Species of *Pronectria* (Bionectriaceae) and *Xenonectriella* (Nectriaceae) growing on foliose Physciaceae, with a key of the European species

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Abstract: Berger, F., Zimmermann, E. & Brackel, W. v. 2020. Species of *Pronectria* (Bionectriaceae) and *Xenonectriella* (Nectriaceae) growing on foliose Physciaceae, with a key of the Central European species. – Herzogia **33**: 473 – 493.

Confusion about the identity of *Xenonectriella leptaleae* (J.Steiner) Rossman & Lowen led us to revise Central European material of the hypocrealean genera *Pronectria* and *Xenonectriella* growing on foliose Physciaceae to clarify the taxonomy. Consequently, we reinstate *Pronectria leptaleae* and describe *Pronectria etayoi*, *Xenonectriella physciacearum* and *X. zimmermanni* as new species. The new combination *Xenonectriella angulospora* is proposed. A key to the species of the genera *Pronectria* and *Xenonectriella* growing on Physciaceae in Europe is provided.

Zusammenfassung: Berger, F., Zimmermann, E. & Brackel, W. v. 2020. *Pronectria*- und *Xenonectriella*-Arten der mitteleuropäischen, auf blättrigen Physciaceae wachsenden Arten mit einem Bestimmungsschlüssel. – Herzogia **33**: 473 – 493.

Die Verwirrung um die wahre Identität von *Xenonectriella leptaleae* (J.Steiner) Rossman & Lowen hat uns bewogen, das mitteleuropäische Material der hypocrealen Gattungen *Pronectria* und *Xenonectriella* auf Physciaceae zu revidieren. Als Ergebnis wird der Name *Pronectria leptaleae* wiedereingeführt und die drei Arten *Pronectria etayoi*, *Xenonectriella physciacearum* und *X. zimmermanni* neu beschrieben. Die neue Kombination *Xenonectriella angulospora* wird vorgeschlagen. Ein Schlüssel der auf den Physciaceae Europas wachsenden Arten der Gattungen *Pronectria* und *Xenonectriella* wird präsentiert.

Key words: Hypocreales, *Anaptychia*, *Phaeophyscia*, *Physcia*, *Physconia*, *Heterodermia,* lichenicolous fungi, new species.

Introduction

Consulting experienced experts in lichenicolous fungi about their opinion of the identity of *Xenonectriella leptaleae* always ended with some frustration. As our own determinations of some material remained doubtful, the first author began to revise available material of *Pronectria* and *Xenonectriella* growing on different species of *Anaptychia*, *Phaeophyscia*, *Physcia* and *Physconia* mostly from Central Europe.

The first species described of those treated in our study was *Pharcidia leptaleae* J.Steiner on *Physcia leptalea* (Steiner 1900). His description of structures and hyaline, ellipsoid ascospores undoubtedly refers to *Pronectria* sensu stricto, consequently it has been combined to *Pronectria leptaleae* (J.Steiner) Lowen (Lowen 1990). By including material of *Xenonectriella*

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and extending the host spectrum to genera like *Heterodermia* and *Physconia* (not taking into account anatomically different features of the taxa involved) Rossman et al. (1999) combined *Pronectria leptaleae* to *Xenonectriella leptaleae* (J.Steiner) Rossman & Lowen. We repeatedly collected morphologically clearly different specimens of Hypocreales on Physciaceae not matching the concept of *X. leptaleae*. So we had to clarify, which species could correspond to this puzzling name. Subsequently, we extended our investigations to more available European specimens of *Pronectria* and *Xenonectriella* on host genera of Physciaceae. This resulted in the description of three more species. Consequently, specimens deposited as *X. leptaleae* should be re-examined with the key presented below for getting conclusive determinations.

Material and methods

We revised more than 90 specimens of *Pronectria* and *Xenonectriella* on hosts of Physciaceae from GZU and our private herbaria [W. v. Brackel (Br), F. Berger (Be) and E. Zimmermann (Zi)]. Morphology was studied using dissecting microscopes Olympus VMZ (FB), Leica M65 (FB), Zeiss GSZ (WB) and Leica M165C fitted with ProgRes GRYPHAX NAOS camera (EZ). To optimize focus depth, images were stacked with CombineZM Software. Information of the localities is given in the original spelling of the labels. Type specimens will be deposited in M and G.

Anatomical investigations were carried out by light microscopes fitted with phase contrast [Olympus BH 2 (FB), Olympus BX51 (WB), Leica DMLS2 (EZ)] on hand-cut sections or squash preparations mounted in tap water (H_2O), 5% solution of potassium hydroxide (K), lactophenol cotton-blue (LC) or Congo red (CR) and Lugols´s reagent (I). Additionally, wall reactions were tested with lactic acid 100%.

Measurements were taken from water mounts and are indicated for the new species as (minimum–){X −SD}−{X +SD}(–maximum), where ‘minimum’ and ‘maximum’ are the extreme observed values, ‘X’ the arithmetic mean and ‘SD’ the corresponding standard deviation, followed by the number of measurements (n). The length/breadth ratio is indicated as l/b and given in the same way.

Taxonomy

Pronectria Clem., Clem. & Shear, Gen. Fungi, pg. 282 (1931).

Type: *P. lichenicola* (Ces.), = *P. robergei* (Mont. & Desm.) Lowen, = *Nectriella carnea* Fuck.; type host is *Peltigera*.

Generic description: A genus of lichenicolous as well as algicolous fungi in the family Bionectriaceae with tendency to parasitism; ascomata immersed, solitary or gregarious, with papillae breaking through the surface, subglobose to pyriform, non stromatic, wall red, orange to pale yellow, K–, lactic acid–; surface cells usually angular in surface view, outer region of thick-walled, ellipsoid cells, inner wall of hyaline, compressed thin-walled cells, periostiolar tissue of parallel layers of elongate cells; paraphyses anastomosing, but only visible when young, soon deliquescing; periphyses lining the ostiolar channel; asci unitunicate, clavate to subclavate, thin-walled, I– in all species, mostly with 8 ascospores, biseriately arranged in the centre, above and below uniseriately; ascospores hyaline, ellipsoid, mostly uniseptate, surface smooth to verruculose. Anamorphs of *Acremonium* (*Cylindromonium*)-type.The genus now contains 43 species (Diederich et al. 2018).

Notes: Species of the genus *Pronectria* were previously included in *Nectriella* (Nitschke in Fuckel; Jahrbuch des Nassauischen Vereins für Naturkunde 23–24: 175, 1870); *Nectriella* has been segregated

before from *Nectria* on base of lacking a stromatic tissue; type species in *Nectriella* is the lichenicolous *N. fuckelii* Nitschke [current name: *Pronectria tincta* (Fuckel) Lowen; type host: *Anaptychia ciliaris*]. The list of generic synonyms of *Nectriella* in Keissler (1930) testifies a weird history on one hand and high attention to this and related genera on the other. *Pronectria* later was separated from *Nectriella*, mainly based on the lichenicolous habit and the one-septate, hyaline ascospores (Clements, in Clements & Shear 1931).

Pronectria and *Nectriella* were considered again synonymous by Rogerson (1970). Lowen (1991) slightly changed the description and resurrected *Pronectria* based on the immersed ascomata with lichenicolous or algicolous growth and a combination of thin ascomatal walls, the presence of ascomatal cells intermingled with those of the host, and a red, orange to pale yellow K– wall. Remaining *Nectriella* differs in growth on decaying herbaceous or woody plants and in having an ascomatal wall consisting of two regions. Rossman et al. (1999) also included species with phragmosporous ascospores and species with K+ ascomata. The latter were all combined into *Xenonectriella* in the meantime, the second, morphologically closely related lichenicolous genus of Hypocreales.

Pronectria echinulata Lowen, Studies in Mycology 42: 58 (1999). Fig. 1

Ascomata aggregated, immersed in the bleached host thallus, rarely additionally with few perithecia in discs of apothecia, up to 260 × 240 µm [120–140(–250) × 100–130(–160) µm according to Rossman et al. (1999)], reddish brown or fuzzy pale pink when covered by remnants of the host cortex tissue. Ascomatal wall c. 20 µm thick, outer layers orange to reddish brown, K–. Asci subcylindrical to subclavate, 55–80 × 8(–10) µm, with partly biseriately arranged ascospores. Ascospores fusiform to ellipsoid, 1-septate, hyaline, (9–)9.7–13(–15) × (5.5–)6–7.8(–8) µm, l/b = (1.4–)1.5–1.9(–2.1), n = 24, with finely echinulate hyaline ornamentation.

Other measurements of ascospores found in literature are (11–)12–14(–18) × 5.5–8(–10) µm (Rossman et al. 1999, from type). Etayo (2017) exactly described and illustrated a specimen from Ecuador on *Physcia* cf. *tribacia*. Its ascospores measure 9–11(–12) × 3.8–4.5(–5) µm and it is most similar in all aspects to the Italian material from locations cited below. A specimen mentioned in Zhurbenko & Kobzeva (2014) with uniseriately arranged ascospores measuring (11.6–)12.9–14.9(–15.8) × (5.7–)6.9–8.5(–9.3) µm on *Physcia aipolia* might represent immature *Xenonectriella physciacearum*. It is obviously conspecific with the specimens of *X.* cf. *leptaleae* on *P. aipolia* in the same study.

Acremonium hypholomatis (Boedijn) D.Hawksw., assumed as its asexual morph, was described and discussed by Brackel (2008).

Host lichens: Type host is *Physcia aipolia*. We found *Pronectria echinulata* also on *Physcia stellaris*, *Physconia distorta* and *P. venusta*. In literature we found additional reports on *P. adscendens* (Rossman et al. 1999), on *P. leptalea*, *P. tenella* and *Physconia perisidiosa* (Etayo 1998, 2010). All records on *Phaeophyscia orbicularis* in Brackel (2009, 2014) refer to *Xenonectriella physciacearum*. So, considering references with detailed and coincident descriptions, *P. echinulata* seems to be a rather rare species.

Remark: Application of K can strongly alter or even dissolve the echinulate ornamentation of ascospores of *P. echinulata*, depending on the concentration.

Selected specimens examined: Italy, Kalabrien, Prov. Cosenza, Parco Nazionale del Pollino, Monte Séllaro, 1010 m, 39°50'44.2"N/16°21'44.3"E, auf *Physconia* sp. an *Acer campestre*, 30.4.2014, W. v. Brackel & D. Puntillo [Br 7310]. – Marken, Prov. Macerata, Cingoli, S Zentrum, Platz an der Porta dello Spineto, 590 m, 43°22'19.8"N/13°13'01.0"E, auf *Physconia venusta* an *Tilia* sp., 4.8.2011, W. v. Brackel [Br 6408]. – Sardinien, Prov. Nouro, Gennargentu, 8 km SSE Fonni, extensives Weideland, 1090 m, 40°04'52"N/9°18'01"E, auf *Physconia distorta*, 27.5.2011, F. Berger [Be 25454]. – Sizilien, Prov. Palermo, Bosco della Ficuzza, 945 m, 37°51'51.5"N/13°24'56.9"E, auf *P. venusta* an *Quercus cerris*, 13.8.2007, W. v. Brackel [Br 4375].

Pronectria leptaleae (J.Steiner) Lowen, Mycotaxon 39: 462 (1990). Fig. 2

Basionym: *Pharcidia leptaleae* J.Steiner, Denkschr. Österr. Akad. Wiss., Math.-Naturwiss. Kl. 68: 238 (1900).

