RARE LABOULBENIALES FROM BELGIUM

André De Kesel¹, Cyrille Gerstmans^{1,2} & Danny Haelewaters^{3,4}

¹ Meise Botanic Garden. Nieuwelaan, 38. BE-1860 Meise (Belgium). E-mail: andre.dekesel@botanicgardenmeise.be
² Fédération Wallonie-Bruxelles. Service Général de l'Enseignement supérieur et de la Recherche scientifique. Rue A. Lavallée, 1. BE-1080 Brussels (Belgium).

³ Research Group Mycology, Department of Biology, Ghent University, K.L. Ledeganckstraat 35, 9000 Ghent (Belgium). ⁴ Faculty of Science, University of South Bohemia, Branišovská 31, 370 05 České Budějovice (Czech Republic).

Summary

Since the publication of the *Catalogue of the Laboulbeniomycetes of Belgium*, eleven species were found that represent new records for Belgium. Some of these taxa are rare in Europe. In this paper we present brief descriptions, notes and illustrations of these taxa. Some corrections to the Catalogue are given.

Samenvatting

Na het verschijnen van de Catalogus van Laboulbeniomycetes van België werden er elf soorten gevonden die nieuw zijn voor België. Enkele van deze soorten zijn zeer zeldzaam in Europa. In dit artikel geven we beknopte beschrijvingen, enkele opmerkingen en illustraties van deze taxa. Enkele correcties van de Catalogus worden gegeven.

1. Introduction

Since the publication of the *Catalogue of the Laboulbeniomycetes of Belgium* (De Kesel *et al.* 2020) and the *Checklist of thallus-forming Laboulbeniomycetes from Belgium and the Netherlands* (Haelewaters & De Kesel 2020), continued fieldwork allowed us to find a number of new country records for Belgium. Special attention was given to *Laboulbenia* Mont. & C.P.Robin. from *Bembidion* Latreille, 1802 (Coleoptera, Carabidae), a genus hosting very common as well as lesser known and rare species of *Laboulbenia*.

The Laboulbeniomycetes of Denmark (Santamaria & Pedersen 2021) monograph lists an impressive number of species found in Europe. The cheer amount of material and literature treated in this study resulted in a better understanding of some species that also occur in Belgium. In this paper we can give a number of corrections and updates for the *Catalogue* (De Kesel *et al.* 2020).

2. Materials & methods

Collecting of host insects was done using pitfall traps filled with water and 5% propane-1.2-diol (anti-freeze) as killing and preservative agent. Long-term preservation of insects was in 96% ethanol. Insects were screened for Laboulbeniales under 50× magnification. Thalli were removed at the foot using an insect pin (Sphinx stainless steel nr. 000). They were then transferred into a droplet of Hoyer's medium (30 g Arabic gum, 200 g chloral hydrate, 16 mL glycerol, 50 mL ddH₂O) on a microscope slide, and immediately arranged. Slides were closed with a cover slip carrying a drop of Amann solution (Benjamin 1971), then sealed with transparent nail varnish. *Laboulbenia temperei*

Balazuc was mounted using the double coverslip technique using Solakryl BMX (ENTO SPHINX s.r.o.), as outlined in Liu et al. (2020). Photographs and measurements were made using an Olympus BX51 light microscope with DIC optics and drawing tube, digital camera and analySIS® (Soft Imaging System GmbH). Measurements and scaling of drawings were checked using a 0.01mm micrometer calibration slide. Image treatment and compositions were made using GIMP 2.8 software. Carabidae hosts were identified using Muilwijk et al. (2015), Chrysomelidae with Lompe (2002). Hosts and microscope slides are deposited at the Herbarium of Meise Botanic Garden (BR) and Ghent University (GENT), Belgium. Fungal names correspond to Index Fungorum (2022). Terminology and more details concerning these methods can be found in Sterbeeckia 36 (De Kesel et al. 2020).

3. Results - new country records for Belgium

Dimeromyces oculatus Santam.

in Santamaria & Pedersen, European Journal of Taxonomy 781: 301 (2021).

