growing together, and further field observations, and especially a search for fertile material, would be very desirable. In this connection we may notice the remarkable paucity of *Stereocaulon* species in the South African flora; the only other species known with certainty to occur there is *St. (Chondrocaulon) albicans* Th. Fr. emen. M. Lamb. discovered in the Atranorine or «gracilescens»-strain by S. Garside in 1942 on the summit of Table Mountain. The conspicuous *St. ramulosum* (Sw.) Räscher, so widespread and common in other parts of the Southern hemisphere, would seem to be absent from South Africa; the specimen quoted as from the Cape of Good Hope by Th. Fries. *Monogr. Stereoc. et Pilophor.* (1858) p. 25, collected by Fraser, was almost certainly from Australia.

6. THE GENUS CLADONIOPSIS ZAHLBRR.

(Plate IV, fig. 9)

This new genus of *Cladoniaceae* was described by Zahlbruckner in his posthumous paper *Lichenes Novae Zelandiae (Denkschr. Akad. Wiss. Wien, math.-naturw. Kl., CIV, 1941)*, on p. 75. According to the diagnosis, it is characterised by sparingly branched, corticate podetia lacking an internal algal stratum, but with the cystococcoid algae adhering in lumps to the outside of the podetia; the apothecia terminal, biatorine, with colorless, acicular-filiform, indistinctly multiseptate spores. Zahlbruckner considered it to take up an intermediate position between *Baeomyces* and *Stereocaulon*, indicating that the external clumps of symbiotic algae might be regarded as primitive phyllocladia. The single species, *Cl. caespitosa* Zahlbr., was found in New Zealand, Mount Ruapehu, Volcanic Plateau, altit. circ. 600 m, on soil, the collector's name being given as E. Clark.

The isotype specimen from the herbarium of the Botany Division, Wellington, New Zealand was received on loan through the kindness of doctor H. H. Allan. The material had been collected by E. Chamberlain in April, 1935 (n° ZA. 487); the citation of the collector's name as «E. Clark» is erroneous. It was at once obvious that Zahlbruckner's description was at fault in several respects. Firstly, by a typographical error the height of the podetia was given as up to 20 centim. high; probably 20 mm was meant, although none of the podetia seen exceeded 10 mm in height. The podetial cortex is said to be «fusco-nigrescens», whereas actually it is sordid yellowish-

nubilated. The medulla of the central column is of conglutinated texture, not «stuppea» as stated, and the apothecial margin, at least in the material seen by us, is not «albidus», but usually rosy-reddish; and finally, in all the apothecia examined the thecium was found to be constantly rufous and completely sterile, without any of the asci and capillary-acicular spores described by Zahlbruckner.

The plant was growing on soil and over decaying remains of vegetation. Primary thallus well developed, effusely crustose, thickish, granulate-verruculose (the granulations 0.2-0.3 mm diam.), tartareous, uneven, pale alutaceous with a faint rosy tinge, matt. No hypothallus seen. Podetia arising from the primary thallus, terete or in places slightly flattened, rigid, at first simple, soon sparingly and very irregularly branched, up to 10 mm high, 0.4-1.0 mm thick, in their greater part covered with a lumpy-verruculose cortex similar to the primary thallus, but becoming gradually decorticated and naked in the uppermost 1-2 mm below the apothecia; the naked decorticate parts smooth or finely longitudinally striate, whitish or subalutaceous with a faint roseate tinge, matt.

No phyllocladia or squamules are present, but here and there on the sides of the podetia there are sessile or shortly stalked, peltate, discoid bodies 0.8-1.3 mm diam., attached centrally by their under side, concolorous with the thallus or more usually pale greenish-cinereous, matt; they suggest cephalodia, but are actually the remains of apothecia secondarily invested with assimilative tissue (see below).

Apothecia terminating all the apical branches, and also present (in various stages of degeneration) on the sides of the apical branches near their ends; ± round, about 1 mm diam. at maturity, biatorine, with thickish, entire or subentire, persistently ± prominent, rosy-reddish, matt proper margin; the disc plane, dark reddish-brown, matt, naked or slightly whitish-pruinose.

Podetia and thallus KHO + dull yellow changing fairly quickly to reddish-brown, CaCl_2O_2 —, PD + (rather quickly) intense persistent golden-yellow. A few fragments sent to Prof. Y. Asahina were kindly examined microchemically by him, and were found to contain Norstictic acid.

The basal thallus consists of an undifferentiated, ± homoiomerous mass of colorless, hyaline, gelatinous hyphae compactly intricated in various directions, thick-walled, ± conglutinated, 3-4 μ thick, with included substratum-particles. The outer part is sordid yellowish-

inspersed, with numerous symbiotic algae which reach almost to the surface.

The podetia consist of a central column of hyaline, colorless fungal tissue containing scattered algal cells; the hyphae running mainly longitudinally, completely fused and gelatinised, only their narrow, thread-like lumina visible, about 1 μ wide. The outer (algal + cortical) layer is very unevenly developed in the form of irregular lumps, in places almost absent, in other places up to 70 μ thick, sordid yellowish-nubilated and semi-opaque in section, indistinctly paraplectenchymatic with small, isodiametric, angulose cells 2-3 μ diam., their walls of moderate thickness. The symbiotic algae are embedded in this nubilated layer, in many places reaching almost or quite to the surface. The nubilation of this outer layer dissolves in KHO with effusion of a yellow color. The scattered algae embedded in the central column are globose, 8.5-13.5 μ diam., pale or yellowish green, with very distinct wall about 1.2 μ thick, multiplying by transverse division (*Pleurococcus* ?); those in the nubilated external layer are more crowded and often somewhat, smaller, but otherwise similar. In the upper parts of the podetia the algal-cortical covering is absent, and there are no algal cells in the central column; the podetium being covered with a sordid yellowish-nubilated layer 10-18 μ thick of indistinctly paraplectenchymatic structure (the same as that bounding the algal-cortical layer lower down), and inside of this is a colorless, hyaline zone 35-50 μ thick composed of completely fused, gelatinised hyphae either intricated in various directions or predominantly \pm perpendicular to the surface; this layer on its inner side passing gradually into the central column of \pm longitudinal hyphae, and not sharply differentiated from the latter. The outer cortical tissue is continued upwards to form the apothecial margin, which has exactly the same structure, and is therefore to be regarded as an amphithecium.

The apothecia contain no algae, and have a colorless, hyaline central cone tissue which is a continuation of the podetial central column, but with the fused and gelatinous hyphae wavy and intricated in various directions, the transition downwards to the \pm longitudinally parallel arrangement being gradual. Hypothecium 50-70 μ deep, sordid dull yellowish-cloudy (but without visible granules), composed of fine, compactly intricated hyphae about 1.5 μ thick. Several apothecia were sectioned, but in all of them, young and old, the thecium was rufous and quite sterile, consisting only of closely

packed paraphyses, without any formation of asci. Paraphyses discrete in water, often branched, 1.5-1.8 μ thick, in the form of somewhat irregular hyphae not thickened or pigmented at the apices.

The peculiar lateral shield-shaped outgrowths on the sides of the podetia, suggestive of cephalodia, were found on sectioning to be the remains of earlier produced apothecia, internally degenerated, collapsed and gelatinised, without algae, but externally covered by thalline cortical tissue with pleurococcoid algae. Obvious transitions to the apical apothecia could be detected on several podetia.