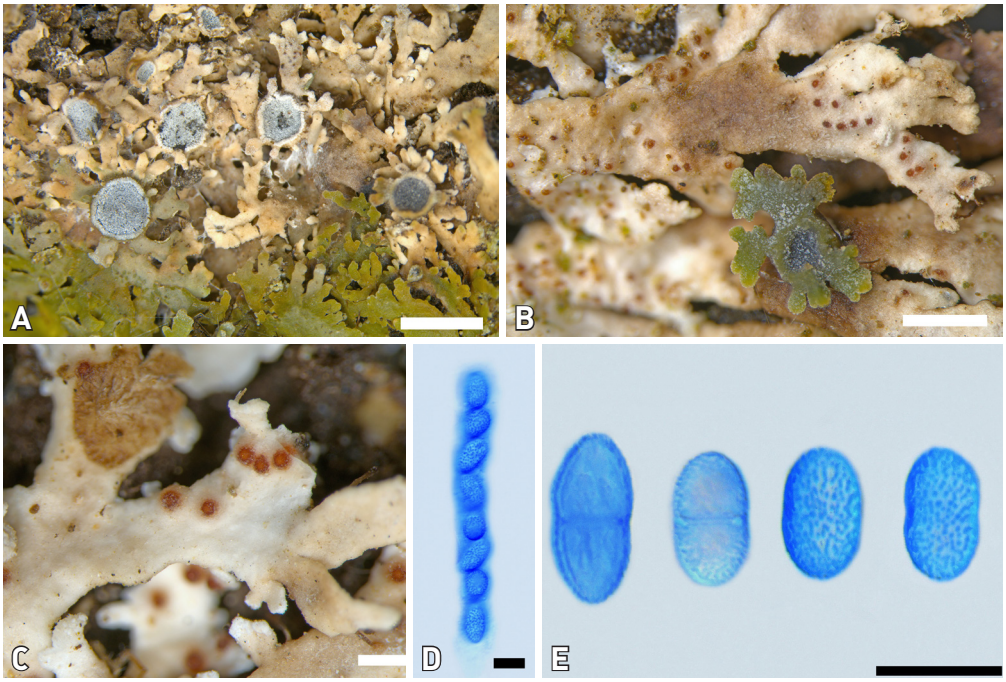

Fig. 1. *Pronectria echinulata* [Br 7400]. **A, B, C.** Infection bleaching the thallus of *Physconia venusta*. **D.** Ascus in LC (atypically uniseriate arrangement of ascospores!) **E.** Ascospores in LC. Scale bars: A = 2.0 mm, B = 1.0 mm, C = 0,5 mm, D, E = 10 µm.

Abb. 1. *Pronectria echinulata* [Br 7400]. **A, B, C.** Thallus bleichender Infekt auf *Physconia venusta*. **D.** Ascus in LC (untypisch, da ausnahmsweise uniseriat angeordnete Sporen). **E.** Ascosporen in LC. Messstrichlängen: A = 2,0 mm; B = 1,0 mm; C = 0,5 mm; D, E = 10 µm.

≡ p.p. *Xenonectriella leptaleae* (J.Steiner) Rossman & Lowen, in Rossman et al., Studies in Mycology 42: 169 (1999).

Ascomata densely aggregated, dull dark pink to red, 4/5 to totally immersed in apothecial discs of *Physcia* species, rarely scattering over the adjacent host thallus, 140–170(–200) µm diameter. In a later phase the discs become slightly bleached and finally disintegrate. Ascomatal wall vivid red to brownish red, K–; outer wall of textura intricata, c. 15 µm thick, consisting of c. 5 layers of coloured cells; inner wall of textura angularis, c. 10–12 µm thick, consisting of c. 6–7 layers of hyaline cells, cells in vertical view polygonal, 6–10 µm in diameter, filled with orange oil-droplets; periphyses up to 30 µm long, furcate; interascal filaments gelatinising soon. Asci subcylindrical, up to 65 × 8–10 µm, with 8 ascospores arranged partly uniseriately in oblique to horizontal position, the central ascospores occasionally also biseriately side by side in a longitudinal position; ascospores 1-septate, not constricted at the septum, hyaline, broadly ellipsoid, smooth or very finely verruculose, 8–10 × 5–6.5 µm, l/b = (1.2–)1.3–1.6(–1.8) (n = 40).

Other ascospore measurements are max. 8 × 4 µm in specimen Be 25496 (on *P. aipolia*), and (6.0–)6.4–7.7(–8.0) × 4.5–5.0 µm in specimen Br 6742 (on *P. tenella*), and 7–11 × 5–7 µm (on *P. aipolia*, Etayo 1998).

The presumed asexual morph is *Acremonium subeffusum* (Ellis & Galw.) Etayo & Brackel (Etayo & Pérez-Ortega 2016). *A. subeffusum* has conidiogenous cells distinctly roughened below and conidia of (6–)7–9(–9.5) × 4.5–6 µm (Hawksworth 1972) with conidiogenous cells 20–30(–35) µm tall, and 3–4.5 µm wide at the base and 2–3 µm at the tip. [Be 34958] differs, as conidia are oblong,

slightly constricted at the middle, 9–12(–14) × 5–6 µm, pointed at the lower apex and conidiogenous cells smooth, 12–20 × 2.5–3 µm, tapering at the tip.

Specimens with a coloured, but K– ascomata wall, not strictly uniseriately arranged and smooth ascospores fit much better into *Pronectria* than into *Xenonectriella*; this is the case in *P. leptaleae*. The examined material perfectly matches the protologue of Steiner (loc. cit.), but additionally, we encountered further host lichens.

As a unique feature among all the species treated in this paper, ascomata of *Pronectria leptaleae* are located almost exclusively in the apothecial discs. All other species differ from this species such as the ascomata are placed solitary, or are aggregated on the host thallus and avoid the apothecial discs.

The description given in Rossman et al. (1999) deviates from the original protologue in several points. We assume, that the authors inappropriately included material of taxa of *Xenonectriella*. We have investigated these specimens in further study and describe them below as new species. The combination to *X. leptaleae* is apparently inappropriate and is not followed by us.

Host lichens: *Physcia leptalea* (type host, also in Etayo 1998, sub *P. semipinnata*), *P. aipolia*, *P. stellaris*; reports on *P. tenella* and *P. adscendens* in Brackel (2014) refer to *Xenonectriella zimmermanni* (see below). Considering the features in van den Boom & Etayo (2014), their record on *Phaeophyscia orbicularis* most probably belongs to *Xenonectriella physciacearum*. Numerous citations of *Pronectria*/*Xenonectriella leptaleae* in literature cannot be assigned properly as the name apparently has been applied to various species. All records with ascomata in apothecial discs of the host lichen (e.g. Calatayud & Barreno 1995) are likely to be correct.

Selected examined specimens (all on apothecial discs): Austria, Kärnten, Bad Kleinkirchheim, W Aigen, Strasse nach St. Oswald, 1125 m, 46°49'01"N/13°46'40"E, auf *Physcia aipolia*, 21.3.2014, F. Berger [Be 28044]. – Kärnten, Weissenssee, Paterzipf, Baumzeile E Anlegestelle, 930 m, 46°42'05"N/13°20'35"E, auf *P. aipolia* an *Salix*, 11.8.2016, F. Berger [Be 31115, 31116]. – **Germany**, Bayern, Oberbayern, Kreis Garmisch-Partenkirchen, Dickelschwaig bei Graswang W Ettal, 865 m, 47°34'09"N/11°01'55"E, 28.2.2010, auf *P. stellaris* an *Acer pseudoplatanus*, leg. A. Zehm, [Br 5405]. – Bayern, Oberpfalz, Kreis Neumarkt, Mauthauser Berg SW Dietldorf, 440 m, 49'12"N/11'56"E, auf *P. stellaris* an *Larix europaea*, 15.1.2007, W. v. Brackel [Br 3968]. – **Italy**, Abruzzen, Prov. L'Aquila, Gran Sasso, Valle del Chiarino, Buschwald, 1150 m, 42°29'45.1"N/13°25'47.9"E, auf *P. leptalea* an *Acer campestre*, 12.8.2011, W. v. Brackel [Br 6459]. – Sardinien, Prov. Ogliastra, Lanusei, Bosco Selene, zona recreativa an SS 198, km 83, 1000 m, 39°52'N/9°30'E, auf *P. aipolia* an *Acer monspessulanum*, 25.5.2011, F. Berger [Be 25496]. – Sizilien, Prov. Messina, Monti Nebrodi, an SP 168, km 15/II, 865 m, 37°58'01.6"N/14°29'14.8"E, auf *P. leptalea* an *Quercus cerris*, 15.8.2007, W. v. Brackel [Br 4502]. – Südtirol, Bez. Schlanders, Laatsch, Felssteppe am Fuß der Sariwand, 960 m, 46°44'17"N/10°31'E, auf *Physcia stellaris* an *Crataegus*, 30.9.2013, F. Berger [Be 27598, 27603]. – **Switzerland**, Kanton Graubünden, Feldis, 1390 m, 46°47′31.5″N/9°25′56.4″E, auf *P. stellaris* an *Fraxinus excelsior*, 20.5.2018, E. Zimmermann [Zi 4239]. – Graubünden, Zernez, God d'Arduond, Gondas, N-exponierter Auwald, 1470 m, 46°42′22.8″N/10°05′20.9″E, auf *P. stellaris* an *Alnus incana*, 22.6.2018, E. Zimmermann [Zi 4329].

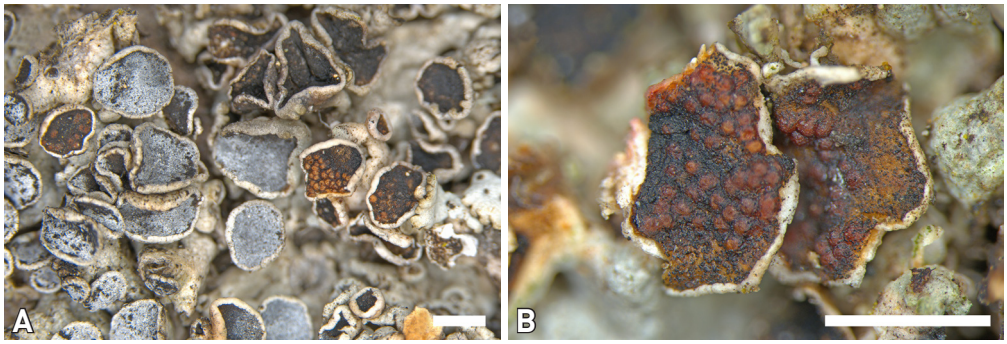

Fig. 2. *Pronectria leptaleae* [Zi 4239]. **A, B.** Infection on the apothecia of *Physcia stellaris.* Scale bars: A, B = 1.0 mm.

Abb. 2. *Pronectria leptaleae* [Zi 4239]. **A, B.** Infekt auf den Apothezien von *Physcia stellaris.* Messstrichlängen: A, B = 1,0 mm.

Pronectria santessonii (Lowen & D.Hawksw.) Lowen, Mycotaxon 39: 462 (1990). Fig. 3

Basionym: *Nectriella santessonii* Lowen & D.Hawksw., Lichenologist 18(4): 322 (1986).

Groups of ascomata immersed in bleached, necrotic, elevated areas of the host thallus, only dark red papillae visible; ascomata pyriform, 200–240 µm in diameter; wall c. 25–30 µm at the side, outermost layer of the wall of textura intricata in surface view, outer half of wall of tangentially compressed cell layers, brownish orange to reddish brown, K–, lactic acid–; inner wall hyaline, textura angularis; asci subcylindrical, 50–70 × 8–12 µm, containing 8 ascospores, irregularly uni- to biseriately arranged; ascospores ellipsoid to fusiform, hyaline, combined ascospore sizes in our specimens are (11–)11.8–13.7(–15) × (4.5–)5.1–5.9(–6.5) µm, l/b = 2.2–2.4, not or slightly constricted at the septum, the lower cell of ascospores often slightly narrowed and elongated; ornamentation lacking or finely echinulate, vanishing in K (see also *P. echinulata*).

Other ascospore measurements found in literature: (10–)12–18 × 4.5–8 µm (Lowen & Hawksworth 1986, type) and (9,5–)12.9–16.7(–18.7) × (3.7–)4.4–5.4(–6) µm, l/b = (1.9–)2.5–3.7(–4.7) (Zhurbenko & Kobzeva (2014).