Brief description

Dioecious. Female thallus 150-180 μ m long, consisting of a vertical row of cells, supporting a single perithecium, a simple primary appendage, and a fine, long, unbranched, septate secondary appendage. Basal cell of the receptaculum (cell I) touches the basal cell of the secondary appendage. Perithecium 100-120 × 25-35 μ m, fusoid, basal cells totally unclear at maturity, perithecial wall with many cells in each vertical row, the delimitation

Fig. 1. a-g



Fig. 1. *Dimeromyces oculatus* from *Longitarsus luridus* (Coleoptera, Chrysomelidae), **a-c**. mature female thalli, **d-e**. mature female thalli, **f-g**. male thalli. All from herb. CG562. Scale bar 50 μm.

of these only visible in the upper part, perithecial venter pale brown, perithecial tip typically flanked by two fairly large and round prominences. Male thallus produces a small (50-60 μ m), hyaline, 4-celled receptacle, terminally supporting a simple primary appendage, laterally producing on its second (supra basal) and also third cell a slightly pigmented compound antheridium with narrowing neck.

Studied material:

On Longitarsus luridus (Scopoli, 1763) (Coleoptera, Chrysomelidae). Belgium, Prov. Vlaams Brabant, Meise, Domein van Bouchout, wet meadow, 50.9274891N 4.324089E, pitfall trap, 01/04/2021, leg. C. Gerstmans, slide
CG562 (thalli from right elytron), herb. CG563 (no slide made); ibid., leg. C. Gerstmans, herb. CG529, 07/07/2020 (no slide, only very young thalli).

Notes

With 166 species described, *Dimeromyces* Thaxt. is one of the largest genera among Laboulbeniales (Santamaria & Pedersen 2021). The genus has a very wide host range and most taxa are tropical. Thirteen species are reported in Europe, *Dimeromyces oculatus* is for the first time reported from Belgium. Our material corresponds well with the protologue, except that Santamaria & Pedersen (2021) mention that the secondary appendage is unicellular or once divided by a septum near the base. Our material shows several septa (1-3), some of them half-way the length of the secondary appendage. We do not consider this an important deviation.

Since *Dimeromyces oculatus* was only recently described, little is known about its ecology. While the type was found on hosts sifted from fresh flood debris on a coastal meadows, the Belgian material originates from a wet meadow, more than 100 km inland.

Dimorphomyces phloeoporae Thaxt. Fig. 2. a-d [as 'thleosporae'], Proc. Amer. Acad. Arts & Sci. 35: 410 (1900) [1901]

Brief description

Dioecious, female and male thallus often growing pairwise. Female thallus with a laterally extended cell I, supporting a series of 10-14 cells, each producing - almost by alternation – either a perithecium or a secondary appendage. Female thalli usually carry up to 4-5 perithecia. Primary appendage unbranched, darkened, composed of three isodiametric cells, with normal septa, terminal cell is narrower. Secondary appendages two-celled, 25-35 µm long, with darker apex, often damaged. Perithecia 58-65 × 22-26 μ m, with a bent stalk cell, outline of its basal cells lost at maturity, perithecial outer wall with numerous cells in each vertical row, outline of these only clear in the upper part, perithecial venter almost entirely pale brownish, slightly darker brown below the ostiolum, apex rounded, asymmetrical with subapical ostiolum. Male thallus consisting of a 2-3 celled receptacle, with 2 compound antheridia and a primary appendage similar to the one from the female thallus. Spores two-celled, spindle shaped, with circular slime sheath at the larger cell.

Studied material:

On *Phloeopora sp.* (Coleoptera, Staphylinidae, Aleocharinae). Belgium, Prov. Vlaams Brabant, Meise, Domein van Bouchout, under bark of dead *Pinus nigra*, 20/02/2020, leg. C. Gerstmans, slides CG494 (CG494a,b thali from last abdominal segments); ibid., 21/02/2020, leg. C. Gerstmans, slide CG495 (thallus from abdomen); ibid., 21/02/2020, leg. C. Gerstmans, slide CG496 (CG496a,b thalli from last segments of abdomen); ibid., 21/02/2020, leg. C. Gerstmans, herb. CG497 (no slide).



Fig. 2. *Dimorphomyces phloeoporae* from *Phloeopora sp.* (Coleoptera Staphylinidae), **a**. Paired male and female thallus, **b**. Mature female thallus, **c**. male thallus showing 2 antheridia, **d**. spores with circular slime sheeth at their base. All from herb. CG494. Scale bar 50 μm.

