Taxonomical and ecological observations on foliicolous lichens in northern Argentina, with notes on the hypophores of "Asterothyriaceae" = Taxonomische und ökologische Beobachtunnen über epiphylle Flechten in Nordargentinien mit Notizen über "Asterothyr...

Autor(en): **Serusiaux, Emannuel / Sloover, Jacques R. de**

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Taxonomical and ecological observations on foliicolous lichens in northern Argentina, with notes on the hypophores of *Asterothyriaceae*

Taxonomische und ökologische Beobachtungen über epiphylle Flechten in Nordargentinien mit Notizen über *Asterothyriaceae*

Observaciones taxonómicas y ecológicas sobre líquenes foliícolas en el norte de la Argentina, con notas sobre los hipóforos de las *Asterothyriaceae*

by

Emannuel SERUSIAUX and Jacques R. DE SLOOVER

CONTENTS

1. INTRODUCTION

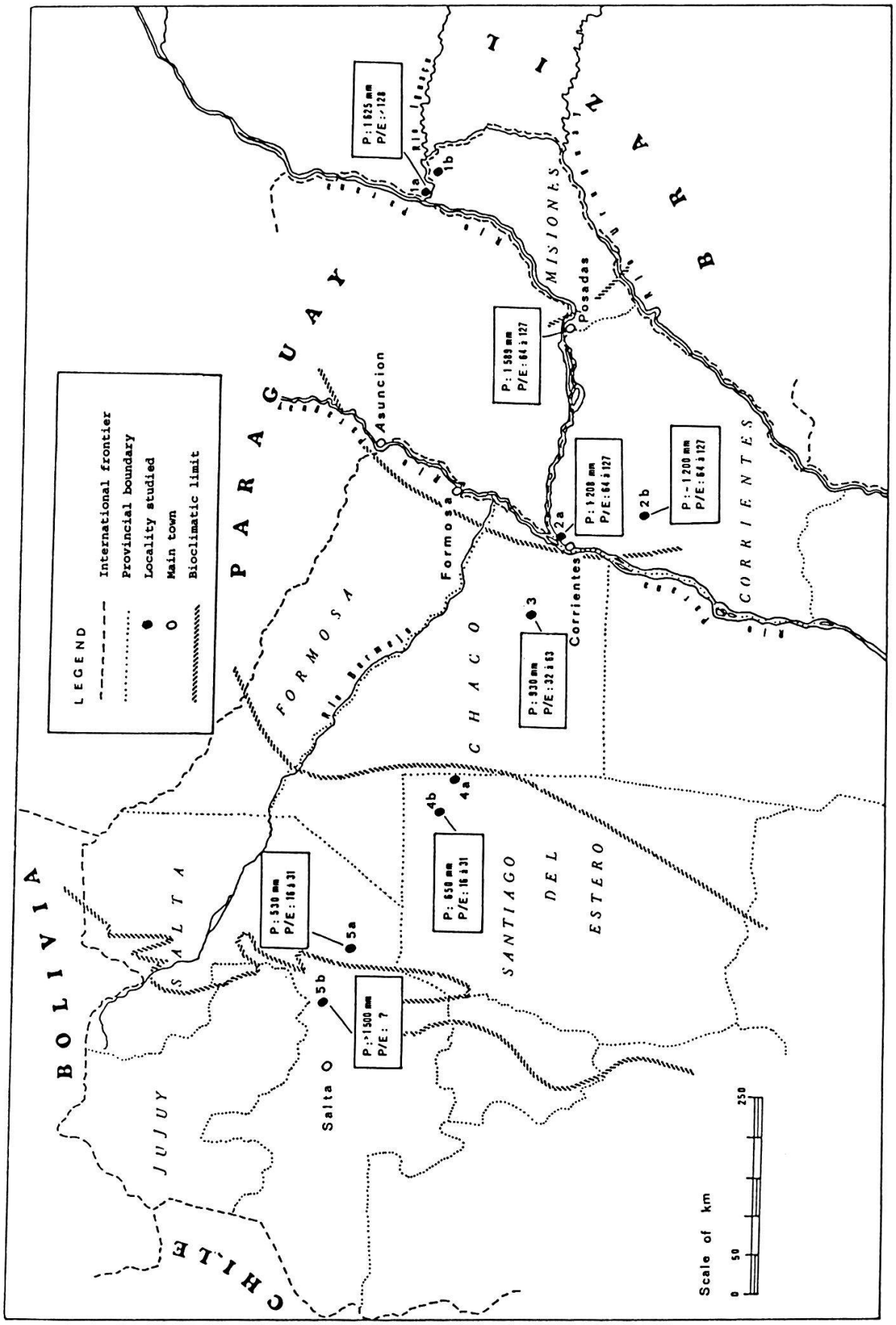
Since the outstanding monograph of SANTESSON (1952), the taxonomy and ecogeography of foliicolous lichens in South America have been little studied, nevertheless several papers have been published on the subject (FERRARO 1978, 1982 and 1983; HENSSEN et al. 1982; HERTEL 1974; NOWAK and WINKLER 1970, 1972, 1975; OSORIO 1975, 1981; SCHELL and WINKLER 1981; VEŽDA 1984; XAVIER FILHO 1975). As large collections are now available (mainly those made by Lic. L.I. Ferraro in Argentina and by Dr. K. Kalb in Brazil), no doubt substantial progress can be expected in the near future. With this in mind, we report on specimens collected by one of us (J.R.D.S.) in the northern parts of Argentina in 1983.

ACKNOWLEDGEMENTS

E. Sérusiaux wants to thank Lic. L.I. Ferraro of the "Universidad Nacional del Nordeste" at Corrientes, Argentina, for submitting to him numerous interesting collections of foliicolous lichens from Argentina, Paraguay and Brazil. He is also indebted to Prof. A. Vězda for his great help in the understanding of the taxonomy of the foliicolous lichens. S.E.M. photographs were taken at the Jardin Botanique National de Belgique with a Philipps 501 B microscope. We owe many thanks to Prof. E. Petit who allowed one of us (E.S.) to use the instrument and to Dr. J. Rammeloo and M. Verhaegen for their active cooperation. Finally the second author takes this opportunity to thank Dr. U. Eskuche from Corrientes, Argentina, for his close attention during the unforgettable trip he led through his country.

2. SAMPLED LOCALITIES

The specimens were gathered during a field trip organized in October 1983 by the International Association for Vegetation Science (I.A.V.S.) and the 17th "International Pflanzengeographische Exkursion" (I.P.E.) (Map 1). The sites are roughly distributed between latitudes 24° and 28° south along an eastwest transect running from the Cataratas of Iguazú (Prov. Misiones) to the southern end of the Sierra Sta Barbara, 75 km east of Gnl. Guemes city (Precordillera, Prov. Salta). On the same map are included concise and pertinent data from Galmarini and Raffo del


LEGEND
International frontier
Provincial boundary
Locality studied
Main town
Bioclimatic limit
BOLIVIA
PARAGUAY
BRAZIL
CHILE
JUJUY
SALTA
FORMOSA
CHACO
SANTIAGO DEL ESTERO
MISIONES
CORRIENTES
Asuncion
Formosa
Posadas
Corrientes
Salta
Rio Bermejo
P: 1625 mm P/E: ? 128
P: 1 589 mm P/E: 64 à 127
P: 1 208 mm P/E: 64 à 127
P: ~ 1 200 mm P/E: 64 à 127
P: 930 mm P/E: 32 à 63
P: 530 mm P/E: 16 à 31
P: 650 mm P/E: 16 à 31
P: >1500 mm P/E: ?
1a
1b
2a
2b
3
4a
4b
5a
5b
Scale of km
0
50
250

Map 1 (p. 262). Map of northern Argentina and neighbouring countries showing the localities of collections. The significant data concerning rainfall and evaporation are also reported for each site.

Karte 1 (S. 262). Karte von Nordargentinien und Nachbarländern mit Angabe der Sammelorte und der entsprechenden Werte für Niederschlagshöhe und Verdunstung.

Mapa 1 (p. 262). Mapa de la Argentina Septentrional y paises vecinos indicando las localidades de colección y para cada sitio, los datos de precipitaciones y evaporación.

P: annual rainfall - jährliche Niederschlagshöhe precipitaciones anuales

P/E: rainfall-evaporation ratio - Quotient aus Niederschlags- und Verdunstungshöhe - cociente de precipitaciones y evaporación

---

Campo (in MARLANGE 1973) on the annual rainfall (P) and on the rainfall-evaporation ratio (index P/E).

Nine localities were searched for foliicolous lichens; all but one (n° 1a) are in Argentina; they are briefly described below.

1a. Brazil, Foz do Iguazú, Parque Nacional do Iguazú (25°41'S/54°26'W), alt. 160 m. Forest on the slopes downstream to the falls (camino inferior): subtropical semi-deciduous forest (selva) dominated by Parapiptadenia rigida, Nectandra saligna, Ficus enormis (*), Cordia trichotoma, Heliocarpus popayanensis... with an understory of small trees and shrubs such as Guarea pohlii, Sorocea bonplandii (*), Trichilia sp. (*), Piper gaudichaudianum (*) and Inga marginata.

1b. Prov. Misiones, Dep. Iguazú, Parque Nacional del Iguazú: along road n° 101 between the Cataratas and Cabure-i (25°40'S/54°16'W). Dense subtropical tableland forest (selva) with the following main trees: Aspidosperma polyneuron, Diatenopteryx sorbifolia (*), Holocalyx balansae, Balfourodendron riedelianum, Ficus enormis, Cabralea oblongifolia, Arecastrum romanzoffianum; the understory of small trees and shrubs includes Sorocea bonplandii (*), Euterpe edulis (*), Trichilia elegans, Psychotria leiocarpa, Piper gaudichaudianum, Chusquea ramosissima, Eugenia burkartii; the scattered ground layer

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*Species with foliicolous lichens are indicated with an asterisk (*)

mainly incorporates grasses and ferns such as Pharus glaber (*), Didymochlaena truncatula, Doryopteris nobilis, creepers such as Adenocalymna paulistarum (*) and a few orchids such as Corymborchis fla- Corymborchis flavescens (*).

2a. Prov. Corrientes, Dept. Capital, Perichon (27°20'S/58°48'W), alt. 60 m. Schinopsis balansae and Astronium balansae forest (Bosque) with Brunfelsia australis: accidently overflooded forest with a tree layer 15 m high (Holocalyx balansae, Gleditsia amorphoides, Ficus enormis (*), Tabebuia ipe, Caesalpinia paraguayensis...), a stratum of small trees and shrubs 2-4 m high: (Trichilia catigua (*), Trichilia elegans (*), Cupania vernalis (*), Myrcianthes pungens (*), Pouteria gardneriana (*), Patagonula americana, Myrcia laruottiana, ... a few creepers such as Serjania perulacea and Paullinia elegans (*) and an open herbaceous layer with Pharus glaber, Pseudananas macrodontes (*).

2b. Prov. Corrientes, Dep. San Roque, Paso Naranjito (28°22'S/58°24'W), alt. 65 m. Low and grazed forest (bosque) on sand including Ficus enormis, Chrysophyllum gonocarpum, Casearia sylvestris (*), Schaefferia argentinensis, Holocalyx balansae, Cupania vernalis (*), Pouteria gardneriana (*), Brunfelsia australis, Patagonula americana; the scattered ground layer is dominated by Pseudananas macrodontes (*) and Bromelia serra.