In our material we observed some discrepancies, deviating from the protologue: 1) Lowen & Hawksworth (1986) observed an apical ring structure in the asci, but we were not able to find this in our material (type material was collected and published in the same year, so it might be possible that

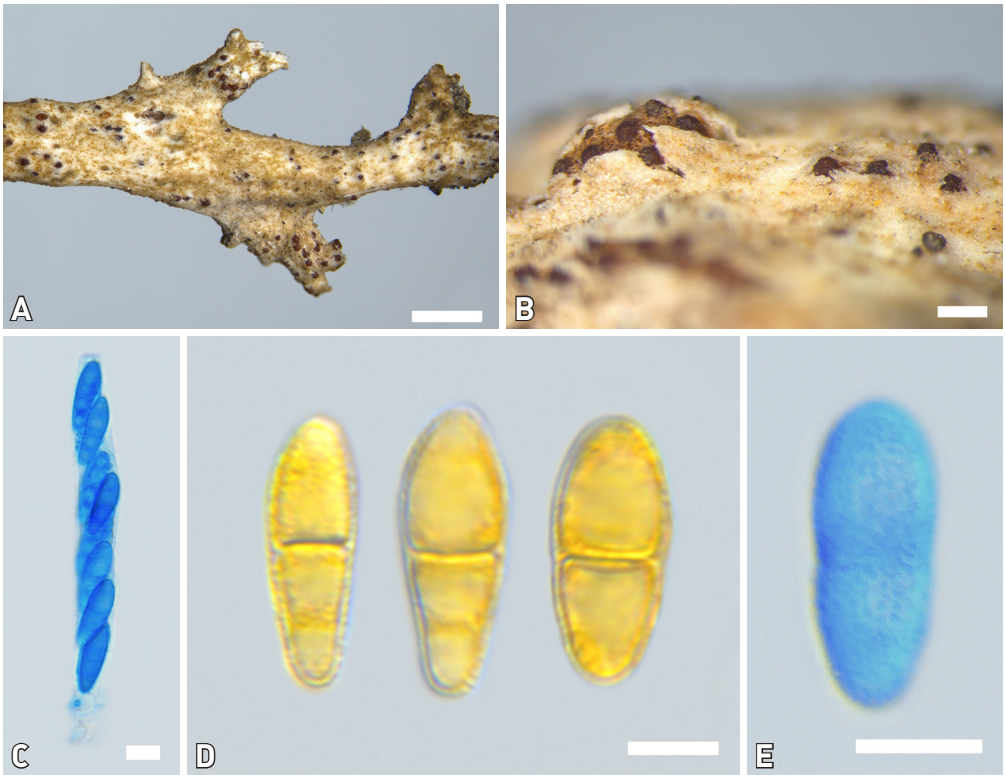

Fig. 3. *Pronectria santessonii* [Br 6456]. **A.** Infection on *Anaptychia ciliaris.* **B.** Ascomatas breaking through the upper cortex. **C.** Ascus in LC. **D.** Ascospores in J. **E.** Ascospores with very fine ornamentation in LC. Scale bars: A = 1.0 mm, B = 0.2 mm, C = 10 µm, D, E = 5 µm.

Abb. 3. *Pronectria santessonii* [Br 6456]. **A.** Infekt auf *Anaptychia ciliaris.* **B.** Ascomata durchbrechen den oberen Cortex. **C.** Ascus in LC. **D.** Ascosporen in J. **E.** Sporen mit sehr feinwarziger Oberfläche in LC. Messstrichlängen: A = 1,0 mm, B = 0,2 mm, C = 10 µm, D, E = 5 µm.

this structure is visible only in very fresh material); the dependency of an apical ring on the ascospore size (Rossman et al. 1999: 7) seems to be rather speculative. 2) in our material ascospores are consistently narrower [(3.7–)4.4–5.4(–6) vs. 4.5–8 µm]; 3) the outermost layer of the wall is described in the protologue as textura angularis, we observed a textura intricata in surface view.

The asexual state (*Acremonium*-type) was described by Lowen & Hawksworth (1986) and by Brackel (2008).

Lowen & Hawksworth (1986) discussed the differences between this species and *Pronectria tincta*, whereas Etayo (2010) assumed conspecifity of both taxa. We are sure that they should be kept apart due to the different ecology and macroscopical aspect (see Fig. 3 and 4), and various morpho-anatomical discriminating characters like colour of the ostiole and the ascomatal wall, shape and size of ascospores, pseudotetrablastic ascospores in *P. tincta* only, and different values of l/b indices.

Type host of *P. santessonii* is *Anaptychia runcinata*, other reported hosts are *A. ciliaris* and *Physcia biziana* (always on thallus) (Etayo 1998, Etayo 2010, Brackel 2015, Zhurbenko & Kobzeva 2014).

Specimens examined: Ireland, Co. Ciarrai/ Kerry, Corca Dhuibhne/ Dinle Halbinsel, Umgebung des Weilers Ballyoughteragh N Baile an Fheirtaraigh/Ballyferriter, Hänge gegen Sybil Point, 120–140 m, auf *Anaptychia runcinata*, 6.8.1978, J. Poelt; det. R. Lowen [GZU 554-78]. – **Italy**, Abruzzen, Prov. L'Aquila, Parco Nazionale del Gran Sasso e Monti della Laga, Valle del Chiarino, above Lago di Provvidenza, 1075 m, 42°30'16,5"N/13°25'47,9"E, auf *A. ciliaris* auf *Acer campestre*, 12.8.2011, W. v. Brackel [Br 6456]. – Sizilien, Prov. Palermo, Bosco della Ficuzza, 945 m, 37°51'51.5"N/13°24'56.9"E, auf *A. ciliaris* an *Quercus ilex*, 13.8.2007, W. v. Brackel [Br 4374].

Pronectria tincta (Fuckel) Lowen, Mycotaxon 39: 462 (1990). Fig. 4

Basionym: *Cryptodiscus tinctus* Fuckel, Fungi rhenani exs. fasc. 4: nr. 1836 (1866?), ≡ *Nectriella coccinea* Fuck., Symb. Mycol., 1869: 177; ≡ *Calonectria tincta* Rehm in Ann. Mycol., VIII (1910: 302).

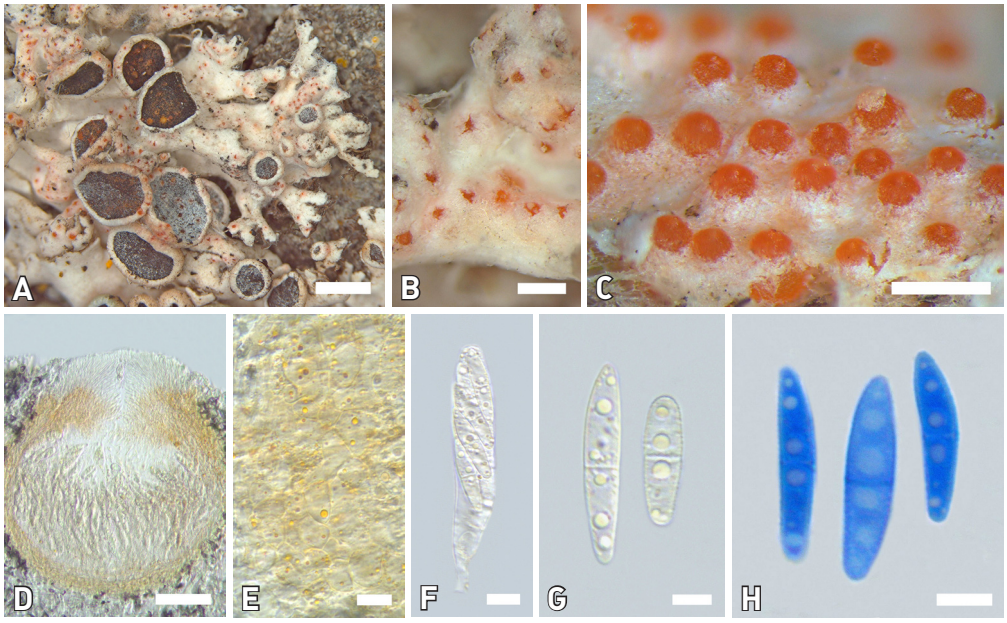

Fig. 4. *Pronectria tincta* [Zi 912]. **A, B, C.** Infection on *Physcia stellaris*. **D.** Ascoma in cross section. **E.** Wall of ascomata inspers due to small orange vacuoles. **F.** Ascus in H_2O. **G.** Ascospores in H_2O. **H.** Ascospores in LC. Scale bars: A = 2.0 mm, B, C = 0.2 mm, D = 50 µm, E, F, G, H = 10 µm.

Abb. 4. *Pronectria tincta* [Zi 912]. **A, B, C.** Infekt auf *Physcia stellaris*. **D.** Schnitt durch ein Ascom. **E.** Gehäusewand inspers durch kleine orange Vakuolen. **F.** juveniler Ascus in H_2O. **G.** Ascosporen in H_2O. **H.** Ascosporen in LC. Messstrichlängen: A = 2,0 mm, B, C = 0,2 mm, D = 50 µm, E, F, G, H = 10 µm.

Ascomata densely arranged in bleached parts of the host thallus, immersed, only the shining orange-red conical papillae visible, causing false galls (due to the volume of the hidden mass of the ascomata), c. 240 µm in diameter; outer part of the ascomatal wall light orange to light red, inner part hyaline, textura angularis, cells abundantly filled with orange oil droplets, K–; periphyses c. 30 × 1.5 µm, septate, furcate, oriented upwards at the ostiolum; paraphyses not seen; asci subcylindrical, 60–80(–90) × 10–14 µm; ascospores biseriately arranged, fusiform, slightly constricted at the septa, hyaline, straight to slightly bent; cells sometimes unequal, ends obtuse, (14–)19–21(–24) × 4–5.5 µm; l/b = (2.8–)3.6–5(–5.7), (n=30); pseudotetrablastic due to 2 oil droplets per cell, not or very finely warted (Be 32355: ornamentation only visible at 1000 ×). For further details see Keissler (1930) and Rossman et al. (1999).

A pinkish hyphomycete with sclerococcoid conidia is growing among the ascomata in Be 33395, which might represent an asexual state.

Type host is *Anaptychia ciliaris*; the species was also observed on the thallus and the apothecial margins of *Physcia aipolia* and *P. stellaris* (e.g. Zimmermann & Berger 2018).

Note: In certain conditions the pseudotetrablastic ascospores, a special of all treated species, might seem 3-septate, so obviously, Rehm (1910) was tempted to apply *Calonectria* as the correct genus (see commentary in Weese 1914).

Specimens examined: Austria, Tirol, Ötztal, Vent, am Rofenbach am westlichen Dorfende, 1905 m, 46°51'23"N, 10°54'39"E, auf *Physcia stellaris* an *Salix*, 7.2011, E. Zimmermann [Be 26456]; ibidem, 5.8.2017, F.Berger [Be 32355]. – Tirol, Ötztal, Vent, am Rofenbach, alte Dorfbrücke, 46°51'13"N 10°55'16"E, auf *Physcia stellaris* an *Salix*, 11.8.2018, E. Zimmermann, S. Feusi & F. Berger [Be 33386]. – Tirol, Ötztal, Vent, Weg zum Hochjochhospiz, 2035 m, 46°51'15"N 10°54'11"E, auf *Physcia aipolia* an *Salix*, 14.8.2018, E. Zimmermann, S. Feusi & F. Berger [Be 33395]. – **Switzerland**, Kanton Wallis, Saas Almagell, Weg entlang Saaser Vispa, 46°06'03"N 7°57'04"E, auf *P. aipolia*, 1.9.2018, F. Berger & E. Zimmermann [Be 33631].

Pronectria etayoi E.Zimm. & F.Berger, species nova Fig. 5

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Diagnosis: Fungus lichenicola, ascomata immersa in hospite generis *Physcia*. Differt a *Pronectria santessonii* ascomatibus maioribus et pariete ascomatum vivente aurantio colorato, ascis maioribus (110–120 × 11–17 µm) ascosporisque etiam maioribus (17–)18–20(–23) × (9–)10–12(–13) µm; ascosporae hyalinae, irregulariter biseriatae, uniseptatae, ellipsoideae vel ovoideae, rare apiculatae, cum perisporio echinulato.