Notes

The genus *Dimorphomyces* Thaxt. has an elongated cell I, the only characteristic different from *Dimeromyces* (Tavares 1985). *Dimorphomyces* is a small genus, counting 29 species (Santamaria & Pedersen 2021). Two species occur in Belgium, *D. myrmedoniae* (see De Kesel *et al.* 2020) and *D. phloeoporae* reported here, both on Staphylinidae. The type of *D. phloeoporae* is from Madeira and in Europe it was thus far only reported from Denmark (Santamaria & Pedersen 2021), Poland (Majewski 1999), and Sweden (Huggert 2010).

Laboulbenia asperata Thaxt. Fig. 3. a-g Proc. Amer. Acad. Arts & Sci. 48: 201 (1912)

Brief description

Dioecious (Santamaria 1996). Female thallus hyaline 170-220 μ m, receptacle with vertical IV-V septum, connected to cell III. Insertion cell poorly pigmented, thin, positioned near the lower quarter of the perithecium. Appendage system with at least basal and suprabasal cell of the outer appendage abaxially (dorsally) inflated, and separated by a thin but dark septum. Perithecium 82-90 × 30-35 μ m, widest just below the middle, hyaline except for the pale brownish spot near the apex, ventral side of the



Fig. 3. *Laboulbenia asperata* from *Paratachys bistriatus* (Coleoptera, Carabidae), **a-b**. mature thalli with arrow showing rugulose surface of perithecium (herb. CG518), **c**. pair of male and female thalli (herb. CG518), **d-e**. slightly younger pair of thalli with female thallus showing rugulose surface of perithecium (black arrows, herb. CG518), **f**. mature male and female thallus (herb. CG524), **g**. mature thallus (herb. CG524). Scale bar 50 μm.

perithecium rugose, especially in young perithecia and then visible as a few optically dense lines (best seen with DIC optics) and rugose outline. Male thallus with the foot always connected to the foot of female thallus; very small, $25-50(60) \mu m$, composed of 4 cells, supporting a terminal

antheridium and separated from it by a dark septum. Antheridum simple, flask-shaped, proliferating in older thalli.

Studied material:

On *Paratachys bistriatus* (Duftschmid, 1812) (Coleoptera, Carabidae). Belgium, Prov. Luxemburg, Chiny, muddy base of a dried up pond, 49.7287506N 5.3497546E, alt. 340 m, 05/07/2020, leg. C. Gerstmans, herb. **CG518** and **CG524** (right elytron).

Notes

The dioecious *L. asperata* (Santamaria 1996) might be reminiscent of monoecious taxa like *L. egens* Speg. or *L. pedicellata* Thaxt. It can be separated from both of these taxa by its very pale color and rugulose surface of the lower ventral perithecial wall cells. This feature is best observed in young thalli and does not always persist in adult thalli (Santamaria 1999, fig. 14-15). In our material, all perithecia of adult thalli had lost this rugosity. *L. asperata* also resembles *L. egens*, but the latter has 2-3 bulging knobs on the abaxial (ventral) side of the perithecium. *Laboulbenia tachyis* Thaxt. also occurs on the same host group, Tachyinae (Coleoptera, Carabidae), but it is different due to a small cell V and the septum IV-V not connecting to septum III-IV (Santamaria 1998).

Laboulbenia asperata is rare, with thus far just 3 records from South America and 2 more from Europe. The type was found on a *Tachys* sp. from Argentina (Thaxter 1912). Spegazzini (1917) reported it also from Argentina on *Paratachys bonariensis* (Steinheil, 1869) and Barragán *et al.* (2013) mentioned it on *Paratachys* sp. (Carabidae, Bembidiini, Tachyina) from Ecuador. In Europe it is only known from Belgium (this paper) and Spain, on *Eotachys* sp. (Santamaria 1999, Santamaria & Pedersen 2021). Laboulbenia carelica Huldén Karstenia 23(2): 52 (1983)

Brief description

Thallus dark brown, 145-160 μ m long. Receptacle 120-130 μ m long, slender. Receptacle cells IV and V about the same size and shape, septum IV-V perpendicular to the insertion cell. Insertion cell black, relatively thick and constricted. Appendages often broken, usually only showing the abaxially inflated basal cell of the outer appendage (paraphysopodium) and its apical dark septum, as well as the much smaller basal cell of the inner appendage (andropodium). Perithecium rather small, 50-60 × 33-37 μ m, ovate, half free, dark brown with on the abaxial (anterior) side two large, slightly elongate and protruding bumps, both separated by a longitudinal cleft; perithecial apex broad and round, mostly hyaline, with dark to black subapical spots.

