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Porina pseudohibernica sp. nov., an isidiate, epiphytic lichen from central and south-eastern Europe

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Abstract: The epiphytic lichen *Porina pseudohibernica* is described as new. It is characterized by a richly isidiate thallus, 7–8(–9)-septate ascospores and the presence of periphyses. It resembles *P. hibernica* s. str., differing in the size and septation of ascospores, and in the dimensions of the terete, branched isidia. The new species was found fertile at a single site in the Carnic Alps (SE Alps, Italy), but it is also known in a sterile condition from scattered localities in the humid (sub-)montane belt of Slovenia, the Czech Republic and Ukraine, occurring on smooth bark of *Fagus* and *Carpinus*. *Porina hibernica* is restricted to the coastal lowlands of Atlantic Europe, and it prefers rather dry, base-rich bark of *Quercus* and *Ulmus*. The characters previously used to segregate the isidiate European *Porina* into the genus *Zamenhofia* are also discussed.

Key words: Ascomycota, beech forests, Europe, *Porinaceae*, systematics

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Introduction

Porina Müll. Arg. nom. cons. is among the largest and most cosmopolitan genera of pyrenocarpous lichens with a trentepohlioid photobiont. Together with the less diverse and predominantly foliicolous *Trichothelium* Müll. Arg., it forms the family *Porinaceae* (McCarthy & Malcolm 1997; Lücking 2008; McCarthy 2013). Although its phylogenetic position is comparatively unambiguous (McCarthy 1993; Grube *et al*. 2004*a*), alternative generic divisions have been proposed (Hafellner & Kalb 1995; Harris 1995; McCarthy & Malcolm 1997). The genus is especially diverse in the tropics and humid-subtropics, with a few species in the boreal zonobiome and in subarid and hot-arid areas of the world, being absent only from continental Antarctica (McCarthy 2013).

Porina, in its traditional delimitation, is characterized by the presence of a hamathecium of simple or sparingly branched paraphyses, thin-walled unitunicate asci eventually with a chitinoid apical ring, mostly transversely euseptate, fusiform to elongate-cylindrical ascospores, and microconidia growing vertically from the apices of conidiophores (McCarthy 1993). Thalline propagules are formed by a few species, and in some cases they have been interpreted as rampant growth by the photobiont (McCarthy 1993). Among the 37 European taxa (data from McCarthy 2013), isidia are reported from only four species (Orange *et al*. 2009), namely *P. atlantica* (Erichs.) P. M. Jørg. (Sérusiaux *et al*. 2007), *P. coralloidea* P. James (James 1971; Rose & Roux 1982; Roux & Bricaud 1991), *P. hibernica* P. James & Swinscow (Swinscow 1962) and *P. rosei* Sérus. (Sérusiaux 1991). These isidia range from truly (*P. atlantica*) to inconspicuously corticated (*P. hibernica*), and on a single thallus they can vary from absent (*P. atlantica*) to invariably present, occasionally forming mounds of congested branches that obscure the thallus surface (*P. coralloidea*, *P. hibernica*).

In 2008, an epiphytic isidiate *Porina* was collected in a coniferous-broadleaved mixed wood in the montane belt of the Pura Pass (Carnic Alps, NE Italy). In the field, it was thought to be an addition to the local, com-

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paratively well-documented lichen flora, and it remained in the unprocessed collections of the author. Only recently could the material be studied in comprehensive detail. Distinctive spores, compared with other isidiate taxa, and the striking similarities with *P. hibernica*, led to a comparison with specimens of the latter from Central Europe and the Atlantic-Mediterranean regions, from where *P. hibernica* was originally described (Swinscow 1962) and where fertile thalli are rather frequent (Orange *et al.* 2009). The Central European samples proved to be closely related to, but not conspecific with, *P. hibernica* s. str., and since they also differ from other non-isidiate taxa, a new species, *P. pseudohibernica*, is described here.

