

## *Lecania belgica* van den Boom & Reese Næsborg, a new saxicolous lichen species from western Europe

Rikke REESE NÆSBORG and Pieter P. G. VAN DEN BOOM

**Abstract:** A new species, *Lecania belgica*, is described and illustrated. It is a saxicolous lichen known only from the type locality in Belgium. It is characterized by apothecia with pruinose, irregularly undulating discs, relatively short ascospores, and by having 12–16 spores in the asci. It was found on mortar together with *Diplotomma alboatrum*.

**Key words:** Belgium, ecology, saxicolous, species nova, taxonomy.

### Introduction

*Lecania* A. Massal. is a medium-sized genus comprising *c.* 40 species, found mainly in temperate areas (Kirk *et al.* 2001). The genus belongs in the *Ramalinaceae* C. Agardh (Eriksson 2006), and includes both saxicolous, corticolous, and lignicolous species. The genus has been circumscribed mainly on the basis of a rather simple set of morphological characters, i.e. a crustose habit, lecanorine apothecia, septate ascospores, and a *Bacidia*-/*Biatora*-type ascus apex. A recent study of its phylogeny has shown that a large proportion of the species traditionally included in *Lecania* form a monophyletic group with high support, i.e. *Lecania* s. str. (Reese Næsborg *et al.* 2007).

During field studies on lichens and lichenicolous fungi in Belgium by the second author a very inconspicuous specimen was collected. The specimen was believed to belong in *Lecania*, and the combination of relatively short ascospores and possession of 12–16 spores per ascus rendered the discovery of a new species likely, since asci con-

taining more than 8 spores are uncommon in the genus. The specimen was included in a study on the phylogeny of *Lecania* and related genera as *Lecania* sp. 1 (Reese Næsborg *et al.* 2007). It was shown that the species was nested within *Lecania* s. str. with high support, and that *L. atrynoides* M. Knowles, *L. turicensis* (Hepp) Müll. Arg. and *L. inundata* (Hepp ex Körb.) M. Mayrhofer were the closest relatives. The new species possesses unique sequence fragments in mt-SSU and several unique base-pair substitutions in ITS which distinguish it from the closest relatives and the rest of the genus. The alignments are available on TreeBase ([www.treebase.org/treebase](http://www.treebase.org/treebase)), matrix accession number M3074.

### Materials and Methods

Morphological and anatomical observations were made using standard microscopic techniques. Microscopical measurements were made on hand-cut sections or squash preparations mounted in deionized water. The number of observations is recorded in square parentheses after the given measurements. The ascus apices were studied in an iodine solution (I) after pre-treatment with KOH (K).

### The Species

#### *Lecania belgica* van den Boom & Reese Næsborg sp. nov.

Thallus saxicola, calcicola, crustaceus, areolatus-rimosus, griseus, chondroideus, verrucosus-papillosus;

R. Reese Næsborg: Systematic Botany, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, SE-752 36 Uppsala, Sweden. Email: Rikke.Reese-Naesborg@ebc.uu.se

P. P. G. van den Boom: Arafura 16, 5691 JA, Son, the Netherlands.

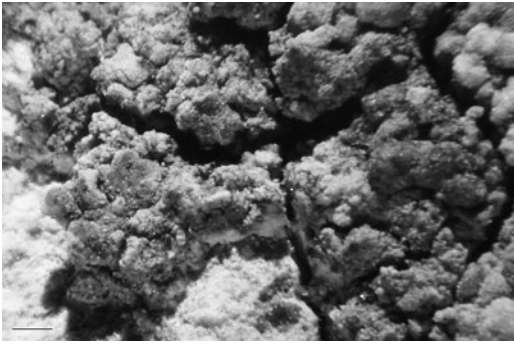


FIG. 1. *Lecania belgica*, habitus (part of holotype), showing the areolate thallus with pruinose, undulating apothecia. Scale=0.5 mm.

