Lichenologist **34**(4): 327–332 (2002)
doi:10.1006/lich.2002.0403, available online at http://www.idealibrary.com on IDEAL®

Bacidia brandii, a new lichen species from the Netherlands, Belgium, France and Lithuania

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Abstract: A new lichen species from the genus *Bacidia* s. lat., *B. brandii*, is described from the Netherlands, Belgium, France and Lithuania. It has been found terricolous, on brick, on lignum and on plant debris. The new species belongs to a group sometimes treated in the genus *Bacidina* Vězda, and shows particular affinities to *Bacidia arnoldiana*, *B. chloroticula* and *B. saxenii*.

Key words: *Bacidia*, *Bacidina*, lichens, Western Europe

Introduction

Over a period of twenty years, material of an undescribed terricolous *Bacidia* species has been collected from the Netherlands. None of the first 10 specimens, collected by Maarten Brand, are well-developed so, hitherto, it has not been advisable to describe this unnamed species. However, during the spring field meeting of the Dutch Bryological and Lichenological Working Group, held in 1994, in central Netherlands, a well-developed specimen was collected for the first time, from a stump in a heathland. A description of this new *Bacidia* species is given below, and comparisons with related species are provided.

The genus *Bacidina* Vězda was described by Vězda (1990) to accommodate species, formerly included in *Bacidia*, characterized by pale orange to orange-brown apothecia and a typically paraplectenchymatous excipulum—with at least some wide cell lumina in the inner part of the proper exciple, which is not the case in *Bacidia* s. str. Later, Ekman (1996) outlined further differences between *Bacidia* and *Bacidina*. These included subtle differences in the apical structure of the ascus (apical cushion relatively broader in *Bacidina*), and in the length of conidogenous cells (shorter in *Bacidina*).

The new species belongs to *Bacidina* as treated by Ekman (1996), but, because of the current uncertainties concerning the circumscription of this genus (Ekman 2001), we have opted to place the new species in *Bacidia* s. lat. Our reluctance to use *Bacidina* has been further prompted by the realization of a likely earlier, competing name, *Lopacidia* Kalb, published in 1994 (Kalb *et al.* 2000: 282).

Materials and Methods

Twenty-two specimens of *Bacidia brandii* and selected specimens of *B. arnoldiana* Körb., *B. caligans* (Nyl.) A.L. Sm., *B. chloroticula* (Nyl.) A.L. Sm., *B. egenula* (Nyl.) Arnold, *B. neosquamulosa* Aptroot & van Herk, *B. saxenii* Erichsen, *B. viridescens* (A. Massal.) Norman and '*Bacidina*' *etayana* (van den Boom & Vězda) van den Boom & Vězda, were investigated. Measurements of ascospores and conidia were made in 10% KOH. Sections were mounted in KOH, water or lactophenol cotton-blue (LCB) and examined by means of standard light microscopic techniques.

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0024–2829/02/040327+06 $35.00/0

A distribution map (Fig. 1) with the known localities in the Netherlands and the single locality in Belgium is provided.

The Species

Bacidia brandii Coppins & van den Boom sp. nov.

Bacidia arnoldiana Körb. similis sed apotheciis parvioribus et congestibus, excipulo et hymenio angustiore, ascosporis brevioribus et thallo non-blastidiatiore differt; *B. saxenii* similis sed hypothecio rufobrunneo (K fuscescenti) differt. Thallus areolis parvis dispersis vel confluentibus compositus. Apothecia 0·05–0·5 mm diam., disco pallide vel obscure rufobrunneo, margine pallidiore. Excipulum hyalinum, lateraliter superne plectenchymaticum, in parte basali cellulis subglobosis 6–10 µm latis. Hymenium 30–40 µm altum, hyalinum. Ascosporae aciculares, 24–31 × 1–1·3 µm, 0–3-septatae.

Typus: The Netherlands; prov. Utrecht, SW of Baarn, Pluismeer, on rotting *Pinus* stump among grassy vegetation, 1 May 1994, *P. van den Boom* 15418 (E—holotypus; hb. van den Boom—isotypus); *ibid.*, 11 March 1996, *B.J. Coppins & A. Aptroot* [39086] (E, hb. Aptroot—topotypi).