Materials and Methods

Specimens collected by the author (in TSB), and additional material obtained on loan from E and GZU, were studied (acronyms of herbaria according to Holmgren *et al.* 1990). Measurements were made of hand-cut sections and squash preparations mounted in glycerine or in water, at ×1000 magnification, and are given as: (min–) [mean-SD] – *mean* – [mean+SD] (–max.), where SD is the standard deviation. Permanent slides, mounted in glycerine or lactophenol-aniline blue (Volkmann-Kohlmeyer & Kohlmeyer 1996), are retained by the author. A Zeiss Axioplan compound microscope was used for micrographs of squashes and hand-cut sections of ascomata, and a stereomicroscope Leica MZ16 was used for habit photographs. The amyloid reaction of hymenial elements was tested with Lugol's reagent (Merck 9261). Chitinoid ring structure of ascus tips was studied in Congo Red (Sigma C-6767). Sections and squash preparations were not pretreated with KOH, unless otherwise stated. Colour reactions of acetone-insoluble perithecial pigments were examined in water-mounted hand-cut sections adding a drop of concentrated KOH, 70% H_2SO_4, or 70% HNO_3; the specimens used for these observations are marked with the symbol § in the following list. The standardized method of thin-layer chromatography (TLC) (Culberson & Ammann 1979) was employed to detect lichen substances; three solvent systems (A, C, and G) were used. Nomenclature follows McCarthy (2013) and Nimis & Martellos (2003).

Selected specimens examined. Porina aenea (Wallr.) Zahlbr.: **Italy:** *Marche*: Pesaro Province, Cinisco Valley, road from Frontone to Mt Acuto, 600 m, 1996, *Nimis & Tretiach* (TSB 24254§).

Porina borreri (Trevis.) D. Hawskw. & P. James: **Italy:** *Sicily*: Palermo Province, Bisacquino, S. Maria in Bosco, *c.* 800 m, on *Fraxinus ornus*, 1991, *Tretiach* (TSB 15163).

Porina cestrensis (Michener) Müll. Arg.: **USA:** *California*: Channel Islands, Santa Rosa, just SE of Black Mountain, 240–320 m, on oaks, 1994, *Nimis & Tretiach* (TSB 18264§); *ibid.*, upper part of Cherry Canyon, 75 m, 1994, *Nimis & Tretiach* (TSB 18261).

Porina coralloidea P. James: **France:** *Provence*: Hyères Islands, not far from Argentea Beach, 20 m, 1982, *Roux* [Vězda, *Lich. Sel. Exsicc.* no. 2127] (TSB 9926§).—**Italy:** *Latium*: Rome Province, Castelporziano Presidential Estate, on *Quercus ilex*, *c.* 20 m, 1991, *Poelt & Tretiach* (TSB 15325§).

Porina hibernica P. James & Swinscow: **Great Britain:** *England*: **V.C.70,** Cumberland: Seatoller, Low Stile Wood, on *Ulmus*, 1990, *Coppins* [13745] (E). **V.C.11,** Hampshire: New Forest, Hollands Wood, on *Quercus*, 1984, *Coppins* [10148] (E); *ibid.*, Barmshaw Wood, on *Quercus*, 1986, *James* (E). **V.C.4,** North Devon: Bideford, Clovelly Park, 0–95 m, on *Quercus*, 1994, *Coppins* [16472, 16506, 16535] *& O'Dare* (E); *ibid.*, 55 m, on *Quercus*, 2005, *Coppins* [22041] *& Coppins* (E), *Coppins* [22032] *& Hope* (E).—**Ireland:** *Kerry*: Brandon Lodge, on *Quercus*, 1977, *Topham* (E).—**Italy:** *Sicily*: Trapani Province, Egadi Islands, Marettimo, below Pizzo delle Fragole, *c.* 500 m, on *Quercus ilex*, 1991, *Nimis* (TSB 15811§).

Porina linearis (Leight.) Zahlbr.: **Italy:** *Marche*: Ascoli Province, Infernaccio Gorge, 800 m, on shaded limestone, 1996, *Nimis & Tretiach* (TSB 24219§).

Strigula stigmatella (Ach.) R. C. Harris: **Italy:** *Friuli*: Udine Province, Lake of Sauris, between Bosco della Stua and Bosco Bertone, *c.* 1100 m, on mosses on *Fagus*, 1987, *Nimis & Tretiach* (TSB 9741). *Emilia-Romagna*: Parma Province, Lago Lagoni above Corniglio, *c.* 1450 m, on mosses on *Fagus*, 2001, *Nimis & Tretiach* (TSB 34821).

