

## New taxa of foliicolous lichens from Western Europe and Macaronesia

Emmanuel Sérusiaux

Sérusiaux, E. 1993. New taxa of foliicolous lichens from Western Europe and Macaronesia. – Nord. J. Bot. 13: 447–461. Copenhagen. ISSN 0107-055X.

One genus and four species of foliicolous lichens are described as new from Western Europe and Macaronesia: *Bapalmuia*, *B. kakouettae*, *Byssoloma aptrootii*, *Gyalectidium setiferum*, and *Scoliciosporum curvatum*. The following combinations are introduced: *Bapalmuia marginalis*, *B. palmularis*, *B. rubicunda*, *Byssoloma lambinonii*, and *Fellhanera michaeliana*.

E. Sérusiaux, Dept. Botany, University of Liège, Sart Tilman, B-4000 Liège, Belgium.

### Introduction

In his outstanding revision of the taxonomy of foliicolous lichens, Santesson (1952) mentioned only seven species in continental Europe (*Strigula smaragdula* Fr.:Fr., *Porina hoehneliana* (Jaap) R. Sant., *P. oxneri* R. Sant., *Gyalectidium caucasicum* (Elenk. & Woronichin) Vězda (mentioned as *G. filicinum* Müll. Arg.), *Fellhanera bouteillei* (Desm.) Vězda, *Byssoloma subdiscordans* (Nyl.) P. James and *B. leucoblepharum* (Nyl.) Vainio). He added reports of a six further species from Macaronesia: *Strigula nitidula* Mont., *Porina leptosperma* Müll. Arg., *P. semecarpi* Vainio, *Dimerella lutea* (Dicks.) Trevisan, *Bacidina apiahica* (Müll. Arg.) Vězda and *Tapellaria epiphylla* (Müll. Arg.) R. Sant., mainly from Madeira. If one excepts the species growing on *Abies* and *Picea* needles and twigs, foliicolous species in Western continental Europe are according to Santesson restricted to two sites, one south of Lac Léman in France and the other in Croatia. It was then admitted that those species are a curiosity in Europe and not an important feature of the European lichen flora. Nobody paid attention to them for twenty years.

That simple assertion was weakened when Vězda & Vivant (1972) were able to report eight species (including a new one) from the Western Pyrenees in

France and when several colleagues brought to my attention a few collections from France that yielded interesting data (De Foucault et al. 1982; De Sloover & Sérusiaux 1984).

The obvious easiness to find foliicolous taxa in common habitats in France really puzzled me. I then decided to explore thoroughly the suitable localities in Western Europe (mainly the gorges with *Buxus sempervirens*) and in Macaronesia (mainly the laurisylva). Several forays were undertaken during the last six years and the results are astonishing: foliicolous lichens are represented by more than twenty species in continental Europe and even more in Macaronesia. Several are widespread and can be found in large quantities, even in artificial habitats. In Navarra (Spain) for example, *Porina hoehneliana* grows exuberantly on leaves and twigs of *Buxus* in a meticulously clipped hedge in a garden.

A detailed account of the taxonomy and ecogeography of the encountered species is being prepared and should appear in the forthcoming months. This preliminary paper, dealing with four new species, is however necessary as their names have been spread amongst colleagues and are being used by some of them.

Accepted 2-12-1992

© NORDIC JOURNAL OF BOTANY

NORD. J. BOT. 13: 447–461



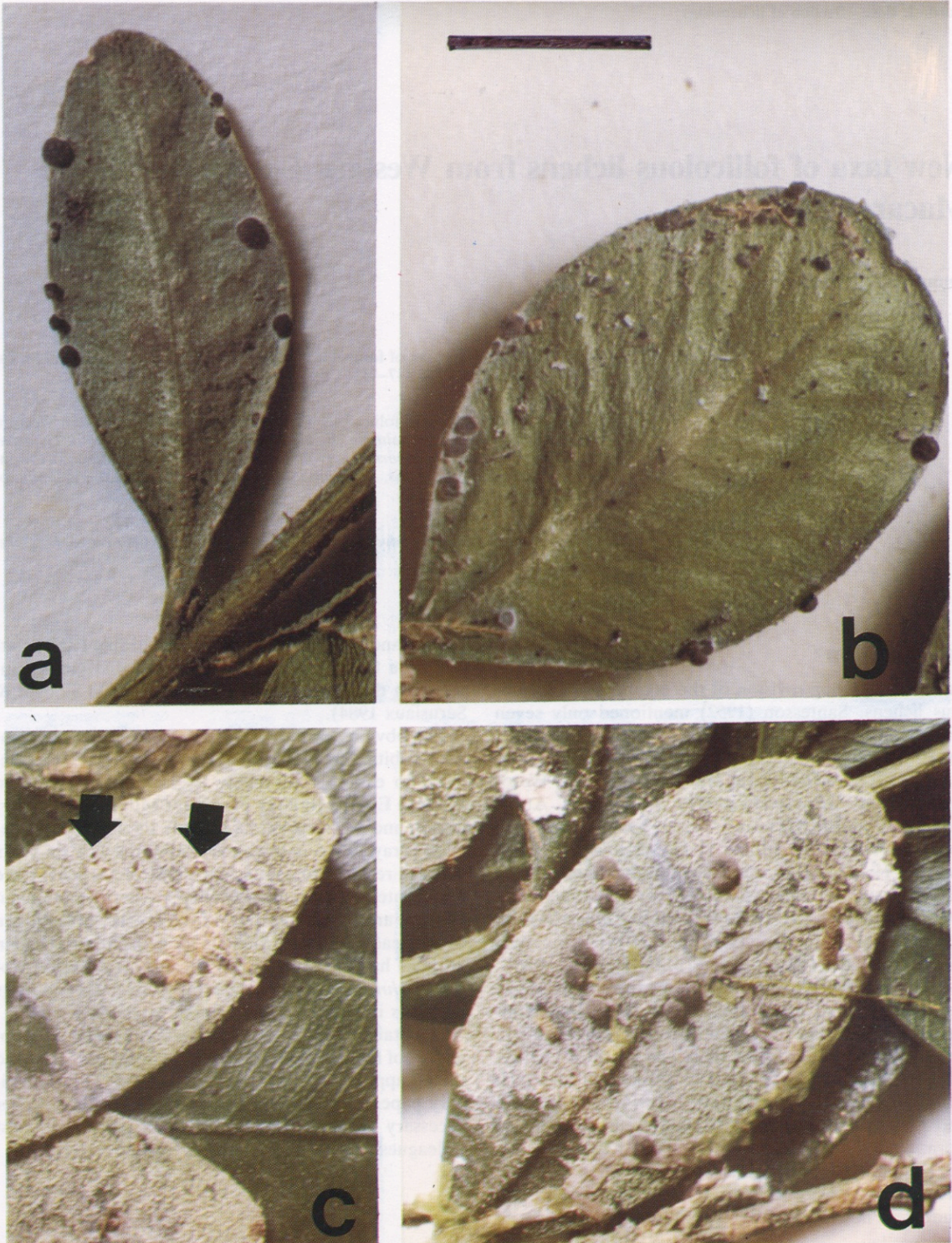


Fig. 1. *Bapalmuia kakouettae*. – a & b: typical position of the apothecia on the under edge of a *Buxus* leaf. – c & d: exuberant specimen with apothecia on the upper side of a *Buxus* leaf. Arrows point to pycnidia. – (Type collection). Scale = 0.5 cm.



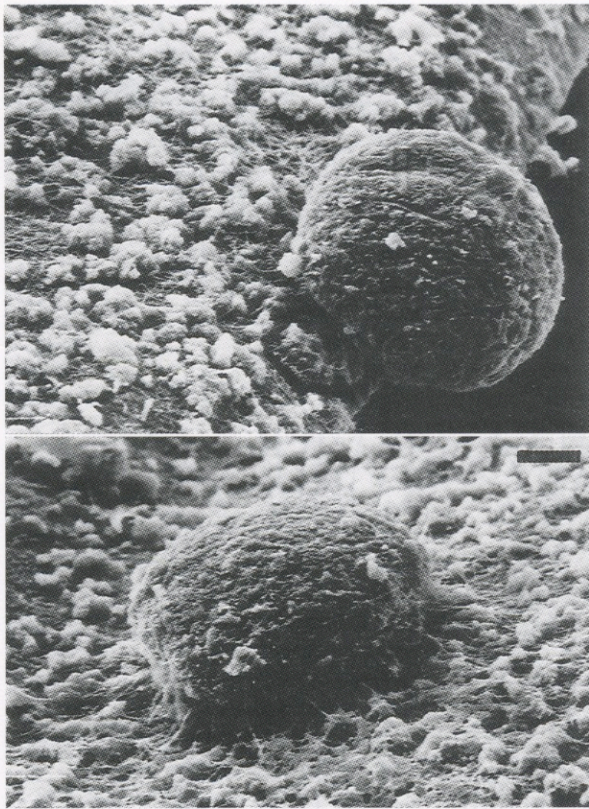


Fig. 2. *Bapalmuia kakouettae*. SCAN photographs of the farinose thallus and of mature apothecia; hyphae anchoring the apothecium to the thallus are seen in the underneath photograph. – Scale = 0.1 mm. (Type collection).

### *Bapalmuia* Sérusiaux gen. nov.

Ascomycetes lichenisati thallo crustaceo algas chlorococcales continentis. Apothecia sessilia, basin arcte constricta, matura discis convexis et sine margine, affixa ad thallum cum hyalinis hyphis. Excipulum paraplectenchymaticum, paraphyses simplices, asci 8-sporei, tholis amyloideis sed sine manifesta structura, sporae filiformes ad cylindricas, multiseptatae.

Typus: *B. palmularis* (Müll. Arg.) Sérusiaux (Bas.: *Patellaria palmularis* Müll. Arg.).