We are unable to confirm Zahlbruckner's statement describing capillary-acicular spores, up to 30 μ long and hardly 1 μ broad, with indistinct septa. On the contrary, the constant sterility of the rufescent thecium is one of the most striking features of the present plant. This sterility indicates that the reproductive function of the apothecia has been lost and that they are persisting as atavistic remnants, on the way to being dispensed with entirely, and in this respect the genus *Cladoniopsis* seems to hint at some phylogenetic connection between *Baeomyces* and certain of the constantly sterile species included in the genus *Siphula*, e. g. *Siphula torulosa* (Thunb.) Nyl. *Cladoniopsis* is distinct from *Baeomyces*, to which it is undoubtedly very closely related, by the sympodial branching of the podetium; in *Baeomyces* the podetia are only rarely and accidentally branched. The podetia are at first simple with a terminal apothecium as in *Baeomyces*, but apical growth is then continued from below the apothecium with formation of further terminal apothecia; the older lower apothecia, now laterally sessile, degenerating and becoming covered by the algal-cortical thalline investment which creeps up over the podetium from the primary thallus at its base.

7. IDENTITY OF CLADONIA RANGIFERINA VAR. PATAGONICA KPHBR.

Krempelhuber, in his enumeration of the lichens collected by doctor Wawra on the cruise of the frigate «Donau» in 1868-71 (*Verhandl. Zool.-Bot. Ges. Wien*, XXVI, 1876), described on p. 437 a var. *patagonica* of *Cladonia rangiferina* in the following few words: «*Podetia et rami (ramulique) decorticata, sterilia. Die Flechte sieht wie abgehäutet aus*». Vainio in his *Monographia Cladoniarum Universalis*, part I (1887), p. 38, lists this as perhaps referable to *Cl.*

pycnoclada (Gaudich.) Nyl., on the basis of the description only, having apparently not seen the type material. The variety is not mentioned in the treatments of Sandstede (*Fedde, Repertorium, Beihefte*, CIII, 1938) and Des Abbayes (*Bull. Soc. Scient. Bretagne*, XVI, 1939), nor is it taken up in Zahlbruckner's *Cat. Lich. Univ.*, but Santesson mentions it in his paper on the South American *Cladoniae* (*Ark. f. Bot.* XXX a, n° 10, 1942) on p. 11 as possibly referable to his new species *Cl. vicaria*, stating however that the diagnosis is too short for a decision on this point.

Through the courtesy of the Director of the Botanische Staatssammlung in München we received the type material from the Krempelhuber herbarium for examination. It is from Patagonia, Port Galant¹, «an freyen Plaetzen, zwischen Moos», coll. Wawra (n° 3141), and consists of two packets with quite identical material. The larger specimen is mixed with mosses, hepatics, traces of another *Cladonia*, and *Cladia aggregata* (Sw.) Nyl. It is obviously referable to *Cladonia laevigata* (Vain.) Gyeln. (Syn. *Cladonia sylvatica* v. *laevigata* Vain.), showing the diagnostic characters of that species (pale stramineous color; long, distinct, sympodially branched main stems; quite smooth and pellucid surface without any tomentosity whatever, the algal stratum occurring only in scattered spots on the chondroid surface), and therefore quite distinct from *Cl. pycnoclada* s. str. (Syn. *Cl. fallax* Des Abb.), which has a more dense, often thyrsoid ramification and a distinct development of tomentum in the upper parts.

The reaction with Paraphenylenediamine is nearly everywhere negative, but in a few places near the tips of the podetia the diffused spots of the stratum gonidiale slowly take on a faint reddish color with the reagent. According to Santesson, *Cl. laevigata* is PD —, but Des Abbayes (*op. cit.*, p. 126) mentions having seen a similar feeble reaction towards the extremities in specimens of *Cl. laevigata* from Cape Horn and Tristan da Cunha. Apparently, like the closely related *Cl. mitis* Sandst., *Cl. laevigata* may at times produce a very small amount of fumarprotocetraric acid in the actively assimilating parts (M. Lamb in *Journ. of Bot.* LXXVI, 1938, p. 161; Des Abbayes, *op. cit.*, p. 125).

Wawra's specimen has loosely straggling podetia up to 5 cm long and 0.7-1.0 mm thick; the habitus is much laxer than in the

¹ In Fuegia, Magallanes, on the Brunswick Peninsula, in approx. long. 72° W., lat. 53° 40' S.

illustration of *Cl. laevigata* given on Pl. I, fig. 4 of Santesson's paper, and it may be considered to represent a loosely straggling growth-form of the species.

S. A NEW PHLYCTIS FROM URUGUAY

Phlyctis pulveracea M. Lamb. sp. nov.

(Tab. IV, fig. 10)

Thallus (quoad visus) *indeterminatus*, usque 0.3 mm *crassus*, *pallide et impure cinereo-virescens*, *opacus*, *superficie inaequali, subleprosa*; *submembranaceus, ecorticatus*, *algas cystococcoideas forens*. *Soredia et isidia desunt*. *Apothecia numerosa, thallo irregulariter supersparsa et immersa, 0.5-0.8 (-1.0) mm lata, haud prominentia, plus minusve rotundata vel vulgo nonnihil irregularia, marginibus thallinis propriisque haud visibilibus*; *discus albidus, pruinosis, sat planus*. *Margo proprius (lamina tenui visus) tenuis, indistinctus, incoloratus, cum hypothecio confluentis*. *Hypothecium incoloratum, hyalinum. Thecium 135-165 μ altum, superne pallide flavo-fuscescens, praeterea incoloratum et hyalinum, haud guttulosum-inspersum*. *Paraphyses discretae, haud ramosae, circ. 2 μ crassae, apice parum inflatae*. *Sporae singulae, incoloratae vel dilute oleoso-flavidulae, naviculiformes vel ellipsoideo-fusoidae, crebre muriformi-cellulosae, 95-132 × 25-35 μ, halone nullo indutae*. *Thallus KHO + obsolete flavofuscescens, CaCl₂O₂ —, PD —, I —; parietes ascorum I + lacte dein sordide caerulei, paraphysibus flavescenscentibus*. *Prope boreali-americanam Phl. Willeyi Nyl. et brasiliensem Phl. calypticam (Kphbr.) Zahlbr. locum tenens, a priore sporis pallidioribus et angustioribus, epithecio colorato, et reactionibus, a posteriore thallo obscurius cinerascens et sporis distincte minoribus recedens*. *A Phl. argena (Ach.) Flot. thallo haud sorediato, KHO et PD immutato, et apotheciis bene conspicuis (disco infra epithecium pulveraceum pallido nec nigrescenti) diversa est. Uruguay, Dept. Florida, La Palma, altit. circ. 100 m. s. m., corticola: W. G. Herter, anno 1938, n. 99430.*

Thallus (so far as seen) effuse, indeterminate, 0.2-0.3 mm thick, dirty cinereous-greenish, matt, with uneven, rough, subleprose surface; submembranaceous, fairly easily separable from substratum, white on underside (no hypothallus present); ecorticate, the algae reaching to the surface and covered only in places by a few indistinct, gelatinised hyphae. Algal stratum very irregular, 60-120 μ deep. Medulla very densely nubilated with gray crystalline masses (calcium

oxalate), composed of fairly closely intertexted, colorless, thin-walled hyphae 1.0-2.5 μ thick running in various directions, distinct, not gelatinised. Algae cystococcoid, round, easily separable, 6-12 (-14) μ diam., bright or slightly yellowish green, thin-walled. Thallus externally and internally KHO + faintly dull yellowish or yellowbrownish, CaCl_2O_2 -, PD -, I -.