Studied material:

On *Bembidion doris* (Panzer, 1796) (Coleoptera, Carabidae).
Belgium, Prov. Luxemburg, Chiny, muddy base of a dried up pond, 49.7287506N 5.3497546E, alt. 340 m, 14/07/2020, leg.
C. Gerstmans, herb. CG565b (from right elytron).

Notes

The majority of *Laboulbenia spp*. from *Bembidion spp*. (Coleoptera, Carabidae) usually belong to either *L. pedicellata* or *L. vulgaris* Peyr.



Fig. 4. *Laboulbenia spp.* from *Bembidion doris* (Coleoptera, Carabidae), **a-b.** *Laboulbenia carelica* with arrows showing typical bumps on perithecium (herb. CG565b), **c-d.** *Laboulbenia* aff. *pedicellata* from the same host specimen (herb. CG565a). Scale bar = 50µm.

However, on European Bembidion spp., several rare and lesser known species can be found. Laboulbenia carelica is one of them. This species seems to be specific to Bembidion doris. Due to the commonness of B. doris, Hulden (1983) suggested that L. carelica could be common too. However, since its description the species was found only once in Poland (Majewski 1999), and recent screening of Danish material of B. doris only resulted in Laboulbenia murmanica Huldén and L. pedicellata (Santamaria & Pedersen 2021). Laboulbenia carelica cannot be mistaken for L. pedicellata since its ventral side of the perithecium shows two large swellings, with a longitudinal groove between them. We found typical L. carelica on both the elytra and the left metatrochanter of a single individual of B. doris, and confirm Majewski's (1999) observation that this taxon neither seems to show much morphological variation, nor has intermediate forms with L. pedicellata. On the same host individual (slide CG565a) we also found some thalli that could not simply be assigned to L. pedicellata (Fig. 4. c-d). Their particular morphology (stout thalli with a very extensive, brush-like appendage system) was also found by Majewski (1994), and on the same host species (see Majewski l.c., p. 116 + 328-329, Pl. 58 fig. 6-7 on B. doris). Given the accepted variability of L. pedicellata, Majewski (l.c.) didn't describe this material as new. More material is lacking for the moment, but it is likely that

sequencing is needed to assess the affiliation of these thalli with *L. pedicellata*.

Laboulbenia luxurians Peyr. Fig. 5. a-c

Sber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. 1 68: 248 (1873)

Brief description

Thalli remind a bit *L. pedicellata*, but in immature thalli (like our material) the cluster of appendages is curved over the developing perithecium. Cell V is narrower towards its base, at maturity slightly shorter than cell IV, the septum between them is often bent from the insertion cell downwards to the perithecium base. In adult thalli the outer margin of cell III is usually shorter than the one from cell IV. The basal and suprabasal cell of outer appendage has dark constricted septa and the insertion cell is remakably pale, never black. A full description of this taxon is given in Santamaria (1998); synonymy in Santamaria & Pedersen (2021).

Studied material:

On *Bembidion dentellum* (Thunberg, 1787). Belgium, Prov. Luxemburg, Chiny, muddy base of a dried up pond, 49.7287506N 5.3497546E, alt. 340 m, 14/07/2020, leg. C. Gerstmans, herb. **CG528** (from edges of elytra).



Fig. 5. *Laboulbenia luxurians* from *Bembidion dentellum* (Coleoptera, Carabidae), **a-c.** immature thalli from the elytra (herb. CG528). Scale bar 50 μm.



Fig. 6. *Laboulbenia scelophila* from *Agonum viridicupreum* (Coleoptera, Carabidae), **a.** pair of mature thalli showing typical flattened cell VI (foot cells are fixed to a tarsal hair), **b.** mature thallus showing insertion cell and upper part of cell V free of perithecium, **c.** mature thallus, **d.** ascospores. All from herb. CG566. Scale bar 100 µm.

Notes

L. luxurians is a fairly common species, reported from Africa, America, Asia and 7 European countries (Santamaria & Pedersen 2021) and there typically found on Carabid beetles from the genus *Bembidion*.