### *Bapalmuia kakouettae* Sérusiaux sp. nov.

*Bapalmuia* species insignis sporis 12–14 (–16) septatis, attingentibus 40–60  $\mu\text{m}$  pro longitudine et conidiis clavatis ad bifusiformibus. – Figs. 1–3.

Type: France, Dép. Pyrénées-Atlantiques, gorges de Kakouetta (SE de Tardets-Sorholus), alt. 400 m, buxaie humide sur le flanc droit de la vallée, sur *Buxus*, 7. 1985, coll. Sérusiaux n° 7703 (LG-holotype; isotype-herb. Lücking).

Thallus leprose to farinose, never shiny nor smooth, rarely continuous and then cracked, sometimes invading the whole upper side of the leaf on which it grows, rarely on twigs, green to pale green or whitish, made of small greenish granules. Granules 50–80  $\mu\text{m}$  diam., composed of spherical green algal cells, 5–10 (–12)  $\mu\text{m}$  diam., surrounded by hyphae (fungal cells, elongated or circular, tightly appressed around the algae).

Apothecia usually present, mainly at the margins of the leaf and preferring the underedge of it where they grow on an unlichenized mycelium, also present on the lichenized thallus of the upper side of the leaf when abundant, rounded, rarely contiguous and never aggregated, 0.4–0.5 (–0.7) mm diam., with a very strongly constricted basis; disc colour ranging from brown-grey to violaceous brown, sometimes almost black, usually with a bluish tinge; young apothecia with a flat disc and a distinctive, paler than the disc and rather livid margin; mature apothecia strongly convex without any margin; apothecia anchored to the thallus or to the free-living mycelium with white hyphae (always visible except in very old apothecia).

Excipulum always present, +/- paraplectenchymatous under the hypothecium but formed of polyhedral or rectangular cells at the margins, brownish at its margins, 60–80  $\mu\text{m}$  in lateral parts, 100–110  $\mu\text{m}$  in basal parts, cut across in basal parts by almost hyaline hyphae joining the apothecia to the thallus or to the unlichenized mycelium; hypothecium brownish, K+ purple-brown to purple, reaching 160  $\mu\text{m}$  in height in old apothecia; paraphyses abundant, simple or slightly furcate, 1.5–2  $\mu\text{m}$  thick, slightly and irregularly inflated at apices, very coherent (hymenial gel dissolving only in a 10% KOH water solution). Asci 80–120  $\mu\text{m}$  long, clavate to cylindrical, with or without an ocular chamber, with a tholus deeply I+ blue but without any distinct structure in it (i.e. no "masse axiale", nor "Röhrenstruktur"; a somewhat darker cap is usually seen on the top of the ascus inner layer). Spores 6–8 per ascus, filiform to cylindrical, only slightly tapering towards one end, with obtuse ends, 12–14 (–16) septate, 40–60  $\times$  2.5–3.5  $\mu\text{m}$ , sometimes breaking into several pieces when ejected out of the asci during microscopical manipulations, without halo.

Pycnidia always present on the upper side of the leaf but never abundant, flask-shaped, usually with hyaline short hairs on their outer walls, blackish blue, less than 0.1 mm diam., with an apical ostiole which is sometimes full of a conidial mass; conidia clavate to bifusiform, 3–4  $\times$  1–1.5  $\mu\text{m}$ .

Photobiont: spherical green cells, 5–12  $\mu\text{m}$  in diam., probably belonging to the Chlorococcaceae. – Figs. 1–3.

*Taxonomic remarks.* *Bapalmuia kakouettae* is easily separated from all other bacidioid species present in Europe by a clear-cut combination of characters: ascus-type, conidia and spores size and septation. It belongs to a small group of foliicolous taxa (the *Bacidia palmu-*



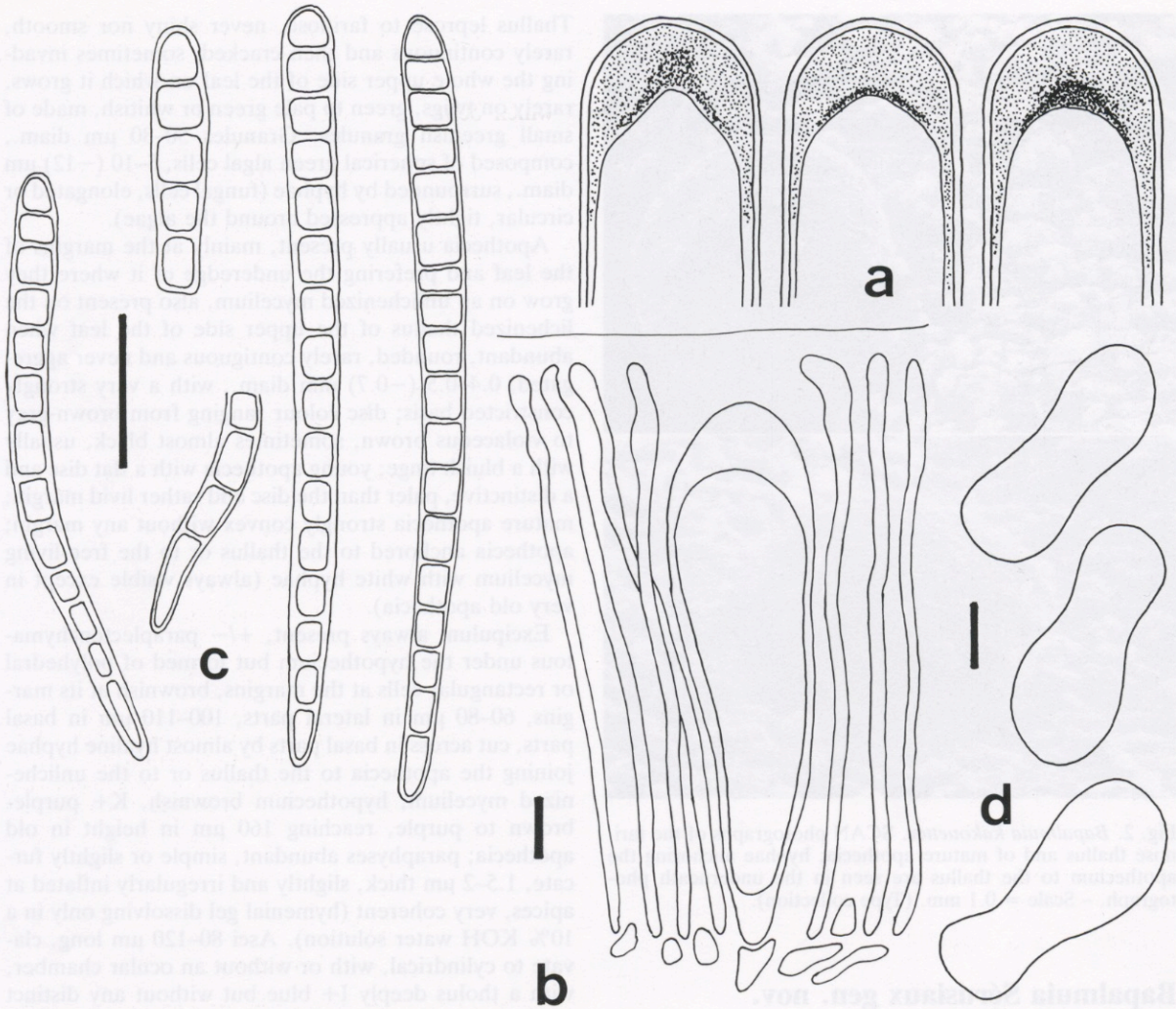


Fig. 3. *Bacpalmya kakouettae*. – a: ascus tip after treatment with I (schematic). – b: immature ascus with paraphyses. Scale = 10  $\mu$ m. – c: spores. Scale = 10  $\mu$ m. – d: conidia. Scale = 1  $\mu$ m. – (Type collection).

*laris* group) that is here recognized as a separate genus. The following characters are diagnostic for it: apothecia anchored to the thallus by hyaline hyphae protruding out of a +/- paraplectenchymatous excipulum, ascus with an I+ blue tholus but without any distinct structure in it (no "masse axiale", nor "Röhrenstruktur"), hypothecium at least 120  $\mu$ m high or much more, simple and coherent paraphyses, hardly thickened at the apices, long, multiseptate filiform spores with obtuse ends, and small conidia.

This group includes (i) *Bacidia marginalis* (Vainio) R. Sant., known from Sumatra and the Philippines and easily recognized by its cylindrical apothecia reaching 0.6–1.0 mm in height (the apothecia are vertically elongated without any real stalk; see Santesson 1952: 445–448) and its spores with 70–110 septa reaching 320–510

$\times$  2–2.5  $\mu$ m; (ii) *Bacidia palmularis* (Müll. Arg.) Zahlbr., a pantropical species with normal-sized apothecia and with 25–30-septate spore reaching 90–120  $\times$  2–2.5  $\mu$ m; (iii) *Bacidia rubicunda* (Müll. Arg.) Zahlbr., known only from the type-locality in Brazil and hardly distinct from the former (see Santesson 1952: 449 for more details).

*B. palmularis* has been examined by Vězda (1987: 81–82) in his study of *Byssoloma* in Zaïre; that author concludes it is different from that genus and that its systematic position is still unclear.

The bacidioid lichens are still poorly known, mainly in the Tropics; in spite of recent studies (Vězda 1986; Brako 1989; Hafellner & Vězda 1992) and creation of new genera (*Auriculora* Kalb, *Bacidiospora* Kalb, *Bacidia* Vězda, *Bacidina* Vězda, *Barubria* Vězda, *Loflam-*



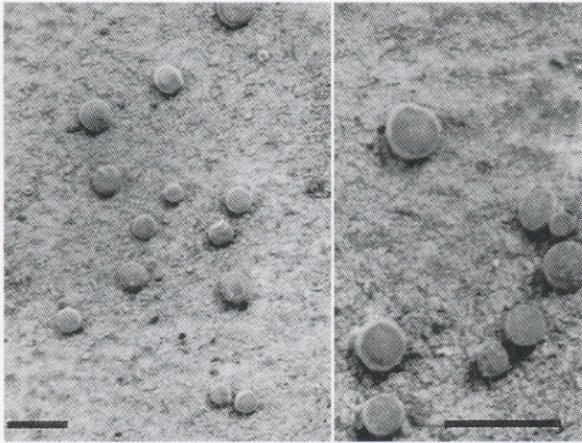


Fig. 4. *Byssoloma aptrootii*. General habit. Scale = 1 mm. (Type collection).