Apothecia numerous, irregularly scattered, 0.5-0.8 (-1.0) mm diam., immersed in thallus and \pm level with it, without perceptible thalline or proper margin, \pm round or often somewhat irregular in outline, with whitish, strongly pruinose, \pm plane, uncracked disc. In section, no algae present below hypothecium; proper margin rudimentary, 12-24 μ thick, colorless and hyaline or faintly yellowish-nubilated, indistinctly paraplectenchymatic, composed of gelatinised, \pm isodiametric, thinwalled cells 3-5 μ diam.; at its base gradually merging into the hypothecium. Hypothecium colorless, hyaline (but often \pm opaque from included air), up to 150 μ deep, composed of vertically and radiately parallel, conglutinated, gelatinised, thinwalled hyphae 1.5-3.0 μ diam. Thecium 135-165 μ high, pallid yellow-brown in uppermost 15-30 μ , otherwise colorless and hyaline. Asci cylindrical, becoming clavate, with colorless, gelatinous wall 1.0-1.5 μ thick all round; ascoplasm faintly yellowish (oil). Paraphyses discrete in water, colorless, not branched, somewhat stiff, not guttulose-inspersed, about 2 μ thick, not or only slightly thickened at the yellowish-nubilated apices (up to 3.5 μ); no membrane-coloration present. Spores 1 per ascus, colorless or usually pale yellowish from oil-content, fusiform or boat-shaped, rounded and tapered at ends, not halonate, muriform-cellular, with usually 32-35 transverse septa and up to 5 longitudinal septa; 95-132 \times 25-35 μ ; spore-cells \pm cubic, 3-4 μ diam. Walls of asci clear blue then dirty blue with Iodine; paraphyses yellowed.

Obviously closely related to *Phl. calyptica* (Kphbr.) Zahlbr., but that species has a whiter thallus («albidus... fere cretaceo») and distinctly larger spores (192-200 \times 44-48 μ) of a pale olivaceous color. *Phl. Willeyi* Nyl., from the description given, differs in its brownish, oblong, much broader spores, its colorless epithecium, in the KHO reaction of the thallus, and the lack of Iodine reaction in the thecium. From *Phl. argena*, with which it agrees in number and size of spores, *Phl. pulveracea* is distinguished by the absence of soredia, the negative reactions with KHO and PD (*Phl. argena* has the thallus KHO + yellow then red, PD + intense yellow, due to Norstictic or α -Me-

thylether Salazinic acid), the quite conspicuous and well defined apothecia, and the pale epithecium (in *Phl. argena* the apothecial disc is blackish beneath the pruina).

In examining the spores of *Phlyctis* species, care should be taken not to apply too much pressure on the cover glass, because by doing so the large and delicately constructed spores may be flattened and distorted, thus bringing about errors in measurement.

9. TELOSCHISTES NODULIFER (NYL.) HILLM. AND T. EXCELSIOR
(STIRT.) M. LAMB, TWO FILAMENTOSE SOUTHERN
HEMISPHERE SPECIES

(Plate V, figs. 11 and 12)

In the alpine rock-wastes («pedregales») of the Nevados de Anconquija in N. W. Argentina there may be observed here and there, over granitic or metamorphic rocks, loosely attached, or among gravelly detritus, a bright red species of *Teloschistes* with narrow, entangled, filamentous laciniae: *T. nodulifer* (Nyl.) Hillm. Its bright orange-red color is similar to that of *Caloplaca elegans*. It commonly bears apothecia, which are usually about 2.5 mm in diameter, plane or scutelliform, with thin, non-fibrillose thalline margin and the disc slightly darker reddish than the thallus. Often, but not always, the ends of the filamentous, slightly flattened laciniae bear minute knot-like swellings, from which the specific name is derived. Plate V, fig. 12 shows a specimen from N. W. Argentina, Prov. Catamarca, Nevados de Anconquija, collected by the author in 1948 (M. Lamb n° 5537).

Teloschistes nodulifer was first published, as a subspecies of *Physcia flavicans*, by Nylander in *Synops. Lich.* I. (1860), p. 407, on material collected by Weddell in Bolivia. The present combination was made by Hillmann in *Hedwigia*, LXIX (1930), p. 326, and there a good description of the species will be found.

The same species has been described under the name of *T. Dubusi* by B. de Lesdain in *Bull. Soc. Bot. France*, LXXXIII (1936), p. 9, on material collected in N. W. Argentina, Territorio de Los Andes, San Antonio de Los Cobres, by Dubus in 1935. The author has not seen this material, but the description of the laciniae as being digitately divided and nodulose-inflated at the tips is quite diagnostic of the species.

Its distribution is typically Central Andean, with a Pampean outlier in the Córdoba massif of Argentina (Fig. 5), the localities known for it to date being the following:

BOLIVIA: Prov. *Cinti*, coll. Weddell (type specimen, Nyl., *loc. cit.*); Prov. *Larecaja*, Sorata, altit. 3900 m. s. m., coll. Mandon (Hillm., *loc. cit.*).

ARGENTINA: Prov. *Salta* (Territorio de Los Andes), San Antonio de Los Cobres, coll. Dubus, 1935 (type specimen of *T. Dubusi* B. de



Fig. 5. — The known distribution of *Teloschistes nodulifer* (Nyl.) Hillm.

Lesd., *loc. cit.*); Prov. *Catamarca*, Nevados de Anconquija, Quebrada de Los Cazadores, altit. circ. 4500 m. s. m., coll. M. Lamb, 1948 (n° 5564), and Cueva del Overo, altit. circ. 4000 m. s. m., coll. M. Lamb, 1948 (n° 5537); Prov. *Córdoba*, Volcan La Poma, coll. Seckt, and Sierra de Achala, between San José and San Clemente, coll. Hieronymus (both recorded by Hillm., *loc. cit.*); Prov. *Mendoza*, Las Heras, Quebrada del Cajón de Las Minas, altit. 2000 m. s. m., coll. Ruiz Leal, 1939 (recorded by Räsänen in *An. Soc. Cient. Argent.* CXXXI, 1941, p. 101).

Somewhat similar to *T. nodulifer*, but differing in the paler orange color, corticolous habitat, and presence of numerous fibrillae on the

lacinae, is *Teloschistes excelsior* (Stirt.) M. Lamb, n. comb. (Syn. *Physcia excelsior* Stirt. apud Bailey in *Queensland Agric. Journ.* V, 1899, p. 40), described from Australia, N. S. Wales, Riverina, where it was collected by H. Paton in 1875.

This species is erroneously retained under *Physcia* in Zahlbruckner's *Cat. Lich. Univ.* VII (1931), p. 618, where the locality is also wrongly given as New Guinea. In a previous publication (*Just's Bot. Jahresber.* XXVII, 1899, p. 445) Zahlbruckner also quoted the species as being from New Guinea.

Stirton's type specimen was received on loan from the Glasgow Museum for revision, and is shown on Plate V, fig. 11; the following is a description of it:

On eroded bark. Thallus forming flat rosettes up to 4.5 centim. across, 2-3 mm thick, composed of crowded lacinae radiating from the center. Color bright orange, corresponding in Ridgway's *Color Standards* to Pl. III. 15. i (« Mars Yellow »). Lacinae 5-10 mm long, 0.3-0.6 (-0.8) mm broad, slightly flattened (rarely \pm terete), smooth, not striate, not canaliculate, not tomentose; matt, loosely adpressed to substratum, their undersides paler (pallid orange-yellow or in places whitish) and smooth, not reticulate or canaliculate; copiously dichotomously and sympodially branched in a radiating manner, and furnished at the ends and on the surface with numerous concolorous simple acuminate fibrillae or ciliary processes 0.6-1.8 mm long, not over 0.1 mm thick; these fibrillae either radiating or ascendant. No rhizines present, but some of the fibrillae on the underside serve as rhizines to attach the lacinae to the substratum. No soredia or isidia. Thallus KHO + intense dark crimson-purple.

Apothecia numerous in central part of rosettes, crowded or discrete, sessile on the lacinae, discoid, well constricted at base, persistently plane, 1-3 (-3.3) mm diam., with persistent, moderate, prominent, smooth to hardly crenulate, non-ciliate thalline margin concolorous with the lacinae; no inner margin (parathecium) visible. Disc smooth to slightly undulate, matt, not pruinose, slightly deeper orange than the margin.

