

A new species of *Lecanactis* (Arthoniales, Roccellaceae) from Madagascar

Damien ERTZ and Emmanuël SÉRUSIAUX

Abstract: *Lecanactis rubra* is described as new to science. It is characterized by having rounded to irregular or lirellate ascomata, relatively wide 3-septate ascospores and by the production of gyrophoric acid and an anthraquinone. The species is known only from the type locality in the deciduous dry forests in the western part of Madagascar.

Key words: *Lecanactis rubra*, anthraquinone, taxonomy

Introduction

Since the monograph of Egea & Torrente (1994), only two new species have been described in the lichen genus *Lecanactis*: *L. olivascens* Egea, Sérus. & Torrente from Papua New Guinea (Egea *et al.* 1996) and *L. canariensis* van den Boom from Fuerteventura in the Canary Islands (van den Boom & Etayo 2006). A total of 25 species is currently accepted in the genus. Phylogenetic analyses performed on 24 species in the genus using morphological, anatomical and chemical data supported *Lecanactis* as monophyletic (Tehler & Egea 1997) but molecular data are very much needed to phylogenetically assess the generic delimitation within the *Roccellaceae* as a whole (Myllys *et al.* 1999; Tehler & Irested 2007; Ertz *et al.*, 2009).

In Madagascar, *Lecanactis* is represented only by a single record of *Lecanactis* aff. *spermatospora* (Egea & Torrente 1994). During a field trip by the second author to the island in 2003, an interesting species of *Lecanactis* containing red crystals in the excipulum

was collected. It is new to science and is described here.

Material and Methods

Microscopical examination was done using hand-cut sections mounted in water, 5% KOH (K), or Lugol's reagent (1% I₂) without (I) or with KOH pre-treatment (K/I). Measurements and drawings of asci and ascospores all refer to material examined in KOH. Drawings were prepared using a drawing tube. Ascospore measurements are recorded as (minimum–) $\bar{x} - \sigma_x - \bar{x} + \sigma_x$ (–maximum), all values are rounded to the nearest multiple of 0.5 μm , followed by the number of measurements (*n*); the length/breadth ratio of the ascospores is indicated as l/b and given in the same way. For the other characters, the minimum and the maximum values are given and are based on the examination of at least three different ascomata.

Additional specimens examined for comparison included *Lecanactis elaeocarpa* (Nyl.) Tehler (lectotype, H-Nyl 4852) and *L. latispora* Egea & Torrente (holotype and Tibell 11158, UPS).

Thin-layer chromatography (TLC) of acetone extracts was performed in solvent systems EA and G on silica gel 60 F₂₅₄ layer 20 × 20 cm glass plates; 10% sulphuric acid was used as a reagent for the visualization of the spots (Orange *et al.* 2001).

The Species

***Lecanactis rubra* Ertz & Sérus. sp. nov.**

Mycobank No.: MB 512674

Thallus crustaceus, ecorticatus. Alga ad Trentepohliam pertinens. Ascomata rotundata vel lirellata,