Type: **Switzerland**, Kanton Wallis, Eischoll, Dinnuhüs, 1330 m, 46°17′13.3″N 7°47′13.2″E, on *Physcia stellaris on Alnus incana*, 18.3.2020, leg. E. Zimmermann [holotype – G, isotype – Zi 4363]

Description: **Ascomata** aggregated in pinkish miscoloured areas of the upper side of the host thallus, causing flat gall-like swellings (due to the volume of hidden ascomata), immersed, only the grey-brown ostiolum visible; papillae 160 µm wide, always covered with pinkish fluffy remnants of the host cortex; ascomata pyriform, c. 200–300 × 200–250 µm; **wall** textura angularis, 17–20 µm at the base, 30 µm at the side, outer part of the perithecial wall orange red to orange brown, K–, inner part hyaline, in cross section c. 8 layers of tangentially compressed cells, 8–15 × 2.5–3 µm, with scattered orange oil droplets; **periphyses** lining the ostiolar channel, 20–30 × 2–4 µm, non-septate, cylindrical to slightly swollen, with tiny orange oil droplets; no hymenial **filaments** observed; **asci** subcylindrical, 110–120 × 11–17 µm, with 8 ascospores, biseriately arranged in the centre; **ascospores** hyaline, widely ellipsoid to fusiform (some with apiculate poles), 1-septate, not constricted at the septum, cells of uneven shape, lower cell slightly longer and narrower; (17–)18–20(–23) × (9–)10–12(–13) µm; l/b ratio: 1,4–1,8(–2.2), (n=30), with small, hyaline oil droplets, perispore hyaline, distinctly echinulate (best seen in 1000×), not dissolving in K. Asexual state not seen.

Etymology: We are very pleased to dedicate this species to the Spanish lichenologist Javier Etayo Salazar for his extraordinary merits in studying and describing lichenicolous fungi, especially in both genera treated in our study.

Discussion: The new species differs from all other *Pronectria* species on *Physcia* (*P. echinulata*, *P. leptaleae*, *P. santessonii*, *P. tincta*) predominately in the considerably larger ascospores and in its

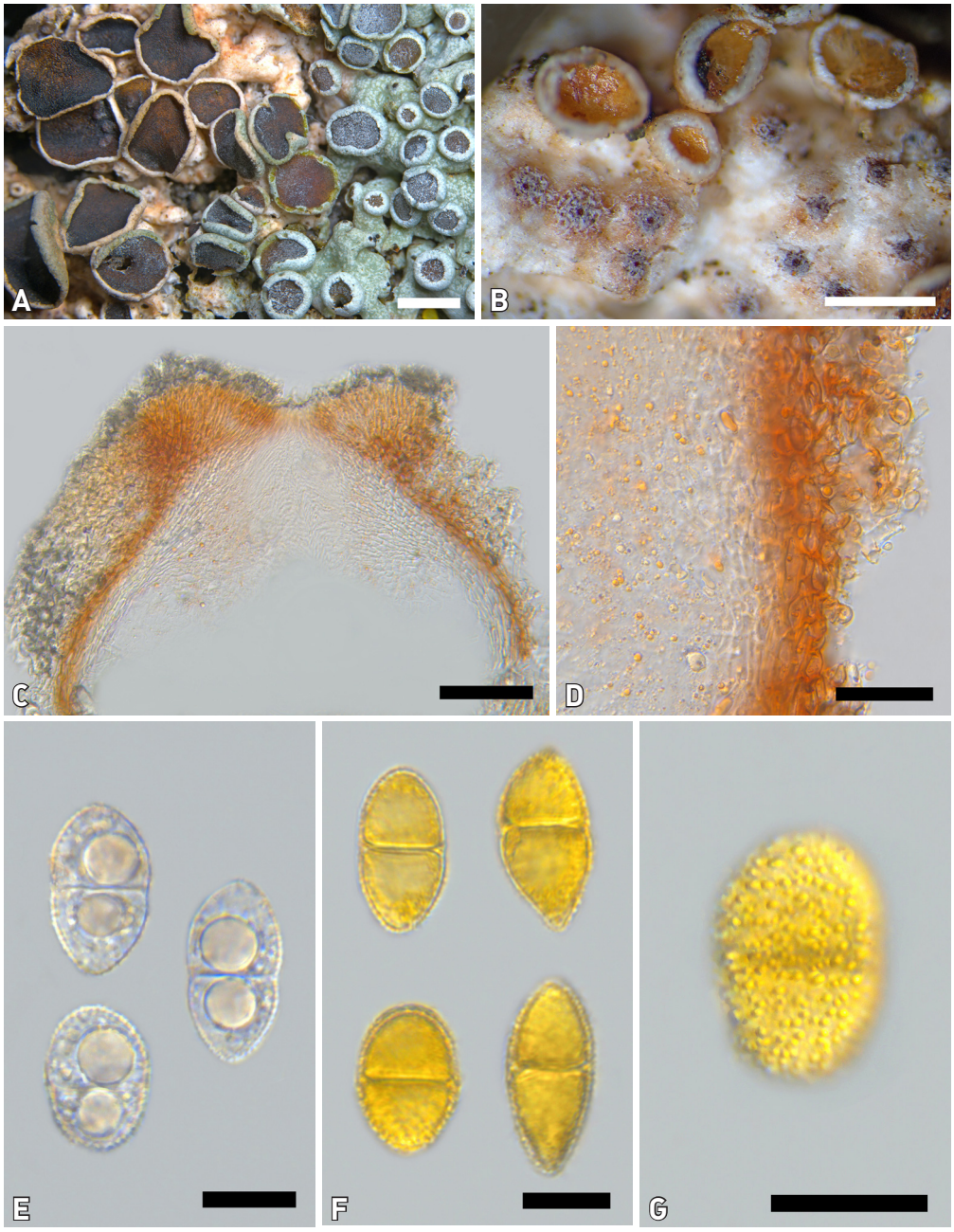

Fig. 5. *Pronectria etayoi* [Zi 4363]. **A.** Infection on *Physcia stellaris*. **B.** Ascomata immersed in the host thallus, only papillae visible. **C.** Cross section of ascoma. **D.** Cross section of lateral wall (in H_2O). **E.** Ascospores with echinulate ornament (in H_2O) **F.**, **G.** Ascospores with echinulate ornament (in Lugol). Scale bars: A = 2.0 mm, B = 0.5 mm, C, E = 50 µm, E, F, G. = 10 µm.

Abb. 5. *Pronectria etayoi* [Zi 4363]. **A.** Infekt auf *Physcia stellaris*. **B.** In den Wirtsthallus eingesenkte Ascomata. **C.** Querschnitt obere Gehäusehälfte. **D.** Wandschnitt (in H_2O). **E.** Echinulate Sporen (in H_2O). **F.**, **G.** Echinulate sporen (in Lugol). Messstrichlängen: A = 2,0 mm, B = 0,5 mm, C, E = 50 µm, E, F, G = 10 µm.

thinner, vividly coloured wall. It shares the echinulate ornament of ascospores and also the stereomicroscopical impression of the infections with *P. echinulata* and *P. santessonii*. *P. etayoi* is unique not only in the species on Physiaceae, but also in all known species of *Pronectria*, if ascospores features like dimensions, volume (largest in the genus!) and type of epispore (echinulate) are cross-combined.

Additional specimen examined: Switzerland, Kanton Jura, Les Cheneviers, La Fonge, margin of a forest, 990 m, 47°13′40″N/6°59′48″E, on *Physcia stellaris* on *Sorbus* sp., 3.1.2020, S. Feusi [Zi 4948]. – **Austria**, Osttirol, Tauernbachtal, Weg vom Matreier Tauernhaus nach Inngergschlöß, 1510 m, 47°07′17″N/12°29′34″E, auf *P. aipolia*, 16.7.2020, F.Berger, E.Zimmermann & S.Feusi [Be 34957]. – Osttirol, Kals, Lesachtal, Erlenwäldchen bei Oberlesach, 1370 m, 46°58′59″N/12°38′38″E, 15.7.2020, auf *P. aipolia*, F.Berger, E.Zimmermann & S.Feusi [Be 34974].

Xenonectriella Weese, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl., Abt. 1, 128: 749, 1919.

Type: *X. lutescens* (Arnold) Weese (≡ *Nectria lutescens* Arnold, Hedwigia 22: 54. 1883); type host: *Solorina*.

Generic description: Brown, orange or red coloured perithecial ascomata, immersed to semi-immersed in the host thallus, with a distinct papilla and smooth wall, wall consisting of 2 layers, outer part of the ascomatal wall yellow, orange or red coloured, consisting of thick-walled compressed cells, reacting K+ red to violet, and lactic acid+ (greenish-)yellow; the inner wall of thin-walled, hyaline flattened cells; periphyses lining the ostiolar channel, paraphyses present only when young, soon vanishing; asci unitunicate, cylindrical, apex simple, with 4–8 uniseriately arranged ascospores; ascospores hyaline and smooth when young, getting pale orange to brown coloured with age, with a verrucose to coarse tuberculate perispore (Rossman et al. 1999).

The genus *Xenonectriella* now contains 18 species of lichenicolous fungi, mainly colonizing foliose lichens (Diederich et al. 2018).

Notes: *Xenonectriella* was segregated by Weese (1919) predominately based on the special ascospore agglomerations in the type species. „..... Asci paraphysati, plerumque 2-spori, interdum 3 bis (sic!) 5-spori. Sporidia elliptica vel oblonga, initio didyma dein pseudo-pluriseptato-muriformia, hyalina vel fusca, verrucosa". Keissler (1930) interpreted the still monospecific genus in this way: „*Xenonectriella* Weese ist eine *Nectriella* N(itsch)ke. sensu Fuck. (Symb. Mycol., 1869, p. 175), bei der die ursprünglich zweizeiligen Sporen in verschiedener Zahl vollständig miteinander verwachsen und dann braune, warzige, mehrzellig erscheinende große Sporen bilden" [*Nectriella* is not correct in today´s sense anymore]. Rossman et al. (1999), while combining 3 more species without that character, ignored the diagnostic feature of ascospore agglutination and changed to the generic circumscription as given above.

Some general notes for delimiting *Pronectria* and *Xenonectriella*: Most *Xenonectriella* spp. are phenotypically similar to *Pronectria*, differing from the latter in ascomata with a K+ violet or red reacting wall, the strictly cylindrical asci with (4–)8 uniseriately arranged ascospores and coloured mature ascospores, ornamented by a brown perispore (Rossman et al. 1999). The presence of an asexual state of the *Fusarium*-type confirms the correct placement in *Xenonectriella* (Maharachchikumbura et al. 2016).

Exceptions, where overlapping features of both genera could lead to wrong determinations and conclusions:

1. At first, how to treat specimens with only darkening (more yellow, orange, brownish) or even a missing reaction with K (as well as lactic acid), while asci and ascospores strongly argument for *Xenonectriella*?

Also other authors had placed question marks behind some of their determinations, mainly because of difficulties in interpreting the taxonomical value of the sometimes variable K+ reaction of the ascomatal wall (e.g. Brackel 2009, 2014, 2015, Zhurbenko & Otte 2012, Etayo 2017); the latter observed two diverse types of the K reaction ("violeta-morado" or "purpura", meaning "violet" or "purple").

We were able to demonstrate that a positive K+ purple reaction as part of the generic delimitation of *Xenonectriella* is not absolutely necessary: In *X. physciacearum* [Zi 1963b] we observed, side by

side, ascomata with a reddish wall reacting K+ violet and those with K+ only darkening the brownish orange wall, leading us to understand the previously puzzling variability. We are hypothesizing, that the intensity of the K reaction in *Xenonectriella* depends on variable amounts of red pigment in the perithecial wall, probably reflecting the intensity of insolation as already suggested by Etayo (2017: 484). This reaction may even be missing in very pale pigmented ascomatal walls.

We also tested the lactic acid reaction, not mentioned any more in a couple of recent descriptions of *Xenonectriella* (e.g. Etayo 2017). Examination of several specimens convinced us that the degree of this reaction runs only parallel to the K reaction and does not provide further information. It reacts quite slowly and the change into yellow hues in questionable cases is more difficult to detect than the fast darkening or colour shift with K. So, in our opinion, the value of the lactic acid reaction in testifying *Xenonectriella* is neglectable and subordinate to the K test.