Upper side of lacinae bounded by an outermost, densely dark yellow-inspersed, opaque stratum about 9 μ thick (KHO + crimson),

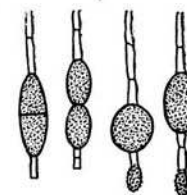


Fig. 6. — Swollen cells of paraphyses (stylospores?) in the type specimen of *Teloschistes excelsior* (Stirt.) M. Lamb.

abruptly delimited from the underlying tissue, which is colorless, hyaline, gelatinised, composed of completely confluent, intertexted hyphae, of which only the fistulose lumina are visible, these about 1μ wide, running in various directions (not predominantly longitudinally or vertically)¹. Total depth of this layer 20-60 μ . Algal stratum \pm continuous but uneven, 80-140 μ deep. Medulla colorless, hyaline, compact, of gelatinised structure, with only the fistulose hyphal lumina visible, these distinct, 1-2 μ wide, interwoven in various directions, embedded in a clear mucilaginous matrix. The medulla forms the lower surface of the thallus; no lower cortical layer is differentiated; but the lower parts of the medulla are in places stained yellow with parietin (KHO + crimson).

Thalline margin of apothecium prominent at sides, containing algae; bounded on its outer side by a sharply delimited, densely dark yellow-inspersed and opaque cortical stratum 10-20 μ thick, without distinct structure. Inner tissue (*medulla*) adjoining the algae colorless, hyaline, compact, of thick-walled, completely gelatinised hyphae running in various directions, only their fistulose, interwoven lumina (up to 1.5 μ wide) visible. *Algae* in numerous, \pm separated clumps, forming a stratum all the way underneath the hypothecium, continued at the sides into the margin, and also below into the stipe bearing the apothecium. *Hypothecium* 60-80 μ deep, containing no algae, faintly yellowish-gray-cloudy in section, but without visible granules; composed of closely compacted hyphae 1.5-2.0 μ thick running in various directions. *Thecium* 80-100 μ high, with uneven upper surface; in its upper 1/3 densely dark yellow-inspersed and opaque, the lower part colorless and hyaline. *Paraphyses* discrete in water, often articulated, 1.5-2.5 μ thick, at the apices clavate (often \pm moniliform) up to 4-5 μ and there encrusted with \pm granular yellow pigment; simple or rarely branched; not infrequently with the *penultimate*, *subpenultimate*, or *middle cell much swollen and filled with dense, granular, highly refractive protoplasm* and forming a \pm globose, ellipsoid or pyriform spore-like cell up to 12 μ diam. These swollen cells ultimately develop a very distinct colorless wall about 1 μ thick. Sometimes two neighboring cells of a paraphysis are thus swollen, the original head of the paraphysis dropping off. The protoplasm of

¹ According to Zahlbruckner in Engler & Prantl, *Nat. Pflanzenfam., Teloschistes* has a thalline cortex of longitudinally running conglutinated hyphae; this is not so in the present specimen, in which the cortical hyphae are interwoven in various directions.

these spore-like bodies is oily, staining red with Sudan III solution (see fig. 6). They are probably stylospores in the sense of Schmidt (1939). *Asci* clavate, about $60 \times 15-18\mu$, with wall about 1.5 μ thick at sides and up to 8 μ at apex, where the plasma forms an invagination. *Spores* Snae, irregularly biseriate in ascus, colorless, polaribilocular, ellipsoid, the septum occupying 1/3 to nearly 1/2 the length of the spore and perforated by a fine tube (occasionally indistinct or absent); apical loculae \pm globose or obtusely conical. Spores $12-15 \times 6-8\mu$. With Iodine, thecium and hypothecium persistently blue.

The symbiotic algae are protococcoid, bright green, globose, thin-walled, 8-12 μ diam.

The distinctive flattened and rosette-like habitus distinguishes *T. excelsior* from *T. flavicans* and *T. exilis*. Other fibrillose species which may be related to it are *T. chrysocarpoides* Vain., *T. subcanaliculatus* Vain., and *T. Hosseusianus* Gyeln. *T. chrysocarpoides* (from S. W. Africa) differs in the pale, whitish thallus (KHO -), and the double margin of the apothecia, the outer margin (amphithecium) being sordid whitish, and the inner one (parathecium) orange. *T. subcanaliculatus* (from E. Africa) has much longer laciniae (3-4 cm.) with convex upper side and canaliculate lower side, and only scanty spinuliform fibrillae. *T. Hosseusianus* Gyeln. (in *Borbasia Nova*, IX, 1942, p. 1, from Argentina, Córdoba) is distinguished by its smaller, pulvinate-hemispherical thallus, broader laciniae, smaller apothecia, etc.

10. DOES BUELLIA INDISSIMILIS (NYL.) B. DE LESD. OCCUR IN THE ANTARCTIC?

Vainio, in his report on the lichens of the Belgian Antarctic Expedition (*Rés. Voy. S. Y. Belgica*, 1897-1899, *Lichens*, p. 25, 1903), recorded *Buellia protothallina* var. *indissimilis* (Nyl.) Vain. from the west coast of Graham Land (Palmer Peninsula), on rocks on Auguste and Wieneke Islands. This combination is based on *Lecidea indissimilis* Nyl. in *Flora*, LXIV (1881), p. 181, described from Portugal, near Porto, on quartzose rock, coll. Newton. On nomenclatural grounds, the combination *Buellia protothallina* var. *indissimilis* (Nyl.) Vain. is not valid, since *indissimilis* (Nyl.) as a specific epithet antedates *protothallina* (Kphbr.) in the same category, the latter having existed only as the name of a form until raised to specific rank by Vainio in 1903 (*loc. cit.*). In addition to this,

Vainio's combination *Buellia protothallina* (Kphbr.) Vain. is antedated by an earlier homonym, *Buellia protothallina* (Anzi) Jatta, *Syll. Lich. Ital.* (1900), p. 400 (Syn. *Abrothallus protothallinus* Anzi, *Catal. Lich.*, 1860, p. 116). From the taxonomic point of view, the alleged occurrence of a Portuguese species in the Antarctic would appear somewhat improbable on phytogeographical grounds, but Vainio states that he had examined the Portuguese type in herb. Nylander, and his judgement regarding its identity with the Antarctic specimens cannot be contradicted without definite contrary evidence.

The author had the opportunity of examining in Vainio's herbarium the Antarctic material named by him as *Buellia protothallina* var. *indissimilis* and var. *Gerlachei* Vain.; the latter obviously conspecific, differing only in the more emergent apothecia. On comparing the material with Nylander's original description of *Lecidea indissimilis*, no obvious difference can be found to separate it as a distinct species. Nylander's herbarium in Helsinki was also consulted for the original specimen collected by Newton, but this was found to be so minute that no adequate comparison or microscopic examination could be made from it. Years later, when working in the Antarctic, the present author found the species thus identified by Vainio to be exceedingly common around the localities where it was collected by the Belgian expedition, and was able to make a detailed study of its variability and ecological relationships. As no direct evidence against the accuracy of Vainio's original determination could be found, the material collected was given the name *Buellia indissimilis* (Nyl.) B. de Lesd.