D. Ertz: National Botanical Garden, Domaine de Bouchout, B-1860 Meise, Belgium. Email: damien.ertz@br.fgov.be

E. Sérusiaux: Plant Taxonomy and Conservation Biology, University of Liège, Sart Tilman B22, B-4000 Liège, Belgium.

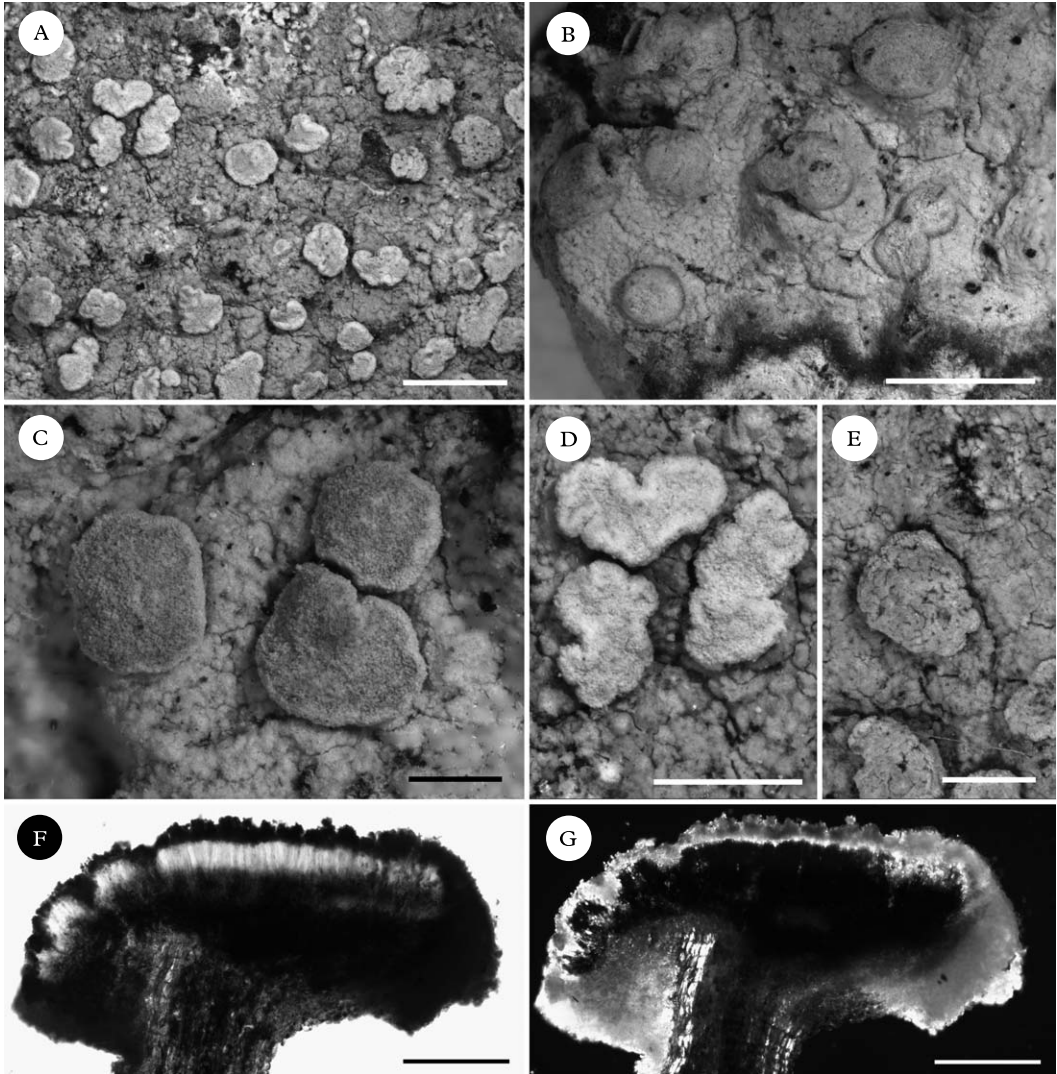


FIG. 1. *Lecanactis rubra* (holotype). A–E, thallus and apothecia; F, section through apothecium mounted in water; G, same section, viewed in polarized light. Scales: A & B = 2 mm; C = 0.5 mm; D & E = 1 mm; F & G = 0.2 mm.

sessilia, 0.5–1.5 mm in diametro, disco albo-pruinoso. Excipulum hyalinum vel pallide brunneum, textura intricata, crystalli rubra et K+ purpurea continentia; hymenium I+ rubrum, 75–100 μm crassum; subhymenium I+ perdurante caeruleum. Asci cylindriclavati, octospori, 55–75 μm longi, 12–17 μm lati. Ascospores fusiformes, 3-septatae, hyalinae, (20.5–)22.5–27.0(–30) μm longi, (5–)5.5–6.0(–7) μm lati; perispora ut videtur absentia. Thallus et apothecia acidum gyrophoricum continentia.

Typus: Madagascar, prov. de Mahajanga, Gorge du Marambolo, 3 km en amont de Bekopaka, rive droite,

forêt sèche sur calcaires, 300 m alt., August 2003, E. Sérusiaux (LG—holotypus; BR & TAN—isotypi).

(Figs 1 & 2)

Thallus verrucose, mat, continuous or rimose, pale cream, 50–115 μm thick, ecorticate; hyphae 2–3 μm diam., interspersed with numerous crystals dissolving in K. *Photobiont* *Trentepohlia*; cells (7–)10–17(–21) μm .