Laboulbenia scelophila Thaxt. Fig. 6. a-d

Thaxt., Mem. Am. Acad. Arts Sci. 12: 329 (1902)

Brief description

Thalli 300-360 μ m long, similar to *Laboulbenia flagellata* but distinct due to a flattened cell VI, a large hyaline area on the anterior (ventral) side of the ostiolum, cell V paler than cell IV, insertion cell as well as part of cell V free from the perithecium.

Studied material:

On Agonum viridicupreum Goeze, 1777 (Coleoptera, Carabidae). Belgium, Prov. Luxemburg, Chiny, muddy base of a dried up pond, 49.7287506N 5.3497546E, alt. 340m, 14/07/2020, leg. C. Gerstmans, herb. **CG566** (slide CG566b from left front tarsus).

Notes

Although our material seems to show secondary divisions in cell II (see Fig. 6a and c), it corresponds well with the description and illustrations of the Spanish material (Santamaria 1998, Fig. 33 a-b).

Laboulbenia scelophila is a rare species, outside of the US (type) only known from Belgium (our material), Italy and Spain (Santamaria 1998). On Agonum viridicupreum, in both Spain (Santamaria I.c.) and Belgium, it was found mixed with Laboulbenia flagellata (slide **CG566a**).

Confusion with *Laboulbenia pseudomasei* Thaxt. is eventually possible, but the latter has cell VI twice longer than broad, a completely free androstichum, more free perithecium and almost entirely darkened subostiolar area.

Laboulbenia temperei Balazuc

in Santamaría, Balazuc & Tavares, Treb. Inst. Bot. Barcelona 14: 37 (1991)

Fig. 7. a-b

Synonym: *Laboulbenia temperei* Balazuc, Bull. Soc. linn. Bordeaux 3(2): 27 (1973) (*nom. inval.*)

Notes

This species is thus far only reported from France (Balazuc 1973), on *Chaetocnema aerosa* (Letzner, 1847) (Coleoptera, Chrysomelidae). Our material consists of 2 thalli. The protologue of *Laboulbenia temperei* mentions a number of corresponding features, like the absence of an insertion cell and the general shape of receptaculum and perithecium. However, some features are not entirely clear nor fully corresponding, like the shape and organisation of the appendage and antheridia. The illustration made by Balazuc (1973) is of little help. An emended description will be made as soon as we possess more material.

Studied material:

On *Chaetocnema hortensis* (Fourcroy, 1785) (Coleoptera, Chrysomelidae). Belgium, West Flanders, Sint-Kruis, Brieversweg 85, 51.2125524N - 3.2632996E, vi.2021, leg. & det. D. Haelewaters, slide D. Haelew. 3525a (GENT).



Fig. 7 (right). *Laboulbenia temperei* from *Chaetocnema hortensis* (Coleoptera, Chrysomelidae), **a-b.** mature thalli (herb. D. Haelew. 3525a). Scale bar 50μm.



Fig. 8. Laboulbenia spp. from Bembidion dentellum (Coleoptera, Carabidae), **a.** Laboulbenia tenera, mature thalli, **b-d.** Laboulbenia vulgaris from the same host specimen. All from herb. CG526. Scale bar 100 μm.

| Laboulbenia tenera T. Majewski | |
|---------------------------------|--|
| Polish Bot. Stud. 7: 112 (1994) | |

Fig. 8. a

Brief description

Receptacle with cell V and cell IV of similar height, both connected to cell III. Outer appendage shows a dark septum between its suprabasal and basal cell. The latter produces 3 long and slender branches. Two of them from the suprabasal cell. A third one is formed directly from the basal cell, and is not separated from it by a dark septum. The inner appendage is composed of two slender branches, as long as the outer appendage, and born from a basal cell without dark septum. At the appendages pigmented, all exceeding the perithecial tip.

Studied material:

On *Bembidion dentellum* (Thunberg, 1787) (Coleoptera, Carabidae). Belgium, Prov. Luxemburg, Chiny, muddy base of a dried up pond, 49.7287506N 5.3497546E, alt. 340m, 05/07/2020, leg. C. Gerstmans, herb., herb. **CG526** (thalli from cephalon, same specimen with *Laboulbenia vulgaris* on left elytron).