*mia* Vězda, *Fellhanera* Vězda, *Squamacidia* Brako, *Tibellia* Vězda & Hafellner, ...), much work remain to be done. Tab. 1 compares *Bacidia* de Not. s.str. to recently segregated genera; albeit the relationships between all those genera remain to be clarified, it is wiser to recognize the *Bacidia palmularis* group at the generic level instead of extending the heterogeneity of *Bacidia* de Not. As none of the recently described genera is suitable to accommodate that group, a new genus is described. Its name is a contraction of *Bacidia* and *palmularis*.

The following combinations are thus necessary:

***Bapalmuia marginalis* (Vainio) Sérusiaux comb. nov.**

Bas.: *Helotiopsis marginalis* Vainio, Ann. Acad. Sci. Fenn. Ser. A, 15: 151, 1921.

***Bapalmuia palmularis* (Müll. Arg.) Sérusiaux comb. nov.**

Bas.: *Patellaria palmularis* Müll. Arg., Lichenes epiphylli novi (Genève): 10, 1890.

***Bapalmuia rubicunda* (Müll. Arg.) Sérusiaux, comb. nov.**

Bas.: *Patellaria rubicunda* Müll. Arg., Lichenes epiphylli novi (Genève): 10, 1890.

No doubt that these species form an homogeneous group (including for its mode of growth; see next paragraph); the shape of conidia however brings in a little variation as they are strongly clavate to bifusiform in *B. kakouettae* and ellipsoid to slightly bifusiform in *B. palmularis*. This of course is acceptable within a genus.

The present status of truly foliicolous bacidioid species is summarized in Tab. 2.

**Ecology and distribution.** *Bapalmuia kakouettae* is known only from two localities in SW France, on the northern edge of the Pyrenees, the most important of which being the Kakouetta gorges. It was not found elsewhere and the very large collections of foliicolous lichens from Macaronesia which I have studied did not yield a single specimen of it. It grows on *Buxus* leaves and twigs and enjoys the margins of the leaves where many apothecia can be found growing on an unlichenized mycelium just on the leaf margin or on its underedge. A lichenized thallus is nevertheless present on the upperside of the leaves: pycnidia are always localized on that side and when abundant, apothecia can also occur there. This mode of growth (lichenized sterile thallus on the upper side and non lichenized fertile thallus on the underedge of the leaf) is shared with other species referred to *Bapalmuia* in this paper and with other unrelated taxa such as *Dimerella fallaciosa* (Müll. Arg.) Vězda. *Bapalmuia kakouettae* is the only species to prefer that peculiar niche amongst European species of foliicolous lichens. It is quite rare in both localities; it apparently requires a long ecological stability of its habitat and is not able to spread easily, even in highly suitable sites like the gorges of Kakouetta.

**Specimens examined other than type.** Same locality as the type, 7. 1989, coll. James, Rose, Vivant & Sérusiaux s.n. (LG). Ibid., au S de Oloron-Ste-Marie, Lurbe-St-Christau, vers Issor, à 0,5–1,5 km après Lurbe, berge du Gave de Lourdios, sur *Buxus*, 7.1990, coll. Diederich 9407, 9410 & 9416 (herb. Diederich, LG).

***Byssoloma* Trev.**

***Byssoloma aptrootii* Sérusiaux sp. nov.**

Foliicola *Byssoloma* species insignis excipulo ex hyphis radiantibus, elongatis et margine globosis formato et sporis 13–19 (–23) septatis, attingentibus 50–67 (–80) µm pro longitudine. – Figs. 4–5.

Type: Madère, route Ribeira Brava-São Vincente, un peu au N du col de Boca de Encumeada, alt. 800 m, laurisylve +/- dégradée le long d'une rivière, sur feuilles de *Ocotea foetens*, 2.1988, coll. Sérusiaux s.n. (LG-holotype; isotypes: BM, E, herb. Lücking, herb. Vězda).

Thallus greenish, rather pale, not shiny, usually continuous but sometimes very irregularly developed over the leaf surface or even reduced to a few granules near the apothecia, farinose, made of small granules, usually thin, becoming thick in old and well-preserved specimens, sometimes with a thin whitish prothallus. Granules 40–60 µm diam., made of spherical green cells, 6–10 µm diam., surrounded by hyphae.

Apothecia always present, abundant, regularly distributed, rounded, very rarely contiguous and never aggregated, 0.4–0.5 mm diam., 0.2–0.3 mm high; disc at



Tab. 1. Comparison between *Bacidia* s.str. and recently segregated genera.

	<i>Bacidia</i>	<i>Bapalmuia</i>	<i>Auriculora</i>	<i>Bacidiospora</i>
Thallus	granular or smooth	finely farinose	byssoid to granular	squamulose to minutely granular, corticate
Apothecia	–	anchored to the thallus with white hyphae protruding out of the excipulum	with lateral ear-like out-growths, due to repeated formation of new hymenia	–
Excipulum	made of coherent radiating hyphae usually with swollen cells on outer surface	± paraplectenchymatous with polyhedral cells at margins	made of coherent radiating hyphae	prosoplectenchymatous, made of coherent radiating hyphae
Ascus-type	<i>Bacidia</i> -type	Tholus I+ blue, without any structure	<i>Bacidia</i> -type	<i>Bacidia</i> -type
Paraphyses	simple, or slightly branched, slightly swollen at apices	simple and coherent, not thickened at apices	simple, hardly thickened at apices	simple, thickened at apices
Spores	long, filiform, tapering towards one end, multiseptate, without halo	long, filiform with obtuse ends, multiseptate, without halo	fusiform, 3-septate, without halo	acicular, multi-septate, without halo
Conidia	produced in pycnidia, filiform, curved, or sigmoid, thinly multiseptate	produced in pycnidia, clavate to ellipsoid, small	produced in pycnidia, bacilliform	–
Assigned to (family)	Bacidiaceae	?	?Bacidiaceae	Bacidiaceae

first plane becoming convex in mature specimens, very variable in colour, pale orange to dark brown, or olive or bluish green or blackish, sometimes with a piebald mixture of these colours, a single specimen can offer apothecia whose colours differ one from another; margin at first thick and slightly prominent, hardly distinct in old apothecia, usually paler than the disc, beige or olive or bluish grey or almost white, smooth or finely pulverulent and shortly byssoid in specimens growing in very humid localities.

Excipulum well-developed, 40–60 µm thick, made of radially arranged rows of elongated cells, that terminate in more globose, inflated cells, almost hyaline in cross sections; hypothecium 100–120 µm thick, orange brown, turning slightly purple in K; hymenium hyaline, 100–120 µm thick; paraphyses rather abundant, simple or rarely furcate, 1–1.5 µm thick, with irregularly inflated apices; asci clavate of the *Byssoloma*-type (sensu Hafellner 1984: 315); spores 8 per ascus, fusiform to cylindrical, sometimes distinctly tapering towards one end, easily breaking into several pieces during microscopical examinations, 13–19 (–23) septate, 50–67

(–80) × 4–6 µm, slightly constricted at the septa when mounted in a 10% KOH solution.

Pycnidia rare to abundant, flask-shaped, very pale orange or bluish, 0.1–0.15 µm diam., with an apical ostiole; conidia bifusiform to slightly clavate (almost obpyriform), 4–6 × 1.5–2 µm.

Photobiont: spherical green cells, 6–10 µm diam., probably belonging to the Chlorococcaceae. – Figs 4–5.

*Taxonomic remarks.* This new species belongs to the Pilocarpaceae because of its ascus-type and because of its small clavate conidia (Hafellner 1984: 315; Vězda 1986: 200–201). Within that family, it is most closely related to *Byssoloma* Trev.: the margin of the apothecia can be shortly byssoid and the excipulum is not paraplectenchymatous. However the excipulum structure is not very typical of *Byssoloma* as it is made of regularly arranged rows of elongated cells, which terminate in inflated cells. It is now accepted to include into *Byssoloma*, species with an excipulum not made of loosely interwoven hyphae (see Kalb & Vězda 1990: 438–441



<i>Badimia</i>	<i>Bacidina</i>	<i>Barubria</i>	<i>Loflammia</i>	<i>Fellhanera</i>	<i>Tibellia</i>
subfarinose	finely granulose, composed of goniocysts	subfarinose	thin, with a smooth $\pm$ shiny surface	thin, usually finely farinose	byssoid, cotton-like
—	—	—	—	—	—
$\pm$ paraplectenchymatous with globose cells on outer surface	typically paraplectenchymatous	typically paraplectenchymatous	typically paraplectenchymatous	typically paraplectenchymatous	made of interwoven hyphae
<i>Byssoloma</i> -type	<i>Lecanora</i> -type	<i>Sporopodium</i> -type	<i>Sporopodium</i> -type	<i>Byssoloma</i> -type	<i>Bacidia</i> -type
mostly simple, slightly thickened at apices	simple, inflated at apices	branched and anastomosed	branched and anastomosed	simple, or branched and anastomosed, hardly thickened at apices	branched and anastomosed
fusiform, 3-septate, with a halo	acicular, septate, without a halo	ellipsoid, 3-septate, without a halo	ellipsoid, 1-septate to submuriform, usually with a halo	ellipsoid, 3-septate to muriform, without a halo	ellipsoid and 1-septate
produced in highly complicated campylidia, very long, filiform and convoluted, multiseptate, with crooks at both ends and lateral pedicellate appendages	produced in pycnidia, long filiform, flexuose or straight, thinly multiseptate	(i) produced in conidia, small and clavate; (ii) produced in campylidia, small, pedicellate and fusiform	produced in campylidia, small, simple and ellipsoid	produced in conidia, clavate, small	—
? Pilocarpaceae	?	Ectolechiaceae	Ectolechiaceae	Pilocarpaceae	Bacidiaceae

and Lücking 1992: 143–144). This option may lead to a heterogeneous genus.