3. Prov.. Chaco, Dep. Presidencia de La Plaza, along road n° 16, 15 km east of Pres. de La Plaza, alt. 75 m (27°4'S/59°45'W). Schinopsis balansae and Astronium balansae forest with Diplokeleba floribunda (bosque chaqueño): badly affected by grazing and felling, open (cover about 10%) forest, 15 m high, rising above a dense layer of shrubs and small trees (to 8-10 m high) mainly consisting of Scutia buxifolia (*), Allophyllus edulis and scattered Brunfelsia australis; less common are Acacia praecox, Aspidosperma triternatum, Eugenia uniflora and Gleditsia amorphoides; the ground layer is made up of Bromeliaceae (cover of 25-30%; Bromelia serra, Aechmaea distichantha, Pseudananas macrodontes) and a few Cactaceae.

4a. Prov. Santiago del Estero, along road n° 16, 10 km east of Pampa de los Guanacos, alt. 140 m (26°15'S/61°48'W). Schinopsis lorentzii and Aspidosperma quebracho-blanco forest. Three strata are recognized: the upper about 15 m high and made up of the two timber-trees mentioned above, an almost continuous layer of tall shrubs with Atamis-

Table 1. Foliicolous lichens in northern Argentina (locality numbers refer to map 1, see text for further details).
Tab. 1. Epiphylle Flechten in Nordargentinien (die Nummern der Orte beziehen sich auf Karte 1; weitere Einzelheiten im Text)
Tab. 1. Líquenes foliícolas en la Argentina septentrional (los números de localidad se refieren al mapa 1, otros detalles en el texto)

Taxa	Localities (*) 1a	1b	2a	2b	3	5b**
Strigula elegans (Fée) Müll.Arg.	x	x	x	x[1]	x[1]	-
Gyalectidium filicinum Müll.Arg.	x	x	x	-	x	x
Gyalectidium eskuchei Sérusiaux	x	-	-	x	-	x
Porina nitidula Müll.Arg.	x	x	x	x	-	-
Tricharia vulgaris (Müll.Arg.) R.Sant.	-	x	x	-	-	-
Strigula nemathora Mont.	-	x	x	-	-	-
Asterothyrium leucophthalmum (Müll.Arg.)R.Sant.	-	-	-	x	-	-
Asterothyrium sp. (2)	-	-	x	-	-	-
Raciborskiella prasina (Müll.Arg.) R.Sant.	-	-	x[4]	-	-	-
Tricharia sp. (3)	-	-	x	-	x	-
Dimerella brasiliensis Vězda and Kalb inéd.	-	-	x	-	-	-
Asterothyrium rotuliforme (Müll.Arg.) Sérusiaux	-	-	-	-	x	-
Catillaria bouteillei (Desm.) Zahlbr.	-	-	-	-	x	x
Dimerella epiphylla (Müll.Arg.) Malme	x	x	-	-	-	-
Porina atrocoerulea Müll.Arg.	x	x	-	-	-	-
Porina leptosperma Müll.Arg.	x	x	-	-	-	-
Phylloporis phyllogena (Müll.Arg.) Clem.	x	x	-	-	-	-
Bacidia apiahica (Müll.Arg.) Zahlbr.	x	-	-	-	-	-
Bacidia dominicana (Vainio) Zahlbr.	x	-	-	-	-	-
Lopadium puiggarii (Müll.Arg.) Zahlbr.	x	-	-	-	-	-
Mazosia sp. (2)	x	-	-	-	-	-
Porina limbulata (Krempelh.) Vainio	x	-	-	-	-	-
Porina rufula (Krempelh.) Vainio	x	-	-	-	-	-
Trichothelium sp. (2)	x	-	-	-	-	-
Byssoloma leucoblepharum (Nyl.) Vainio	-	x	-	-	-	-
Lopadium sp. (2)	-	x	-	-	-	-
Phyllophiale alba R.Sant.	-	x	-	-	-	-
Porina epiphylla (Fée) Fée	-	x	-	-	-	-
Porina rubentior (Stirton) Müll.Arg.	-	x	-	-	-	-
Strigula subtilissima (Fée) Müll.Arg.	-	x	-	-	-	-

* Campylidia, usually known as Pyrenotrichum splitgerberi Mont., were found in loc. 1a, 1b and 2; they are anamorphic states of species of Tapellaria or Lopadium.

** This station has two other taxa: a species of Porina and an unknown one, probably close to Calenia; the material is too scanty to permit identification.

(1) with the parasymbiont Opegrapha strigulae R. Sant. nom. nud. 1952
(2) no spores seen: identification impossible
(3) most probably a new species
(4) with the parasitic hyphomycete Hansfordiellopsis lichenicola (Bat. and Maia) Deighton.

quea emarginata, Capparis retusa, Celtis pallida, Acacia praecox, Prosopis kuntzii and Zyziphus mistol and a ground layer (Bromelia hieronimi largely dominant). No foliicolous lichens were found here.

4b. Prov. Santiago del Estero, close by road n° 16, between Los Pirpintos and El Cabure, alt. 170 m (26°4'S/62°W). Almost virgin Aspidosperma quebracho-blanco forest on loessic sand, with Capparis speciosa, Ximenia americana, Castela coccinea in the shrub layer and a Selaginella sellowii sward on the ground. No foliicolous lichens were found here.

5a. Prov. Salta, north-east of Joaquin V. González towards Campos del Norte (25°4'S/64°7'W). Schinopsis lorentzii open forest on loess with the shrubs Atamisquea emarginata, Ruprechtia triflora, Castela coccinea and Zyziphus mistol and, on the ground, a subcontinuous carpet of Selaginella sellowii. No foliicolous lichens found.

5b. Prov. Salta, Dep. Anta, Parque Nacional El Rey, alt. 1100 m, along the arroyo La Sala (24°40'S/64°35'W). The lowest altitudinal zone of this subtropical forest (selva tucumano-oranense) is dominated by large trees such as Phoebe porphyria (*), Tipuana tipu, Blepharocalyx gigantea, Enterolobium contortisiliquum,... with tall shrubs including Allophylus edulis, Scutia buxifolia (*), creepers such as Smilax cf. campestris (*) and numerous epiphytes, for example Tillandsia maxima, Rhipsalis lumbricoides, Usnea div. sp.
At lower elevations near the park entrance, along road n° 20, the composition of the forest is intermediate between the above "selva" and the "bosque chaqueño" with Schinopsis haenkeana, Astronium urundeuva, Anadenanthera macrocarpa, Caesalpinia paraguayensis, Pisonia ambigua and Cereus validus. No foliicolous lichens were found here.

3. ECOLOGY AND CHOROLOGY OF THE FOLIICOLOUS LICHENS IN THE STUDIED AREA

The list of the taxa identified in the nine investigated forests is summarized in table 1. Localities 4a, 4b and 5a do not appear as we failed to discover any foliicolous species in these forests.
As might be expected, the subtropical humid forests near Iguazú are the richest: 23 species are detected on the collected leaves. Most of the

species however are pantropical (or almost pantropical) or common in the tropics of South America. The floristic differences between the two localities prospected (1a vs. 1b) might only be indicative of unequal but nevertheless different microclimatic conditions: downstream of the Catarates (loc. 1a), the atmospheric humidity does not significantly differ from saturation at any time, and the leaves are moistened throughout the day; this is not the case in the same forest type on the table-land (loc. 1b) where moisture from the air can fall every day for a few hours, even in the undergrowth. The foliicolous flora is relatively poor here compared with the situation encountered in equatorial rain forests at low elevations in the Amazon, the Zaïre basin, Indonesia, and New Guinea where it is much richer (in collections from New Guinea, E.S. has observed more than 40 species on a single palm leaf) and dominated by species with a more restricted distribution.

From the northern part of Prov. Misiones towards the west, diversity of species decreases with annual rainfall, which changes from more than 1600 mm to 500-600 mm in the western part of Prov. Chaco, and with the atmospheric humidity, which on the average decreases from 70% in Corrientes to 55% in western Chaco, rising again to 70% in the Precordillera in Prov. Salta. At the same time, annual mean temperatures rise from 20.3°C in Iguazú to 22.5°C in the eastern part of Prov. Salta (loc. 5a) where the highest temperatures of South America have been recorded. In spite of this progressive thermal rise from east to west, the mean number of days with frost increases from zero to seven. Such a high thermal amplitude, together with the lower rainfall, may explain the scattered foliicolous lichen flora which requires steady climatic conditions to reach its optimum. However it seems that the most important limiting factor is the effective humidity. In this respect the "effective rainfall index" perfected by Thornthwaite indicates the useful rainfall; the calculated amounts of this P/E index are shown in Map. 1 for each locality studied (data from MARLANGE 1973). Marlange constructed a map from which the bioclimatic limits of Map 1 were obtained. These limits agree well with those of the forest vegetation in north-east Argentina (ESKUCHE 1984) and with the decreasing number of foliicolous lichen species.

The subtropical humid forest with Parapiptadenia rigida and Nectandra saligna which covers the greatest part of Prov. Misiones is replaced in Prov. Corrientes by a vegetation mosaïc made up of savannas, swamps, and

fragments of forest with Schinopsis balansae and Astronium balansae (humid Chaco). In these forests (loc. 2a and 2b), the number of species of foliicolous lichen falls to eleven, though loc. 2a shares a group of three species with loc. 1a and 1b. Locality 2b is however much poorer than 2a. Locality 2a is extremely close to the Parana and atmospheric humidity within the forest canopy is unquestionably higher than in loc. 2b. Moreover, the small forest patch of loc. 2b stabilizes a slight eminence of sandy soil; cattle grazing inside the forests bring about severe disturbances i.e. openings in the forest margins.

Westwards, beyond the Parana river, the Schinopsis balansae - Astronium balansae forest is represented by a probably less sciaphilous and less hygrophilous facies (?), easily recognized by Diplokeleba floribunda (ESKUCHE 1984). Its structure is such that it is less propitious for foliicolous species: in loc. 3 one species of shrub only appears to be suitable for foliicolous lichens and only 5 foliicolous species could be detected. Further in the central Chaco (loc. 4a and 4b) and on its west side (loc. 5a), the natural type of vegetation is the Schinopsis lorentzii - Aspidosperma quebracho-blanco forest (dry Chaco); this is an open forest showing xerophilous features (structure and composition); even in the less disturbed stands, no foliicolous lichen were found.

In the last locality (5b), the "selva montana" is generated by the high rainfall produced by ascending air currents along the first Precordillera ranges. In this forest a foliicolous flora is present, contrasting to the "desert" in the western Chaco. The small number of identified species from this locality is considered only to reflect the limited searching.

4. TAXONOMICAL NOTES

4.1. NEW SPECIES AND NEW COMBINATION

Asterothyrium rotuliforme (Müll. Arg.) Sérusiaux comb. nov.

Bas.: Gyalectidium rotuliforme Müll. Arg., Lichenes Paraguayenses **10**, 65, 1888. SANTESSON (1952: 354) pointed out the relationships between Gyalectidium rotuliforme and Asterothyrium. VĚZDA (1979: 50-51) detailed

all characters shared by both. The cortex formed by one layer of rectangular cells arranged in radiate rows, the apothecia immersed in the thallus, and first covered by a photobiont-containing layer which splits radially from the centre and thus exposes the hymenial disc, the paraplectenchymatous exciple reacting I+ red, especially in lateral parts, the unbranched paraphyses with more or less clavate apices and the ascospores lacking a mucilagineous sheath. HENSSEN (1981: 155) added that, according to her yet unpublished results, the ascocarp ontogeny of Gyalectidium rotuliforme corresponded to the development in the genus Asterothyrium. As we are ourselves convinced that Gyalectidium rotuliforme belongs to Asterothyrium, we can see no reason to retain it further within Gyalectidium, and so formal combination is made here.
Besides, Asterothyrium seems to be more closely related to Chroodiscus (Müll. Arg.) Müll. Arg., a genus placed in the Thelotremataceae, than to any genus in the Asterothyriaceae sensu SANTESSON (1952) and VĚZDA (1979). Dr. A. Vězda is currently working on a new circumscription of the family.