2. Specimens of *Xenonectriella* with K+ reaction and hyaline, smooth ascospores are reminiscent of *Pronectria* species and should therefore be treated with caution, as normally they represent a premature stage of development. As contours of the filaments fade away completely with ongoing ripening (Rossman et al. 1999), their presence is a strong hint for unmature material. Additonally, cylindrical asci with uniseriately arranged ascospores are a further argument for the proper placement in *Xenonectriella*.

3. Another characteristic and reliable feature of *Xenonectriella* are more or less coloured ascospores with reddish-orange to brownish convex warts or tubercles. Curiously, the only exception is the deviating arrangement of ascospores in the type species *X. lutescens*, where conglutinations of ascospores led to the false impression of submuriform ascospores.

Xenonectriella angulospora (Etayo) F.Berger, combinatio nova

Basionym: *Pronectria angulospora* Etayo, Nova Hedwigia 67: 502 (1998).

= *Xenonectriella leptaleae* sensu Rossman & Lowen, in Rossman et al., Studies in Mycology 42: 169 (1999).

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Host: *Heterodermia obscurata*

The description of *Pronectria angulospora* reveals typical features of *Xenonectriella* [e.g. immersed ascomata, ascomatal wall pale, K+ orange, asci cylindrical with uniseriately arranged ascospores, which are almost cubic or polygonal due to broad, brownish tubercles (Etayo 1998)]. As we are convinced that this species is well placed in *Xenonectriella*, we herewith propose this new combination. Arguments against the inappropriate combination into *X. leptaleae* by Rossman et al. (1999) see above under *Pronectria leptaleae*.

This species is close to *X. vertebrata* on *Heterodermia leucomelos* in respect to the coarsely ornamented ascospores and the host. However, *X. vertebrata* differs in its red, K+ purple ascomatal wall, smaller asci (67–78 × 6–9 µm vs. 117–130 × 10–12.5 µm), and smaller ascospores (7–9.5 × 5.5–7.5 µm vs. 10–13.5 × 8–11 µm); they are reminiscent of fish vertebrae due to the constriction at the septum and a belt like coarse ornament around the poles, differing from the tuberous shaped tubercles in *X. angulospora* (Etayo 1998). *X. angulospora* was described from France and reported also from Guatemala (Etayo & van den Boom 2006).

Xenonectriella physciacearum F.Berger, E.Zimm. & Brackel, species nova Fig. 6

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Diagnosis: Fungus lichenicola, ascomata solitaria vel aggregata, semiimmersa in thallo devitale pallidoque lichenum e generibus *Physciacearum*, 240–320 µm diametro, solo emergens cum papilla obscure rubro-nigra vel parda, ostiolo distincto; K colorem parietis ascomatum affirmat vel violascit; asci cylindrici (80–)90–120 × 8 µm, cum octo ascosporis uniseriatis. Ascosporae uniseptatae et clare brunneae, ellipsoideae, (10–)11–13(–15) × (6–)6.5–7.5(–8) µm, cum tuberculis aureo-

brunneis, robustis, 0.5–1 µm latis ornatae; differt de *X. protopannaria* hostibus aliis et ascosporis distincte ornamentatis.

Type: **Italy**, Calabria, Prov. di Cosenza, Sila, nahe Varco San Manro, Eichenhain, 1085 m, auf *Physconia venusta*, 29.4.2014, W. v. Brackel & D. Puntillo, [holotype – M, isotype – Br 7294].

Description: Scattered or loosely aggregated **ascomata** dispersed on slightly bleached areas of the host thallus (*Physcia*, *Phaeophyscia* or *Physconia* spp.), 1/2 to 2/3 immersed in the upper side of the thallus, mostly only the dark red to black coloured conical papilla visible. Ascomata pear-shaped, 240–320 µm in diameter, upper circumference, if visible, dark red brown; **wall** 35–40 µm wide at base and side, outmost layer in surface view with textura intricata; coloured outer part 20 µm wide in cross section, consisting of 8–10 layers of tangentially compressed cells, brownish-yellow or brownish-red, cinnabar-red, golden, orange coloured or rarely pale ochre only; K reaction depending on the colour: darkening with a less or intensive brownish hue, whereas the presence of red pigments is triggering a violet reaction, fading to centre, reaction absent if wall is pale ochre; lactic acid+ yellow or negative (see remark above); inner wall hyaline, 15–20 µm wide, consisting of c. 7 cell layers; **periphyses** fine, up to 45 µm long; paraphyssoids visible only in young ascomata, ramifying, septate, 2–4 µm wide, soon gelatinizing; **asci** cylindrical, (80–)90–120 × 8–9 µm, unitunicate, wall very thin and brittle (difficult to get unfractured asci), with 8 strictly uniseriately arranged ascospores; **ascospores** light brown, broadly ellipsoid, 1-septate, cells ± equal in size and shape, ends broadly rounded, constricted at the septum, (10–)11–13(–15) × (6–)7.5–9(–10) µm, l/b: 1.3–1.8 (n=54), with one big oil droplet per cell, with golden brown tubercles, 0.5–1 µm wide, strongly convex, constricted at the base.

Anamorph: *Fusarium*-type, conidiogenous cells flask-shaped, hyaline, thin-walled, 8–14 × 2–3 µm. Conidia arising singularly on the conidiogenous cells, crescent-shaped, apex obtuse, pointed at the base; 45–65 × 3–4 µm, hyaline, smooth, with 4–5 septa; observed only once [Be 34520], structure of orange sporodochium nearly destroyed.

Etymology: referring to the broad host spectrum within the Physciaceae.

Discussion: Despite the striking variability of the colour of the perithecium wall in section and consequently its K reaction in different specimens, *Xenonectriella physciacearum* is a well circumscribed entity. This variability does not concern other microscopical details. In our material we observed that the normally conspicuous violet K+ reaction in *Xenonectriella* depends on the amount of red pigments in the perithecial wall.

Observations: *X. physciacearum* has a broad host selection restricted to species of the family Physciaceae. We observed some phenotypical variability, regarding following observations: Ascospore sizes in most Central European specimens are in range of the type; only some Swiss specimens have broader ascospores (up to 12 µm). Density, size and convexity of the tubercles can be variable. [Zi 4067] deviates in ascomata of 400 × 370 µm and up to 11 ascospores /ascus. Sometimes ascomata are extremely dark in colour and are therefore not reminiscent of the usual brown or red *Xenonectriella* colours which are typical for all other species in Central Europe.

Discrepancies to *X. leptaleae* sensu Rossman and Lowen were observed already by previous authors, who as consequence, treated this cluster as *X.* cf. *leptaleae*. We are strongly inclined to believe, that these citations belong to *X. physciacearum*. Ascospore measurements given in literature, all on *Physconia distorta*: Zhurbenko & Otte (2012): (8–)9.5–13.5(–18) × (4.5–)5.5–7.5(–8.5) µm, l/b: (1,2–)1,3–2,3(–2,9), (n=72); Zhurbenko & Kobzeva (2014, with an illustration of young asci): (12.3–)12.9–18.5(–23.5) × (6.7–)7.8–9.0(–9.7) µm, l/b ratio: 1.4–2.4; Zhurbenko & Kobzeva (2016): (9.9–)10.8–14.0(–17.9) × (6.5–)7.2–8.4(–9.0) µm, l/b ratio: 1.3–1.9(–2.7), (n=55).

Host lichens (ascomata always on ± bleached or weakened thallus areas): *Phaeophyscia orbicularis*, *P. ciliata*, *Physcia adscendens*, *P. aipolia*, *P. leptalea*, *P. stellaris*, *P. tenella*, *Physconia distorta*, *P. venusta*, *Heterodermia speciosa.*

Delimitation: Compared with other species of *Xenonectriella* with an average ascospore length of 10–16 µm, most taxa are dwelling on large foliose lichens such as *Pseudocyphellaria* [*X. aurantiaca* Etayo, *X. humilis* Etayo, *X. streimannii* (S.Y.Kondr., Coppins & D.J.Galloway) Rossman], *Sticta*

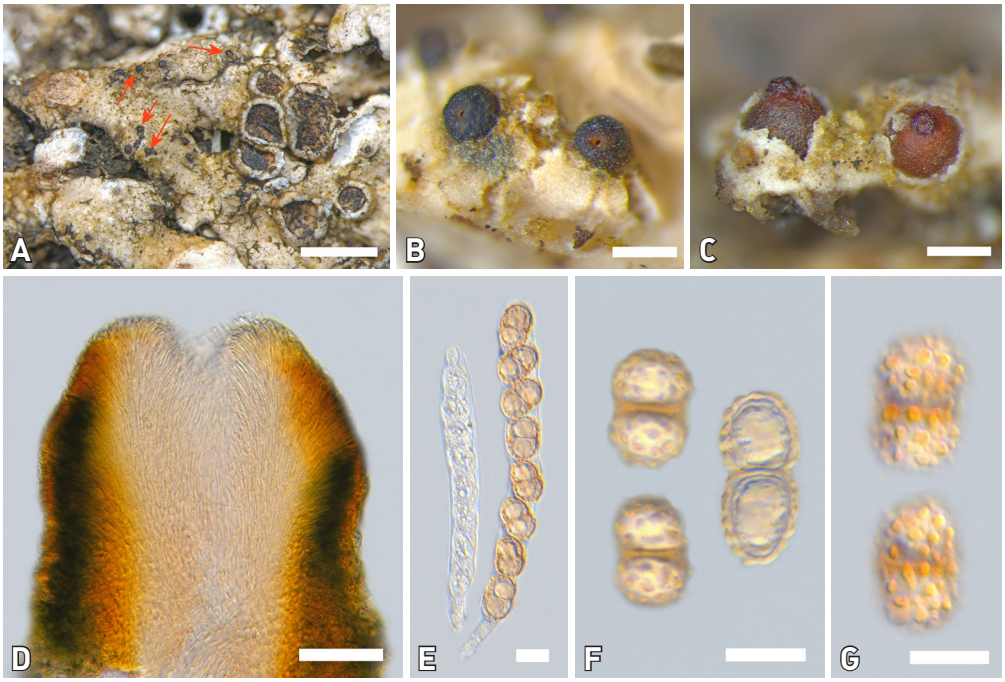

Fig. 6. *Xenonectriella physciacearum* [Zi 1963]. **A, B.** Infection on *Physcia stellaris*. **C.** Ascomata immersed in host thallus [Zi 344]. **D.** Chimney-like ostiolum in cross section. **E.** Ascus in H_2O. **F.** Ascospores in H_2O. **G.** Ascospores with coarse ornament in H_2O. Scale bars: A = 1.0 mm, B, C = 200 µm, D = 20 µm, E, F, G = 10 µm.

Abb. 6. *Xenonectriella physciacearum* [Zi 1963]. **A, B.** Infekt auf *Physcia stellaris.* **C.** In den Wirtsthallus eingesenkte Ascomata [Zi 344]. **D.** Querschnitt durch das kaminartige Ostiolum. **E.** Ascus in H_2O. **F.** Ascosporen in H_2O. **G.** Sporen mit grob ornamentierter Oberfläche in H_2O. Messstrichlängen: A = 1,0 mm, B, C = 200 µm, D = 20 µm, E, F, G = 10 µm.

(*X. streimannii*) and *Lobariella* (*X. rugulatispora* Etayo). Exceptions are *X. protopannariae* (Zhurb.) Brackel on *Protopannaria pezizoides* and the generic type species *X. lutescens* (Rehm) Weese on *Collema*, *Parmeliella* and *Solorina*. *X. lutescens* as well as *X. streimannii* are producing ascospores seeming submuriform due to conglutinations of single ascospores. Ascomata of the non pathogenic *X. protopannariae* (Zhurb.) Brackel are taller (200–250 × 400 µm), have a thicker peridium, ascospores are nearly colourless and fitted with an inconspicuous ornamentation. Additionally, the new species is restricted to different hosts in Physciaceae in temperate regions. *X. physciacearum* differs from *X. zimmermanni*, also on *Physcia* (see below) by its dark, always solitarily arranged ascomata with conspicuous dark papillae, larger ascospores and additionally in larger conidia of its anamorph with more septa. Observed variations do not depend on different host genera.