In my opinion, a group of species should already be excluded and gathered into one or several different genera (no names are however available): they all have a rather compact excipulum, filled with crystals, made of elongated to globose cells. That group includes *Byssoloma anomalum* Kalb & Vězda, *B. lecanorinum* (Zahlbr.) Zahlbr., *B. subundulatum* (Stirton) Vězda, *B. ortizii* Lücking, and perhaps *Fellhanera cateilea* (Vainio) Farkas and *Bacidia ekmanii* Vězda.

There are however too many tropical species (corticolous and foliicolous) that fit into the broad concept of *Byssoloma* and that are in need of critical examination and, for many, that await formal description, to reach final decisions now. For the time being I prefer to describe this new species in *Byssoloma*.

*Byssoloma aptrootii* is easily characterized by its spores that are so far unique in that group: they have numerous septa [13–19 (–23)] and they reach 50–67 (–80)  $\mu\text{m}$  in length. The colour variation of the apothecia, especially of the disc, is also quite remarkable but

there is no doubt that only one taxon is involved as all those colours can be observed in a single population.

This new species is named after Dr Aptroot, a dutch lichenologist and a good friend of mine.

*Ecology and distribution.* *Byssoloma aptrootii* is known from several localities in Madeira and from Tenerife where it is reported from both remaining spots of the laurisylva (Sierra de Anaga and Monte del Agua). It is most probably present in Gomera and La Palma where large stands of the laurisylva are still present, as well as in the Azores.

In Madeira it grows on leaves of the Lauraceae in the laurisylva (*Appolonias barbujana*, *Laurus azorica*, and *Ocotea foetens*) but not of *Clethra arborea*. It is frequently associated with *Fellhanera christiansenii* Sérusiaux & Vězda (in press) in less disturbed stands of the forest near the rivers. It forms an overlooked foliicolous community with *Byssoloma leucoblepharum* Porina *leptosperma* and *Fellhanera christiansenii* in such localities; no doubt however it is more ubiquitous than *F. christiansenii*.



Tab. 2. Status of truly foliicolous bacidioid species (the list includes the species accepted in *Bacidia* by Santesson 1952, or later described in *Bacidia* by other authors).

<i>africana</i>	<i>Bacidia africana</i> Vězda
<i>albidocincta</i>	<i>Bacidia albidocincta</i> (Vainio) Zahlbr.
<i>apiahica</i>	<i>Bacidina apiahica</i> (Müll. Arg.) Vězda
<i>aurantiaca</i>	<i>Fellhanera aurantiaca</i> (Vězda) Vězda
<i>brasiliensis</i>	<i>Bacidia brasiliensis</i> (Müll. Arg.) Zahlbr.
<i>buxi</i>	<i>Fellhanera buxi</i> (Vězda & Vivant) Vězda
<i>carnea</i>	<i>Fellhanera carnea</i> (Vězda) Vězda
<i>cateilea</i>	<i>Fellhanera cateilea</i> (Vainio) Farkas
<i>cinnamonea</i>	<i>Bacidia cinnamonea</i> (Krempelh.) Vainio
<i>cochica</i>	<i>Bacidia colchica</i> Vězda
<i>consanguinea</i>	<i>Bacidia consanguinea</i> (Müll. Arg.) Zahlbr.
<i>consimilis</i>	<i>Bacidia consimilis</i> (Müll. Arg.) R. Sant.
<i>dimerelloides</i>	<i>Bacidia dimerelloides</i> Vězda
<i>dimidiata</i>	<i>Badimia dimidiata</i> (Babingt. ex Leight.) Vězda
<i>dominicana</i>	<i>Fellhanera dominicana</i> (Vainio) Vězda
<i>ekmanii</i>	<i>Bacidia ekmanii</i> Vězda
<i>elegans</i>	<i>Badimia elegans</i> (Vainio) Vězda
<i>foliicola</i>	a synonym of <i>Bacidia dimerelloides</i>
<i>fragilis</i>	<i>Bacidia fragilis</i> Vězda
<i>fuscatula</i>	<i>Fellhanera fuscatula</i> (Müll. Arg.) Vězda
<i>fuscoviridis</i>	<i>Barbaria fuscoviridis</i> (Vězda) Vězda
<i>gabrielis</i>	<i>Loflammia gabrielis</i> (Müll. Arg.) Vězda
<i>galbinea</i>	<i>Badimia galbinea</i> (Krempelh.) Vězda
<i>iturienis</i>	<i>Bacidia ituriensis</i> Vězda
<i>lambinonii</i>	<i>Byssoloma lambinonii</i> (Sérusiaux) Sérusiaux (1)
<i>lecanorina</i>	<i>Byssoloma lecanorinum</i> (Zahlbr.) Zahlbr.
<i>lisowskii</i>	<i>Fellhanera lisowskii</i> (Vězda) Vězda
<i>marginalis</i>	<i>Bapalmuia marginalis</i> (Vainio) Sérusiaux
<i>mastothallina</i>	<i>Bacidia mastothallina</i> Vainio
<i>michaeliana</i>	<i>Fellhanera michaeliana</i> (Sérusiaux) Sérusiaux (2)
<i>microdiscus</i>	<i>Fellhanera microdiscus</i> (Vainio) Vězda
<i>micrommata</i>	<i>Bacidia micrommata</i> (Krempelh.) R. Sant.
<i>myriocarpa</i>	a synonym of <i>Fellhanera rhipidophylli</i>
<i>nigrescens</i>	<i>Bacidia nigrescens</i> (Müll. Arg.) Vainio
<i>olivaceorufa</i>	<i>Bacidia olivaceorufa</i> Vainio
<i>pallidocarnea</i>	<i>Bacidina pallidocarnea</i> (Müll. Arg.) Vězda
<i>pallidula</i>	<i>Badimia pallidula</i> (Krempelh.) Vězda
<i>palmularis</i>	<i>Bapalmuia palmularis</i> (Müll. Arg.) Sérusiaux
<i>paradoxa</i>	<i>Fellhanera paradoxa</i> (Vězda) Vězda
<i>pauciseptata</i>	<i>Bacidia pauciseptata</i> R. Sant.
<i>permira</i>	<i>Bacidia permira</i> Vězda
<i>polillensis</i>	<i>Badimia polillensis</i> (Vainio) Vězda
<i>psychotriae</i>	<i>Bacidia psychotriae</i> (Müll. Arg.) Zahlbr.
<i>rhipidophylli</i>	<i>Fellhanera rhipidophylli</i> (Rehm) Vězda
<i>rubicunda</i>	<i>Bapalmuia rubicunda</i> (Müll. Arg.) Sérusiaux
<i>scutellifera</i>	<i>Bacidina scutellifera</i> (Vězda) Vězda
<i>sorediantha</i>	<i>Fellhanera sorediantha</i> (Vězda) Vězda
<i>stanhopeae</i>	<i>Badimia stanhopeae</i> (Müll. Arg.) Vězda
<i>sublecanorina</i>	<i>Fellhanera sublecanorina</i> (Nyl.) Vězda
<i>submicrommata</i>	<i>Bacidia submicrommata</i> Vězda
<i>subsimilis</i>	<i>Bacidia subsimilis</i> Vězda
<i>subternella</i>	<i>Fellhanera subternella</i> (Nyl.) Vainio
<i>subundulata</i>	<i>Byssoloma subundulatum</i> (Stirton) Vězda
<i>tuckermanii</i>	<i>Bacidia tuckermanii</i> R. Sant.
<i>vasakii</i>	<i>Bacidina vasakii</i> (Vězda) Vězda
<i>vieillardii</i>	<i>Badimia vieillardii</i> (Müll. Arg.) Vězda
<i>wirthii</i>	<i>Fellhanera wirthii</i> (Vězda) Vězda
<i>ziamensis</i>	<i>Bacidina ziamensis</i> (Vězda) Vězda

(1) *Byssoloma lambinonii* (Sérusiaux) comb. nov. Bas.: *Bacidia lambinonii* Sérusiaux, Lejeunia, N.S. 90: 12, 1978.

(2) *Fellhanera michaeliana* (Sérusiaux) comb. nov. Bas.: *Bacidia michaeliana* Sérusiaux, Lejeunia N.S. 90: 15, 1978.

*senii* as it was collected on an introduced species (*Buxus*) in park conditions.

In Tenerife it is a mostly abundant species in the laurisylva and in the "Fayal-Brezal" bushes, even in rather disturbed and dry conditions; it is sometimes the only foliicolous species present and it can also colonize twigs and small branches of the trees. It grows on the "smooth" leaves of Lauraceae, of *Ilex perado*, and of *Prunus lusitanica* ssp. *hixa*, as well as on the hairy leaves of *Viburnum rigidum*. Only three species are able to grow on these leaves: *Byssoloma aptrootii*, *Strigula nitidula* and an unidentified species of *Bacidina* (close to *B. chlorotricula* (Nyl.) Vězda).