Porina pseudohibernica Tretiach sp. nov.

MycoBank No.: MB 807718

Thallus epiphloeodes, effusus, isidiatus, ecorticatus, lividofuscus, in herbario aurantiaco-brunneus. Isidia teretiuscula, ramiformia, *c.* 27–*32*–37(–45) µm diam., ad *c.* 0·7 mm alta. Algae ad Trentepohliam pertinentes, cellulae 13–*15*–17(–20) µm diam. Perithecia rara, subglobosa, partim in substrato immersa, solitaria, picea, *c.* 0·34–*0·37*–0·40(–0·43) mm diametro. Involucrellum dimidiatum, ad basi excipuli exclusum, castaneo-brunneum vel nigrum, in kalio atroazulinum vel atrocyaneum, in acido sulphurico purpurascens, in acido nitrico cinnamomeum vel glandaceum. Excipulum cum periphysibus circa ostiolum. Hymenium cum paraphysibus persistentibus, simplicex vel raro ramosum. Asci octospori, 150–165 × 13–15 µm lati, I–, cytoplasma I+ pardo, apice rotundato annuloque chitinoideo indistincto. Ascosporae hyalinae, (6–)7–8(–9)-septatae, fusiformes vel caudato-fusiformes, 34–*38*–43(–53) × 7–*8*–9(–10) µm, longitudinis/amplitudinis ratione (3·4–)4·0–*4·9*–5·8(–7·7). Pycnidia non visa.

Typus: Italy, Friuli, Udine Province, Carnic Alps, Pura Pass, 46°25′28·37″N, 12°44′26·69″E, 1430 m alt.,

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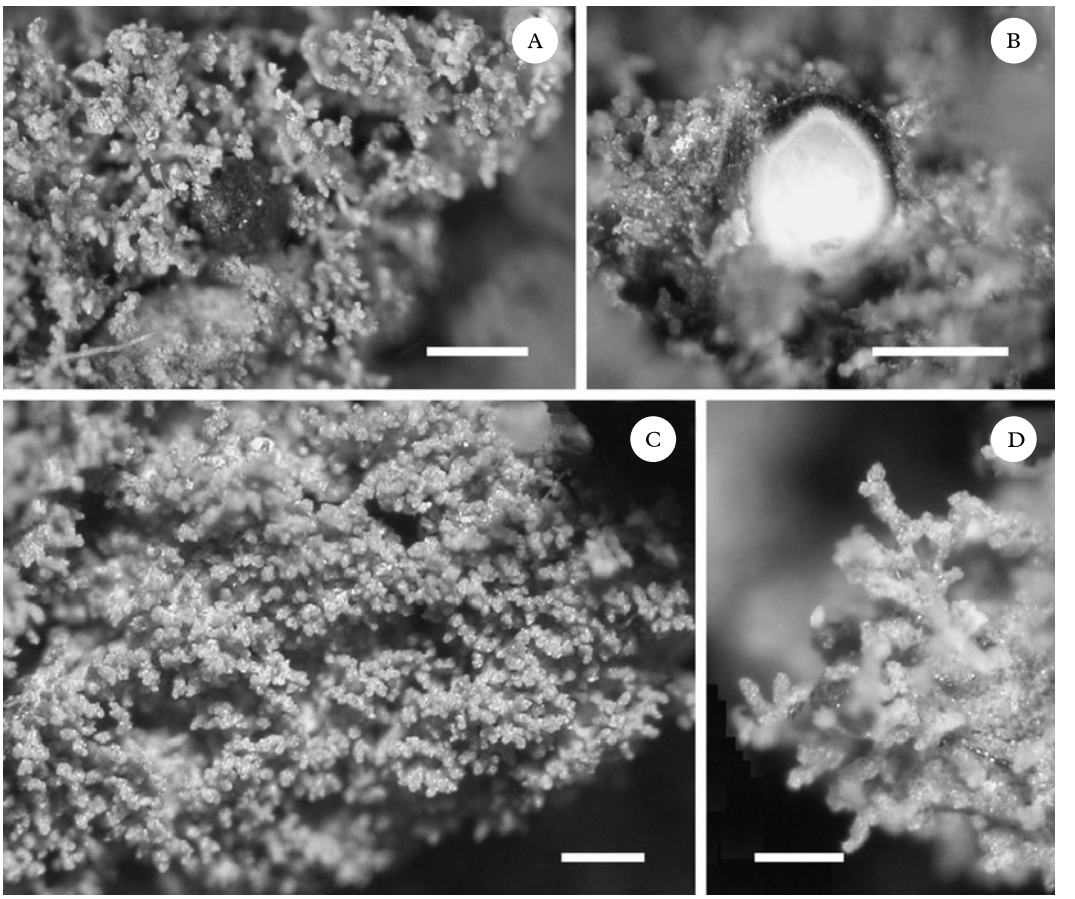