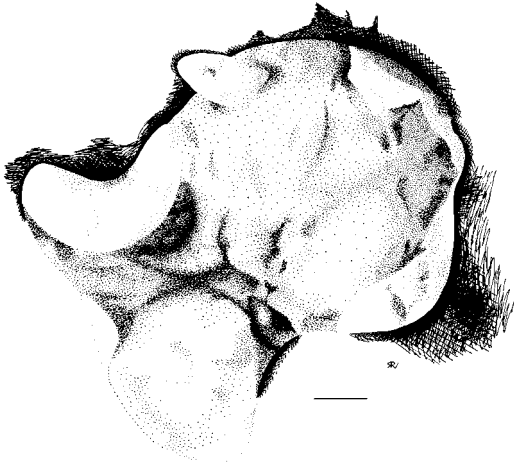


FIG. 2. *Lecania belgica*, undulating apothecium depicted in the bottom left corner of Fig. 1 (holotype). Scale=0.1 mm.

apothecia immersa, discus brunneus, pruinosis, planus-undulatus; margo crenulatus, griseus, persistens; asci 12–16 spori; ascosporae uniseptatae, oblongae-ellipsoidae,  $8\text{--}10 \times 4\text{--}5.5 \mu\text{m}$ . Similis *Lecaniae fructigenae* et *L. inundatae*, sed differt apothecii pruinosis, et ascosporis brevioribus.

Typus: Belgium, Luxembourg, WNW of Arlon, Habay-la-Vieille, Chât. de la Trapperie, shaded wall, N exposed, on vertical surface,  $49^{\circ}43'7''\text{N}$ ,  $5^{\circ}37'8''\text{E}$ , 300 m alt., 1 May 2003, P. & B. van den Boom 30770 (UPS—holotypus, hb. v.d. Boom—isotypus).

(Figs 1–3)

*Thallus* up to 0.8 (–1) mm thick [5], weakly areolate to rimose, usually uniformly

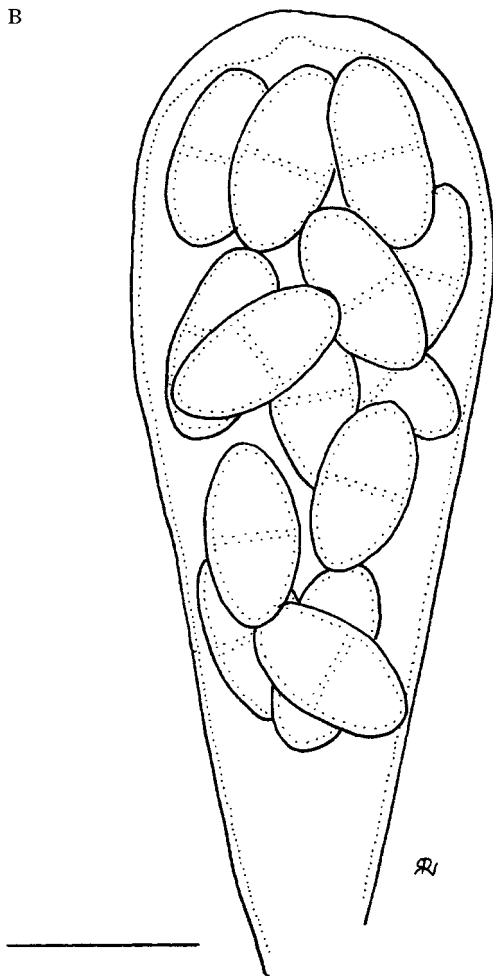
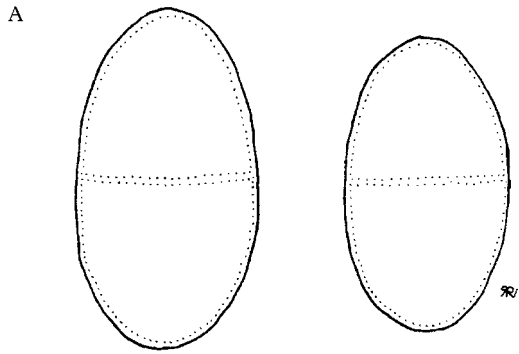