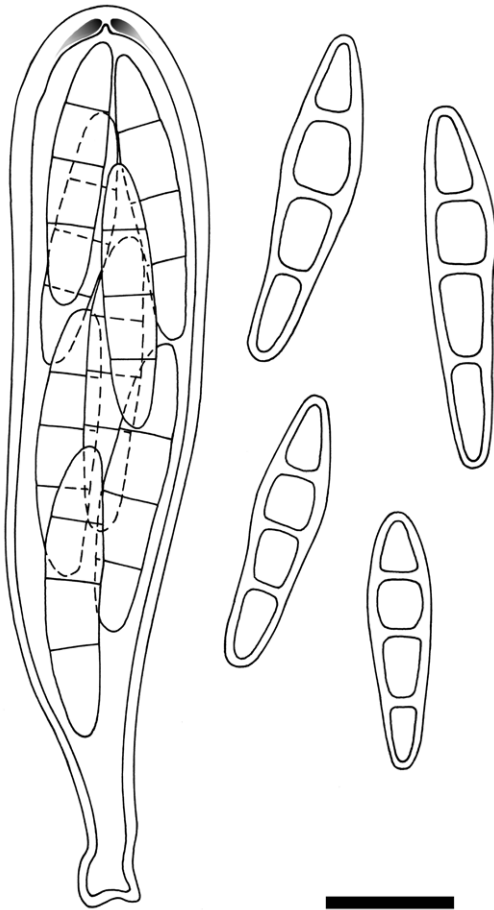


FIG. 2. *Lecanactis rubra* (holotype), ascus and ascospores. Scale = 10 μm .

Prothallus dark brown, byssoid, 0.3–0.4 mm wide (Fig. 1 B).

Ascomata sessile, constricted at the base, dispersed, single or in groups of 2, rounded (Fig. 1 A–C), slightly to strongly lobate, sometimes lirelliform (Fig. 1D) or rarely ‘cerebriform’ (Fig. 1A & E), with a flat hymenial disc covered by a dense layer of white pruina, sometimes with an orange tinge, (0.3–)0.5–1.5 mm diam. *Excipulum* hyaline to pale brown and 45–50 μm thick on sides of apothecia, dark brown, K+ olivaceous and 75–100 μm thick below the hymenium, of *textura intricata*, with hyphae 2–3 μm thick, strongly interspersed with reddish, K+ purple crystals 0.5–6 μm diam., and

covered by a thick layer of white pruina (Fig. 1G); pruina covering the excipulum composed of hyaline, very irregular crystals of 0.5–5 μm diam., not dissolving in K. *Hymenium* hyaline or orange in parts, not interspersed with oil droplets, 75–100 μm ; hymenial gel I+ red, except the subhymenium I+ blue, K/I+ blue; epihymenium hyaline, I+ red, K–, covered by a dense layer of crystals, not or only a part dissolving in K (Fig. 1G). *Paraphyses* branched, especially in the epihymenium, anastomosing, 1–2 μm , apically slightly enlarged to 3–4 μm , not distinctly pigmented but wall covered by crystals dissolving in K. *Asci* clavate to cylindrical, 8-spored, 55–75 \times 12–17 μm , K/I–, except for a distinct K/I+ blue apical ring surrounding a small ocular chamber (Fig. 2) and a K/I+ blue endoascus, more strongly coloured in young asci. *Ascospores* fusiform, 3-septate, with ontogeny starting with a median septum, straight or very slightly curved, not constricted at septa, with the two middle cells squared or rectangular, one of the middle cells sometimes slightly wider, the end cells usually elongate-triangular, (20.5–)22.5–27.0(–30) \times (5–)5.5–6.0(–7) μm , l/b ratio 3.8–4.8 ($n=50$), becoming evenly dark brown when very over-mature; perispore indistinct or absent (Fig. 2).

Pycnidia not observed.

Chemistry. Thallus K–, C+ red fleeting, P–, UV+ pale. Apothecia C+ red fleeting (especially the margin), K+ red, P–. TLC: gyrophoric acid plus an orange spot in daylight becoming pale greyish to almost hyaline after application of 10% sulphuric acid and heating, with relative Rf values in solvent G of 59 (anthraquinone).

Distribution and ecology. *Lecanactis rubra* is known only from the type collection in western Madagascar. The new species grows on bark and was found to be common in a dry deciduous forest on calcareous soil at 300 m of altitude, but only a single but representative collection was taken for documentation.