FIG. 1. *Porina pseudohibernica* (holotype). A, isidiate thallus with one semi-immersed perithecium partially covered by isidia; B, cross-sectioned perithecium in lateral view; C, clump of isidia; D, closer view of coralloid isidia. Scales: A–C = 0·4 mm; D = 0·1 mm.

in *Abieti-Fagetum*, on bark of *Fagus sylvatica*, 3 August 2008, *M. Tretiach* (TSB 40922—holotypus; CANB, E, GZU, TSB 40923—isotypi).

(Figs 1 & 2)

Thallus corticolous or overgrowing epiphytic mosses and liverworts, superficial, well-developed, isidiate (Fig. 1A), pale orange-brown, with an olive-green tinge when dry and fresh, fading to ochre or pale brown in the herbarium. *Prothallus* not apparent. *Isidia* often crowded (Fig. 1C), terete, branched and coralloid (Figs 1D, 2H & I), fragile, to 0·7 mm high, branches *c.* 27–*32*–37(–45) µm thick [$n = 64$], ecorticate or with a thin, inconspicuous cortex (Fig. 2G & J). *Alga Trentepohlia*, in well-developed filaments; cells with maximum diam. 13–*15*–17(–20) µm [$n = 42$].

Ascomata perithecia, occasional, subglobose, black, semi-immersed in the thallus and substratum but not covered by a thalline layer, solitary (Fig. 1A & B), 0·34–*0·37*–0·40(–0·43) mm diam. [$n = 11$]; surface matt. *Ostiole* white in fertile perithecia due to a distinct, persistent crown of periphyses protruding slightly from the pore. Involucrellum contiguous with the excipulum and extending to excipulum-base level, dull brown to black, in section dull reddish brown to