*Selected specimens examined.* Madeira, Ribeira da Janela, im Lorbeerwald südöstlich von Porto Moniz, ca 300 m, auf Blättern von Lauraceen, 6.1987, coll. S. Schumacher 750 (KOELN). Ibid., entre a Encumeada e a Chã do Loiro, numa ravina exp. a Norte, ca 900 m, sobre as folhas de *Ocotea foetens*, 7.1951, coll. C. Tavares 4428 M (UPS). Ibid., Parque de Santo da Serra, 660 m, leaves of *Buxus*, 7.1990, coll. Etayo (herb. Etayo, LG). Tenerife, Sierra de Anaga, Monte de las Mercedes, alt. 600–900 m, on living leaves of *Appolonias barbujana* in dense laurel forest, 11.1974, coll. S. Christiansen 74478 (herb. S. Christiansen). Ibid., Las Montañas de Anaga, Bosque de Las Mercedes, between Las Mercedes and Ermita Cruz del Carmen, alt. 700 m, by a road in a dense forest, on leaves, 3.1976, coll. R. Santesson 26837 (UPS). Ibid., Monte del Agua, route allant de Portela Alta vers Erjos, au-dessous du Barranco de los Cochinos, alt. 800–1000 m, laurisylve +/- dégradée et "Fayal-brezal", sur feuilles et sur branchettes, 4.1991, coll. E. Sérusiaux (LG).

## Gyalectidium Müll. Arg.

### Gyalectidium setiferum Vězda & Sérusiaux

Foliicola *Gyalectidium* species insignis thallo ciliis instructo et massula conidiorum algarumque viridi, super thallo sessili et sine protectionis squama. – Figs. 6–8.

Type: Georgia, Colchis, dist. Soci, in valle fluminis Chosta, alt. 50 m, foliicola (*Laurocerasus officinalis*), 6. 1980, coll. Vězda (herb. Vězda).

Thallus formed of small rounded patches, reaching only 0.3 mm diam. when a fully grown hyphophore is already present, eventually confluent and forming large patches of up to 4 mm in diam., pale, greyish, membranaceous and rather shiny when young, becoming whitish because of numerous crystals developing into the thallus and therefore puffy and irregular; moist or old thalli have a distinct green color; old necrosed thalli reduced to white crystals surrounded by greenish granules. Corticiform layer always present, covering the thallus, not exceeding 2–5 µm thick; prothallus usually present, membranaceous.

Cilia always present, 0.3–0.5 mm long, tapering towards the tips, translucent to whitish, blackish on old thalli, especially at the tips, made of periclinally elongated, hyaline hyphae with rather thin walls, present



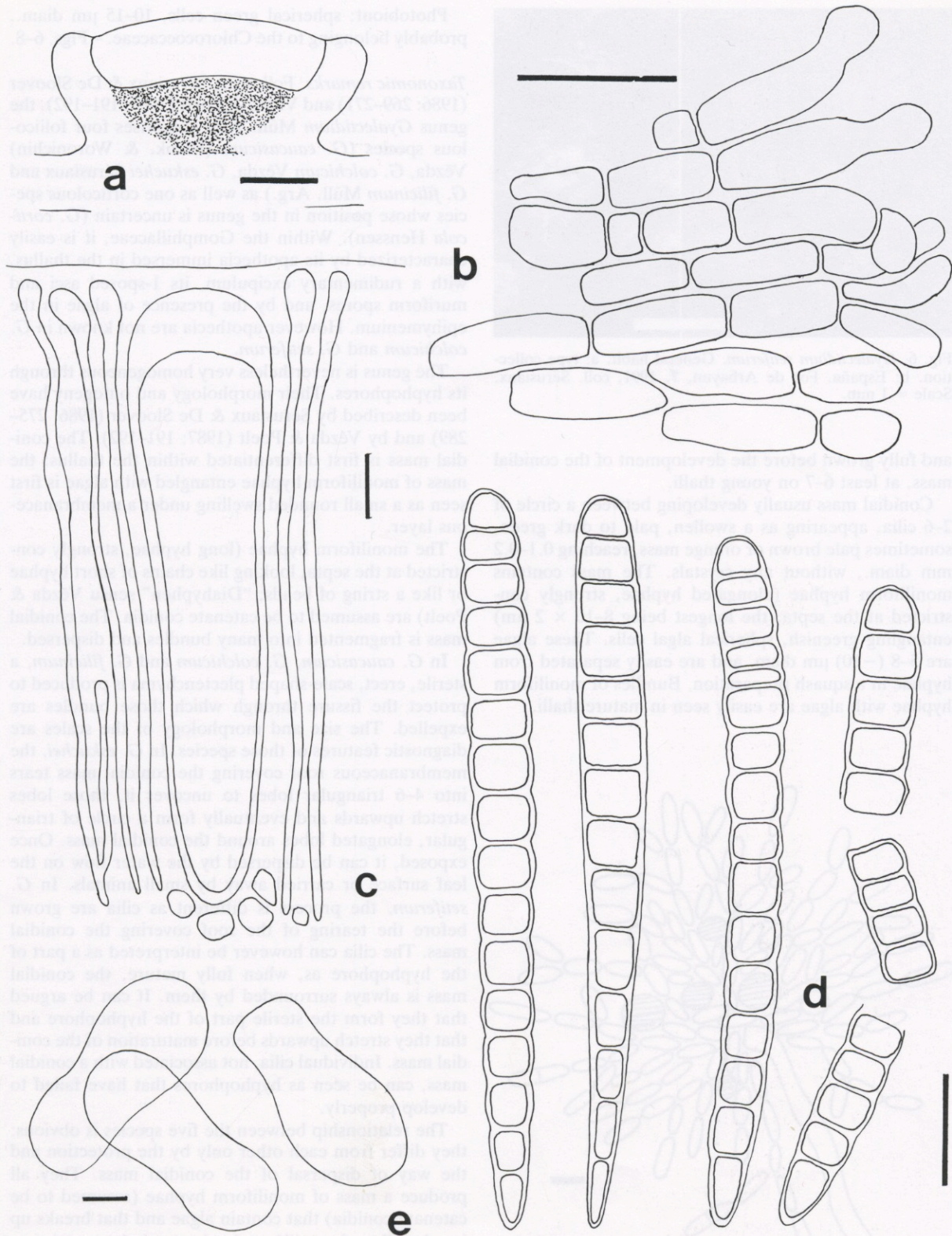


Fig. 5. *Byssoloma aptrootii*. - a: cross-section of an apothecium. Scale = 0.1 mm. - b: outer edge of the excipulum. Scale = 10  $\mu$ m. - c: immature ascus with paraphyses. Scale = 10  $\mu$ m. - d: spores. Scale = 10  $\mu$ m. - e: conidia. Scale = 1  $\mu$ m. - (Type collection).



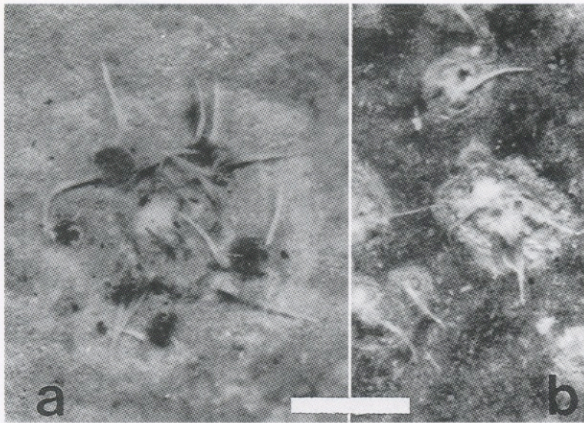


Fig. 6. *Gyalectidium setiferum*. General habit. a: type collection. b: España, Foz de Arbayun, 7. 1991, coll. Sérusiaux. Scale = 1 mm.

and fully grown before the development of the conidial mass, at least 6–7 on young thalli.

Conidial mass usually developing between a circle of 2–6 cilia, appearing as a swollen, pale to dark green, sometimes pale brown or orange mass, reaching 0.1–0.2 mm diam., without any crystals. The mass contains moniliform hyphae (elongated hyphae, strongly constricted at the septa, the longest being  $8\text{--}10 \times 2 \mu\text{m}$ ) entangling greenish, spherical algal cells. These algae are 5–8 (–10)  $\mu\text{m}$  diam. and are easily separated from hyphae in a squash preparation. Bundles of moniliform hyphae with algae are easily seen in mature thalli.

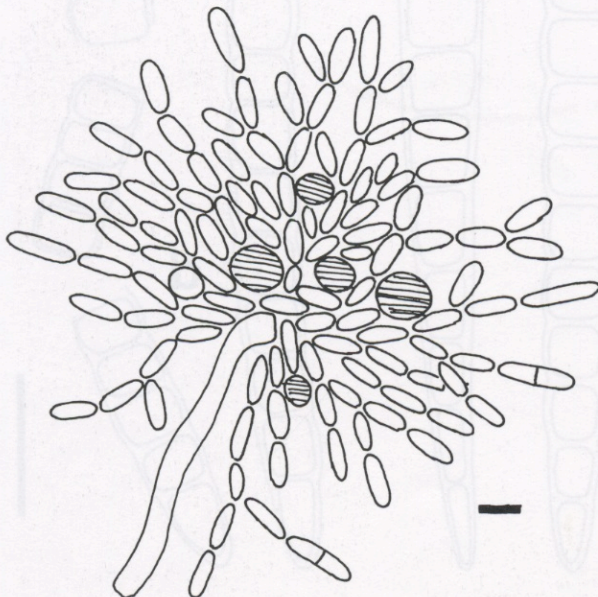


Fig. 7. *Gyalectidium setiferum*. Bundle of moniliform hyphae with algae. Scale = 10  $\mu\text{m}$ . (Del. A. Vězda; type collection).

Photobiont: spherical green cells, 10–15  $\mu\text{m}$  diam., probably belonging to the Chlorococcaceae. – Figs. 6–8.