Notes. In the identification keys to genera of *Arthoniales* by Egea & Torrente (1994) and Grube (1998), the new taxon keys out in the genus *Lecanactis*. The new species is characterized by rounded to irregular or lirelliform ascomata, relatively wide 3-septate ascospores and by the production of gyrophoric acid and an anthraquinone (numerous red and K⁺ purple crystals in the excipulum). It is the first species of *Lecanactis* known to produce an anthraquinone. The closest species is *L. latispora* Egea & Torrente, known only from Tasmania. This taxon is similar to the new species in the size of its ascomata and ascospores and the production of gyrophoric acid (Egea & Torrente 1994; Kantvilas 2004), however, it differs clearly by having an endophloeodal thallus, mainly rounded ascomata, an almost entirely carbonized excipulum of compact plectenchyma and by the absence of red and K⁺ purple crystals in the excipulum. *Lecanactis elaeocarpa* (Nyl.) Tehler is similar to the new species in having 3-septate ascospores, an excipulum of textura intricata and the production of lecanoric or gyrophoric acid, but it differs clearly by its tomentose, darker and much smaller ascomata (0.4–0.6 mm diam.), the absence of red and K⁺ purple crystals in the excipulum and the narrower ascospores (4.5–5 µm). As the ascomata of the new species are sometimes clearly lirelliform, one might expect that the new species belongs to the genus *Lecanographa*, segregated from the genus *Lecanactis* by Egea & Torrente (1994). However, the ascus type is much closer to the *Abietina*-type and the absence of a perispore also supports the description of the new species in the genus *Lecanactis*. Within the genus *Lecanographa*, *L. subgrumulosa* (Egea, Torrente & Manrique) Egea & Torrente is the only species known to produce an anthraquinone (in the thallus). This species differs by having mainly lirelli-

form ascomata, an I⁺ blue hymenium, shorter ascospores (15–21 µm) surrounded by a thick perispore, a saxicolous habit and by lacking gyrophoric acid. In order to verify that the species has not been described in a completely different genus, we also checked that no other epithet was available for it in the relevant literature, especially amongst the lichens known to occur in Madagascar and East Africa.

REFERENCES

- Egea, J. M. & Torrente, P. (1994) El género de hongos liquenizados *Lecanactis* (Ascomycotina). *Bibliotheca Lichenologica* **54**: 1–205.
- Egea, J. M., Sérusiaux, E. & Torrente, P. (1996) The lichen genus *Lecanactis* and allied genera in Papua New Guinea. *Mycotaxon* **59**: 47–59.
- Ertz, D., Miądlikowska, J., Lutzoni, F., Dessein, S., Raspé, O., Vigneron, N., Hofstetter, V. & Diederich, P. (2009) Towards a new classification of the Arthoniales (Ascomycota) based on a three-gene phylogeny focussing on the genus *Opegrapha*. *Mycological Research* **113**: 141–152.
- Grube, M. (1998) Classification and phylogeny in the Arthoniales (Lichenized Ascomycetes). *Bryologist* **101**: 377–391.
- Kantvilas, G. (2004) A contribution to the Roccellaceae in Tasmania: new species and notes on *Lecanactis* and allied genera. *Symbolae Botanicae Upsalienses* **34**(1): 183–203.
- Myllys, L., Lohtander, K., Källersjö, M. & Tehler, A. (1999) Applicability of ITS data in *Roccellaceae* (Arthoniales, Euascomycetes) phylogeny. *Lichenologist* **31**: 461–476.
- Orange, A., James, P. W. & White, F. J. (2001) *Microchemical Methods for the Identification of Lichens*. London: British Lichen Society.
- Tehler, A. & Egea, J. M. (1997) The phylogeny of *Lecanactis* (*Opegraphaceae*). *Lichenologist* **29**: 397–414.
- Tehler, A. & Irestedt, M. (2007) Parallel evolution of lichen growth forms in the family Roccellaceae (Arthoniales, Ascomycota). *Cladistics* **23**: 1–23.
- van den Boom, P. P. G. & Etayo, J. (2006) New records of lichens and lichenicolous fungi from Fuerteventura (Canary Islands), with descriptions of some new species. *Cryptogamie, Mycologie* **27**: 341–374.

Accepted for publication 19 December 2008