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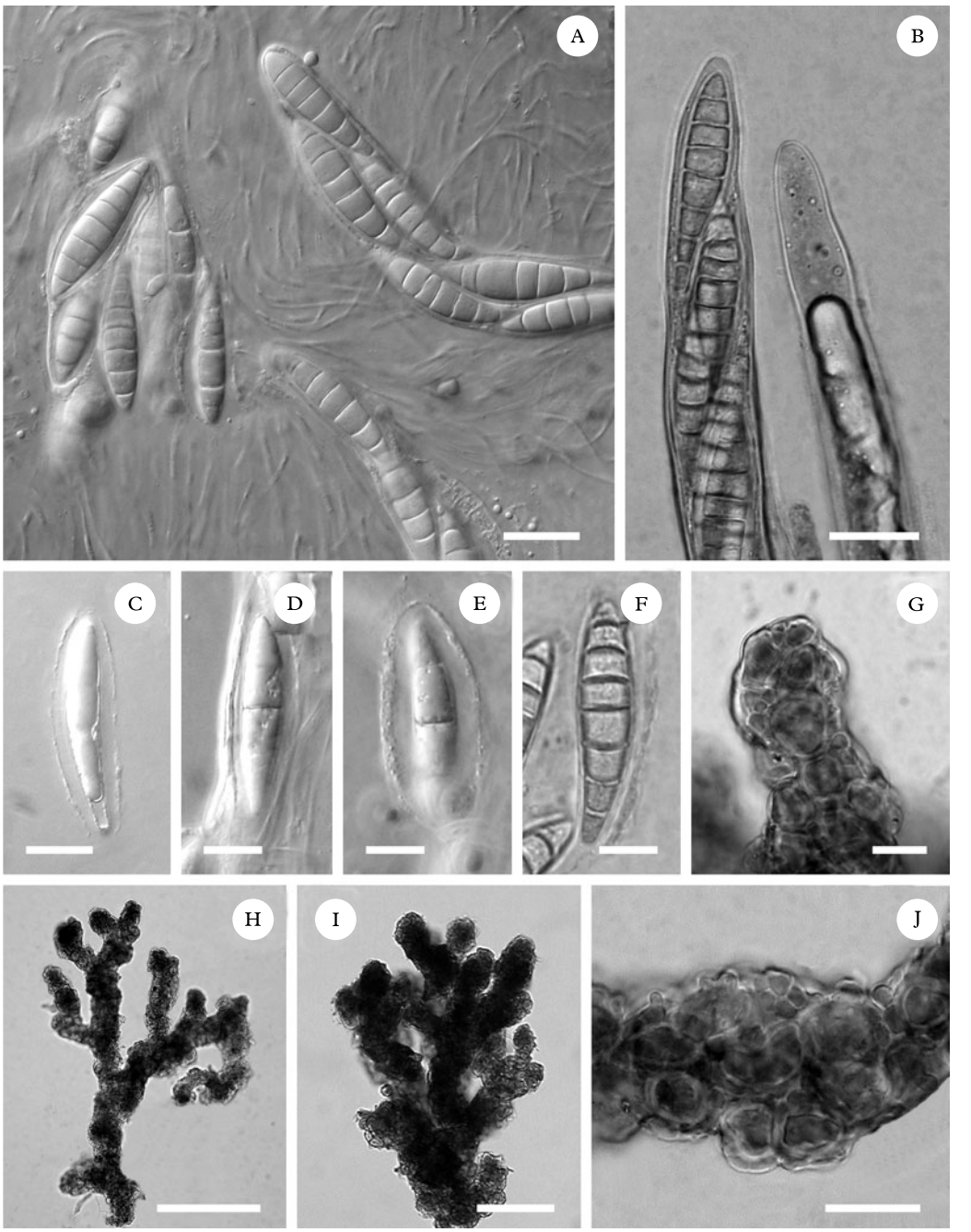

FIG. 2. *Porina pseudohibernica* (holotype). A, mature ascospores with simple paraphyses (squash); B, apical portion of two asci, the one on the right immature (squash); C–F, ascospores in different developmental stages, covered by a gelatinous sheath; G, tip of isidium; H & I, branched isidia; J, closer view of mycobiont hyphae appressed to the *Trentepohlia* cells in an isidium. A & C–E: differential interference contrast; B, F, G–J: transmitted light. B: Congo Red; G–J: lactophenol-aniline blue. Scales: A, B & J = 15 μm; C–G = 10 μm; H & I = 80 μm.

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blackish, K+ greenish to blackish blue, H_2SO_4+ purple-red, HNO_3+ gold to reddish brown. *Excipulum* colourless. *Subhymenium* 25–30 µm thick. *Hamathecium* composed of simple, filiform paraphyses, numerous and persistent, *c.* 1 µm thick, not constricted at septa, obscurely branched at the tips. *Hymenium* inspersed. *Asci* thin-walled, 8-spored, 150–165 × 13–15 µm, with a more or less truncate apex and without an apical chitinoid ring (Fig. 2B), I–, cytoplasm I+ yellow. *Ascospores* hyaline, thin-walled, 7–8(–9)-septate, fusiform or caudate-fusiform, with acute ends (Fig. 2A & F), 34–*38*–43(–53) × 7–*8*–9(–10) µm, length/breadth ratio 4·0–*4·9*–5·8(–7·7) [$n = 42$, 10 perithecia examined]; immature spores with a well-developed gelatinous perispore (Fig. 2C–E).

Conidiomata not observed.

Chemistry. No lichen substances detected by TLC.

Etymology. The epithet *pseudohibernica* was selected because the species is apparently closely related to, but not conspecific with, *P. hibernica*; from the Greek *pseudes* (false).