Gyalectidium eskuchei Sérusiaux sp. nov. (fig. 1-5, 19-21, 29)

Thallus epiphyllus, ± orbicularis, 2-3(-4.5) mm diam, cum translucenti margine, cinerascens vel viridis, irregulari pagina et numerosis crystallis. Hyphophori numerosi, primum in thallo immersi (ut pote maculae 0.2-0.3 mm diam) deinde constati e triangularibus erectibusque lobis cingentibus algas continentes hypharum diasporicarum (= conidia) fasciculos. Apothecia orbicularia, immersa sed prominentia, 0.2-0.25 mm diam, disco pallide viridi et margine leviter prominenti et atrocinerascenti. Excipulum fere paraplectenchymaticum, usque ad 25 µm crassum, cum algis; hypothecium incoloratum, ± 10 µm crassum; hymenium incoloratum, 40-50 µm crassum, cum algis; epithecium ± 10 µm crassum cum numerosis cellulis algarum. Paraphysoideae densae, ramosae anastomosantesque, articulatae, 1.5-2 µm crassae; asci clavati, 1-spori; sporae ellipsoideae, muriformes, 32-36(-40) x 10-15 µm. Alga cellulis globosis, 8-12 µm diam, ad familiam Chlorococcacearum verosimiliter pertinens.

Thallus ± circular, 2-3 mm diam, sometimes reaching 4.5 mm, hardly delimited by a thin translucid margin (prothallus ?), greyish to greenish, sometimes almost translucent, surface always irregular due to crystal accumulation within the thallus, or with ± convex white swellings reaching 0.1-0.5 mm diam and containing enormous amounts of crystals. Corticiform layer always distinct. Hyphophores always present, at first appearing as ± rounded (sometimes ± ellipsoid or irregular), bluish grey spots, 0.2-0.3 mm diam, randomly distributed or arranged in a circle

over the thallus surface; when mature, appearing as a circle of 5-7(-10) ± triangular lobes, usually upright or sometimes recurved, 0.3-0.5 mm long, surrounding a mass of catenate conidia (moniliform hyphae: long hyphae, strongly constricted at the septa, looking like chains of short sausages or like a string of beads) containing numerous algal cells, 3-6 µm diam. Apothecia rare, circular, immersed in the thallus but distinctly prominent, 0.2-0.25 mm diam, disc pale green, sometimes ± translucent, margin slightly prominent, dark grey to bluish black. Excipulum always distinct, at most 25 µm thick, consisting of cylindrical to globose, interwoven hyphae, sometimes almost paraplectenchymatous, brownish in section, containing several algal cells but usually very few crystals; hypothecium consisting of angular to globose cells, ± 10 µm thick, colorless; hymenium 40-50 µm high, containing several bundles of 4-10 algal cells but otherwise hyaline; epithecium ± 10 µm thick, containing numerous algal cells arranged in clusters (cells spherical, green, 3-6 µm diam). Paraphysoids numerous, forming a compact gelatinous mass, branched and anastomosed, articulate, rather thick (1.5-2 µm); asci broadly clavate, 1-spored. Spores ellipsoid, muriform, 32-36(-40) x 10-15 µm. Phycobiont: most probably a species of Chlorococcaceae, cells globose, green, 8-12 µm diam.

Typus: Brazil, Foz do Iguazú, down stream from the falls, on leaves of Ficus enormis, 4.10.1983, J.R. De Sloover (LG-holotypus).
Additional specimens examined: Same locality as the type but on leaves of Piper gaudichaudianum, J.R. De Sloover (LG). Argentina, Corrientes prov., Paso Naranjito, degraded forest with Patagonula americana, on leaves of Pouteria gardneriana, 14.10.1983, J.R. De Sloover (LG). Salta prov., Anta Depto., Parque Nacional El Rey, "Selva subtrop. de las Yungas", on leaves of Smilax cf. campestris, 18.10.1983, J.R. De Sloover (LG). Misiones prov., Depto. Apóstoles, 6 km S de San José, en borde de selva en galería, sobre Pilocarpus sp., 1979, Arbo et al. 2387 (CTES, LG). Corrientes prov., Depto Santo Tomé, Arroyo Chimiray, interior de selva, sobre Lauraceae, 1974, Krapovickas et al. 36752 (CTES, LG). Paraguay, Depto Amambay, Cerro Guazú, sobre hojas de Diatenopteryx sorbifolia, 1980, Schinini et al. 20723 (CTES, LG).

The circumscription of the genus Gyalectidium Müll. Arg. has recently been examined by VĚZDA (1983a: 56-60 and 1984: 197) who emphazised the

importance of the hyphophores. As a matter of fact, the type species of the genus, G. filicinum Müll. Arg., produces scale-shaped hyphophores (fig. 15), slightly curved, 0.6-0.8 mm long, 0.3-0.4 mm high with two long (up to 0.3 mm) cilia at each end. In spite of external differences, the hyphophores of Gyalectidium eskuchei and of G. filicinum are closely related: in both species, a mass of catenate conidia (moniliform hyphae or "Diahyphen" in the sense of VĚZDA 1983a) containing algae is formed within the thallus and is raised out by thick-walled hyphae under the protection of the sterile parts of the hyphophores (in G. filicinum, these are lateral and scale-shaped; in G. eskuchei, they surround the mass of conidia and are triangular lobes, fig. 28-29). Last but not least, the apothecia of this new species are almost identical to those of Gyalectidium filicinum, the only firm difference between these two being the morphology of the hyphophores. There is therefore no doubt that this new species belongs to the genus Gyalectidium.

This new species is dedicated to Dr. U. Eskuche, of the Herbarium Humboldtianum UNNE (Corrientes), who organized the trip during which it was collected.

As demonstrated above, Gyalectidium rotuliforme belongs to Asterothyrium. Gyalectidium aspidotum (Vainio) R. Sant., the third species recognized in Gyalectidium by SANTESSON (1952), must also be transfered to another genus: its hyphophores (pictured by VĚZDA 1979: 84, fig. 2.9) are totally different. They are like long white cilia bearing a small hyphal-ball. Contrary to the hyphophores of Gyalectidium species, they are fully grown before the differentiation of the conidial mass which does not contain any algal cells. Moreover, as in several other genera with hyphophores (Aulaxina Fée, Calenia Müll. Arg., Echinoplaca Fée and Tricharia Fée), the conidial mass is produced by the tip of the hyphophore, not at its base. This species has been rightly transfered to Calenia by VĚZDA (1984: 195).

Four foliicolous species are thus known in the genus Gyalectidium: G. caucasicum (Elenkin et Woronichin) Vězda, G. colchicum Vězda, G. eskuchei newly described in this paper and G. filicinum Müll. Arg. The only other species in the genus is Gyalectidium corticola HENSSEN (1981) which does not have hyphophores. We have not examined the type of this species and cannot therefore comment on its generic position.

4.2. NOTES ON THE HYPHOPHORES OF ASTEROTHYRIACEAE

As early as their first description by VEZDA (1973), hyphophores were considered organs of asexual reproduction for the mycobiont. Subsequent papers of that author (1975, 1979, 1983a, 1983b, 1984) have clearly demonstrated that hyphophores are conidia-producing structures, most of which are distinctive of the species developing them. As is the case for campylidia (sensu MUELLER ARGOVIE 1881, see VEZDA 1983a for a modern re-appraisal of these highly specialized conidiomata), it seems that several generic and specific names of deuteromycetes (lichenized or not) have been established on the basis of hyphophores. Dr. K.A. Steifert (comm. pers., unpubl. results) submitted to one of us the type-collections of two monotypic genera (Epilithia Nyl., Microspatha Karsten) which are deuteromycetes, apparently lichenized, producing hyphophores. Unfortunately both collections are sterile. The foliicolous genera of imperfect lichens described from Brazil by Batista and co-workers (BATISTA 1961; BATISTA and MAIA 1961, 1965, 1967; BATISTA et al. 1961) most probably also refer to lichenized fungi producing either hyphophores or campylidia. The case of Microlychnus Funk (1973) seems to be similar: from the illustrations provided, there is little doubt that the synnemata described are hyphophores.

It has formerly been suggested (SERUSIAUX 1984) that hyphophores are modified synnemata. This must be abandonned for two reasons:

- hyphophores are rigid and permanent structures surviving as long as the lichen thallus, while typical synnemata are usually either very brittle or easily collapsed;
- the conidia are produced within a ± globose (usually tear-shaped) mass* that can survive for a long time. This mass, in all cases examined, is bound to the hyphophore by several (from 2 to 15) thick walled hyphae. In most genera it is hung from the hyphophore tip by these hyphae, whereas in the genus Gyalectidium (see below), it is raised up by them from within the base of the hyphophore.

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*This mass of conidia and conidiogenous cells was named "Büschel" or "Knäuel" by VĚZDA (1973), and translated into English as "hyphal-ball" by one of us (SERUSIAUX 1978). We here suggest using "conidial mass" instead.

The conidial mass contains conidiophores, conidiogenous cells, conidia and, in several cases, algae. When dry, it is a compact rather smooth mass. It is usually highly hygroscopic, when moistened it can double its volume and then more or less bristles with conidia (fig. 6). Hyphophores can therefore be distinguished from synnemata by two features: they are rigid and permanent structures and they produce a conidia-containing ball (named conidial mass) bound to the structure by several thick walled hyphae.

The only exceptions to this scheme seem to be Gyalideopsis muscicola P. James and Vězda and G. kalbii Vězda. We have not examined any specimens of these species. But from the illustrations provided by VĚZDA (1979) for the former, it seems that there are no thick walled hyphae carrying the conidial mass. For the latter, it is obvious, from the description and illustration provided by VĚZDA (1983b), that the hyphophores of this species are very close to genuine synnemata.

Morphological classification of the hyphophores

With the data available, we can complete the classification of the hyphophores into different morphological types (see VĚZDA 1979 and fig. 7).

Zygomorphic hyphophores

1. Cilia hyphophores (fig. 7.1): short (less than 0.1 mm) to long (up to 0.4 mm) cilia tapering towards the end, carrying a single conidial mass, usually tear-shaped and stuck to the structure when dry.
   Ex.: Calenia aspidota (Vainio) Vězda.
2. Spathella hyphophores (fig. 7.2): short (0.1 mm) cilia ± enlarged and ± flat near the tip, to large (0.2-0.3 mm high, 0.5-0.7 mm large), peltate structures, usually curved downwards near the tip, carrying a single conidial mass, usually tear-shaped and stuck to the structure when dry.
   Ex.: Echinoplaca diffluens (Müll. Arg.) R. Sant., Tricharia dilatata Vězda.
3. Roundabout hyphophores (fig. 7.3.): short (0.1 mm) cilia with several conidial masses suspended at the ends of long thick walled hyphae emerging from the cilia tips.
   Ex.: Aulaxina microphana (Vainio) R. Sant.
4. Scale hyphophores (fig. 7.4): scale of various shape and size (up to

0.8 mm long and 0.5 mm high); several conidial masses maintained within the thallus and raised up by thick walled hyphae.
Ex.: Gyalectidium filicinum Müll. Arg.