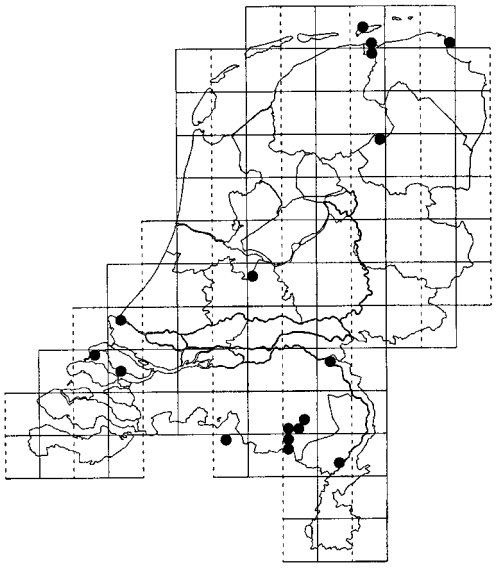

FIG. 1. Distribution of *Bacidia brandii* in the Netherlands and Belgium. One dot in the Netherlands represents a grid of 5 × 5 km square and sometimes represents more than one locality.

Thallus effuse, episubstratal, composed of scattered to usually confluent areoles. Areoles convex, *c.* 0·15–0·3 mm diam., greenish grey or pale brown-grey, matt to slightly shiny; in sections ecorticate. *Photobiont* cells 7–14 µm diam.

Apothecia numerous, dispersed over thallus surface to crowded, sessile and adpressed, 0·05–0·5 mm diam.; disc flat to soon convex, pale red-brown becoming dark red-brown, surrounded by a paler margin. *Exciple* 24–40 µm wide, hyaline, lumina of cells to 6–10 µm wide. *Hymenium* 30–40 µm tall, hyaline; epithecium hyaline, K−. *Hypothecium* dark reddish brown, K+ dull fuscous brown. *Paraphyses* few, simple, 1·5–2 µm wide (at mid-hymenium, in K); apices clavate-capitate, to 5 µm wide, hyaline. *Asci* 30–35 × 5–7 µm, cylindrical to slightly clavate, ± *Lecanora*-type; apex with broad apical cushion (axial body). *Ascospores* acicular, straight, or mostly slightly curved, 24–31 × 1–1·3 µm, 0–3-septate. *Pycnidia* (few seen), whitish, ± immersed in the thallus, wall hyaline; conidia filiform, curved, 23–30 × 0·8–1 µm, appearing to be thinly 3-septate in LCB.

Chemistry. Not examined by TLC. Hypothecial pigment: Arnoldiana-brown of Meyer & Printzen (2000).

Etymology. Bacidia brandii is named in honour of our friend Maarten Brand (Leiden) who was the first collector of this species, and for his most outstanding contribution to the knowledge of Dutch lichenology.

Distribution and ecology. In the Netherlands, *Bacidia brandii* was initially found in maritime regions, from north-eastern to south-western coastal areas. More recently, specimens (including the type-collection) have been collected from inland localities (Fig. 1). In Belgium, *B. brandii* was found on sandy soil of a grave, in the northern part of the country. The French record is from a coastal area. Several collections are terricolous, usually over moribund bryophytes, but also on various debris, mostly on calcareous sandy soil. Four of the terricolous collections have no associated species, but three of the coastal collections were found

growing close to *Bacidia egenula*, *B. saxenii* and weakly developed *Cladonia* spp. In one terricolous collection a small piece of *Xanthoria parietina* was found. In another (*v.d. Boom* 15058), *B. brandii* was growing on bare sandy soil, the only accompanying species among abundant *Trapeliopsis gelatinosa*. It has also been found on brick, among grass on shell-rich, sandy soil (*Brand* 11468) without associated species. Two of the most extensive populations were found in the province of Noord-Brabant, but in a somewhat poorer condition than the type-specimen. The specimen *van den Boom* 7215 was found on a large, decaying unidentified stump, on which apothecia were very abundant and mostly crowded with a less developed thallus and without accompanying species. The population at the Strabrechtsche Heide, on several *Betula* stumps, was also extensive and accompanying species included the dominating *B. chloroticula* in association with *Lecania cyrtella* and, on one occasion, *Lecanora dispersa*. *Lecania cyrtella*, which is normally corticolous, was also abundantly present and easily mistaken for *B. brandii* in this situation. The type collection was growing on rotting wood of a stump, with *Lecanora saligna* and *Placynthiella icmalea* as the only associated species. Several of the neighbouring stumps in the heath vegetation were examined in an unsuccessful attempt to find more *Bacidia* material. Most of these stumps had a luxuriant cover of *Cladonia* species, such as *C. coccifera* s. lat., *C. digitata*, *C. glauca*, *C. incrassata* (abundant), *C. ochrochlora*, *C. polydactyla*, and *C. sulphurina* (the last is only rarely reported in the Netherlands).