Habitat and distribution. The species is known from scattered sites in central and south-eastern Europe. All fertile specimens were collected on the north-exposed side of the Pura Pass, within a coniferous-broad-leaved mixed wood with beech (dominant), fir (co-dominant), spruce and sycamore, on three nearby beeches, *c.* 80–100 years old. The Pura Pass has a typical humid climate with cold season [type X (VI) of Walter & Lieth 1960] and high rainfall (mean annual precipitation: 1580 mm, for 114 rainy days per year, see Nimis 1981), with frequent persistence of fog banks. The nearby area, well studied from a botanical point of view due to the presence of a summer station (Nimis *et al.* 2013), has a highly diversified lichen flora (see e.g. Tretiach 1993, 2004; Tretiach & Carvalho 1995; Nimis & Martellos 2012), including many rare or extremely rare species with cool-oceanic affinities ("Northern subatlantic" *sensu* Nimis & Tretiach 1995).

The specimens from the Šumava Mts (W Bohemia), the western part of Transcarpathian Ukraine, and the Snežnik-Javorniki area (Slovenia), cited respectively as *P. hibernica* by Coppins *et al.* (1998), Palice (1999), and Mayrhofer & Coppins (2013), were collected on beech and sycamore in the montane belt (1000–1200 m alt.), with a single exception (*Coppins* 17634). These specimens are sterile, but they match perfectly the specimens from the Carnic Alps in the shape and thickness of the terete, branched lobules. The specimens from Switzerland mentioned by Scheidegger *et al.* (2002) under *Zamenhofia hibernica* might also belong here, although these have not been examined.

Associated lichens observed in the herbarium collections of *P. pseudohibernica* are *Ochrolechia androgyna, Pannaria conoplea* and *Strigula stigmatella*. Most of the thalli of *P. pseudohibernica* overgrow epiphytic mosses and liverworts, often starting as a continuous, greenish brown, dull crust.

Additional specimens examined. **Czech Republic:** *Bohemia*: Šumava Mts, Železná Ruda, Černé Jezero, 1227 m, on *Acer pseudoplatanus*, 1995, *Palice* (E).—**Slovenia:** Snežnik-Javorniki, Forest Reserve Ždrocle, 1380 m, MTB 0452/2, y = 5459250 / x = 5047800, on *Fagus*, 1998, *Prügger & Surina* (GZU).—**Ukraine:** Zakarpattia Oblast: Velyky Berezny district, Novostuzhytzia Forest, Mt Cheremkha, 1060 m, on *Fagus*, 1997, *Kondratyuk*, *Coppins* [17688, 17711], *Coppins*, *Khodosovtsev*, *Zelenko & Wolseley* (E); *ibid.*, at bottom of the valley, stream Semeniv-Sokoliv, *c.* 470 m, on *Carpinus*, 1997, *Kondratyuk*, *Coppins* [17634] *& Wolseley* (E).

Discussion

This distinctive lichen is characterized by a richly isidiate thallus, blackish perithecia with periphyses, and 7–8(–9)-septate ascospores that are 7–*8*–9(–10) µm wide. The isidiate *Porinas* reported so far from Europe, *P. atlantica*, *P. coralloidea*, *P. hibernica* and *P. rosei*, are mostly restricted to the evergreen and deciduous oak belts, growing on sheltered trunks in ancient woodland. *Porina atlantica* and *P. rosei* can be readily distinguished from *P. pseudohibernica* by the colour and pigmentation of the perithecia, these being pale dull orange, with *Porina*-yellow pigment in the walls of the peridial cells. Furthermore, *P. atlantica* has larger ascospores, and the

isidia are globose to cylindrical, sometimes forming coralloid proliferations on the thallus surface, and they have a papillose surface. *Porina rosei* has smaller, 3-septate ascospores and isidia with a well-defined cortex (Table 1).