Radiate hyphophores

5. Star hyphophores (fig. 7.5.): circle of upright triangular lobes surrounding several conidial masses raised up by thick walled hyphae.
   Ex.: Gyalectidium eskuchei Sérusiaux.
6. Umbrella hyphophores (fig. 7.6): umbilicate plate carrying several conidial masses on its lower side.
   Ex.: Gyalideopsis lambinonii Vězda.

This classification, as any, is rather artificial: several species display intermediate types, e.g. Aulaxina quadrangula (Stirt.) R. Sant. has hyphophores intermediate between type 1 and 3, but it is convenient for such a rapid survey. We have refrained from making a further type for Gyalideopsis kalbii, because as shown above, its "hyphophores" might be genuine synnemata.

Conidial development

This classification does not give any details on the development of conidia. This study is of course of paramount importance for the mycological interpretation of hyphophores. The material is usually so scanty and so badly preserved that identification is extremely difficult. Moreover, structures only 1 to 2 µm wide must be resolved. Ultrastructural studies will be necessary to solve this problem. So far, results are available for a few species producing moniliform hyphae (diahyphae in the sense of VĚZDA 1983a) in their conidial masses. The material studied includes the Argentine material of Gyalectidium filicinum and G. eskuchei cited above, Gyalectidium colchicum Vězda (Vězda Lich. Sel. Exsicc. No. 1866 - isotypus, LG), G. caucasicum (Elenkin and Woronichin) Vězda (several collections from Iran and URSS, Caucase) and Tricharia armata Vězda (several collections from Africa, Zaïre and Burundi).

The ways in which conidiogenous cells and conidia are produced and the terminology used to describe these processes have been radically revised by MINTER et al. (1982, 1983). Indeed, the different stages of development recognized by these authors form an excellent frame for the appraisal of the development of conidia and a major objective of the study

of hyphophores must be to describe them with their terminology.
In the five species studied, conidia follow, within the conidial mass, the same pattern of development (fig. 8): holoblastic conidial ontogeny, replacement of wall building apex at one or two loci (fig. 8a-b), maturation by diffuse wall building, delimitation by transverse septa, perhaps sometimes incomplete or very slow to appear. It seems that there is no retrogressive maturation or delimitation. But occasionally lateral holoblastic ontogeny may occur on the conidiogenous hyphae much lower down than the "budding" apices (fig. 8c). Long chains of conidia are thus produced: they are kept within the conidial mass which either hangs on the hyphophore tip (in Tricharia armata) or is raised up from the base of the hyphophore (in Gyalectidium ssp.) when placed in suitable conditions. The secession is schizolytic and occurs at random but does not concern all constrictions of the chains. Thus conidia are dispersed as chains of 2 to 7 (figs. 12-14). We have not been able to assess the conidia regeneration process.
As said in the next paragraph, in the genus Gyalectidium (not in Tricharia armata), these conidia-chains are frequently but loosely entangled with algae. The diaspores are therefore able to rebuild the lichen very easily as both partners remain together in the process.

Hyphophore development in Gyalectidium

In the four foliicolous species of Gyalectidium, the conidial mass is differentiated within the thallus before the hyphophores are fully grown. The conidial mass contains numerous algal cells.
In Gyalectidium filicinum (figs. 9-11, 15-17, 28), the hyphophore first becomes visible as a falcate thickening of the cortex of the thallus (fig. 17), usually not far from the margin. In vertical section (figs. 9-11), this thickening appears as a fascicle of periclinally arranged hyphae. These hyphae burst through the cortex and continue to grow upwards until the final shape and size of the hyphophores is reached. At the very early stages of this growth, the differentiation of the conidiogenous cells and perhaps also of the conidia has already started at the base of the hyphophore, within the thallus. Algal cells increase their division (the daughter cells are formed by successive cleavages and thus are aplanospores) and the medullary hyphae evolve into chains of more or less short segments (=conidia) following the process described above. This mass increases in volume but remains covered by the thallus corti-

cal layer until maturity. Under suitable conditions, thick walled hyphae raise the conidial mass out through a longitudinal fissure (fig. 18) on the concave face of the hyphophore. It is then obvious that the conidial mass is not a single unit but made of at least three.

The hyphophores of G. colchicum (see fig. 4 in VĚZDA 1983a, 59; figs. 22-23) are rather similar to those of G. filicinum. They follow the same pattern of development, but they are smaller (0.15-0.2 mm long, 0.1-0.15 mm high) and do not have two long cilia at each end. G. colchicum is so far unknown fertile; it occurs in West-Transcaucasia (U.S.S.R.).

In G. eskuchei (figs. 3-5, 19-21, 29), no upwards growth occurs before the full differentiation of the conidial mass. At this stage, the hyphophores are a lens-shaped mass of hyphae bound together within the thallus under a greyish blue cortex. The cortex then stretches to form 5-7(-10) triangular lobes which grow upwards, then forming a circle of upright lobes. This process uncovers the mass which is raised up by thick-walled hyphae.

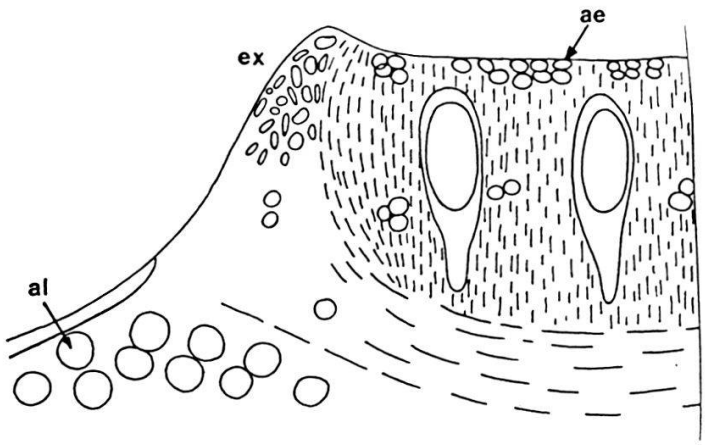
The ontogeny of the hyphophore in G. caucasicum (figs. 24-27) is rather close to that of G. eskuchei. In the numerous specimens examined, the hyphophores were, at the early stage of their formation, seen as small discs (0.1-0.2 mm in diam) containing the mass of conidia embedded in the thallus crystals. The cortical disc eventually splits either into one scale-shaped structure (as illustrated by VĚZDA, 1979, 84; figs. 2-8) or into several triangular lobes. In the latter case, the final shape of the hyphophore ressembles that of G. eskuchei. Moreover in all the hyphophores of G. caucasicum examined, the conidial mass includes algal cells.

Figs. 1-2 (p. 277). Gyalectidium eskuchei, holotype
1. Section through a young apothecium. Note the presence of algae throughout the hymenium and in the excipulum.
2. Hymenium, including an ascus with immature spore.

Abb. 1-2 (S. 277). Gyalectidium eskuchei, Holotypus
1. Schnitt durch ein junges Apothecium. Man beachte das Vorhandensein von Algen im ganzen Hymenium und im Excipulum.
2. Hymenium, einen Ascus mit einer unreifen Spore einschliessend.

Fig. 1-2 (p. 277). Gyalectidium eskuchei, holotypus
1. corte de un apotecio jóven. Observe la presencia de algas en todo el himenio y en el excípulo.
2. himenio que envuelve un asco con esporas inmaduras.

ex = excipulum; al = algal cells in the thallus; ae = epithecial algae
ex = Excipulum; al = Algenzellen im Thallus; ae = Algen des Epithecium
ex = excípulo; al = células de algas dentro del talo; ae = algas del epitecio



1

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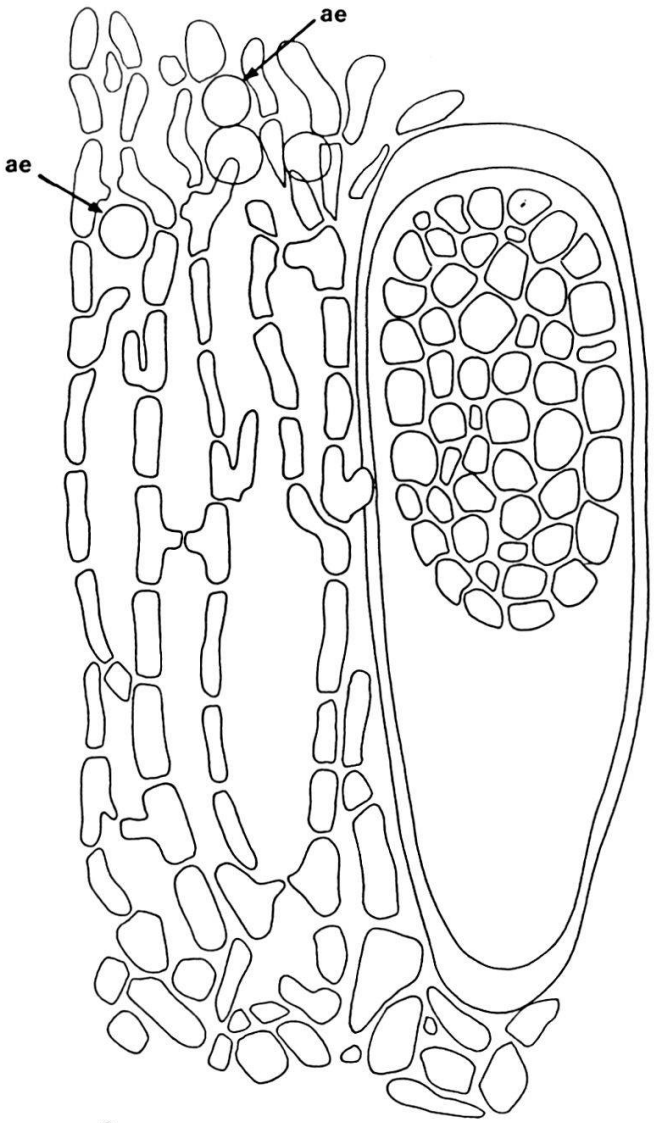