Recently, through the courtesy of the Director of the Instituto de Botânica «Dr. Gonçalo Sampaio» of the University of Porto, Portugal, the author received a specimen of *Buellia indissimilis* collected in or very near the classical locality by Sampaio in 1920, and described by him in a paper in *Broteria, ser. bot.*, XIX (1921), p. 18. The specimen agreed very well with Nylander's original description, and there could hardly be any doubt concerning the correctness of Sampaio's determination. It is from the vicinity of Porto, the label stating: «Povoado-Varzim: entre Amorim e Abremar, penêdos (rara)». The following is a revised description of the species, based on this specimen:

On quartzitic rock. *Thallus* forming a \pm continuous patch nearly 3 centim. across in the specimen seen, bounded in most places by a

black hypothalline zone up to 0.3 mm wide, which is however thin and irregular, not fimbriate. *Thallus* thin (0.10-0.15 mm thick), even, finely cracked-areolate, the areolae 0.25-0.40 (-0.50) mm diam., variously angulose, \pm plane (*not becoming tumid*), the cracks separating them extremely thin and *in most places black*. *Thallus* matt, not pruinose, now sordid cream-colored or pallid alutaceous; according to Sampaio's description of the freshly gathered material (*loc. cit.*) «cinzento ou cinzento-obsuro» (cinereous or dark cinereous). No isidia or soredia. Symbiotic algae \pm globose, protococcoid, thin-walled, now pale green, 6-8 μ diam. *Reactions*: surface of thallus KHO + indistinctly yellowish, then after a few minutes in places orange-yellowish, CaCl_2O_2 —, PD + indistinct yellow; medulla KHO + yellow; then slowly orange-red, CaCl_2O_2 —, PD + good persistent yellow, I-. Sections of thallus under microscope KHO + yellow then orange-red, with formation of copious small spicular crystals, often aggregated in sheaf-like or star-like formations.

Apothecia numerous, arising in the areolae and at first sometimes with a faint thin pseudothalline margin; at maturity adpressed-sessile, not or hardly constricted at base, 0.4-0.5 (-0.6) mm diam., persistently plane, with a very thin, entire proper margin, which only rarely disappears entirely; disc blackish (not pure black), matt, not pruinose; proper margin usually slightly lighter, gray-blackish or gray-brown-blackish. *Excipulum* poorly differentiated, being merely a lateral extension of the hypothecial tissue; 50-60 μ thick, darker brown in section than the hypothecium, without distinct radiating structure, composed of \pm isodiametric, rounded, thin-walled, pigmented cells 3-4 μ diam. *Hypothecium* in central part continued downwards into the subtending thallus to a depth of about 200 μ ; medium-brown in section, composed of pigmented hyphae 2-3 μ thick closely compacted together and intertexted in various directions (in upper subhymenial part mostly vertically parallel). *Thecium* 50-60 μ high, rather abruptly dark brown (without any olivaceous or greenish tinge) in uppermost 8-10 μ , otherwise colorless and hyaline. *Paraphyses* discrete, not embedded in mucilage, simple or branched, not or hardly articulated, except near the tips, 1.8-2.0 (-2.5) μ thick, at the tips well capitate up to 4 μ and there brown-pigmented, the pigment often lying in the form of a well delimited cap on the upper side of the head. *Asci* clavate, 50-55 \times 8 — 11 μ , with wall about 1 μ thick at sides, at apex thickened up to 8 or 9 μ . *Spores* often aborting in ascus before maturity, finally 2 to 8 (usually about 6) in ascus, irregularly bi-

seriate; dark brown, ellipsoid, 1-septate, with smooth even wall of the same thickness as the septum (up to $1\ \mu$); (9-) $10-12 \times (4.5-) 5.6 (-7)\ \mu$. Thecium I + persistent blue. Epithecium and hypothecium KHO —, HNO_3 — (only made somewhat lighter in color). (No *pycnidia* found).

On the assumption that the above description gives a good general picture of the species, it is possible to affirm that *Buellia indissimilis* and the Antarctic plant placed here by Vainio are not specifically identical. The obvious differences may be tabulated as follows:

<i>Buellia indissimilis</i>	Antarctic species
Thallus 0.10-0.15 mm thick.	Thallus up to 0.7 (-1.5) mm thick.
Areolae 0.25-0.40 (-0.50) mm diam., plane, not becoming tumid.	Areolae (0.3-) 0.5-1.0 mm diam., usually tumid-convex.
Thecium 50-60 μ high; epithecium dark brown (without olivaceous or greenish tinge), HNO_3 —.	Thecium (60-) 70-80 (-90) μ high; epithecium dark brown with usually an olivaceous tinge, HNO_3 + crimson-purple.
Spores (9-) $10-12 \times (4.5-) 5.6 (-7)\ \mu$.	Spores (13-) $14-16 (-18) \times 7-8 (-9)\ \mu$.

It now therefore remains to find a valid name by which the Antarctic species may be known. Hue, in his report on the lichens of the 2nd. French Antarctic Expedition of 1908-1910 (1915), published a number of *Buellia*-species as new under the old comprehensive genus name *Lecidea*. Unfortunately all the types appear to have been lost; a systematic search for the lichens of the French Antarctic Expeditions undertaken by the author at the Paris Museum in 1936 brought to light only a few of them, none of the crustaceous species. However, several of Hue's new *Buellia*-species were described from a small rocky islet (Goudier Islet) where the present author in 1945 found the species now under consideration to be particularly abundant, and therefore it is almost certain that at least one of the new species described by Hue from this same islet must refer to it. The species in question are the following (all described in *Deux. Expéd. Antarct. Franç., 1908-1910, Lichens*, 1915):

- L. inordinata* Hue. (Syn. *Buellia inordinata* Darb. in *Brit. Antarct. (« Terra Nova ») Exped., 1910, Nat. Hist. Rept., Bot., Part. III*, 1923, p. 63).
L. dichromatina Hue (Syn. *Buellia dichromatina* Darb., *op. cit.*, p. 62).
L. citrella Hue (Syn. *Buellia citrella* Darb., *op. cit.*, p. 62).
L. Goudieri Hue (Syn. *Buellia Goudieri* Darb., *op. cit.*, p. 63).

- L. imperfecta* Hue (Syn. *Buellia imperfecta* Darb., *op. cit.*, p. 63).
L. acarosporoides Hue (Syn. *Buellia acarosporoides* Darb., *op. cit.*, p. 61).
L. russa Hue (Syn. *Buellia russa* Darb., *op. cit.*, p. 64).
L. Gainii Hue (Syn. *Buellia Gainii* Darb., *op. cit.*, p. 63).
L. subpedicellata Hue (Syn. *Buellia subpedicellata* Darb., *op. cit.*, p. 64).
L. melampoa Hue (Syn. *Buellia melampoa* Darb., *op. cit.*, p. 63).
L. conspicua Hue (Syn. *Buellia conspicua* Darb., *op. cit.*, p. 62).
L. isabellina Hue (Syn. *Buellia isabellina* Darb., *op. cit.*, p. 63).

A careful analysis of the descriptions of the above species permits the definite elimination of the following: *inordinata*, *citrella*, *Goudieri*, *subpedicellata* (medullary hyphae amyloid, I + blue); *Gainii*, *conspicua*, *isabellina* (pycnocidia filiform, arcuate); and *dichromatina* (thallus glaucous-white, medulla KHO + yellow). Of the remaining species, *imperfecta* and *melampoa* are rather poorly described and doubtful; but *acarosporoides* and *russa* have descriptions showing fairly good agreement with our species, and probably both of them refer to it. On the whole, the description of *B. russa* is the better one, *B. acarosporoides* appearing to be founded on a small depauperate specimen much altered in color by alkaline substances. The length and thickness of the paraphyses does not agree, but it is now known that Hue's observations in this respect are unreliable (*cf.* the remarks of A. H. Magnusson in *Rev. Bryol. et Lichénol.* XIII, 1944, p. 149). In the author's opinion, the epithet *Buellia russa* (Hue) Darb. may safely be used to designate the Antarctic species now under consideration. Whether, as stated by Vainio, it is identical with «*Lecidea stellulata* f. *protohallina*» Kphbr., «*Lecidea punctata*» Fée, and «*Buellia stellulata*» Vain. *Etud. Lich. Brés.* (non Tayl.) (all from Brazil) is very doubtful on phytogeographical grounds. The var. *Gerlachii* Vain. (*Rés. Voy. S. Y. Belgique 1897-1899, Lichens*, 1903, p. 25) is only a state of the species with more quickly emergent apothecia, and not worth distinguishing taxonomically (type specimen examined by the author in herb. Vainio).