Porina coralloidea and *P. hibernica* are apparently more closely related to the new species; their fruiting bodies have the same dull brown to black colour in section, and they contain the same pigment in the peridium (see below). Furthermore, the shape of the ascospores is similar, although there is a trend of increasing size from *P. pseudohibernica* (with smaller ascospores, rarely with more than 8 septa) to *P. hibernica* (with longer ascospores, and up to 16–17 septa). The isidia shape in the three species also differs. Those of *P. coralloidea* are generally simple or sparingly branched, and they typically have a tuft of colourless filamentous apical hyphae that gives a hairy appearance to the dull dark grey thallus. In contrast, the isidia of *Porina hibernica* are very similar to those of *P. pseudohibernica*, being ecorticate or with only a thin, inconspicuous cortex, and forming nodular-coralloid mats of terete lobules which often obscure the perithecia. However, the isidia of *P. hibernica* s. str. are rather robust, up to 60–80 μm in diameter, with short branches, whereas those of *P. pseudohibernica* are more slender, up to 37–45 μm in diameter (Table 1), with clearly elongate branches.

Some authors have argued that the coralloid proliferations observed on the thallus surface of some species of *Porinaceae* (e.g. *P. atlantica, P. ocoteae,* "*Clathroporina*" *isidiifera*) are caused by abnormal outgrowth of the photobiont, possibly as an adaptation to a stressful environment (McCarthy 1993; Grube *et al.* 2004*b*; Sérusiaux *et al.* 2007). However, since these structures always contain fungal hyphae, they cannot be just rampant growth of the photobiont. They are more likely an adaptation to increase the thallus surface area, making it *de facto* microfruticulose, with facilitation of hydration and gas exchange under certain ecological conditions, as demonstrated in several macrolichens (Valladares *et al.* 1993; Rikkinen 1997; Tretiach *et al.* 2005). Since the development of isidia might be environmentally induced, *P. pseudohibernica* was also compared with non-isidiate species. The most similar is *Porina borreri*, which colonizes the rough bark of several deciduous trees (including beech), and is also known to occur in the montane belt of Central Europe [see e.g. Poelt & Vezda (1977) and McCarthy (2013)]. However, it differs from *P. pseudohibernica* in having much narrower ascospores [3·0–5·0(–5·5) μm, see Sérusiaux *et al.* (2007); Orange *et al.* (2009); our personal observations], in its peridial pigments (it lacks the H_2SO_4+ purple-red reaction, see below), and in ascus structure (it has the chitinoid ring typical of *Porina* s. str.) (Hafellner & Kalb 1995).

The new species was also compared with *P. cestrensis*, a granular to obscurely isidiate species whose peridial wall also reacts H_2SO_4+ purple-red. This lichen has a pan-temperate distribution, but it is not known from Europe (McCarthy 2013). With respect to *P. pseudohibernica*, *P. cestrensis* can be distinguished by its longer and narrower ascospores, *c.* 45–50(–70) × 3·5–4·5(–6·0) μm, the absence of a gelatinous sheath, and a dimidiate involucrellum (Aptroot 2001; McCarthy 2003).

In one isotype (TSB 40923), a poorly fertile thallus overgrows an abundantly fertile *Strigula stigmatella*, and in some parts the development of small, simple isidia can be observed adjacent to perithecia that are partly covered by a thin thalline layer, whereas other portions are covered by the nodular-coralloid mats of branched isidia described above. This specimen initially caused some confusion. *Strigula stigmatella* has fissitunicate asci, with an ocular chamber and a short-stalked, more or less bilobed base, but also ascospores that are 7–8(–9)-septate, like those of the new *Porina*, and largely overlapping in size [*c.* 26·0–36·5(–40·5) × 5·5–7·0 μm, see Coppins & Orange (2009)]. A closer examination revealed further subtle spore differences that allow a ready separation of the two species. The spores of *S. stigmatella* are in fact slightly constricted at the central euseptum, the two cells divided by this euseptum are of equal size (and usually are the largest of the whole ascospore), and some septa are oblique. In contrast, the spores of *P. pseudohibernica* are

Table 1. *Comparison of morphological and anatomical characters of isidiate* Porina *species from Europe.*