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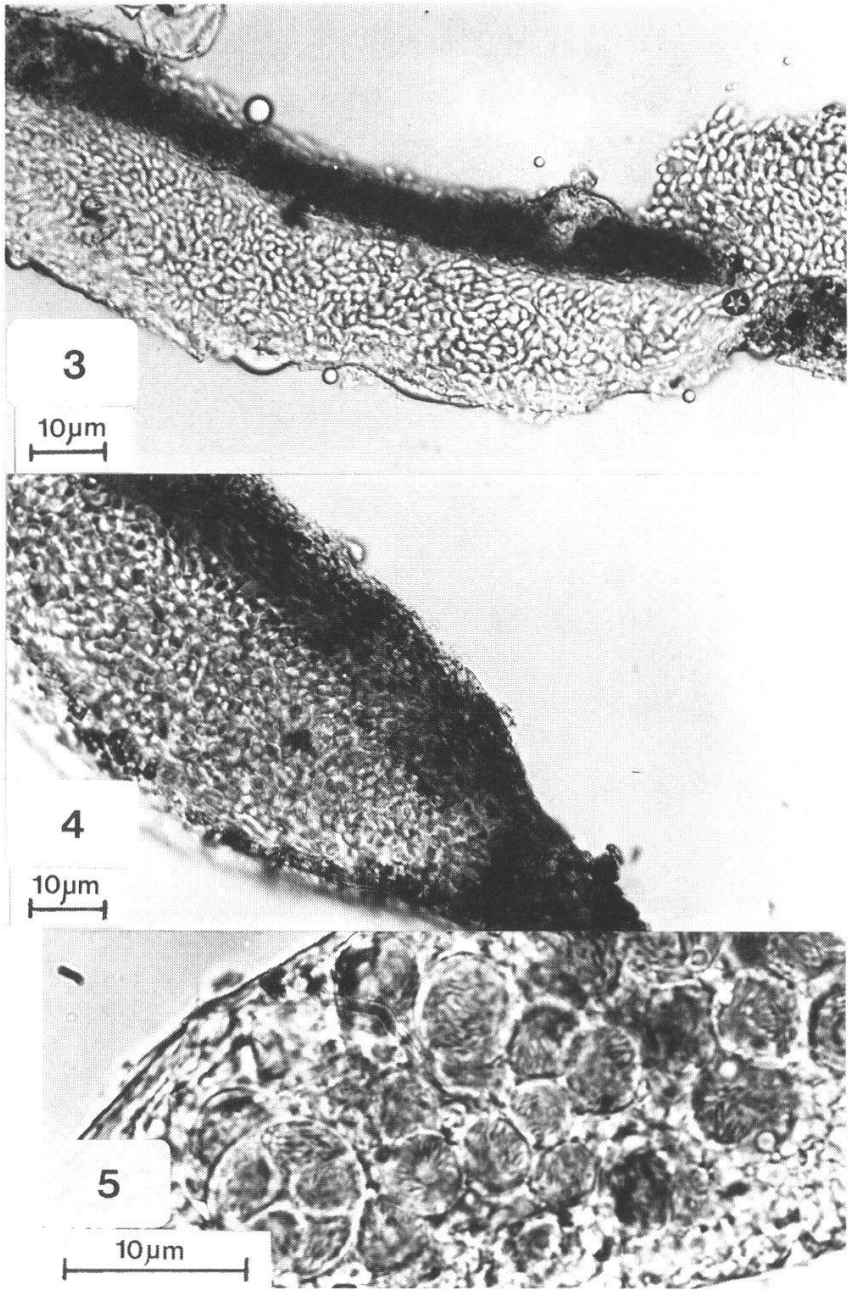


Figs. 3-5. Gyalectidium eskuchei, holotype.

3. Cross section through an almost mature hyphophore. The dark upper zone is the upper cortex of the structure. The conidial mass is clearly seen underneath it. The leaf on which the lichen grows has been removed. The conidial mass has swollen on its weakest side, the lower one. The cortex broke at its right edge and the conidial mass escaped through it.
4. Idem as 3.
5. Algal aplanospores at a very early stage of the hyphophore formation.

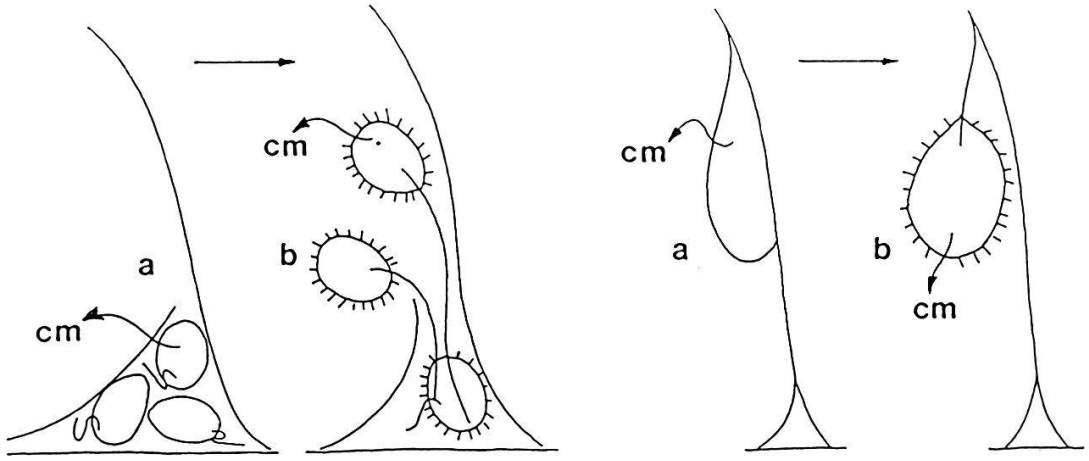


Fig. 6. Schematic drawings of the hyphophores of Gyalectidium filicinum (left) and of a species producing cilia-hyphophores (right). In state a, the material is dry. In state b, the material has been moistened (see text for further details). cm = conidial mass. Proportions not respected.

Abb. 6. Schema der Hyphophoren von Gyalectidium filicinum (links) und einer Art, welche Zilien-Hyphophore bildet (rechts). In Phase a ist das Material trocken, in Phase b angefeuchtet (weitere Einzelheiten im Text). cm = Konidialmasse. Ohne Berücksichtigung der natürlichen Proportionen.

Fig. 6. Dibujos esquemáticos de los hifóforos de Gyalectidium filicinum (izqu.) y de una especie que produce hifóforos cilatiformes (der.). En la fasa a, el material está seco; en fase b, fue humedecido (mas detalles en el texto). cm = masa conidial. Sin considerar proporciones.

Figs. 3-5, p. 278 (continued)

Abb. 3-5. Gyalectidium eskuchei, Holotypus

3. Transversaler Schnitt durch einen fast reifen Hyphophor. Die dunkle obere Zone ist die obere Rinde der Struktur. Die Konidialmasse ist deutlich darunter zu sehen. Das Blatt, auf welchem die Flechte wuchs, ist entfernt worden. Die Konidialmasse ist an ihrer schwächsten, der unteren Seite angeschwollen. Die Rinde ist am rechten Rande aufgebrochen und erlaubt den Austritt der Konidialmasse.
4. dasselbe wie 3.
5. Algen-Aplanosporen in einer sehr frühen Phase der Hyphophorenbildung.

Fig. 3-5. Gyalectidium eskuchei, holotypus

3. Corte transversal por un hifóforo casi maduro. La zona superior oscura es la corteza superior de la estructura. Debajo de ella se ve claramente la masa conidial. La hoja hospedante del liquen fue removida. La masa conidial se hinchó en su lado mas débil, el inferior. La corteza se quebró en el borde derecho facilitando la salida de la masa conidial.
4. igual a 3.
5. aplanósporas algales en una fase muy temprana de la formación de hifóforos.

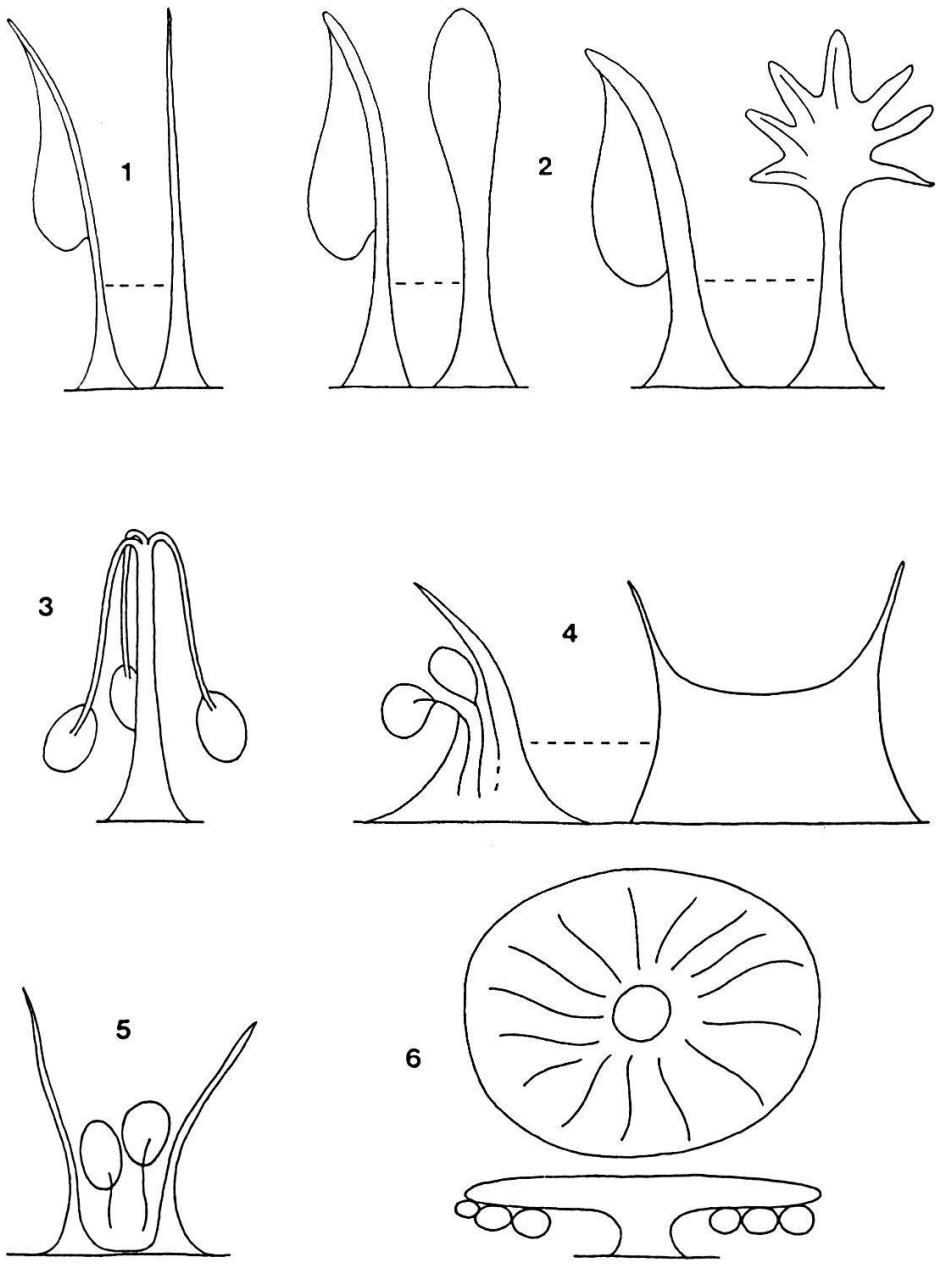


Fig. 7. Morphological types of hyphophores
1 = cilia-hyphophores, 2 = spathella hyphophores, 3 = roundabout hyphophores, 4 = scale-hyphophores, 5 = star-hyphophores, 6 = umbrella-hyphophores. Proportions not respected.

Abb. 7. Hyphophoren-Typen
1 = Zilien-Hyphophor, 2 = spatelförmiger Hyphophor, 3 = karussellförmiger Hyphophor, 4 = schuppenförmiger Hyphophor, 5 = sternförmiger Hyphophor, 6 = schirmförmiger Hyphophor. Die natürlichen Proportionen wurden nicht berücksichtigt.

Fig. 7. Tipos de hifóforos
1 = hifóforos ciliatiformes, 2 = hifóforos espatuliformes, 3 = hifóforos radiales, 4 = hifóforos escuamiformes, 5 = hifóforos estrellados, 6 = hifóforos peltados. Sin considerar proporciones.