The following general description of *B. russa* (Hue) Darb. is based on specimens collected by the Belgian Antarctic Expedition (in herb. Vainio), by various British expeditions subsequently (in Herb. Mus. Brit.), and by the present author in various localities of the Graham Land or Palmer Peninsula in 1944-46:



Thallus effuse, forming \pm orbicular or soon irregularly conerescent patches of various size (from 1 to 7 cm. across), on quartzitic, basaltic or metamorphic rocks, often bounded at the periphery by a distinct, dark brown to blackish hypothalline zone; areolate or subverrucose-areolate, usually up to 0.7 mm thick, occasionally up to 1.5 mm; areolae (0.3-) 0.5-1.0 mm diam., \pm rounded or irregularly angulose, plane to tumid-convex, smooth, separated by narrow concolorous cracks. Surface of thallus normally cream-colored with a faint pinkish tinge, or pallid brownish-cream-colored, but often changed to reddish or brown-reddish by ammoniacal products in the environment; in normal state corresponding approximately to Pl. XL. 19" d-f in Ridgway's *Color Standards*. Matt, not pruinose, without isidia or soredia. Exposed medulla macroscopically whitish, faintly pink, or reddish (depending on the alkalinity of the environment).

Reactions: surface of thallus KHO + yellowish or brownish then soon dull dark red, CaCl_2O_2 -, PD -; exposed medulla KHO + yellow then dark red (with formation of acicular crystals under the microscope), CaCl_2O_2 -, PD + persistent yellow; medullary hyphae I -. Thallus covered by an outer, colorless, semi-amorphous, negrotic layer 5-15 μ deep; cortex 15-45 μ deep, yellow-brownish to almost colorless, paraplectenchymatic (cells isodiametric, thin-walled, 3-6 μ diam.). Algal stratum \pm interrupted, 75-150 μ deep; algae proto-coccoid, globose, 10-19 μ diam. Medulla colorless in section or with streaks and granules of depsidone-substance, at the base merging gradually into reddish-brown, dense, hypothalline tissue.

Apothecia usually numerous, arising in the areolae, sometimes a long time \pm immersed, finally emergent and \pm sessile, not constricted at base, 0.3-0.7 mm diam., black, plane with an indistinct, concolorous, non-prominent proper margin, then often becoming moderately convex and \pm immarginate; disc matt, not pruinose, smooth or minutely scabrid. Margins of apothecia occasionally with adherent whitish flakes derived from the thallus. *Excipulum* developed at sides only, being a lateral continuation of the hypothecial tissue, sometimes almost absent in young immersed apothecia; dark brown or aeruginose-fuliginous in section, composed of pigmented cells 4-6 μ diam., without distinct radiating structure. *Hypothecium* medium-brown to dark brown, lighter brown at sides and above, up to about 150 μ deep in center, composed of compacted, intricate, brown-walled hyphae 4-8 μ thick. *Thecium* (60-) 70-80 (-90) μ high, in upper part dark olive-brown or brown-blackish (HNO + crimson-purple), other-

wise colorless and hyaline. *Paraphyses* discrete under pressure in water, 1.5-2.0 μ thick, often branched, not articulated, at the tips pigmented and capitate up to 5 μ . *Asci* clavate, (45-) 60-70 \times 15-20 μ , with wall about 1 μ thick at sides and up to 10 μ at apex. *Spores* usually 8 nae, \pm biserially arranged in the ascus, dark brown, ellipsoid, 1-septate, with thin even wall of the same thickness as the septum; (13-) 14-16 (-18) \times 7-8 (-9) μ ; occasionally slightly constricted at the septum. *Thecium* I + blue then aeruginose blackish (the asci often becoming wine-red).

Pycnidia occasional, immersed in the areolae, indicated by minute dark spots; pycnoconidia borne on exobasidial fulera, fusiform-ellipsoid to bacillar, straight, 4.5-6.0 \times 1.0 μ .

B. russa is the commonest *Buellia* at or near sea level on snow-free promontories and islets of the Graham Land or Palmer Peninsula region, at least as far south as Marguerite Bay, and also in the South Orkneys and Shetlands. It is a distinctly nitrophilous species, occurring on rocks near the nesting sites and resting places of birds (*Chionis alba*, gulls, skuas, etc.), and its thallus is sometimes changed to a reddish color on account of the decomposition of its depsidone-content by seepage of ammoniacal water, the medulla then becoming red. «*Lecidea Tuxenii*» Hue, *op. cit.*, p. 155 (Syn. *Buellia Tuxenii* Darb., *op. cit.*, p. 65) almost certainly refers to such a reddened condition of the species.

11. IDENTITY OF RHIZOCARPON COMPOSITUM M. LAMB

Rhizocarpon compositum M. Lamb, described from Argentina, Prov. Tucumán, Quebrada de Lules, in the first part of these *Notes* (Lilloa, XIV, 1948, p. 222, Pl. IV, fig. 8), proved, on later comparison with a type fragment sent by A. H. Magnusson, to be identical with the latter's *Buellia* (*Diplotomma*) *excellens* (in *Medd. Göteborgs Bot. Trädg.* XVII, 1947, p. 69). The mucilaginously conglutinated paraphyses suggest *Rhizocarpon*, but the spores are non-halonate, and Magnusson's disposition of the species under *Buellia* sect. *Diplotomma* is probably the correct one. This N. W. Argentine species is now known from the following localities:

Prov. Salta: Quebrada de San Lorenzo, altit. 1400 m s. m., coll. M. Grassi-Digilio, 1946 (Herb. Crypt. Inst. Lillo n° 5403).

Prov. Tucumán: Quebrada de Lules, altit. circ. 500 m s. m., coll.

M. Lamb, 1947 (n°s 5132, 5133, 5142); bed of Rio Cochuna near Alpachiri, altit. circ. 1000 m s. m., coll. M. Lamb, 1949 (n° 5778).

Prov. Catamarca : near Laguna del Tesoro, altit. circ. 1800 m s. m., coll. M. Lamb, 1948 (n°s 5715, 5717).

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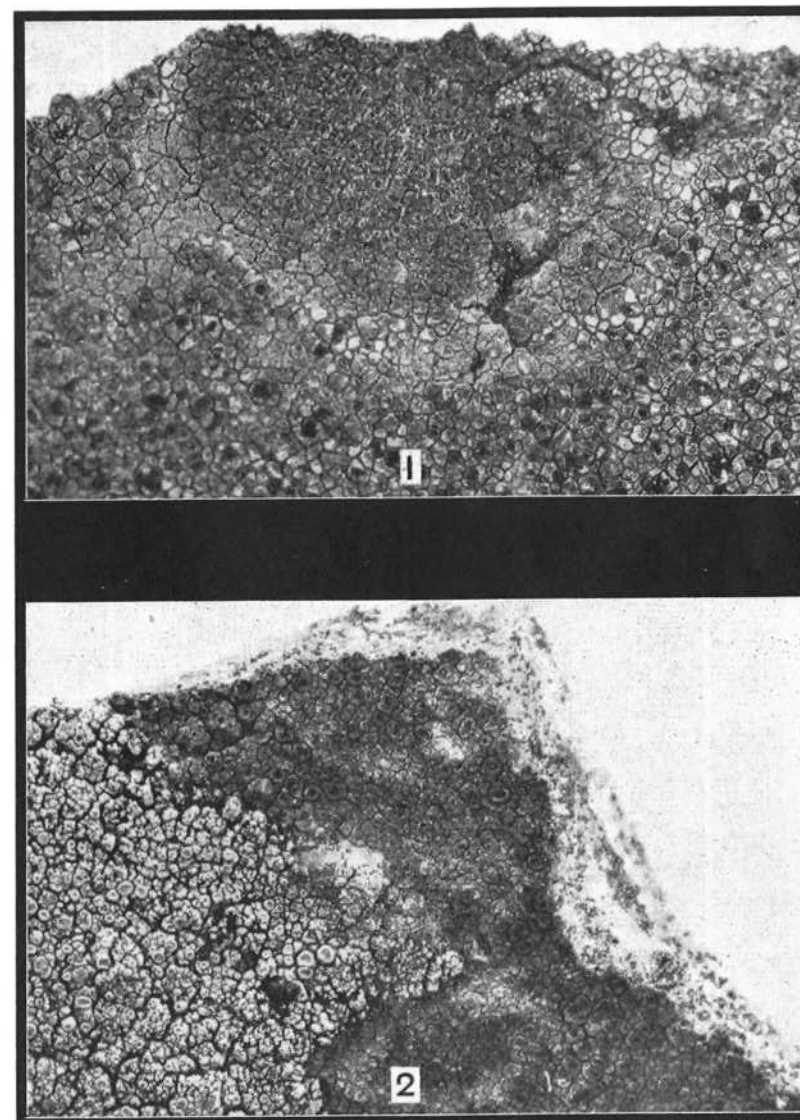