Ecology: *X. physciacearum* is pathological, finally destroying all observed hosts.

Selected specimens: Austria, Oberösterreich: Bez. Schärding: St. Roman, 300 m E Füchsledt, Waldrand, 530 m, 48°27'13"N/13°37'58"E, auf *Physcia stellaris* an *Fraxinus excelsior*, 30.11.2014, F. Berger [Be 28708]. – Kopfing 130, 545 m, 48°26'23.3"N/13°39'24"E, auf *Phaeophyscia orbicularis*, 1.1.2015, F. Berger [Be 28794]; ibidem 24.2.2017, F. Berger [Be 31413]; ibidem 7.1.2019 [Be 33891]. – St.Ägidi, Mühlbach, 615 m, 48°29´43´´N/13°42´40,8´´E, auf *Physcia stellaris*, 5.1.2019 [Be 34520, with *Fusarium* Anamorph]. – Bez. Vöcklabruck, Pöndorf, Kobernausserwald, S Wienerhöhe, Nassgalle mit Eschen, 680 m, 48°02'55"N/13°19'20"E, auf *Physcia tenella* an *Fraxinus excelsior*, 22.12.2018, F. Berger [Be 33867]. – Bez. Kirchdorf, Hinterstoder, Weg zur Baumschlagerreith, 690 m, 47°39'18"N/14°05'56"E, auf *Heterodermia speciosa* auf *Salix*, 27.1.2020, [Be 34546]. – Tirol: Osttirol, Matrei, Wanderweg Außergschlöss nach Innergschlöss, 1515 m, 47°07'19"N/12°29'22"E,

auf *Physcia aipolia* an *Salix*, 15.8.2016, F. Berger [Be 31140]. – **Germany**, Bavaria: Oberfranken, Kreis Kronach, E Schwärzdorf, 305 m, 50°16'21"N/11°12'13.8"E, auf *P. tenella* an *Alnus glutinosa*, 21.6.2011, W. v. Brackel [Br 5703]. – Mittelfranken, Kreis Erlangen-Höchstadt, W Hannberg, 295 m, 49°38'10.6"N/10°53'26.3"E, auf *P. tenella* an *Prunus spinosa*, 11.12.2013, W. v. Brackel [Br 6742]. – Oberpfalz, Kreis Regensburg, NW Pentling, 400 m, 48°59'27"N/12°03'04.6"E, auf *P. orbicularis* an *Fraxinus excelsior*, 21.10.2009, W. v. Brackel [Br 5112]. – Oberbayern, Kreis Weilheim-Schongau, am Dietelhofer See, 555 m, 47°51'N/11°09'E, auf *P. orbicularis* an *Acer* sp., 2.2.2008, leg. A. Zehm, det. W. v. Brackel [Br 4560]. – **Italy**, Basilicata: Prov. Potenza, Monte Vulture, nahe „Femmina Morta" 1025 m, auf *P. stellaris* an *Quercus cerris*, 22.8.2010, W. & G. v.Brackel [Br 5650]. – Kalabrien: Prov. Cosenza, Parco Nazionale della Sila, Fallistro (Riserva Statale I Giganti della Sila), 1410 m, 39°19'24.9"N/16°28'06.6"E, auf *Physcia leptalea* an *Pinus laricio* und *Acer pseudoplatanus*, 25.4.2014, W. v. Brackel & D. Puntillo [Br 7302]. – Latium: Prov. Roma, Monti Simbruini, oberhalb Campo dell'Osso, 1650 m, 41°57'18.4"N/13°11'1.2"E, auf *Physcia aipolia* an *Fagus sylvatica*, 14.8.2013, W. & G. v. Brackel [Br 6706]. – Lombardei: Prov. Brescia, Parco dell'Adamello, Valle dell' Avio S Temù, 1170 m, 46°14'17"N/10°28'25"E, auf *Phaeophyscia ciliata* an *Fraxinus excelsior*, 7.9.2009, W. v. Brackel [Br 5213]. – Sizilien: Prov. Palermo, Bosco della Ficuzza, am Crocifisso, 925 m, 37°51'51.6"N/13°23'00.9"E, auf *Physconia distorta* an *Quercus ilex*, 13.8.2007, W. & G. v. Brackel [Br 4557]. – Toskana: Prov. Arezzo, Caprese Michelangelo, neben Michelangelo-Geburtshaus, 615 m, 43°38'40.2"N/11°59'07.9"E, auf *P. stellaris* an *Quercus cerris*, 21.8.2012, W. & G. v. Brackel [Br 6568]. – **Switzerland**, Kanton Bern: Lenk, Richtung Iffigental, Blatti, Waldrand, 1070 m, 46°26′39.5″N/7°26′47.3″E, auf *Physcia stellaris* an Ästen von *Fraxinus excelsior*, 14.5.2017, E. Zimmermann [Zi 1963 a,b]. – Adelboden, Unter dem Birg, 1470 m, 46°27′42.2″N/7°33′30.1″E, auf *Physcia stellaris*, 22.5.2019, leg. E. Zimmermann & S. Feusi [Zi 4067]. – Kanton Vaud: Villeneuve, Grands Larges, Erlenwald, 380 m, 46°23′31.60″N/6°53′33.32″E, *Alnus incana*, Zweige, auf *Ph. stellaris*, 2012, E. Zimmermann; [Zi 344]. – Kanton Luzern: Wiggen, Hilferen, Erlenwald, 1250 m, 46°52′11.3″N/7°58′16.3″E, auf *Ph. stellaris* auf Zweigen von *Alnus incana*, 5.2011, E. Zimmermann [Zi 351].

Xenonectriella zimmermanni F.Berger & Brackel, species nova Fig. 7

MycoBank 836589

Diagnosis: Ascomata solitariter, semimmersa in partibus pallide decoloratis laminae superioris lichenum generis *Physcia* sect. *Physcia*. Differt a *X. dirinariae* ascomatibus maioribus, rubris, cum pariete ascomatum K+ violascente et ascis cylindricis longioribus, (45–)65–85 × 6–7(–7.5) µm, cum octo ascosporis 1-septatis; ascosporae clare brunneae, ellipsoideae, uniseptatae, (7–)7,8–10,1(–12) × 5,1–6,1(–7) µm, saepe etiam ascosporae globosae aseptatae sunt, (7–)8–9.5(–10) × 8–9(–10) µm, ascosporae cum episporo tuberculato.

Type: **Germany**, Bayern, Oberfranken, Kreis Forchheim, Regnitztal, S Burk bei Forchheim, 270 m, auf *Physcia tenella* auf *Prunus spinosa*, 28.12.2013, W. v. Brackel [holotype – M, isotype – Br 6784].

Description: **Ascomata** singularly dispersed on pale pinkish spots of the upper cortex of *Physcia tenella*, semi-immersed, perithecioid, vividly orange to deep red, orbicular to subpyriform, (140–)200–240 µm in diameter; papilla inconspicuous with central ostiolum. **Perithecial wall** approximately 25–30 µm thick, outer part vividly salmon red to apricot orange, reacting K+ violet, lactic acid+ yellow, especially around the slightly protruding ostiolum, reaction weaker in the basal part of the ascoma; outer part of wall in cross-section with 6–7 layers of coloured, polygonal cells (in surface view) with diameter up to 15 µm (textura angularis); inner part consisting of 5–6 layers of hyaline cells up to 15 × 3 µm in section; always with many orange oil-droplets. **Periphyses** fine, 20–35 × 1–1.5 µm. **Paraphysoids** shadowy, shortly septate, with strongly varying diameter, containing orange oil droplets up to 2.5 µm diameter, gelatinising with ongoing maturity. **Asci** cylindrical, unitunicate, thin-walled, (45–)65–85 × 6–7(–7.5) µm, (n=12), (6–)8-spored, ascospores arranged uniseriately, with their axis parallel or oblique in the ascus. **Ascospores** (7–)7.8–10.1(–12) × 5.1–6.1(–7) µm, l/b ratio: (1.4–)1.5–1.7(–2), (n=30), apically broadly rounded, 1-septate, hyaline to pale brown, more or less constricted at the septa, septa very fine, beginning to develop rather lately; perispore tuberculate, tubercles flat, c. 0.5 µm. Sometimes a considerable part of ascospores is aseptate, pale brown, broadly ellipsoid to spherical, aseptate ascospores with slightly polygonal shape due to prominent tubercles, (7–)8–9.5(–10) × (5.5–)8–9(–10) µm, l/b ratio: (1–)1.2–1.3(–1.5), (n=20), cells with one large oil droplet of c. 5 µm diameter.

Asexual state: *Fusarium*–type, described and illustrated in Brackel (2014: 406). Convex, pale orange colonies on the host thallus, c. 100–200 µm in diameter. Sporodochia formed by densely aggregated

conidiophores, hyaline, of irregular shape and size, septate, ramifying. Conidiogenous cells terminal, aggregated, flask-shaped, hyaline, thin-walled, 5–12 × 2–3 µm. Conidia arising singularly, terminally on the conidiogenous cells, 3-septate, ca. 25–30 × 2–4 µm, crescent-shaped, with long, tapering ends, hyaline. Immature conidia sickle shaped with the lower end extended and the upper round, developing their typical form not before they dissolve from the conidiogenous cells.

Etymology: We are glad to dedicate this taxon to our friend Erich Zimmermann from Switzerland, an important Central European lichenicologist and brilliant photographer of microlichens and lichenicolous fungi, honouring his important records of lichenicolous fungi mainly in Central European Alps and his perpetual and patient helpfulness. At least not to forget the development, design and production of "Lichen candelaris®", a LED- equipped lens, which proved to be an indispensable tool in the field, not only for lichenologists.

Variability: The colour of the ostiolum varies between scarlet-red and brownish-red, according to the concentration of red pigments in the outer wall. This concentration is responsible for the intensity of the always positive K reaction in *X. zimmermanni*. It ranges from brilliant violet in the entire wall to dull violet near the ostiolum. The percentage of aseptate ascospores is also variable and subsequently, the different shapes of aseptate and septate ascospores. As a result, asci with mixed 0- to 1-septate ascospores as well as asci with only 1-septate or only aseptate ascospores can be observed in different collections. At the beginning of our investigation, we considered an additional species with only aseptate ascospores. With more material available, we observed asci with mixed septation of ascospores but otherwise homogenous in macroscopical appearance and host selection. It became clear, that this does not deserve an own taxon.

Remark: This taxon was also part of the *Xenonectriella leptaleae* convolute (e.g. Brackel 2014).

Delimitation: The new species differs from *X. physciacearum* on the same hosts in several features: The smaller ascomata are more vividly coloured and are lacking the distinctly prominent dark papilla of *X. physciacearum*. This difference is readily visible under a lens. Microscopically, the K reaction is always violet, at least in the wall around the ostiolum. Ascospores are shorter than 10 µm, aseptate in variable amount, and their perispore is less prominent. Nearly all known hosts belong to the genus *Physcia* sect. *Physcia* (*P. tenella, P. adscendens, P. leptalea* and *P. neogaea*). *P. stellaris* has been encountered only once. Equally, *Xanthoria parietina* has been observed also once as an opportunistic host in the vicinity of infested *Physcia*.

Some species of *Xenonectriella* with an ascospore length of <10 µm were compared already in Etayo & van den Boom (2013): According to the description, *X. dirinariae* Etayo & van den Boom has smaller, immersed perithecia, slightly longer (9–10.5 × 4.5–5.5 µm) and very pale, smooth, fusiform, obliquely arranged ascospores. Type host is a *Dirinaria* on tropical mangroves. Perithecia of *X. fissuriprodiens* (Etayo) Etayo are immersed completely in the upper cortex of *Lobaria pulmonaria* with at most the brownish papillae visible in cracks, the peridial wall is pale to medium brownish-red, with a temporary K+ reaction (morada type sensu Etayo 2017: 488), ascospores are hyaline with a perispore of weakly developed tubercles. *X. coppinsiana* Etayo and *X. leptaleoides* (Etayo) Etayo are dwelling on big foliose tropical lichens, the further with brown-red ascomata walls and longer ascospores, the latter with longer asci and narrower ascospores, fitted with a granular perispore and a torus. *X. vertebrata* on *Heterodermia* is the last species to be compared due to its ascospore dimensions. In this species ascospores are very different in shape, subcylindrical due to a belt of coarse, warty orange perispore concentrated around the truncate poles, reminiscent of fish vertebrae (Etayo 2017). Differences to the similar *Pronectria angulospora* on the same host genus are discussed in the same reference.