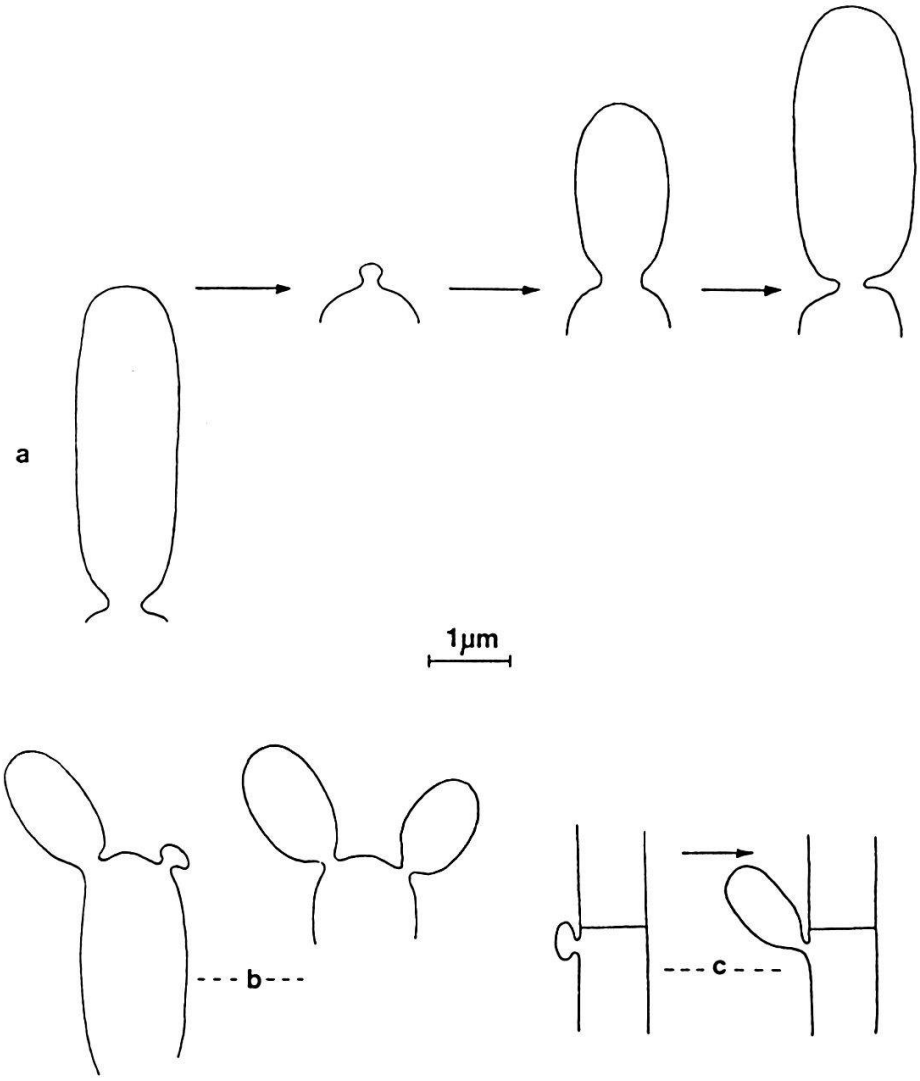


Fig. 8. Conidial development in Tricharia armata and the four foliicolous species of Gyalectidium.
a = typical conidial development with replacement of wall-building apex at one locus, b = ibid., but replacement at two loci, leading to a branching of the conidia chain, c = lateral conidial development.

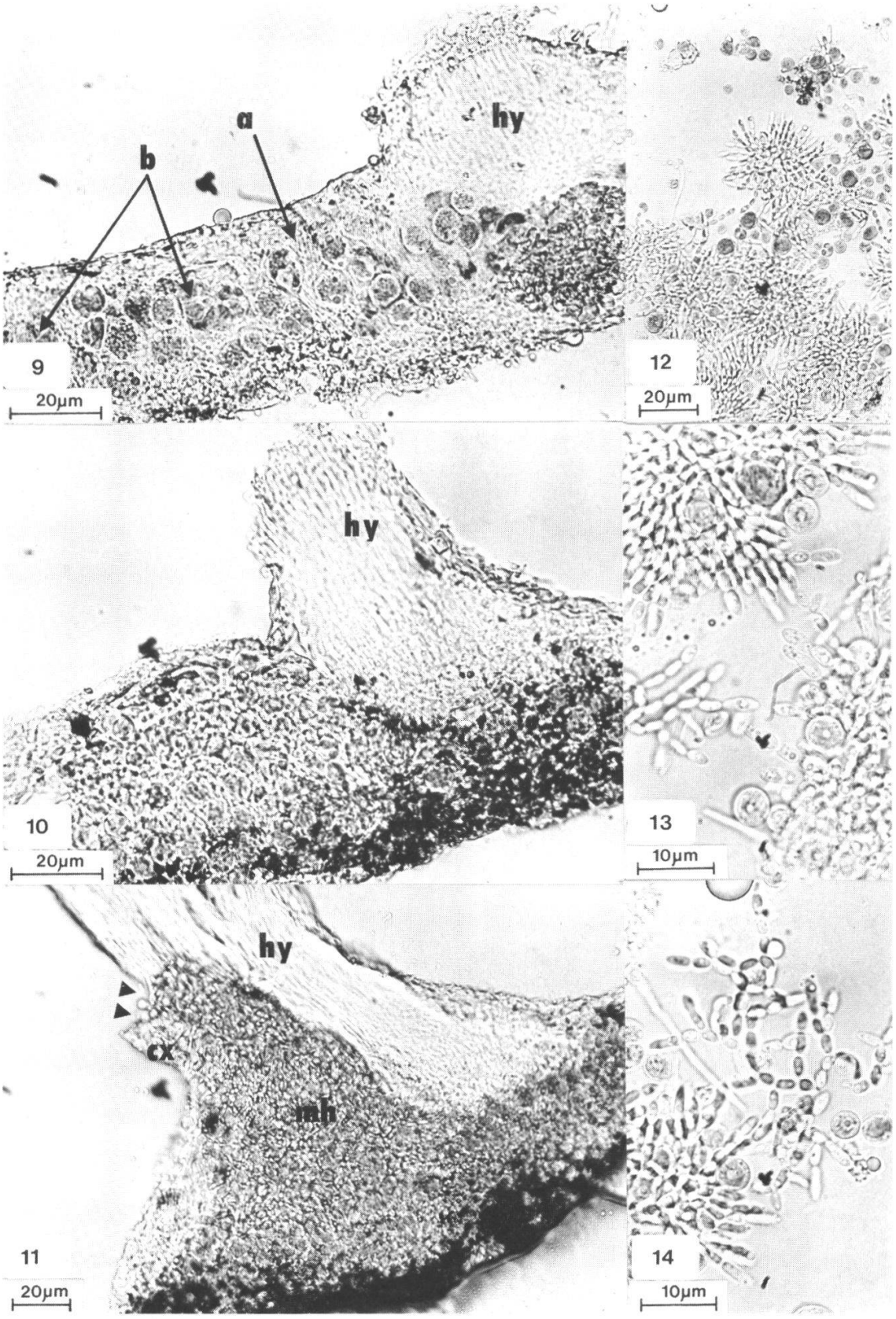
Abb. 8. Konidien-Entwicklung von Tricharia armata und den vier blattbewohnenden Gyalectidium-Arten.
a = typische Konidien-Entwicklung mit Ersatz der wandbildenden Spitze an einer Stelle, b = dasselbe aber Ersatz an zwei Stellen, was zur Verzweigung der Konidienkette führt, c = seitliche Konidienbildung.

Fig. 8. Desarrollo de conidios en Tricharia armata y en las cuatro especies foliícolas de Gyalectidium.
a = desarrollo típico con sustitución del ápice generador de pared en un locus, b = idem, pero sustitucion en dos loci, produciendo una ramificación de la cadena de conidios, c = desarrollo lateral de los conidios.

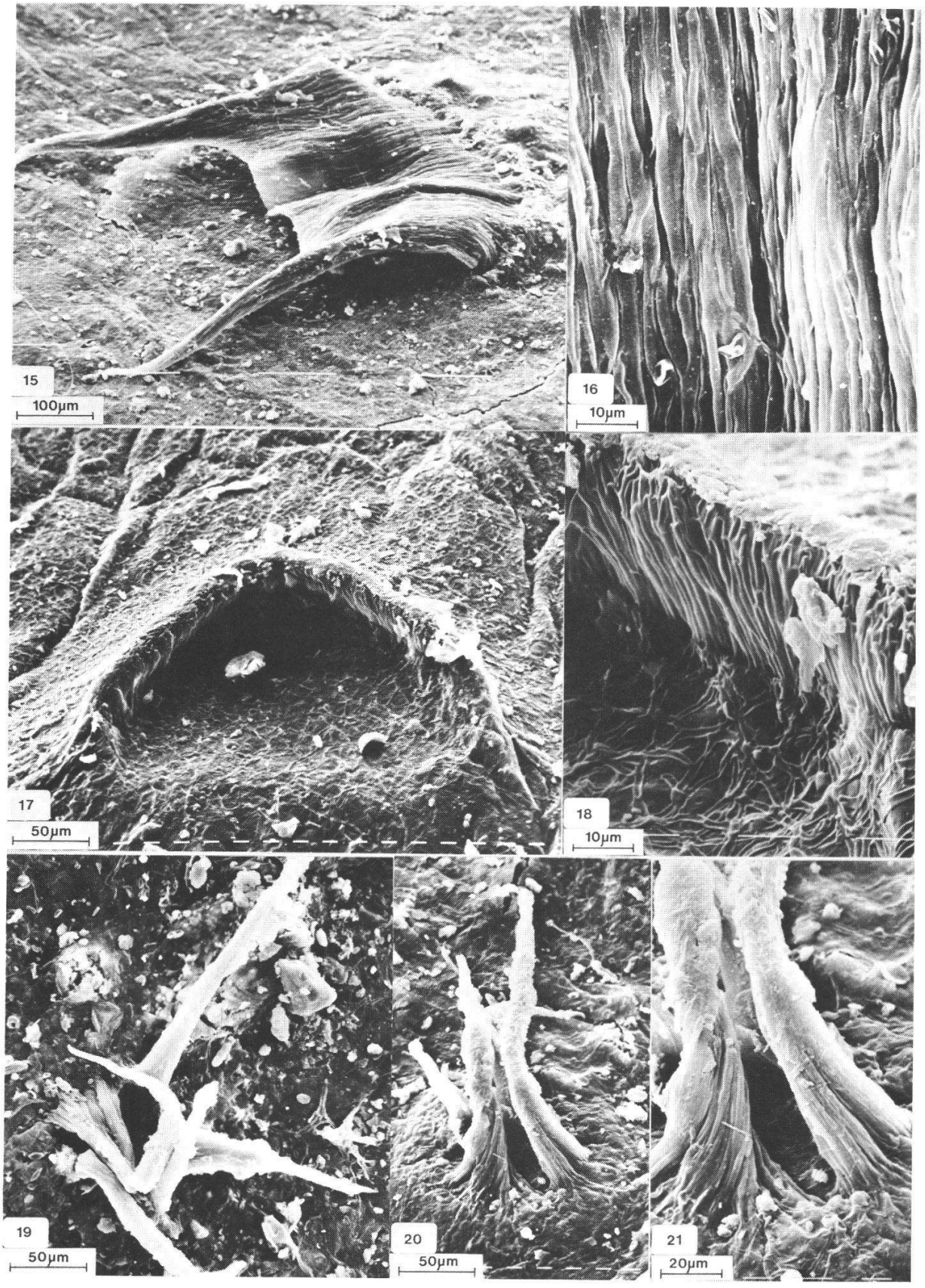
Figs. 9-14. Gyalectidium filicinum (Argentina, El Rey, J.R. de Sloover).
9-11. Cross sections through immature hyphophores showing the development sequence. Note in fig. 9 that, at this early stage of development, the hyphae in the thallus are anticlinally arranged (arrow a) and that the algae are producing aplanospores (arrow b). In fig. 11, the arrows indicate the split between the hyphophore and the corticiform layer which will be used by the conidial mass to escape from the structure.
12-14. Detail views of the conidial mass, including algae and conidia-chains = moniliform hyphae.
cx = cortical layer; mh = mass of moniliform hyphae entangled with algae; hy = vegetative part of the hyphophore.