Fig. 1. — *Diploschistes diffractus* Müll. Arg. ; a young plant growing over and destroying the thallus of *Lecidea* sp. Argentina, Prov. Tucumán, Valle de Tafi, Carapunco-Infiernillo, altit. circ. 2800 m. s. m., coll. M. Lamb, 1947 (n° 5350). 3 times nat. size.

Fig. 2. — *Diploschistes diffractus* Müll. Arg. ; an older plant associated with *Lecanora chlorophaeodes* Nyl. Same locality and date as above (M. Lamb n° 5392). 3 times nat. size.

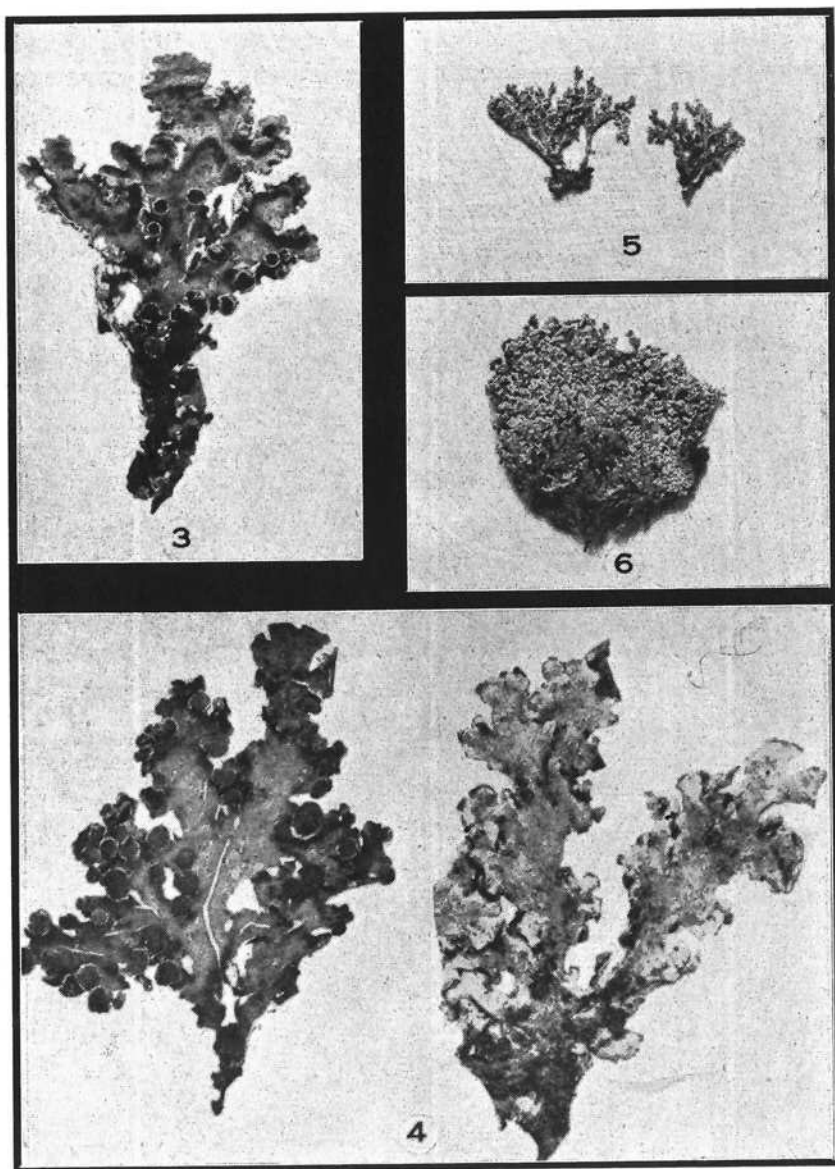


Fig. 3. — *Psoroma calophyllum* Müll. Arg.; the type specimen from Chile in the Kew Herbarium. 2 times nat. size.
 Fig. 4. — *Psoroma calophyllum* Müll. Arg.; a specimen from Argentine Patagonia, Chubut, Lago Menéndez, coll. A. Castellanos, 1945, showing upper and lower surfaces. 2 times nat. size.
 Fig. 5. — *Stereocaulon capense* M. Lamb; part of the type specimen. 3 times nat. size.
 Fig. 6. — *Stereocaulon Esterhuysenae* M. Lamb; part of the type specimen. 3 times nat. size.

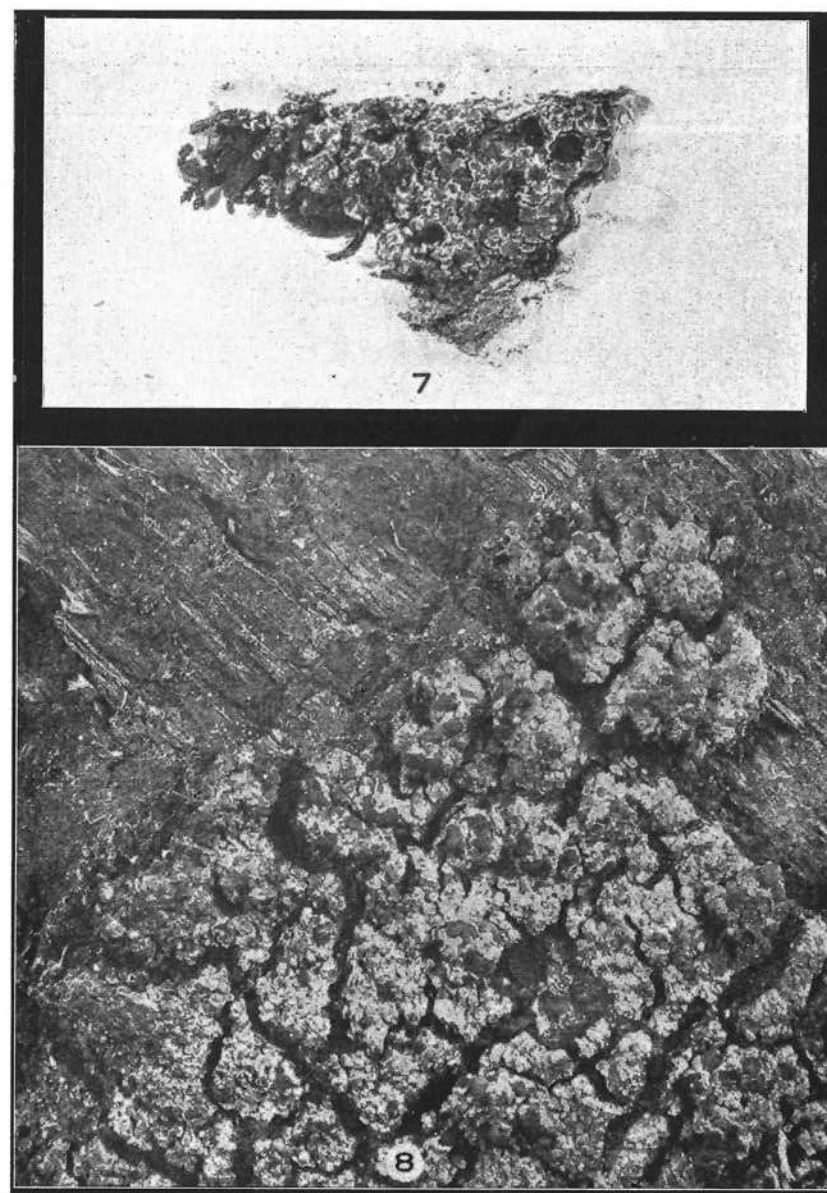


Fig. 7. — *Psoromaria subdescendens* (Nyl.) Nyl.; the type specimen (Herb. Nylander n° 30798). 5 times nat. size.
 Fig. 8. — *Psoromaria descendens* (Nyl.) Nyl.; part of the type specimen (Herb. Nylander n° 30799). 5 times nat. size.