As we observed specimens with a considerable amount of aseptate ascospores, we also compared *X. zimmermanni* with some lichenicolous Hypocreales with aseptate ascospores smaller than 10 µm, namely *Globonectria cochensis* (Etayo 2002) on *Lobaria pallida*. Its wall is K–; ascospores are smaller (6–7.5 µm) and very finely ornamented. Additionally, *X. calabrica* Brackel & Puntillo, commensalistic on *Pertusaria*, has smaller orange perithecia up to 170 µm in diameter. The hyaline to weakly brownish ascospores are slightly broader [(6.5–)8–9.6(–10.5) × (5.5–)6–8.2(–9.5) µm, l/b ratio: 1.1–1.5] and ornamented with a weakly developed flat warty perispore (Brackel & Puntillo 2016).

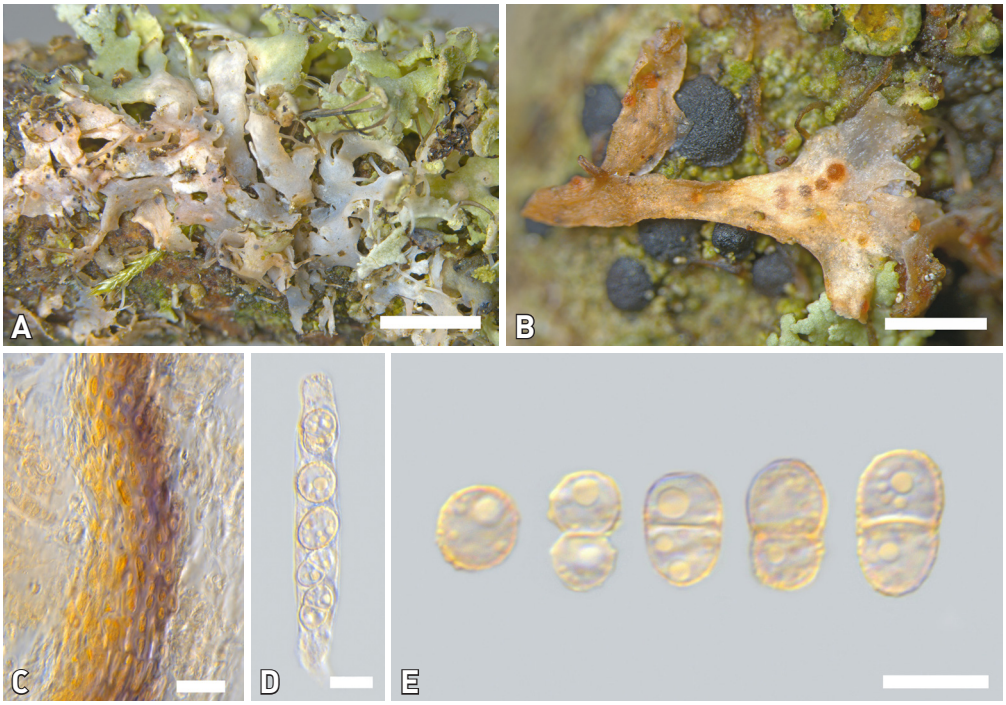

Fig. 7. *Xenonectriella zimmermanni* sp. nov. [Zi 4276]. **A, B.** Infection on *Physcia tenella*. **C.** Specimen with in this case only weak K reaction of the outer wall. **D.** Juvenile ascus with one- and two-celled spores in H_2O. **E.** Ascospores in H_2O. Scale bars: A = 2.0 mm, B = 1.0 mm, C, D, E = 10 µm.

Abb. 7. *Xenonectriella zimmermanni* sp. nov. [Zi 4276]. **A, B.** Infekt auf *Physcia tenella*. **C.** Gehäusewand mit in diesem Fall nur schwacher K Reaktion im äußeren Wandbereich. **D.** juveniler Ascus mit ein- und zweizelligen Sporen in H_2O. **E.** Ascosporen in H_2O. Messstrichlängen: A = 2,0 mm, B = 1,0 mm, C, D, E = 10 µm.

Anatomical features overlap with *X. subimperspicua* (Speg.) Etayo, with its immersed dark-red to brown-red ascomata growing on Parmeliaceae, with only the short truncate papillae visible through cracks in the upper cortex of the host (Fig. 8). The orange wall is reacting dull violet to wine-red in K (Zi 1943, Be 29919). Ascospores in *X. subimperspicua* are slightly shorter, not or slightly constricted at the septum, remaining very pale brown with a gappy short echinulate, but not tuberculate ornament, 7.5–8(–10) × 5–5.6(–6) µm and hosts in Parmeliaceae. Brackel (2014: 291) found it once on poor developed *P. tenella* (as an occasional host near infected *P. sulcata*). Critical revision of this specimen confirmed the identity.

Host lichens: *Physcia tenella* (15 of 20 investigated specimens, including 6 with mainly or exclusively aseptate ascospores), *P. adscendens* (2/20), *P. neogaea* (1/20), *P. aipolia* (1/20), *Xanthoria parietina* (1/20). According to the given details (Etayo 2017: 489), specimen Et 20028 on saxicolous *Physcia* sp. might also be placed here (ascospores 7–9.5 × 5–7 µm).

Ecology: *X. zimmermanni* is pathological, finally destroying the host lichens. We observed it mainly in *Physcia tenella* rich communities on well lit twigs in locations with elevated humidity.

Data about the distribution are restricted to our specimens at the moment. We are sure that the range will expand after revision of specimens, deposed as *X. leptaleae*.

Selected specimens investigated with septate ascospores (all on discoloured thallus areas): Austria, Oberösterreich, Bez. Schärding, St. Roman, 300 m E Füchsledt, Waldrand, 530 m, 48°27'13"N/13°37'58"E, auf *Physcia tenella* an *Fraxinus excelsior*, 30.11.2014, F. Berger [Be 28717, mit *Fusarium* Anamorphe]. – Oberösterreich,

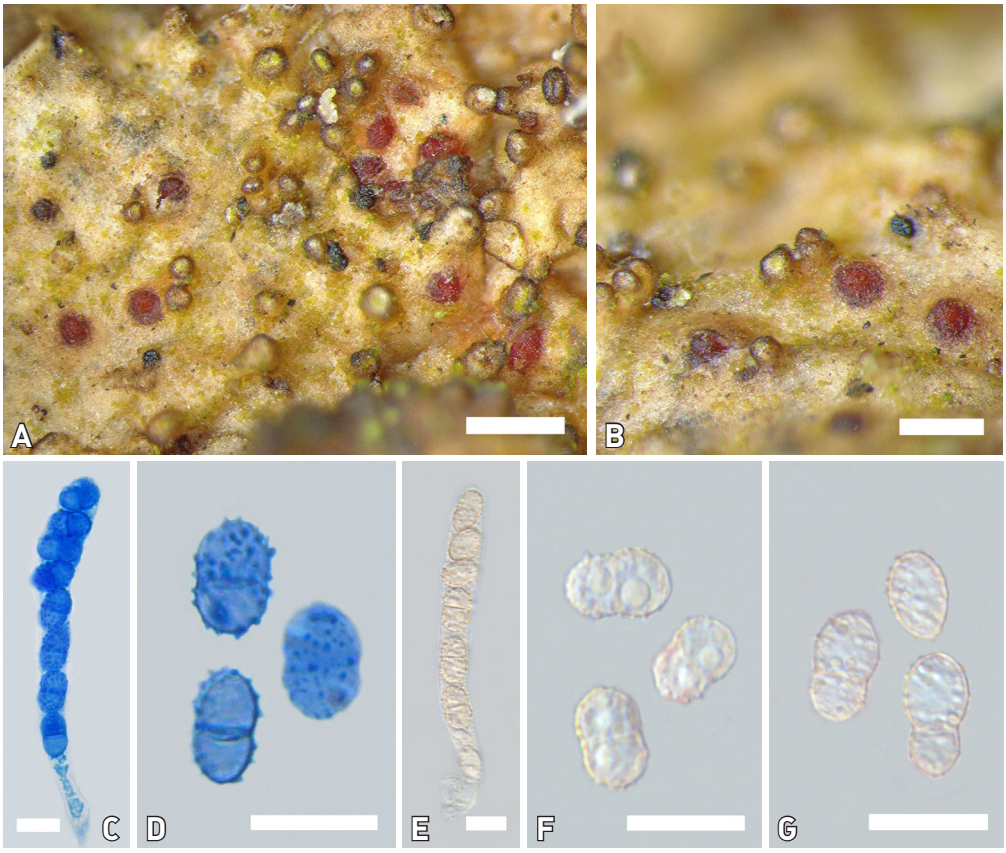

Fig. 8. *Xenonectriella subimperspicua* [Zi 1943]. **A.** Infection on *Melanohalea exasperata*. **B.** Red ascomata immersed in the host thallus. **C.** Ascus in LC. **D.** Ascospores in LC. **E.** Ascus in CR. **F, G.** Ascospores in CR. Scale bars: A = 0.5 mm, B = 0.2 mm, C, D, E, F, G = 10 µm.

Abb. 8. *Xenonectriella subimperspicua* [Zi 1943]. **A.** Infekt auf *Melanohalea exasperata*. **B.** In den Wirtsthallus eingesenkte Ascomata. **C.** Ascus in LC. **D.** Ascosporen in LC. **E.** Ascus in CR. **F, G.** Ascosporen in CR. Messstrichlängen: A = 0,5 mm, B = 0,2 mm, C, D, E, F, G = 10 µm.

Kopfing 130, 545 m, 48°26'23.3"/13°39'24"E, auf *P. tenella* an *Juglans regia*, 12.11.2014, F. Berger [Be 28788]; ibidem, auf *P. tenella*, 30.6.2013, F. Berger [Be 27238, mit *Fusarium* Anamorphe]; ibidem, auf *P. tenella*, 28.11.2016 [Be 31383]. – Oberösterreich, Donautal, Neustift, 290 m, 48°28'58"N/13°45'46"E, auf *Xanthoria parietina* an *Salix fragilis*, 1.2.2015, F. Berger [Be 28924]. – **Germany**, Mittelfranken, Kreis Erlangen-Höchstadt, W Flugplatz Herzogenaurach, 325 m, 49°34'53,0"N/10°52'47,7"E, auf *Physcia adscendens* an *Prunus spinosa*, 6.1.2014, W. v. Brackel [Br 6813]. – Oberfranken, Kreis Forchheim, Westhang der Ehrenbürg N Parkplatz Schlaifhausen, 440 m, 49°43'03,5"N/11°09'05,2"E, auf *P. adscendens* an *Prunus spinosa*, 30.12.2013, W. v. Brackel [Br 6803]. – Oberfranken, Kreis Lichtenfels, Mondstein N Kümmersreuth, 540 m, 50°03'20,7"N/11°06'25"E, auf *P. tenella* an *Prunus spinosa*, 15.7.2011, W. v. Brackel [Br 5767]. – **Switzerland**, Kanton Bern, Lenk, Richtung Iffigental, Blatti, Waldrand, 1070 m, 46°26′39.5″N/7°26′47.2″E, auf *Physcia stellaris* an Ästen von *Fraxinus excelsior*, 14.5.2017, E. Zimmermann [Zi 1963c]. – Kanton Jura, La Joux, La Combe, 850 m, 47°16′56.47″N/7°05′28.49″E, auf *P. tenella* an Zweigen von *Salix sp.*, 23.12.2018, E. Zimmermann [Zi 4276]. – **Bermuda**, Mid Ocean Golf Course, shore of Mangrove Lake, 1 m, 32°19'29"N/64°42'36"W, auf *Physcia neogaea* an *Rhizophora mangle*, 2.11.2007, Scott LaGreca & F. Berger [Be 22305].