Discussion. The diagnostic features of *Bacidia brandii* and some similar species are summarized in Table 1. Anatomically, *B. brandii* seems to be very close to *B. chloroticula* and *B. saxenii* (spore size, ascus size, hymenium height and apothecium size). Its exciple cells are rather large [and they ± separate in K], and are more like those of *B. saxenii* than *B. chloroticula*. It differs from both in the orange/reddish brown (K+ fuscous brown or olivaceous) pigmentation (Arnoldiana-brown) in the hypothecium. It further differs from *B. saxenii* in the complete absence of purplish or greenish brown pigments in the hymenium and parathecial crown [although ± pigment-deficient forms of *B. saxenii* are sometimes encountered].

In habit, the apothecia of *Bacidia brandii* resemble those of a small or immature form of *B. arnoldiana*, which has identical pigmentation, but the apothecia of the latter species are much larger and are not as abundantly produced and crowded as those of *B. brandii.* Furthermore, *B. arnoldiana* has a broader exciple (45–60 vs. 24–40 μm), a taller hymenium, larger asci (7–9·5 vs. 5–7 μm wide), longer spores [(19–)24–46 vs. 24–32 μm], and more numerous paraphyses, all in combination with a 'sorediose' thallus that is largely dissolved into 20–50 μm diam. goniocysts.

Bacidia brandii can also be confused with *B. egenula*, which also has Arnoldiana-brown in the hypothecium, and the two species have been found growing together on the same substratum. However, *B. egenula* often has apothecia with a pale to dark olivaceous to blue-green epithecial pigment (Bagliettoana-green; Meyer & Printzen 2000) that reacts N+ violet with the production, after a few minutes, of blue crystals (Purvis *et al*. 1992), and, like *B. arnoldiana*, its thallus is largely dissolved into goniocysts.

Similarly, *Bacidia brandii* could also be overlooked for *B. viridescens*, because the latter species is mostly found on soil, on bryophytes and plant debris and its apothecia are sometimes pale brown when the green epithecial pigmentation is poorly developed. *B. viridescens* can, however, be distinguished by its hyaline hypothecium, and purplish brown (sometimes also greenish) pigmentation in the upper exciple (parathecial crown).

The thallus of '*Bacidina*' *etayana* can be somewhat similar to that of *Bacidia brandii*, including the colour; however the apothecia of *Bn. etayana* are bright brown (disc) to almost black (margin), the apothecia are much smaller and the hypothecium is

TABLE 1. *Main diagnostic features for* Bacidia brandii *and similar species*

Species	*B. brandii*	*B. arnoldiana*	*B. chloroticula*	*B. egenula*	*Bn. etayana*	*B. neosquamulosa*	*B. saxenii*
Thallus							
Morphology	Granular-areolate	Sorediose (goniocysts)	Thin, scurfy	Sorediose (goniocysts)	Sorediose (goniocysts)	Granular micro-squamulose	Thin, scurfy
Diam. of granules, areoles or micro-squamules (μm)	150–300	20–40 (50)	—	15–60 (90)	*c.* 30	Granules 50–100; microsquamules to 400	—
Apothecia							
Diam. (mm)	0·05–0·5	0·3–0·7 (1·2)	0·08–0·2	(0·15) 0·3–0·6 (0·75)	0·1–0·12	0·2–1·0	0·1–0·3 (0·45)
Colour	Pale red-brown to red-brown	Pale grey to grey-brown	Pinkish to pale grey-brown	Grey-brown, blue-grey to black	Bright brown	Pinkish buff to flesh coloured, p.p. ± smoky black	Pale grey-brown to dark brown
Margin	Paler than disc	Paler than disc, ± white pruinose	Concolorous or paler than disc	Darker than disc	Darker than disc	Usually paler than disc adjacent to disc, but dark grey or brown on upper lateral side	Concolorous or paler than disc
Hypothecium	Reddish brown	Reddish brown	Hyaline	Reddish brown	Hyaline	Hyaline	Hyaline
Epithecium/ upper hymenium	Hyaline	Hyaline	Hyaline	Pale olivaceous to blue-green	Hyaline to pale brown	Hyaline or p.p. smoky brown	Hyaline to pale brownish or olivaceous
Upper outer exciple	Hyaline	Hyaline	Hyaline	Olive-brown	Dark olivaceous to brownish	Dark brown	Hyaline to dark brown
Width of exciple cells (μm)	6–10	3–7	3–5 (–7)	3–7 (–10)	4–5	4–8	5–12 (–20)
Hymenium (μm)	30–40	45–60	35–42	35–55	25–30	40–55 (–60)	40–45
Paraphyses	Few	Numerous	Few	Numerous	Few	Numerous	Few