Notes

L. tenera has slender thalli with elongated cells, mostly reminding the slender forms of *L. pedicellata*. Due to its variability and vast array of hosts, *L. pedicellata* could be a species complex (Haelewaters *et al.* 2019). *Laboulbenia tenera* shares a number of morphological features with *L.*

pedicellata, but the appendages are different. They are also pigmented over a large part of their length, a feature the protologue does not mention, although it can be seen in the drawings (Majewski 1994, pg. 324, Pl. 56, fig. 4-7). Compared to *L. pedicellata*, the perithecium of *L. tenera* is less free (only half free) and its cells IV and V seem much more elongated (much higher than wide). Santamaria & Pedersen (2021) find these characteristics not very robust and mention *L. tenera*-like forms mixed with normal *L. pedicellata* on *Bembidion aeneum* Germar, 1823.

Thus far, *L. tenera* was only known from Poland (Majewski 1994). We found *L. tenera* on the same host as the type (*B. dentellum*) and also mixed with *L. vulgaris* (see Fig. 8. b-d).

Peyritschiella geminata Thaxt. Fig. 9. a-d

Thaxt., Proc. Amer. Acad. Arts & Sci. 29: 101 (1894)

Brief description

Thallus hyaline, 124-215 μ m long. Receptacle up to 150 μ m long. Basal cell higher than broad 45 × 30 μ m, lowest tier two-celled, up to 30 μ m high, middle tier composed of a large middle cell, up to 25 μ m high with laterally one or two cells that produce sterile appendages; upper tier with a triangular middle cell with apical primary appendage and dark septum and bilateral series of 2-3(4) cells, each supporting perithecia and sterile appendages (25-36 μ m long). Antheridia not recognizable in our material.



Fig. 9. *Peyritschiella geminata* from *Pterostichus minor* (Coleoptera, Carabidae), **a.** mature thallus with several perithecia, **b** & **d**. juvenile thalli, **c.** damaged old thallus showing regeneration. All from herb. CG567. Scale bar 50µm.



Fig. 10. *Peyritschiella subinaequilatera* from *Philonthus sp.* (Coleoptera, Staphylinidae), **a.** Mature thallus with damaged and regenerated perithecium, **b.** intact mature thallus. All from herb. CG561. Scale bar 50 μm.

Perithecium hyaline, quite symmetrical, ellipsoid, 53-68 \times 24.6-29.7 $\mu m,$ with distinct and prominent apical lobes around the ostiolum.

Studied material:

On Pterostichus minor (Gyllenhal, 1827) (Coleoptera,

Carabidae). Belgium, Prov. Luxemburg, Chiny, muddy base of a dried up pond, 49.7287506N 5.3497546E, alt. 340m, 14/07/2020, leg. C. Gerstmans, herb. **CG567** (slide CG567a1,2 from pro- and metasternum); ibid. leg. C. Gerstmans, herb. **CG564** (no slide).

Notes

Peyritschiella geminata was described from the USA (Thaxter 1894, 1896) on a carabid beetle. This fungus is rare in Europe, reported only once from Poland, on the elytra of *Pterostichus nigrita* (Paykull, 1790) (Coleoptera, Carabidae) and mixed with thalli of *Laboulbenia pseudomasei* (Majewski 1999, 2008). Our material represents the second record of *P. geminata* in Europe. We found it on a different host, *Pterostichus minor*, but also

observed double infections with *L. pseudomasei*. This host range is not exceptional since both of these species, *P. nigrita* and *P. minor*, can be found in the same micro habitat, i.e. often found together in pitfall traps (pers. obs. from M. Dufrêne and A. De Kesel).

Peyritschiella subinaequilatera (Speg.) Speg. Fig. 10. a-b Anal. Mus. nac. Hist. nat. B. Aires 29: 661 (1917)

- Basionym: *Dichomyces subinaequilaterus* Speg., Anal. Mus. nac. Hist. nat. B. Aires 26: 458 (1915)
- Synonyms: Peyritschiella anisopleura (Speg.) Speg., Anal. Mus. nac. Hist. nat. B. Aires 29: 661 (1917) (basionym: Dichomyces anisopleurus Speg., Anal. Mus. nac. Hist. nat. B. Aires 27: 48 (1915))

Brief description

Thallus asymmetrical, up to 180-200 μ m high. Lower tier composed of 3 cells, slightly pigmented or almost hyaline. Middle tier slightly widening upwards, with similar

pigmentation (very little), asymmetrical, unilaterally extending with few cells. Upper tier almost hyaline and symmetrical, bilaterally extending with numerous cells (5-7). Perithecia usually one or two, without apical auricles.