Specimens with mainly aseptate ascospores: **Austria**, Oberösterreich, Bezirk Schärding, Engelhartszell, Weichholzau NW Oberranna, 290 m, auf *Physcia tenella* auf *Salix cinerea*, 27.9.2011, F. Berger [Be 25827];

ibidem, 7.3.2012 [Be 26277]; ibidem, 3.4.2015 [Be 29094]. – Oberösterreich, Bezirk Schärding, Kopfing, Raiffeisenweg 130, 545 m, 48°26´24´´N/13°39´23´´E, auf *P. tenella* an *Juglans*, 27.9.2011, F. Berger [Be 25827]; ibidem, 3.4.2015 [Be 29084].

Specimens of *Xenonectriella subimperspicua* compared: Germany, Bayern: Unterfranken, Kreis Kitzingen, Gereutholz NE Willanzheim 245 m, MTB 6327/1, 49°41'32,8"N/10°14'09,4"E, an Ast von *Quercus robur* aus der Krone, heruntergebrochen, auf dem Thallus von *Parmelia sulcata*, 14.12.2006, W.v.B. [Br 3971]. – Gemeindewald Willanzheim W Willanzheim, an Ästen von *Quercus robur* aus der Krone, auf dem Thallus von *P. sulcata*, 260 m, MTB 6327/1, 21.12.2006, W.v.B. [Br 3972]. – Oberbayern, Kreis Garmisch-Partenkirchen, Perlach SE Riegsee, auf *P. jeckeri* an Eiche, 740 m, MTB 8333/2, 47°49'54"N/11°15'02"E, 6.3.2011, leg. A. Zehm, det. W.v.B. [Br 6695]. – **Portugal**, Lisboa, Jardim Botanico da Ajuda, on bark, on *Punctelia borreri*, 85 m, 38°42'23,8"N/9°12'05.2"W, 17.5.2016, W. & G. v. Brackel [Br 7686]. **– Switzerland**, Kanton Bern, Lenk, Zelg, Simmenfälle, Grauerlenbruch, 46°25′36.7″N/7°28′48.9″E, *Alnus incana*, auf *Melanohalea exasperata*, 1030 m, 14.5.2017, E. Zimmermann [Zi 1943]. – Kanton Aargau, Vordemwald, Langholz, 450 m, 47°17′11.3″N/7°52′32.7″E, auf *Melanelia glabratula*, auf *Fraxinus*, 14.5.2014, E. Zimmermann [Zi 1030].

Xenonectriella sp. Fig. 9

Only one specimen of this distinct material, growing free on rhizines of slightly damaged *Physconia distorta* was found. As the material is scanty and partly immature, the description is only provisional:

Ascomata vividly orange red, with protruding papilla of the same colour, aggregated on the tangled rhizines of old, miscoloured *Physconia distorta*, globose, 100–200 µm diameter, base of the ascomata conjugated with the host rhizines by a fine web of hyaline hyphae. Outer **wall** textura intricata in surface view, orange red, hyphae 4–8 µm, interwoven, septate, distinctly K+ violet; inner peridium in cross section textura globosa to angularis; **periphyses** c. 30 × 1.5 µm, insperse; **paraphysoids** poly-

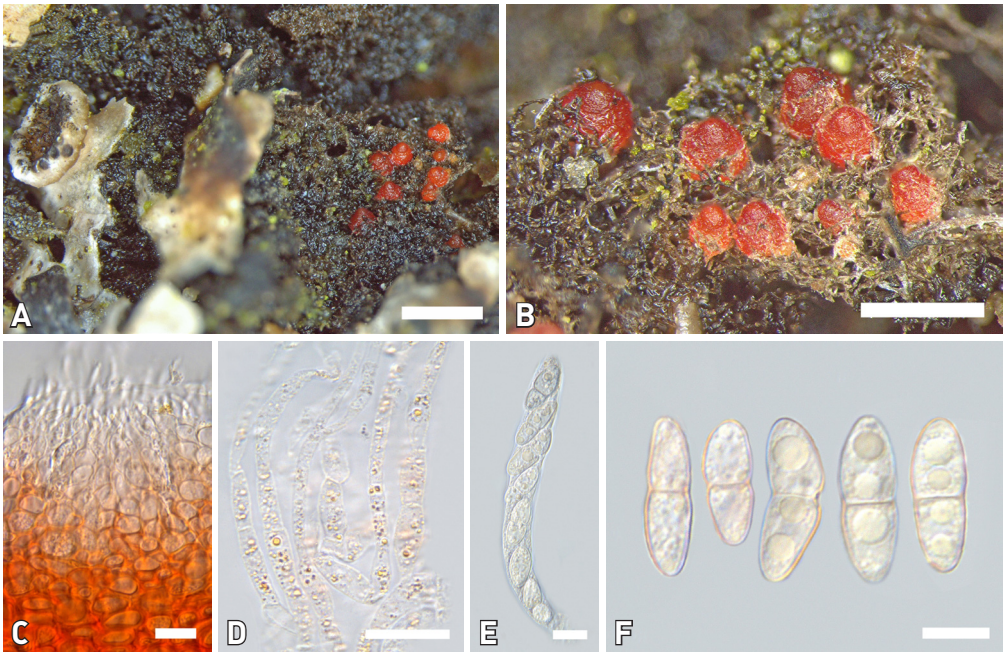

Fig. 9. *Xenonectriella* sp. [Zi 1944]. **A, B.** Ascomata on rhizines of *Physconia distorta*. **C.** Ostiolum. **D.** Paraphyses of young ascoma; inspers due to orange vacuoles. **E.** Juvenile ascus in H_2O. **F.** Ascospores in CR. Scale bars: A = 1.0 mm, B = 0.5 mm, C, D, E, F = 10 µm.

Abb. 9. *Xenonectriella* sp. [Zi 1944]. **A, B.** Ascomata auf den Rhizinen von *Physconia distorta*. **C.** Ostiolum **D.** Paraphysen junger Ascomata inspers durch orange Vakuolen. **E.** Juveniler Ascus in H_2O. **F.** Ascosporen in CR. Messstrichlängen: A = 1,0 mm, B = 0,5 mm, C, D, E, F = 10 µm.

morph, anastomosing, 3–5 µm broad, septate, with lots of pale orange oil droplets up to 1 µm, which make the hymenium seemingly insperse, at least in the observed young material; **asci** cylindrical to subclavate, 100–120 × 10 µm, with thin wall, containing 8 uniseriately, obliquely arranged ascospores; **ascospores** in early stage hyaline, aseptate, broadly ellipsoid, mature also fusiform, septate, hyaline, smooth, slightly constricted at the septum, straight to slightly bent, apex obtuse, 16–23 × 6–8 µm, (n=15), mature pale brownish, filled with tiny oil droplets, without ornamentation. Asexual state not observed.

Material examined: Switzerland, Bern, Lenk, Simmenfälle, Grauerlenbruch, Zweige von *Alnus incana*, auf *Physconia distorta*, 1030 m, 46°25′36.7″N/7°28′48.9″E, 14.5.2017, E. Zimmermann [Zi 1944].

Ecology: Colonizing rhizines of *Physconia distorta* in a humid forest of *Alnus incana* at a north exposed slope in the Swiss Alps. Other notable lichens in this environment were *Chaenotheca cinerea*, *Hypotrachyna sinuosa* and *Thelotrema lepadinum*.

Key to *Pronectria and Xenonectriella* species on Physciaceae

Species not yet observed, but possibly present in Europe are referred to in square brackets. This key, starting with couplet 2 should replace couplet 22 in the key of Hafellner & Zimmermann (2012).

1 Ascomata with setae or hairs ..... ***Paranectria*, *Trichonectria*, *Nectriopsis***: not treated here
1* Ascomata without setae or hairs **2**

2 Ascospores brownish to orange-brown at maturity, distinctly tuberculate, ascospores exclusively uniseriate in cylindrical asci; if wall of ascomata distinctly coloured, then K+ [violet, orange or (dark) brown(-red) or intensifying given colour], pale parts of peridial wall may remain K– .... **(*Xenonectriella*) 3**
2* Ascospores remaining hyaline, not or finely ornamented, partly biseriate in ascus, wall of ascomata K–, even when red ..... **(*Pronectria*) 8**

3 Ascospores <10 µm long, ascomata distinctly orange or red, diameter <200 µm, wall always K+ violet **4**
3* Ascospores >10 µm long, broadly ellipsoid, 1-septate, asci >100 µm long, reaction of wall in K variable: K+ purple to violet, or intensifying only with additional brownish hue (negative only, if pale coloured) **6**

[4 Ascospores subcylindrical, vertebra-like (diameter highest near poles) due to a distinct brown circular perispore around poles, 1-septate, with one big oil droplet in each cell, 7–9(–9,5) × 5,5–7,5 µm; ascomata immersed, only red papilla visible, wall red, on *Heterodermia leucomelos* (Ecuador, Dominican Republic, Madeira) ..... ***Xenonectriella vertebrata*]**
4* Ascospores orbicular or ellipsoid, tubercles <0.5 µm **5**

5 Ascomata 2/3 immersed in hosts of *Physcia tenella* group, wall red, distinctly K+ violet, asci >65 µm, ascospores 0- or 1-septate or both mixed, spherical to broadly ellipsoid, with flat golden tubercles >0.5 µm ..... ***Xenonectriella zimmermanni***
5* Ascomata immersed in Parmeliaceae, infecting only adjacent *Physcia*, wall orange, K+ weakly purple, asci <65 µm long, ascospores 1-septate, broadly elliptical, with very short fine spikes .... ***Xenonectriella subimperspicua***

6 On *Heterodermia*, wall pale, K–, ascospores 10–13.5 × 8–11 µm, with polyhedral shape due to coarse tubercles concentrated at the pole ..... ***Xenonectriella angulospora***
6* On *Physcia, Phaeophyscia, Physconia, Heterodermia*; ascospores <8 µm wide **7**

7 Ascomata dark red to blackish, with distinctly darker papilla, singularly arranged on thallus, ascospores 10–15 µm long, with tubercles 0.5–1 µm ..... ***Xenonectriella physciacearum***
7* Ascomata vivid cinnabar red, arranged on rhizines of *Physconia*, ascospores >16 µm long, without ornamentation ..... ***Xenonectriella* sp.** [Zi 1944]

8 Ascospores length in average <10 µm, smooth, ascomata densely aggregated on discs of *Physcia* sp. . .....***Pronectria leptaleae***

8* Ascospores length in average >10 µm, ascomata mainly on thallus or thalline margin of the host . **9**

9 Ascospores 10–15 µm long, not pseudotetrablastic **10**

9* Ascospores >18 µm long, pseudotetrablastic or not..... **12**

10 Ascomata red-brown, ascospores 11–14 × 5–6 µm, l/b >2, ornamentation inconspicuous, on *Anaptychia* and *Physcia* ..... ***Pronectria santessonii***

10* Ascomata pale, ascospore l/b: <2 ..... **11**

11 Ascomata greyish-pink, ascospores echinulate, 12–14 × 5.5–8 µm, on *Physcia* and *Physconia* .... ***Pronectria echinulata***

[11* Ascomata hyaline, wall hyaline, ascospores 10–12 × 6–8 µm, ornamentation distinctly verruculose, on *Heterodermia* (Ecuador, Etayo 2017) ..... ***Pronectria pycnidioidea***]

12 Ascomata vividly orange-red; ascospores (14–)19–21(–24) × 4–5.5 µm; l/b >3, with very fine warts, pseudotetrablastic, on *Anaptychia* and *Physcia* ..... ***Pronectria tincta***

12* Ascomata brownish pink, ascospores (17–)18–20 × 9–10.5 (–12) µm; l/b <2, echinulate, not pseudotetrablastic, on *Physcia* ..... ***Pronectria etayoi***

Acknowledgments

We are greatly indebted to Javier Etayo (Pamplona) for information on *Xenonectriella angulospora* and to Walter Obermayer (GZU, Graz) for disposing loans. We also appreciate the valuable comments of two anonymous reviewers, who greatly helped to improve this study. Gavin Lancaster (Münzkirchen) is warmly thanked for linguistic corrections.

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Manuscript accepted: 11 August 2020.

Communicated by: Volker Otte

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