**Taxonomic remarks.** Following Sérusiaux & De Sloover (1986: 269–271) and Vězda & Poelt (1987: 191–192), the genus *Gyalectidium* Müll. Arg. comprises four foliicolous species (*G. caucasicum* (Elenk. & Woronichin) Vězda, *G. colchicum* Vězda, *G. eskucheii* Sérusiaux and *G. filicinum* Müll. Arg.) as well as one corticolous species whose position in the genus is uncertain (*G. corticola* Henssen). Within the Gomphillaceae, it is easily characterized by its apothecia immersed in the thallus, with a rudimentary excipulum, its 1-spored asci and muriform spores, and by the presence of algae in the epihyemium. However apothecia are not known in *G. colchicum* and *G. setiferum*.

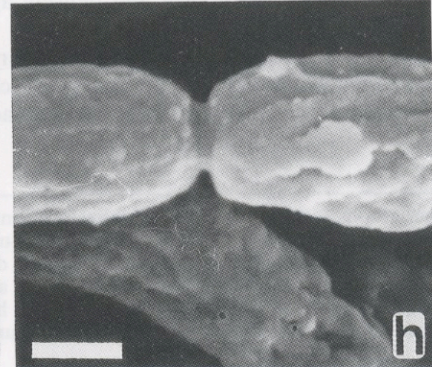
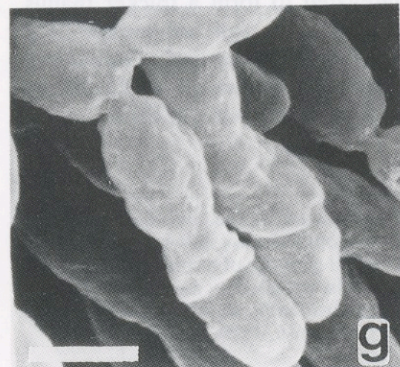
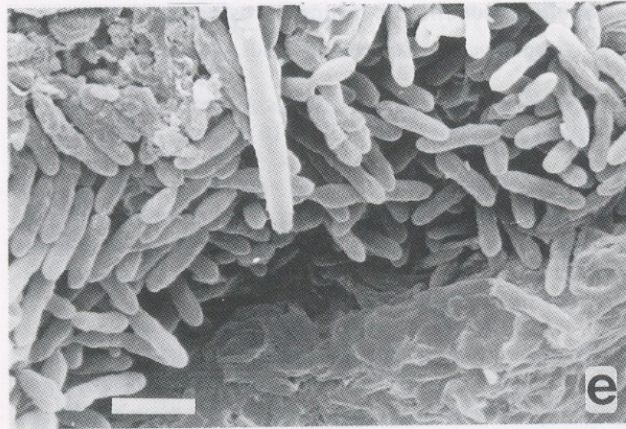
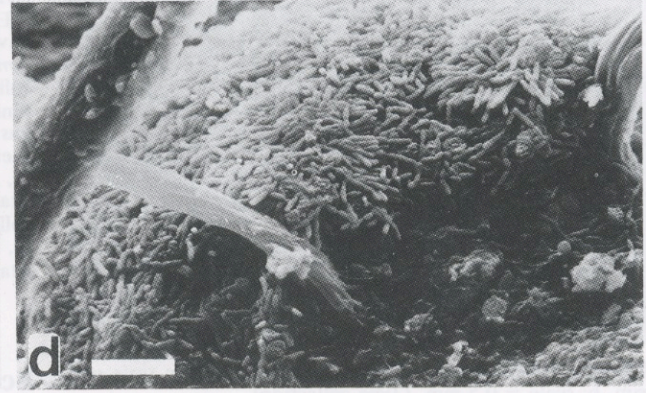
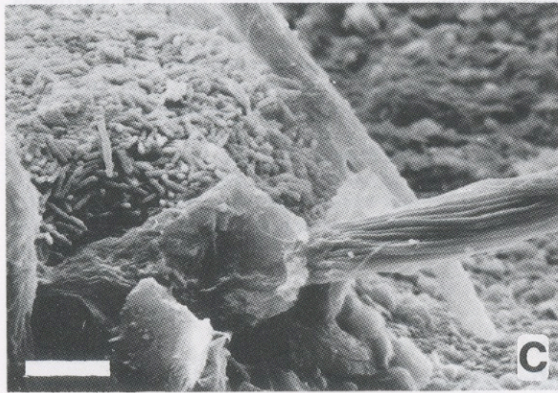
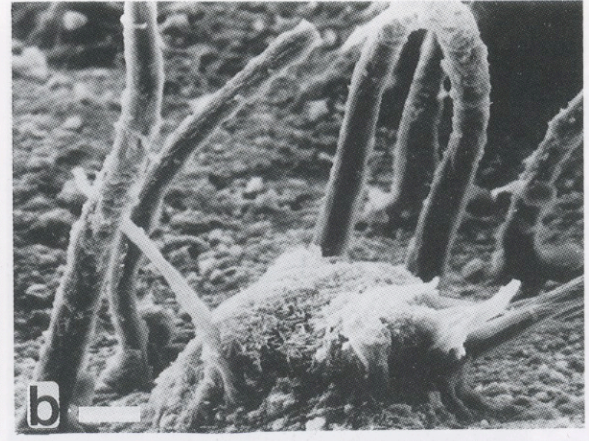
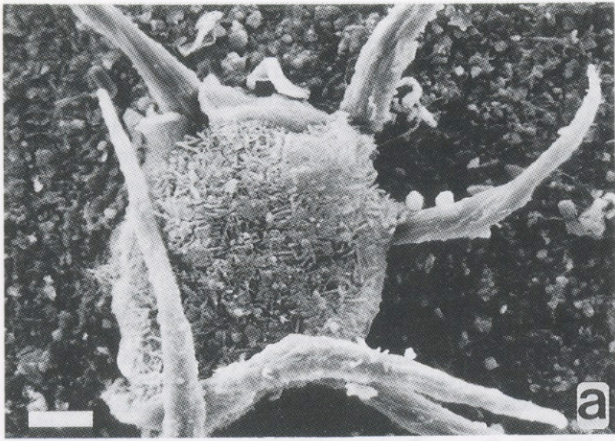
The genus is nevertheless very homogeneous through its hyphophores. Their morphology and ontogeny have been described by Sérusiaux & De Sloover (1986: 275–289) and by Vězda & Poelt (1987: 191–192). The conidial mass is first differentiated within the thallus: the mass of moniliform hyphae entangled with algae is first seen as a small rounded swelling under a membranaceous layer.

The moniliform hyphae (long hyphae, strongly constricted at the septa, looking like chains of short hyphae or like a string of beads; “Diahyphen” sensu Vězda & Poelt) are assumed to be catenate conidia. The conidial mass is fragmented into many bundles and dispersed.

In *G. caucasicum*, *G. colchicum* and *G. filicinum*, a sterile, erect, scale-shaped plectenchyma is produced to protect the fissure through which those bundles are expelled. The size and morphology of the scales are diagnostic features of those species. In *G. eskucheii*, the membranaceous roof covering the conidial mass tears into 4–6 triangular lobes to uncover it, those lobes stretch upwards and eventually form a circle of triangular, elongated lobes around the conidial mass. Once exposed, it can be dispersed by the water flow on the leaf surface or carried away by small animals. In *G. setiferum*, the process is different as cilia are grown before the tearing of the roof covering the conidial mass. The cilia can however be interpreted as a part of the hyphophore as, when fully mature, the conidial mass is always surrounded by them. It can be argued that they form the sterile part of the hyphophore and that they stretch upwards before maturation of the conidial mass. Individual cilia, not associated with a conidial mass, can be seen as hyphophores that have failed to develop properly.

The relationship between the five species is obvious: they differ from each other only by the protection and the way of dispersal of the conidial mass. They all produce a mass of moniliform hyphae (assumed to be catenate conidia) that contain algae and that breaks up into bundles of moniliform hyphae and algae, acting as diaspores.







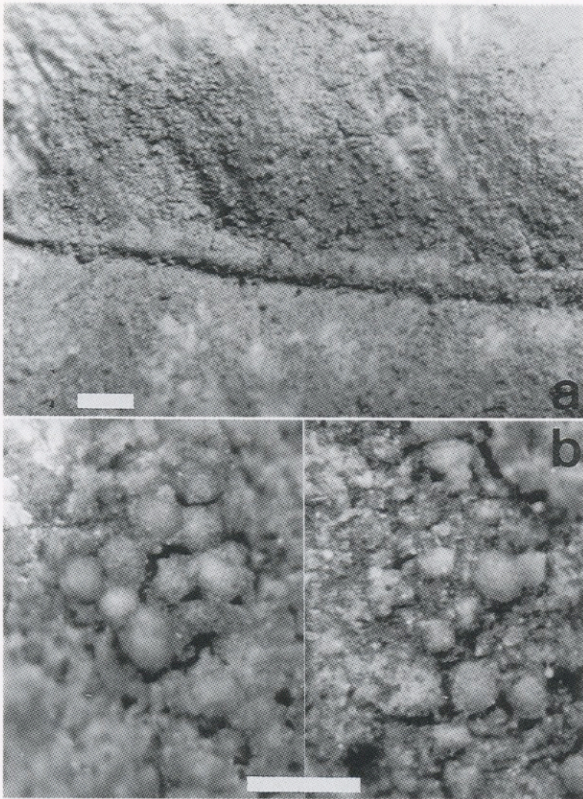


Fig. 9. *Scoliciosporum curvatum*. General habit. a: scale = 1 mm. b: scale = 0.5 mm. (Type collection).