		P. atlantica	*P. coralloidea*	*P. hibernica*	*P. pseudohibernica*	*P. rosei*
Isidia	frequency	absent to abundant	abundant	abundant	abundant	abundant
"	morphology	globose to coralloid, moniliform	simple to coralloid, with hyaline hairs	simple to coralloid	simple to coralloid	simple to coralloid
"	surface	papillose	papillose to hairy	±papillose	smooth	±papillose
"	cortex	well defined	well defined	inconspicuous	inconspicuous	well defined
"	width (µm)	50–80	40–70	43–61(–82)	27–37(–45)	25–50
Perithecium	(colour)	orange to brown	black	black	black	dull orange
Involucrellum	"	pale orange	brown	brown	brown	yellow
Excipulum	"	pale yellow	yellow	pale yellow	pale yellow	yellow
Ascospore	septa (*n*)	7–9(–13)	(6–)9–11(–12)	(7–)12–16(–17)	(6–)7–8(–9)	3
"	length (µm)	44–80	(35–)40–57(–63)	(55–)60–90(–95)	(30–)34–43(–53)	22–33
"	width (µm)	7–13	(5–)8–13(–15)	5–7(–8)	(6–)7–9(–10)	4–6(–7)

Table 2. *Colour reactions of acetone-insoluble perithecial hyphal pigments in selected species of* Porina *(modified from Hafellner & Kalb 1995).*

Pigment	natural colour	colour in KOH	colour in H_2SO_4	colour in HNO_3	selected species
Porina-yellow	yellow to orange-red	intensifying to reddish-brown	light orange to brownish red	bright orange to reddish brown	*P. lectissima*, *P. mammillosa*
Pseudosagedia-violet	dull brown to blackish with purple to violet tinge	darkening, purple to violet tinge disappearing	reddish brown	reddish brown	*P. aenea*
Sagedia-red	purple-red to dark violet	blue, then blackish	dark red	dark red	*P. linearis*, *P. mammillosa*
Segrestria-brown	brownish	pale with pinkish tinge	violet	pale with violet tinge	*P. lectissima*
Zamenhofia-red	dull brown to blackish	blue, then blackish	purple red	golden brown	*P. cestrensis*, *P. coralloidea*

never constricted at the septa, there is one cell larger than the others (this is typically the third or, more rarely, the second cell from one end), and the septa are perpendicular to the long axis of the spore. From examination of this sample, it can be inferred that *P. pseudohibernica* can utilize the photobiont cells from well-established thalli of other lichens. This phenomenon was previously observed in the epiphyllous *P. rubentior*, which apparently contacts already lichenized *Phycopeltis* cells within young thalli of *Phyllophiale* sp. (Sanders & Lücking 2002).

Final remarks concern the systematic position of the species formerly segregated in the genus *Zamenhofia*, which was introduced by Clauzade & Roux (1985) for a single species, *Z. coralloidea*, on account of its distinctive hairy isidia, long ascospores, and the presence of periphyses. Subsequently, further species (*P. hibernica*, *P. rosei*) were added to the genus, although this arrangement did not find general acceptance (see e.g. Aptroot 2001; McCarthy 2003), and has been abandoned in the most recent floras (see e.g. Orange *et al.* 2009). According to Hafellner & Kalb (1995), the characters supporting the segregation of *Zamenhofia* from *Porina* are the absence of an external ring structure in the asci, and the absence of perithecial pigments typical of the *Porinaceae* (as *Trichotheliaceae*), more than the development of isidia, a character that cannot be used for generic delimitation. However, as noted by McCarthy (1993) and McCarthy & Malcom (1997), asci without a ring structure and periphyses are also known in other representatives of *Porina* s. str., whereas the absence of pigments in the peridial wall was an error caused by the paucity of material available for study (J. Hafellner, pers. comm.). The type species of *Zamenhofia* has an excipulum and peridial wall containing a pigment that gives a vivid purple reaction to concentrated sulphuric acid, whereas in concentrated nitric acid it turns gold to golden brown (Table 2). Since these reactions differ from those described by Hafellner & Kalb (1995) for the Sagedia-red of Bachman (1890), it is proposed here to call this pigment "Zamenhofia-red". To date, it has also been detected in *P. cestrensis*, *P. hibernica*, *P. peregrina* and *P. pseudohibernica*. This species group might actually form a natural evolutionary unit within *Porina* s. str., a hypothesis that certainly deserves to be tested by molecular analyses.

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