Studied material:

On *Philonthus sp*. Stephens, 1829 (Coleoptera, Staphylinidae). Belgium, Prov. Luxemburg, Chiny, muddy base of a dried up pond, 49.7287506N 5.3497546E, alt. 340m, 13/07/2020, leg. C. Gerstmans, herb. **CG561** (slide CG561a,b from legs).

Notes

In Europe, P. subinaequilatera is reported from Spain and Italy; outside Europe it is only known from Argentina and Ethiopia (Santamaria 1999, Spegazzini 1915a,b & 1917). Santamaria (1999) considers this a good species, but points out that it resembles a growth form of *P. vulgata* (Thaxt.) I.I.Tav. The typical P. vulgata shows symmetrical thalli with cells from the lower and middle tier completely or partly blackened, as well as perithecia with apical auricles. P. vulgata sometimes produces a mix of typical thalli with unpigmented ones on the same host individual. The unpigmented thalli have perithecia without auricula, and they can be confused with P. subinaequilatera. What distinguishes P. subinaequilatera from pale P. vulgata is the asymmetry of its receptacle. Especially the single perithecium and the 3-celled middle tier of horizontal cells, showing a few smaller cells on one side only, is distinctive (see fig. 18-19 in Santamaria 1999). In pale forms of P. vulgata, the middle horizontal tier is also 3-celled, but it laterally produces more cells, and on both sides (in a symmetrical way, see Majewski 1999, fig. 7d). We only found P. subinaequilatera on tarsal hairs of Philonthus sp., and so far this seems to be the only growth position this taxon was ever reported from. The host we studied did not have any other thalli on the integument. More material should be found and sequenced to determine whether P. subinaequilatera also occurs in other places than tarsi (elytra, abdomen, tibia or femur) and what its relationship is to P. vulgata.

4. Corrections to the 2020 Catalogue (De Kesel et al. 2020)

- Peyritschiella oxyteli (Cépède & F. Picard) Santam. (in Santamaria & Pedersen, European Journal of Taxonomy 781: 288, 2021) is a new taxon for Belgium. Based on recombination of taxa in *Peyritschiella* Thaxt. (Santamaria & Pedersen 2021), thalli from *Anotylus rugosus* we illustrated in Plate 67a,b and c (De Kesel et al. 2020) actually represent *Peyritschiella oxyteli*. Normally developed thalli of *P. protea* Thaxt. (Proc. Amer. Acad. Arts & Sci. 35: 427, 1900) are typically asymmetrical (see Plate 67d in De Kesel et al. 2020), while those of *P. oxyteli* are more regular and symmetrical.
- The records of *Teratomyces actobii* Thaxt. (Proc. Amer. Acad. Arts & Sci. 29: 98, 1894) reported from *Gabrius* (De Kesel *et al.* 2020, plate 81) belong to *Teratomyces*

philonthi Thaxt. (Proc. Amer. Acad. Arts & Sci. 35: 432, 1900) whereas those of *T. philonthi* (De Kesel *et al.* 2020, plate 82) might belong to *T. actobii* (Santamaria & Pedersen 2021).

- The material we identified as *Rhachomyces sciakyi* W. Rossi (Mycologia 74(6): 1025, 1982) (De Kesel *et al.* 2020: pl. 71) belongs to a newly described taxon *Rhachomyces spinosus* Santam. & Cuesta-Segura (in Santamaria, Cuesta-Segura & Guardia, Nova Hedwigia 110(3-4): 362, 2020).
- Monoicomyces californicus (Thaxt.) Thaxt. (Mem. Am. Acad. Arts Sci., ser. 2 16(1): 38, 1931) and Monoicomyces invisibilis Thaxt. (Proc. Amer. Acad. Arts & Sci. 36: 414, 1900 [1901]) were kept separate in De Kesel et al. (2020, plate 60 a-d), but it is likely that M. californicus is a synonym of M. invisibilis (Santamaria & Pedersen 2021).

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