FIG. 3. *Lecania belgica*. A, spores; B, spores in ascus. Scales: A=5  $\mu\text{m}$ ; B=10  $\mu\text{m}$ .

compact with no individual nodules present; chondroid and easily broken when dry, but very soft when wet; hypothallus absent; areoles usually angular, closely grouped, up to 1 mm wide, often covered by subglobose warts or papillae with a slightly pruinose, matt surface, whitish grey or darker brownish grey, not discoloured or translucent when wet; cortex not well developed, but corticoid structures, formed by chondroid tissue, sometimes present; occasionally a very thin epinecral layer; algal layer/medulla formed by loosely interwoven hyphae, filled with oxalate crystals. *Photobiont* trebouxoid, 8–18 µm diam.

*Apothecia* 0.15–0.8 mm diam. [10], adnate to immersed in thallus warts, occasionally slightly sessile, scattered or more often clustered in small groups, strongly deformed, especially when mature, causing a characteristic undulating apothecium disc (see Fig. 2); disc flat to moderately convex, pale brown (young apothecia), orange-brown, red-brown to dark brown, usually white-pruinose; translucent red-brown with dark pigment spots when wet. *Thalline margin* always present, pale grey, dark grey, pale brownish, usually white-pruinose; rather thin to slightly swollen in young apothecia but becoming well developed in mature apothecia (to 0.1 mm wide); slightly raised, usually irregularly crenulate; with an algal-rich inner part and a narrow algal-free non-corticated zone; *proper exciple* sometimes present, the outer cell walls may be concolorous with the epihymenium. *Hypothecium* to 70 µm high, hyaline or rarely very pale yellowish, the hyphae intricate. *Hymenium* 30–50 µm [8], hyaline or with pale red-brown pigmentation extending from the epihymenium; *epihymenium* hyaline to pale red-brown; *episamma* scarcely present, slightly yellow or pale brown. *Paraphyses* 2–2.5(–3) µm wide [5], somewhat conglutinated, septation ± visible, occasionally dichotomously branched in the upper part, the terminal cells are usually only slightly swollen but some are strongly swollen (to 5 µm wide), apical cell slightly yellowish to pale red-brown. *Asci* ± narrowly clavate, 30–45 × 12 µm [5], (8–)12–16

spores per ascus, ascus apex with a ± conical axial body that does not reach through the amyloid layer to the wall at the tip of the ascus, and with a darker zone surrounding the conical axial body (*Biatora*-type apex). *Ascospores* 1-septate, oblong to broadly ellipsoid, straight, hyaline, 8–10(–12) × 4–5.5 (–6) µm [35].

*Pycnidia* not seen.

*Chemistry.* All spot-tests negative. No chemical compounds are known from *Lecania* s. str. with the exception of a few unidentified triterpenes in *L. aipospila* (van den Boom & Brand 2005). Triterpenes were not detected in *L. belgica*.

*Etymology.* The epithet 'belgica' refers to the country Belgium, where the specimen was collected.

*Distribution and ecology.* *Lecania belgica* has so far been found only at the type locality. It was growing on mortar on a long, high, old castle wall in a shaded, N-facing, and rather sheltered location along an unpaved path. It was found among *Diplotomma alboatrum* (Hoffm.) Flot., the only accompanying species. In most floras *D. alboatrum* is referred to as growing in well-lit habitats. However, in Western Europe (Belgium and Netherlands) it is often found on shaded, N-exposed, and sometimes sheltered vertical walls. The lichen flora of Belgium is well known since lichenologists have worked extensively in the area for the last 30 years, including emphasis on *Lecania* (van den Boom 1992; Diederich & Sérusiaux 2000). It is thus likely that the new species is very rare.