**Ecology and distribution.** *Gyalectidium setiferum* appears to have a rather wide distribution in Europe as it is recorded in the W Caucasus (Russia and Georgia, along the NE coast of the Black Sea), in Brittany (Western France) and on both sides of the Pyrenees. It is nevertheless quite rare and not easily found as it is usually very confined to peculiar spots, even in highly suitable localities. In the Gorges of Arbayún (Navarra, N Spain) for example, it is present on one or two *Buxus* at several isolated places within the site, in the understory of *Quercus ilex* woods on the slopes of the gorges. It is impossible to understand why it is not more widespread in such a site where its apparent niche is common. For quite a long time I considered it to be a relic species, until a large collection of it from the Chaos de St-Herbot (W France) was shown to me by Dr T. Lumbsch. This site is a famous hyper-atlantic woodland with a poor foliicolous flora (only *Fellhanera bouteillei*

on *Abies*), except for *G. setiferum* which grows on needles of a conifer introduced there, namely *Abies*. This clearly demonstrates its dispersal capacity and one can expect to find other localities in Europe. It is however of interest to note that it is not recorded in Macaronesia, in spite of the large collections examined from those islands. Two species of *Gyalectidium* occur in Macaronesia: *G. caucasicum* and a second one, probably identical to *G. colchicum*.

*Specimens examined other than type.* Georgia, dist. Adler (Sochi), in faucibus fluminis Psakho infra vicum Kamenka, alt. 200–300 m, ad folia *Laurocerasi*, 6.1979, coll. Vasak (LG). Russia, "Rossia australis, Caucasus septentrionalis, Republica autonoma Adigejskensis S.S.", prope opp. Majkop, surpa folia *Abietis nordmannianae*, 1908, N. Ja Schestunov in V. P. Savicz, Lich. Rossica, IX, 1959, n° 89, "*Biatorina bouteillei*" (GB, O). France, Pyrénées-Atlantiques, gorges de Kakouetta (SE de Tardets-Sorholus), buxaie humide sur le flanc droit de la vallée, à l'entrée des gorges, alt. 400 m, foliicole sur *Buxus sempervirens*, 8.1985, coll. Sérusiaux 7702 (LG). Ibid., 7.1989, coll. James, Rose, Vivant & Sérusiaux (LG). Ibid., Bretagne, Finistère, Chaos de St-Herbot, hyper-atlantischer *Quercus-Fagus* wald, auf *Abies*, 10.1990, coll. Lumbsch & Feige 8099b (herb. Lumbsch, LG). España, Navarra, Foz de Arbayún, 400 m, hojas de *Buxus sempervirens*, 9.1989, coll. Etayo (herb. Etayo, LG). Ibid., 500–550 m, sur *Buxus sempervirens*, 7.1991, coll. Sérusiaux (LG). Ibid., Catalunya, Oïx, Riera d'Oïx, 500 m, sur *Buxus sempervirens*, 2.1991, coll. Etayo 5725 (herb. Etayo, LG).

## **Scoliciosporum Massal.**

### ***Scoliciosporum curvatum* Sérusiaux sp. nov.**

= *Lilliputeana curvata* Sérusiaux ined., in Sérusiaux (1989: 90).

*Scoliciosporum* species insignis foliicola habitatione et sporis 1-septatis, lunatis et 8–16 in ascis. – Figs. 9–10.

Type: France, Vercors, E de St-Jean-en-Royans, Combe Laval, alt. 380–400 m, taillis de noisetiers et de buis en bord de rivière, 8.1986, sur feuilles et branchettes de *Buxus*, coll. Sérusiaux (LG-holotype; isotypes to be distributed).

Thallus effuse and spreading over the surfaces available to it, light green to dark grey-green, composed of small greenish granules, at first scattered but soon proliferating and densely aggregated to form a thicker thallus, especially where the granules can accumulate (e.g. along the main nerve of an old *Buxus* leaf). Granules up to 50 µm diam., composed of spherical algal cells surrounded by hyphae; algal cells 10–15 µm diam., under-

Fig. 8. *Gyalectidium setiferum*. SCAN photographs. – a: view from above showing a conidial mass surrounded by cilia. Scale = 0.1 mm. – b: lateral view of a conidial mass and of cilia. Scale = 0.1 mm. – c: lateral close-up of a conidial mass showing the basis of a cilium and a torn part of the roof that first covered the conidial mass. Scale = 50 µm. – d: lateral close-up of a conidial mass. Scale = 50 µm. – e: ibid. d. Scale = 10 µm. – f & i: details of the conidial mass showing the algal cells wrapped by moniliform hyphae, here assumed to be catenate conidia. Scale = 10 µm. – g: tips of growing moniliform hyphae, probably showing conidiogenesis. Scale = 1 µm. – h: detail of the connection between moniliform hyphae. Scale = 1 µm (Georgia, 6.1979, coll. Vasak).



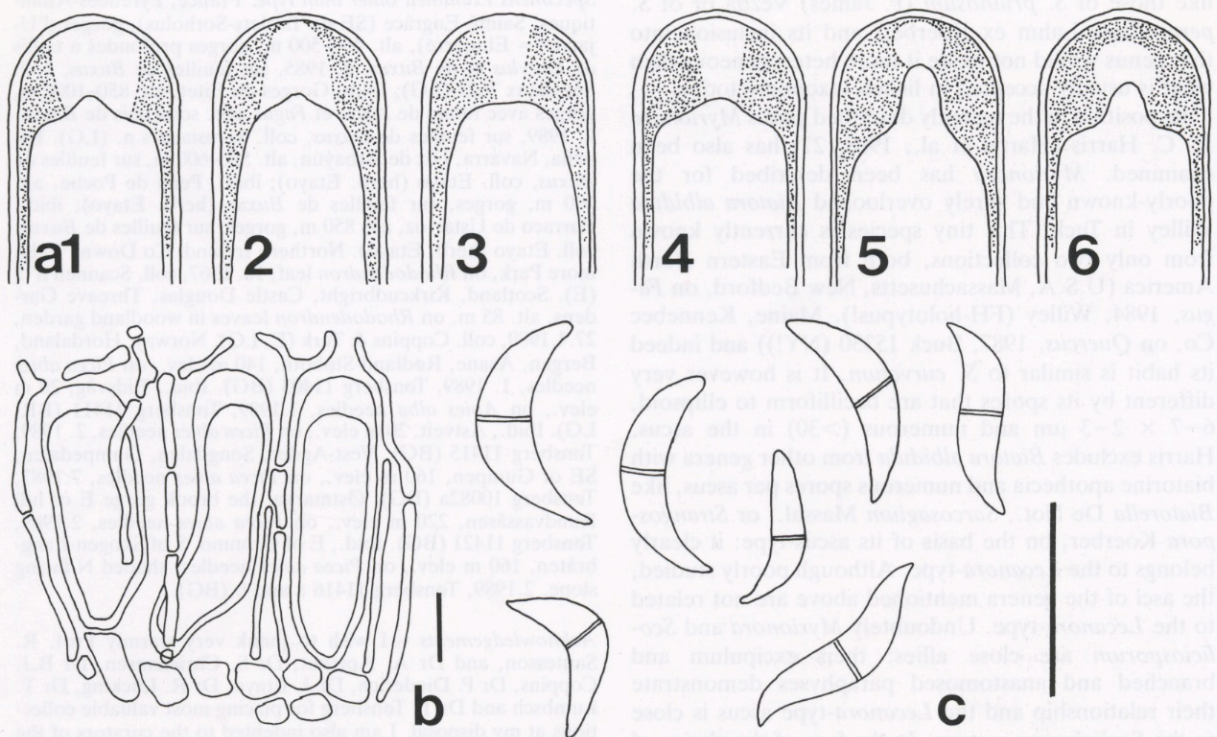


Fig. 10. *Scoliciosporum curvatum*. – a: (1–3): ascus tip after treatment with I (schematic). For comparison: *ibid.* for *Scoliciosporum umbrinum* (a4), *Myrionora albidula* (a5) and *Bacidina phacodes* (a6). – b: asci with paraphyses. Scale = 10  $\mu$ m. – c: spores. Scale = 10  $\mu$ m. (Type collection).

going active aplanospores division (free-living aplanospores often seen on the thallus surface or on the edge).

Apothecia usually extremely numerous, rounded, (100-)130–150(-160)  $\mu$ m diam. and +/- 60  $\mu$ m high, with a rather flat disc when young but soon becoming globose to hemispherical; in well developed specimens contiguous, agglomerated and occasionally laterally fused; occasionally tuberculate in very old ones (probably due to a regeneration process); disc pale pink to orange, brown in old specimens, at first with a tiny darker or paler margin which soon vanishes; whitish outwardly growing hyphae present at the margins of young apothecia growing in shade (and wetter?) conditions.

Excipulum seen only in young apothecia still with a flat disc, max. 10  $\mu$ m thick, made of elongated interwoven hyphae, outer surface usually with a few (but abundant in apothecia growing in shade conditions) protruding hyphae; hypothecium distinct, hyaline, paraplectenchymatous in upper parts; paraphyses abundant only in young apothecia, 2  $\mu$ m thick, simple or furcate (rarely anastomosing), especially in upper parts of the hymenium where they sometimes form a thick (several  $\mu$ m) epihymenium or adopting unusual and poorly organized patterns. Asci short (40–45  $\mu$ m long), clavate, close to the *Scoliciosporum*-type (sensu Hafellner 1984: 340). Spores 8–16 per ascus, fusiform, with acute ends,

curved like a bow or lunate, or slightly sigmoid, 1-septate, 7–11  $\times$  1.5–3  $\mu$ m. Pycnidia not seen.

Photobiont: algal cells of mature thalli spherical, green, (12-)14–20(-22)  $\mu$ m diam., probably belonging to the Chlorococcaceae. – Figs 9–10.

*Taxonomic remarks.* The generic position of this remarkable species has been a problem to me for a long period and I have often contemplated to describe a new genus (*Lilliputeana*) to accommodate it. That unpublished genus name has been propagated amongst colleagues and even included in a preliminary list of foliicolous lichens of SW France (Sérusiaux 1989: 90). I finally decided to describe it in the well-known genus *Scoliciosporum* Massal. The main reasons are: (i) the ascus-type, almost identical to that of *S. umbrinum* (Ach.) Arnold (the type species of the genus; see Hafellner 1984: 340 for a good illustration of the asci of that species); (ii) the structure of the excipulum, clearly related to the excipulum of *Scoliciosporum* species (see Vězda 1978: 413); (iii) the lunate spores that are reminiscent of the curved and sigmoid spores of *S. umbrinum* and other species. There are however two features that push *S. curvatum* away from that genus: (i) the number of spores per ascus; (ii) the thick paraphyses and their pattern of organization.