hyaline. *Bn. etayana* is still known only from the type locality from wood of a fence post (van den Boom & Vězda 1996).

If well developed, *Bacidia neosquamulosa* is very different from *B. brandii* in habit, because of its thallus of granulose microsquamules; however, several specimens have a reduced thallus and so could be mistaken for *B. brandii*. Moreover, the apothecia of *B. neosquamulosa* are sometimes similar to those of *B. brandii*, particularly the pinkish buff to flesh-coloured form, but they always have a hyaline hypothecium. Although *B. neosquamulosa* was originally mentioned only from bark of tree trunks (Aptroot & van Herk 1999), it has since been found in the Netherlands on rotting stumps, and in one locality (Leenderstrijp) both species were growing close together on a fallen branch of *Picea*.

Although not yet found in Belgium or Luxemburg and rarely found in the Netherlands, *Lecania subfuscula* (Nyl.) S. Ekman [syn. *Bacidia subfuscula* (Nyl.) Th. Fr.] resembles *B. brandii* and grows in similar habitats, but has a hyaline hypothecium and broader, narrowly fusiform to ± bacilliform ascospores (Purvis *et al.* 1992: 112).

In two previously published reports, *B. brandii* was included in *B. saxenii* (van den Boom 1994; van den Boom & Vězda 1995); both collections were terricolous on sandy soil and on plant debris.

Only one specimen has been observed with a lichenicolous fungus. On the thallus of the collection *Brand* 10901 from the province Zuid-Holland, most probably an undescribed taxon of *Neocoleroa* was found.