*Characterization.* Thallus areolate, chondroid and covered with subglobose to elongate warts or papillae. Apothecia immersed, orange-brown to dark brown, pruinose, often with an irregularly undulating disc, 0.15–0.8 mm. The margin is grey, crenulate, and contains algal cells. Hymenium hyaline to pale red-brown, 30–50 µm high. Spores 12–16 per ascus,

oblong to broadly ellipsoid, 1-septate, 8–10 × 4–5.5 µm.

### Discussion

*Lecania belgica* is a distinct species and can be separated from other *Lecania* species on the basis of morphological and anatomical characters. Furthermore, molecular evidence clearly shows that it is a unique species nested within *Lecania* s. str. (Reese Næsborg *et al.* 2007).

In the field *L. belgica* is easily mistaken for *Diplotomma alboatrum* since both have pruinose, immersed apothecia and thalli that are somewhat similar in colour. However, they can be distinguished by the different colour of the apothecial disc; brownish in *L. belgica* and black in *D. alboatrum*. The community where *L. belgica* was found was dominated by *D. alboatrum* and the new species was scarce. Despite a thorough search no more than *c.* 25 apothecia of *L. belgica* were recovered. Although *L. belgica* and *D. alboatrum* were growing very close to each other, there was no indication even in early stages of growth that the new *Lecania* is lichenicolous on *D. alboatrum*.

*Lecania belgica* is somewhat similar to *L. fructigena* Zahlbr., which also has an areolate–papillate thallus, but the latter differs in having paraplectenchymatous tissue in the thallus, usually non-pruinose apothecia, longer spores (10–16 µm), 8 spores per ascus, and numerous pycnidia. *Lecania fructigena* is known mainly from coastal areas, but is also found in inland localities. For more information on this species, see van den Boom & Brand (2005) and van den Boom & Ryan (2004).

According to their phylogeny, the closest relatives of *Lecania belgica* are *L. inundata*, *L. turicensis* and *L. atrynoides* (Reese Næsborg *et al.* 2007). *Lecania inundata* is somewhat similar to the new species, but has a thinner, more yellowish grey thallus, adnate to sessile apothecia that are usually non-pruinose, 8 spores per ascus, and longer spores (11–18 µm). *Lecania turicensis* also has pruinose apothecia, but it differs in having a thin granular, areolate thallus, sessile, crowded

apothecia, a thalline margin that often becomes excluded, 8 spores per ascus, and longer spores (10–13 µm). *Lecania atrynoides* is found on acidic rocks in the xeric-supralittoral zone. It has sessile, non-pruinose apothecia, which are often crowded, 8 spores per ascus, and longer spores (9–14 µm).

*Lecania rabenhorstii* (Hepp) Arnold resembles the closely related group consisting of *L. inundata*, *L. turicensis*, *L. atrynoides*, and *L. belgica* morphologically. However, it can be distinguished from *L. belgica* by its yellowish grey to brownish grey thallus consisting of angular areoles, sessile, non-pruinose apothecia that are often numerous, longer spores (9–16 µm), and by 8 spores per ascus. More information on *L. inundata*, *L. turicensis*, *L. atrynoides*, and *L. rabenhorstii* can be found in Mayrhofer (1988) and van den Boom (1992).

The very rare *L. insularis* (Hepp ex Arnold) M. Mayrhofer is another saxicolous *Lecania* species with up to 16 spores per ascus, but this species, which is known from calcareous rock, has much longer spores (12–17 µm) that are occasionally 2-septate, and an endolithic thallus. For more information on *L. insularis* see Mayrhofer (1988). Two other *Lecania* species found in Europe have up to 16 spores per ascus, but both of these are corticolous. One is *Lecania fuscella* (Schaer.) A. Massal. which has longer (12–22 µm), 3-septate spores and more uniform apothecia than *L. belgica*, and the other is *Lecania sambucina* (Körb.) Arnold which has longer spores (10–16 µm) and a thinner thalline margin. More information on these species can be found in James & Purvis (1992) and Reese Næsborg (2008) respectively.

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