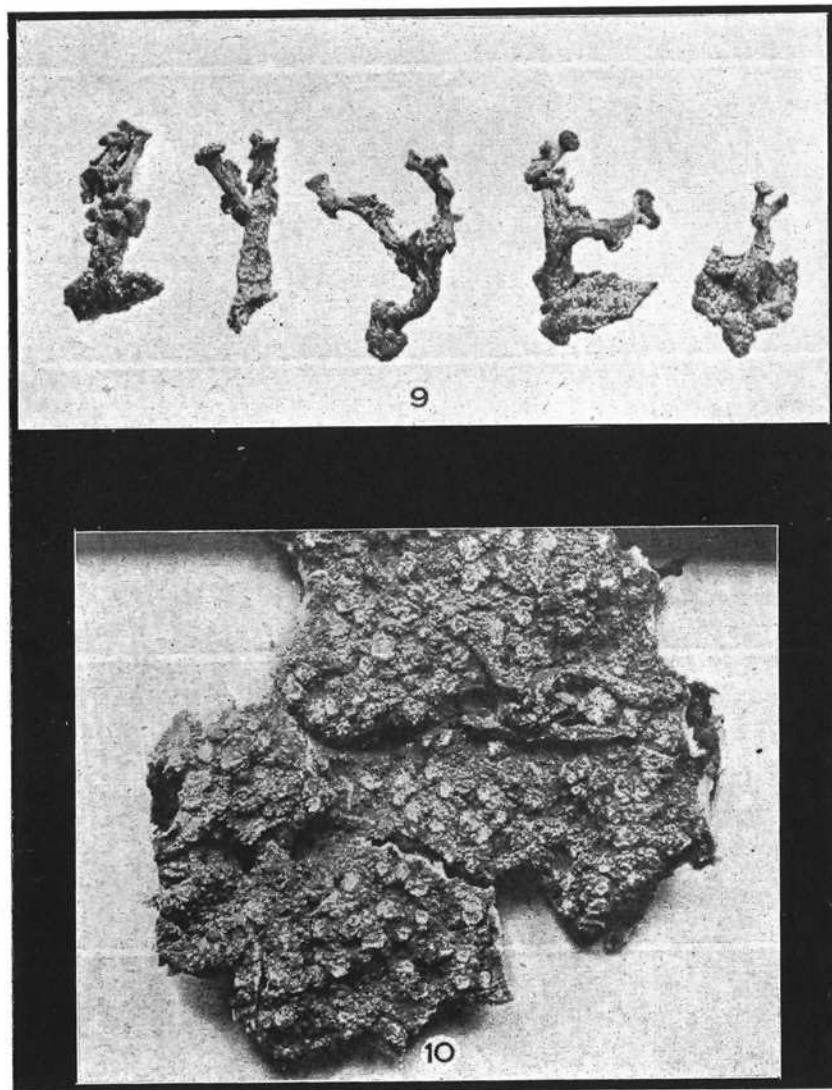


Fig. 9. — *Cladoniopsis caespitosa* Zahlbr.; podetia from the isotype specimen in Herb. Botany Division, Wellington, New Zealand. 3 times nat. size.

Fig. 10. — *Phlyctis pulveracea* M. Lamb; the type specimen. 3 times nat. size.

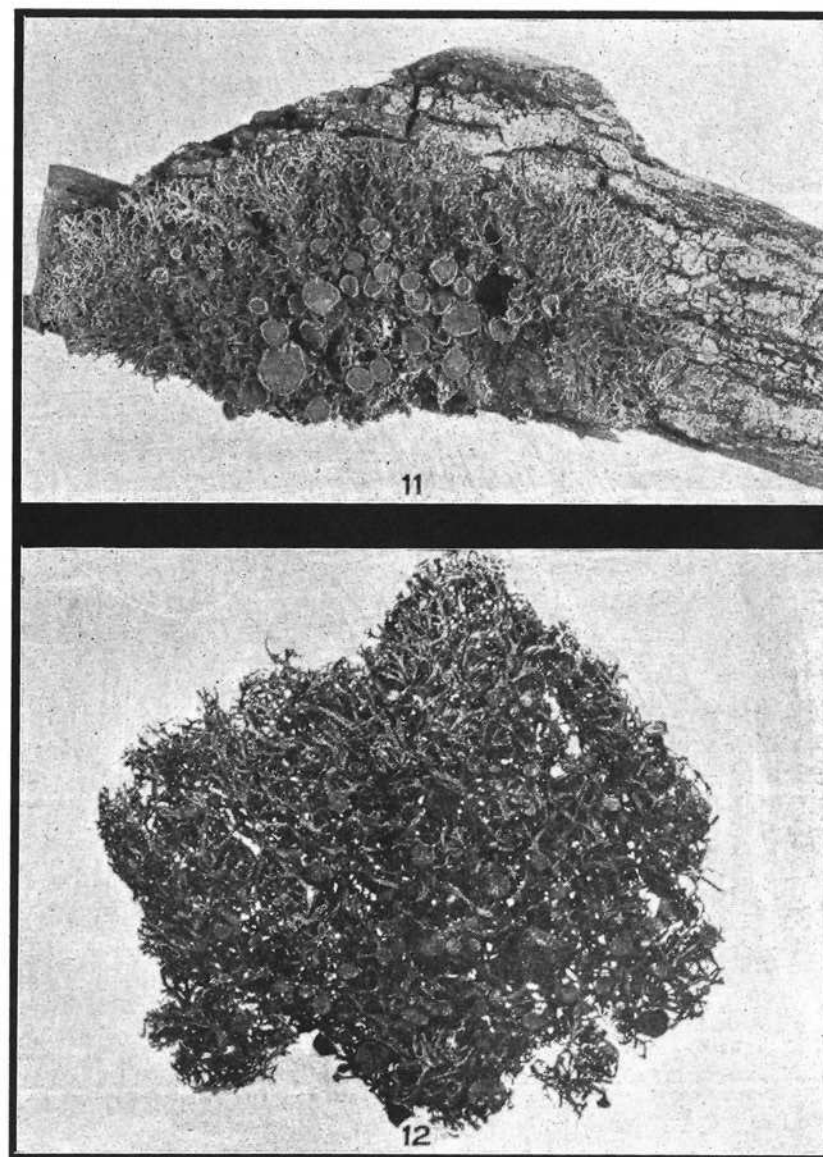


Fig. 11. — *Teloschistes excelsior* (Stirt.) M. Lamb; the type specimen in Herb. J. Stirton. 2 times nat. size.

Fig. 12. — *Teloschistes nodulifer* (Nyl.) Hillm.; a specimen from N. W. Argentina, Prov. Catamarca, Nevados de Aconquija, Cueva del Overo, altit. circ. 4000 m. s. m., coll. M. Lamb, 1948 (n° 5537). 2 times nat. size.