The tiny and globose apothecia of *S. curvatum* look



like those of *S. pruinosum* (P. James) Vězda or of *S. perpusillum* Lahm ex Koerber, and its inclusion into that genus would not make it more heterogeneous than what is usually accepted in lichen taxonomy today.

Its position in the recently described genus *Myrionora* R. C. Harris (Harris et al., 1988: 27) has also been examined. *Myrionora* has been described for the poorly-known and surely overlooked *Biatora albidula* Willey in Tuck. This tiny species is currently known from only two collections, both from Eastern North America (U.S.A., Massachusetts, New Bedford, on *Fagus*, 1984, Willey (FH-holotypus!). Maine, Kennebec Co, on *Quercus*, 1987, Buck 15330 (NY!)) and indeed its habit is similar to *S. curvatum*. It is however very different by its spores that are bacilliform to ellipsoid,  $6-7 \times 2-3 \mu\text{m}$  and numerous ( $>30$ ) in the ascus. Harris excludes *Biatora albidula* from other genera with biatorine apothecia and numerous spores per ascus, like *Biatorella* De Not., *Sarcosagium* Massal., or *Strangospora* Koerber, on the basis of its ascus-type: it clearly belongs to the *Lecanora*-type. Although poorly studied, the asci of the genera mentioned above are not related to the *Lecanora*-type. Undoubtedly *Myrionora* and *Scoliciosporum* are close allies: their excipulum and branched and anastomosed paraphyses demonstrate their relationship and the *Lecanora*-type ascus is close to the *Scoliciosporum*-type. In the face of the choice of describing this new species either in *Scoliciosporum* or in *Myrionora*, I prefer the former, mainly because of its spores.

**Ecology and distribution.** Although a very small species that is easily passed over for a dying green algal cover, and hardly detected in the field, *Scoliciosporum curvatum* is now known from a large portion of Western Europe and from different phytogeographical regions. Collections have been studied from SW Norway, SW Scotland, N Ireland, SW and Central France and N Spain. It is obviously an ubiquitous and easily spreading species as demonstrated by its occurrence in park and gardens conditions in N Ireland and Scotland. It should be looked for in more natural conditions in these countries, e.g. in humid localities of the Caledonian pine forests of Scotland. In Norway, it is present on *Abies* and *Picea* needles and twigs, mainly in wet localities. Field observations in France and N Spain by J. Etayo and myself show it is here a light and drought tolerant epiphyllous species on *Buxus*, being found in more exposed conditions than any other foliicolous species of SW Europe. In the Ujarre gorges, it was collected only in the canopy of the *Buxus* bushes whereas other foliicolous species (*Bacidina vasakii*, *Byssoloma subdiscordans*, *Fellhanera bouteillei*, *Porina oxneri*) were present in the undergrowth where light is much lower and air humidity higher and more constant. In the Vercors range, it was found extremely abundant on several *Buxus* bushes (on leaves and twigs) in a sheep and cow pasture at the bottom of the "Combe Laval" gorges.

*Specimens examined other than type.* France, Pyrénées-Atlantiques, Sainte-Engrâce (SE de Tardets-Sorholus), gorges d'Ujarre (= Ehujañarré), alt. 400–500 m, gorges profondes à taillis de *Corylus* et de *Buxus*, 8. 1985, sur feuilles de *Buxus*, coll. Sérusiaux 7625 (LG); Ibid., Gorges du Bitet, alt. 850–1000 m, gorges avec futaie de *Abies* et *Fagus* avec sous-bois de *Buxus*, 7. 1989, sur feuilles de *Buxus*, coll. Sérusiaux s.n. (LG). España, Navarra, Foz de Arbayún, alt. 550–600 m, sur feuilles de *Buxus*, coll. Etayo (herb. Etayo); ibid., Peña de Poche, alt. 600 m, gorges, sur feuilles de *Buxus* (herb. Etayo); ibid., Barraco de Ustarroz, alt. 850 m, gorges, sur feuilles de *Buxus*, coll. Etayo (herb. Etayo). Northern Ireland, Co Down, Tollymore Park, on *Rhododendron* leaf, 10. 1967, coll. Scannell n° 5 (E). Scotland, Kirkcudbright, Castle Douglas, Threave Gardens, alt. 85 m, on *Rhododendron* leaves in woodland garden, 27.4.1989, coll. Coppins & Türk (E, LG). Norway, Hordaland, Bergen, Åsane, Rødland-Støbtotn, 140 m elev., on *Picea abies* needles, 1. 1989, Tønsberg 11403 (BG). Ibid., Eidsvåg, 20 m elev., on *Abies alba* needles, 1.1989, Tønsberg 11411 (BR, LG). Ibid., Åstveit, 20 m elev., on *Picea abies* needles, 2. 1989, Tønsberg 11415 (BG). Vest-Agder, Songdalen, Gumpedalen, SE of Gumpen, 160 m elev., on *Picea abies* needles, 7.1987, Tønsberg 10082a (BG). Østmarka, the brook gorge E of hill Rundvassåsen, 220 m elev., on *Picea abies* needles, 2.1989, Tønsberg 11421 (BG). Ibid., E of Gronmo, S of Skogen-Langbråten, 160 m elev., on *Picea abies* needles, shaded N-facing slope, 2.1989, Tønsberg 11416 a and b (BG).

**Acknowledgements** – I wish to thank very warmly Prof. R. Santesson, and Dr A. Aptroot, Dr S. Christiansen, Dr B.J. Coppins, Dr P. Diederich, Dr J. Etayo, Dr R. Lücking, Dr T. Lumbsch and Dr T. Tønsberg for placing most valuable collections at my disposal. I am also indebted to the curators of the following herbaria for allowing me to study material in their care: BG, E, FH, GB, KOELN, NY, O and UPS. Many thanks are also due to Dr J. Hafellner who first suggested to me that "*Lilliputeana curvata*" would be better placed in *Scoliciosporum*. I am also grateful to Dr B.J. Coppins, Dr R. Lücking, Prof. J. Poelt and Dr A. Vězda for assistance in preparing my manuscript for publication.

Photographs were taken at the Jardin Botanique de Belgique (SCAN), at P. Diederich's laboratory and at the Department of Botany in Liège; I thank Dr P. Diederich, Dr J. Rammeloo and M. Verhaegen for their active cooperation in this regard.

## References

- Brako, L. 1989. Reevaluation of the genus *Phyllospora* with taxonomic notes and introduction of *Squamicidia*, gen. nov. – Mycotaxon 35: 1–19.
- De Foucault, B., Sérusiaux, E. & Van Haluwyn, C. 1982. Une nouvelle station française de lichens foliicoles dans le massif central occidental (Aveyron). – Cryptogamie, Bryol. Lichénol. 3: 73–76.
- De Sloover, J. R. & Sérusiaux, E. 1984. Une station de lichens foliicoles en Provence. – Cryptogamie, Bryol. Lichénol. 5: 291.
- Hafellner, J. 1984. Studien in Richtung einer natürlichen Gliederung der Sammelfamilien Lecanoraceae und Lecideaceae. – Nova Hedwigia, Beiheft 79, pp. 241–371.
- & Vězda, A. 1992. *Tibellia*, eine neue Gattung der Bacidiaceae mit Byssoidem thallus (Lichenisierte Ascomycetes, Lecanorales). – Nova Hedwigia 55: 183–189.
- Harris, R. C., Selva, S. B., Buck, W. R., Guccion, J. G., Nelson, J. & Schmitt, C. 1988. Lichens of southern Maine collected on the 1987 Andrews Foray. – Evansia 5: 26–32.
- Kalb, K. & Vězda, A. 1990. Die Flechtengattung *Byssoloma* in der Neotropis (eine taxonomisch-phytogeographische Studie). – Nova Hedwigia 51: 435–451.



- Lücking, R. 1992. Foliicolous lichens – A contribution to the Knowledge of the Lichen Flora of Costa Rica, Central America. – *Nova Hedwigia*, Beiheft 104, 179 pp.
- Santesson, R. 1952. Foliicolous lichens I. A revision of the taxonomy of the obligately foliicolous, lichenized fungi. – *Symb. Bot. Upsal.* 12 (1), 590 pp.
- Sérusiaux, E. 1989. Foliicolous lichens: ecological and chorological data. – *Bot. Journ. Linn. Soc.* 100: 87–96.
- & De Sloover, J. R. 1986. Taxonomical and ecological observations on foliicolous lichens in northern Argentina, with notes on the hyphophores of *Asterothyriaceae*. – *Veröff. Geobot. Inst. ETH, Stiftung Rübel, Zürich* 91: 260–292.
- Vězda, A. 1978. Neue oder wenig bekannte Flechten in der Tschechoslowakei. II. – *Folia Geobot. Phytotax.* (Praha) 13: 397–420.
- 1986. Neue Gattungen der Familien *Lecideaceae* s.l. (Lichenes). – *Folia Geobot. Phytotax.* (Praha) 21: 199–219.
- 1987. Foliicolous Flechten aus Zaïre (III). Die Gattung *Byssoloma* Trevisan. – *Folia Geobot. Phytotax.* (Praha) 22: 71–83.
- & Poelt, J. 1987. Flechtensystematische Studien XII. Die Familie *Gomphillaceae* und ihre Gliederung. – *Folia Geobot. Phytotax.* (Praha) 22: 179–198.
- & Vivant, J. 1972. Lichens épiphyllés des Pyrénées-Atlantiques. – *Bull. Soc. Bot. Fr.* 119: 253–258.