Additional specimens examined. **The Netherlands:** *Groningen*: N of Delfzijl, Bierum, on dike, on plant debris, 1981, *A.M. Brand* 10169 (hb. Brand); Lauwerszeepolder, Ballastplaat, sandy soil with shells, on and among mosses, 1981, *A.M. Brand* 10411B (hb. Brand); Lauwerszeepolder, Marnebos, calcareous sandy soil, on herbaceous stems and sandy soil, 1982, *A.M. Brand* 11016B & *H. Sipman* 16952 (B, hb. Brand, hb. Aptroot); Lauwerszeepolder, Schildhoek, bank of Zoutkamperril, open place among *Phragmites*, on calcareous sandy soil, 1982, *A.M. Brand* 10990 (hb. Brand); *ibid.*, 1983, *A. Aptroot* 11476 (hb. Aptroot). *Friesland*: Schiermonnikoog, Prins Bernhardweg, dune area with open mossy places, 1996, *P. v.d. Boom* 18157 (hb. v.d. Boom); Appelscha, Aekingerzand, *Calluna* heathland, on stump, 2000, *P. & B. v.d. Boom* 25346 (hb. v.d. Boom). *Zuid-Holland*: Hoek van Holland, WNW of Semaphoer, edge of dune area, terricolous on plant debris, 1988, *A.M. Brand* 17694 (hb. Brand); Overflakkee, Nieuwe Tonge, bank of Grevelingen, on brick on soil, 1982, *A.M. Brand* 11468 (hb. Brand); Grevelingen, Hompelvoet, open pioneer vegetation, on dead mosses, 1981, *A.M. Brand* 10901 (hb. Brand). *Noord-Brabant*: Cuijk, centre, old church and churchyard, on sandy soil, 1993, *P. v.d. Boom* 15058 (hb. v.d. Boom); Someren, NNW of Lierop, Hersel, on decaying stump in *Pinus* plantation, 1988, *P. v.d. Boom* 7215 (E, hb. v.d. Boom); Leende, Leenderstrijp, *Picea* forest, on fallen branch of *Picea*, *P. v.d. Boom* 24565 (hb. v.d. Boom); Heeze, Heezerven, *Calluna* heathland, on stump, 2001, *P. v.d. Boom* 26650 (hb. v.d. Boom); Eindhoven, Kanunnikesven, *Calluna* heathland, on stump, 2001, *P. & B. v.d. Boom* 25592 (hb. v.d. Boom); Heeze, Valkenhorst, *Calluna* heathland, on stump, *P. v.d. Boom* 27861 (hb. v.d. Boom); Heeze, Strabrechtsche Heide, open *Calluna* heathland with many *Betula* and *Pinus* stumps, on big high *Betula* stump, 2001, *P. & B. v.d. Boom* 28127, 28141 (hb. v.d. Boom); ibid., on small *Betula* stump, *P. & B. v.d. Boom* 28145 (hb. v.d. Boom). *Zuid-Limburg*: Roermond, Horn, Fransche Berg, *Calluna* heathland, on stump, 2001, *P. & B. v.d. Boom* 25579 (hb. v.d. Boom).—**Belgium:** *Antwerpen*: Turnhout, old churchyard with high brick wall and many old gravestones, terricolous on sandy soil, 1993, *P. v.d. Boom* 15045 (hb. v.d. Boom).—**France:** *Brittany*: dept. Côtes-du-Nord, WSW of St Malo, Le Guildo, near ruins of castle, steep side of hollow path, 1999, *A.M. Brand* 38860 (hb. Brand).—**Lithuania:** Viešvilé Strict Nature Reserve, forest area No. 67, on bases of dead branches of *Rubus* sp., 1999, *G. Adamonyté* 5254 (BILAS, E).

The authors are grateful to Dr A. Aptroot and Mr Maarten Brand for loan of their specimens, to Dr Jurga Motiejūnaité for sending material from Lithuania, and to Drs Emmanuël Sérusiaux and Stefan Ekman for helpful discussions.

References

Aptroot, A. & van Herk, C. M. (1999) *Bacidia neosquuamulosa*, a new and rapidly spreading corticolous lichen species from western Europe. *Lichenologist* **31:** 121–127.

Ekman, S. (1996) The corticolous and lignicolous species of *Bacidia* and *Bacidina* in North America. *Opera Botanica* **127:** 1–148.

Ekman, S. (2001) Molecular phylogeny of the Bacidiaceae (Lecanorales, lichenized Ascomycota). *Mycological Research* **105:** 783–797.

Kalb, K., Lücking, R. & Sérusiaux, E. (2000) Studies in *Bacidia* sensu lato (lichenized ascomycetes: Lecanorales) I. The genus *Bapalmuia*. *Mycotaxon* **75:** 281–309.

Meyer, B. & Printzen, C. (2000) Proposal for a standardized nomenclature and characterization of insoluble lichen pigments. *Lichenologist* **32:** 571–583.

Purvis, O. W., Coppins, B. J., Hawksworth, D. L., James, P. W. & Moore, D. M. (1992) *The Lichen Flora of Great Britain and Ireland*. London: Natural History Museum Publications.

van den Boom, P. P. G. (1994) De lichenologische voorjaarsexcursie van 1993 naar Noord-Brabant, met gegevens over aangrenzend België. *Buxbaumiella* **35:** 30–47.

van den Boom, P. P. G. & Vězda, A. (1995) A new species and a new variety of the lichen genus *Gyalidea* from western Europe. *Mycotaxon* **54:** 421–426.

van den Boom, P. P. G. & Vězda, A. (1996) *Woessia etayana* sp. nov., a lichen species from the western Pyrenees. *Herzogia* **12:** 31–34.

Vězda, A. (1990) *Bacidina* genus novum familiae Lecideaceae s. lat. (Ascomycetes lichenisati). *Folia Geobotanica et Phytotaxonomica, Praha* **25:** 435–436.

Accepted for publication 24 *May* 2001