Abb. 9-14. Gyalectidium filicinum (Argentina, El Rey, J.R. de Sloover).
9-11. Transversale Schnitte von unreifen Hyphophoren, welche den Entwicklungsgang zeigen. Man beachte in Abb. 9, dass die Thallushyphen in diesem frühen Entwicklungszustand antiklinal angeordnet sind (Pfeil a) und dass die Algen Aplanosporen bilden (Pfeil b). In Abb. 11 zeigen die Pfeile auf den Spalt zwischen Hyphophor und Rindenschicht, welcher den Austritt der Konidialmasse ermöglicht.
12-14. Detailansicht der Konidialmasse mit Algen und Konidienketten, die als moniliforme Hyphen erscheinen.
cx = Rindenschicht; mh = Masse moniliformer Hyphen, mit Algen vermengt; hy = vegetativer Teil des Hyphophor.

Fig. 9-14. Gyalectidium filicinum (Argentina, El Rey, J.R. de Sloover).
9-11. Secuencia de cortes transversales por hifóforos inmaduros mostrando su desarrollo. Observe en fig. 9 que en esta fase temprana de desarrollo las hifas del talo se encuentran en posicion anticlinal (flecha a) y que las algas estan produciendo aplanósporas (flecha b). En fig. 11, las flechas indican la hendidura entre el hifóforo y la capa cortical, por la cual saldrá la masa conidial.
12-14. Vistas en detalle de la masa conidial consistente de algas y cadenas de conidios que aparecen como hifas moniliformes.
cx = capa cortical; mh = masa de hifas moniliformes entremezcladas con algas; hy = parte vegetativa del hifóforo.



Figs. 9-14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Figs. 15-21 (p. 284)

Figs. 15-18. Gyalectidium filicinum (Argentina, El Rey, J.R. de Sloover; and Argentina, Krapovickas 36752).
15. View of a mature hyphophore. The horizontal position of the structure is due to herbarium pressing of the leaves on which the lichen grows.
16. Closer view of the outer parts of the same hyphophore than fig. 15.
17. Young hyphophore.
18. Closer view of the inner part of a young hyphophore, showing the corticiform layer and the upright fascicle of hyphae of the hyphophore.

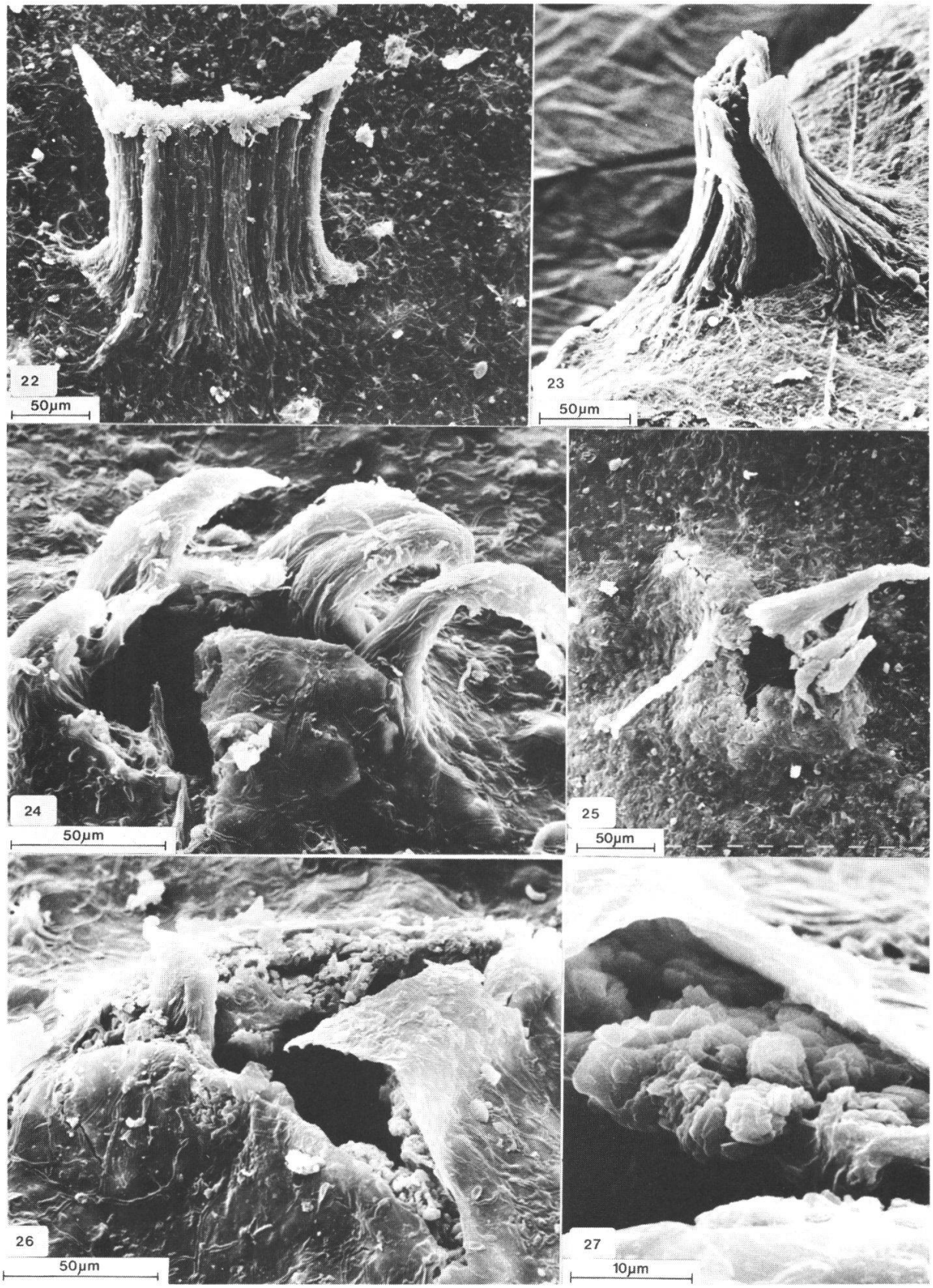
Abb. 15-18. Gyalectidium filicinum (Argentina, El Rey, J.R. de Sloover; und Argentina, Krapovickas 36752).
15. Reifer Hyphophor; die horizontale Lage der Struktur wurde durch das Pressen der Blätter, auf welchen die Flechte wächst, verursacht.
16. Aeussere Teile desselben Hyphophors wie in Abb. 15 bei stärkerer Vergrösserung.
17. Junger Hyphophor.
18. Das Innere eines jungen Hyphophors, die Rindenschicht und die aufrechten Hyphenbündel des Hyphophors zeigend.

Fig. 15-18. Gyalectidium filicinum (Argentina, El Rey, J.R. de Sloover; y Argentina, Krapovickas 36752).
15. Vista de un hifóforo maduro. La posición horizontal de la estructura se debe al prensado de las hojas hospedantes.
16. Vista mas aproximada de las partes exteriores del mismo hifoforo que en fig. 15.
17. Hifoforo joven.
18. Vista mas aproximada de la parte interior de un hifóforo jóven, mostrando la capa cortical y el fasciculo erecto de hifas del hifóforo.

Figs. 19-21. Mature hyphophores of Gyalectidium eskuchei (Argentina, Arbo 2387). Fig. 21 is a detail view of fig. 20.
No conidial masses are seen in these pictures.

Abb. 19-21. Reife Hyphophoren von Gyalectidium eskuchei (Argentina, Arbo 2387). Abb. 21 gibt eine Detailansicht von Abb. 20 wieder.
In diesen Bildern sind keine Konidialmassen zu sehen.

Fig. 19-21. Hifóforos maduros de Gyalectidium eskuchei (Argentina, Arbo 2387). Fig. 21 es una vista detallada de fig. 20.
En estas figuras no se observan masas conidiales.



Figs. 22-27

Figs. 22-27 (p. 286)

Figs. 22-23. Gyalectidium colchicum, isotype.
22. Mature hyphophore as seen from behind.
23. Immature hyphophore.

Abb. 22-23. Gyalectidium colchicum, Isotypus.
22. Reifer Hyphophor von hinten gesehen.
23. Unreifer Hyphophor.

Fig. 22-23. Gyalectidium colchicum, isotypus.
22. Hifóforo maduro visto desde atrás.
23. Hifóforo inmaduro.

Figs. 24-27. Gyalectidium caucasicum (U.R.S.S., Vežda 13.6.1978).
24-26. Aspects of mature hyphophores.
27. Details of fig. 26, showing the collapsed conidia chains underneath the scale-shaped hyphophore.

Abb. 24-27. Gyalectidium caucasicum (U.R.S.S., Vežda 13.6.1978).
24-26. Reife Hyphophoren.
27. Einzelheiten von Abb. 26, die erschlafften Konidienketten unter dem schirmförmigen Hyphophor zeigend.

Fig. 24-27. Gyalectidium caucasicum (U.R.S.S.) Vežda 13.6.1978).
24-26. Vistas de hifóforos maduros.
27. Detalles de fig. 26, mostrando las cadenas de conidios desmoronadas debajo del hifóforo escuamiforme.

Fig. 28 (p. 288). Gyalectidium filicinum. Schematic drawing of hyphophore development.
Arrows within the figures indicate the direction of growth.
cx = cortical layer; al = algae in the vegetative thallus; cm = conidial masses (including conidia chains, conidiogenous cells and algal aplanospores); hy = vegetative part of the hyphophore; twh = thick walled hyphae raising up the conidial masses; di = diaspores (small conidia-chains entangled with algal aplanospores).

Abb. 28 (S. 288). Gyalectidium filicinum. Schema der Hyphophoren-Entwicklung.
Die Pfeile in den Abbildungen zeigen die Wuchsrichtung an.
cx = Rindenschicht; al = Algen im vegetativen Thallus; cm = Konidialmassen (einschliesslich Konidienketten, konidienbildenden Zellen und Algen-Aplanosporen); hy = vegetativer Teil eines Hyphophors; twh = dickwandige Hyphe, die Konidialmassen emporhebend; di = Diasporen (kleine Konidienketten, mit Algen-Aplanosporen verstrickt).

Fig. 28 (p. 288). Gyalectidium filicinum. Esbozo del desarrollo de los hifóforos.
Las flechas en las figuras indican la direccion del crecimiento.
cx = capa cortical; al = algas del talo vegetativo; cm = masas conidiales (incl. cadenas de conidios, células conidiógenas y aplanósporas algales); hy = parte vegetativa del hifóforo; twh = hifas con paredes gruesas que elevan las masas conidiales; di = diásporas (pequenas cadenas de conidios entremezcladas con aplanósporas algales).

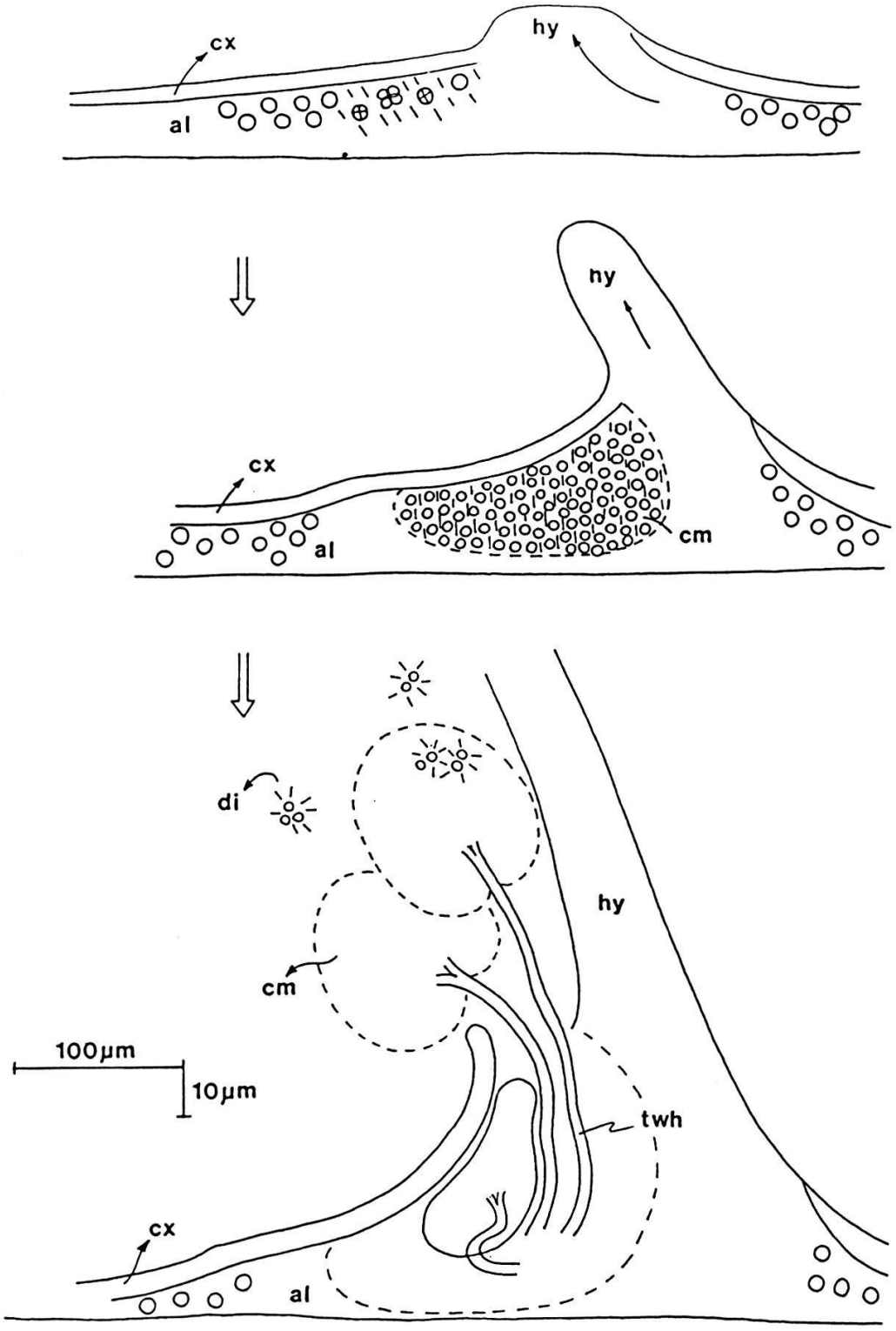


Fig. 28

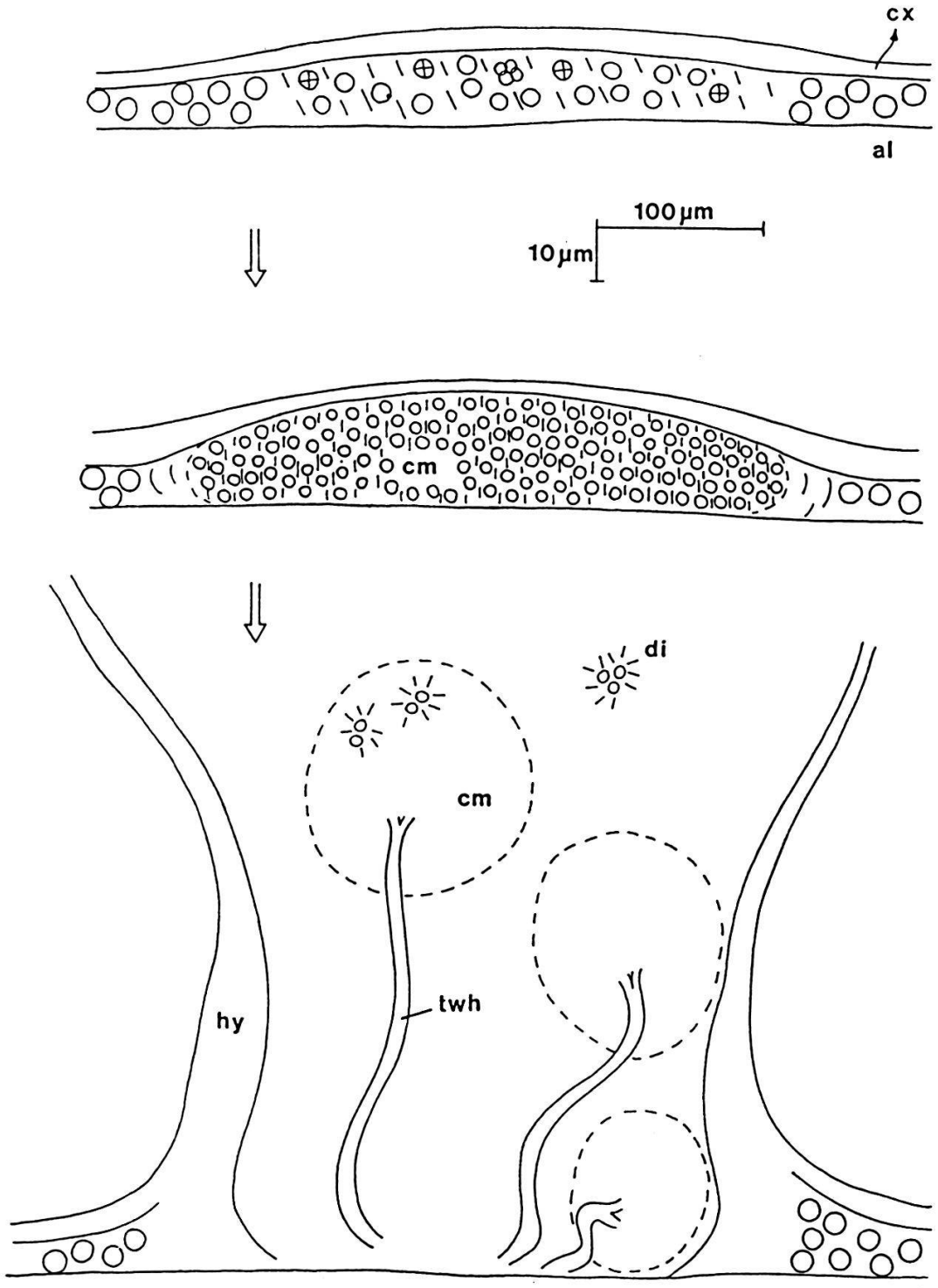


Fig. 29. Gyalectidium eskuchei. Schematic drawing of hyphophore development.
Abbreviations as in fig. 28.

Abb. 29. Gyalectidium eskuchei. Schema der Hyphophoren-Entwicklung.
Zeichen wie in Abb. 28.

Fig. 29. Gyalectidium eskuchei. Esbozo del desarrollo de los hifóforos.
Signos como en fig. 28.

SUMMARY

Twenty-five species of foliicolous lichens, plus two parasitic fungi, are reported from northern Argentina. The collections were made along an east-west transect from Iguazú to the eastern slopes of the Andean mountains. The foliicolous lichen flora of the forests studied varied considerably, only three species being common to all sites. Heavy rainfall and the absence of a dry season appear to be the most important requirements for the development of a rich foliicolous flora in this region.
One species is described as new: Gyalectidium eskuchei Sérusiaux sp. nov., and one new combination is made: Asterothyrium rotuliforme (Müll. Arg.) Sérusiaux comb. nov.
Hyphophores are highly specialized conidia-producing structures of several genera in the Asterothyriaceae. They are shown to be different from synnemata. The development of conidia is studied in five species (Gyalectidium ssp. and Tricharia armata) following the terminology of MINTER et al. (1982, 1983) and the development of hyphophores is described for the four foliicolous species of Gyalectidium.

ZUSAMMENFASSUNG

Aus Nordargentinien werden 25 epiphylle Flechten und zwei parasitische Pilze genannt. Sie wurden entlang eines Ost-West Transektes von Iguazú zu den östlichen Hängen der Anden gesammelt. Die epiphylle Flechtenflora der untersuchten Wälder ist sehr variabel, nur drei Arten sind allen gemeinsam. Die hohen Niederschläge und die Abwesenheit einer Trockenperiode scheinen die wichtigsten Anforderungen für die Entwicklung einer reichen epiphyllen Flora im Gebiet zu sein.
Eine neue Art, Gyalectidium eskuchei Sérusiaux sp. nov., ist beschrieben und eine Neu-Kombination, Asterothyrium rotuliforme (Müll. Arg.) Sérusiaux comb. nov., vorgeschlagen.
Die Hyphophoren sind bei mehreren Gattungen vorkommende hochspezialisierte konidienbildende Strukturen. Die Unterschiede zu den Synnemata werden dargestellt. Die Entwicklung der Konidien wird bei fünf Arten (Gyalectidium ssp. und Tricharia armata) nach der Terminologie von MINTER et al. (1982, 1983) beschrieben, die Entwicklung der Hyphophoren bei vier epiphyllen Arten von Gyalectidium.

RESUMEN

Veinte cinco especies de líquenes foliícolas y dos hongos parasíticos fueron reportados de la Argentina septentrional. Las colecciones fueron hechas siguiendo un trajecto este-oeste desde Iguazú hasta las cuestas orientales de las sierras andinas. Dentro de los bosques estudiados la flora de líquenes foliícolas cambia considerablemente, siendo trés especies solamente comunes a todos los sitios. Abundantes precipitaciones y ausencia de una estación de sequía parecen ser las exigencias mas importantes para el desarrollo de una flora foliícola rica en esta región.
Se describe una nueva especie: Gyalectidium eskuchei Sérusiaux sp. nov., y se hace una nueva combinación Asterothyrium rotuliforme (Müll. Arg.) Sérusiaux comb. nov.
Hifóforos son estructuras altamente especializadas en la produccion de conidios dentro de los generos de Asterothyriaceae. Se demuestra que estos difieren de los synnemata. El desarrollo de conidios se estudió en

cinco especies (Gyalectidium ssp. y Tricharia armata) siguiendo la terminología de MINTER et al. (1982, 1983). Además, se describe el desarrollo de hifóforos en los quatro especies foliícolas de Gyalectidium.

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Address of the authors: Dr. E. Sérusiaux
Institut de Botanique
Sart Tilman
B-4000 Liège, Belgique

Prof. J.R. de Sloover
Unité d'Ecologie et de Biogéographie
4-5, Place Croix du Sud
B-1348 Louvain-la-Neuve, Belgique