LICHENICOLOUS FUNGI FROM THE WESTERN PYRENEES, FRANCE AND SPAIN. IV.
ASCOMYCETES*

Javier ETAYO‡ and Paul DIEDERICH§

Abstract: Twenty species of lichenicolous ascomycetes are recorded for the western Pyrenees. Capronia hypotrachyna Etayo & Diederich (on Hypotrachyna species, also known from the Canary Islands and from Papua New Guinea), Llimoniella pubescens Etayo & Diederich (on Lepraria species, also from Scotland and Papua New Guinea), Polycoccum microcarpum Diederich & Etayo (on Cladonia species, also from Scotland), Skyttea megalospora Etayo & Diederich (on Megaspora tuberculosa), Sphaerellothecium cinerascens Etayo & Diederich (on Cladonia parasitica) and S. parmeliae Diederich & Etayo (on Parmelia s. str., also from Finland) are described as new.

Introduction

Lichenological exploration of the western Pyrenees (France and Spain) during the past 10 years has resulted in the authors discovering a very diverse biota of lichenicolous fungi. This is our fourth contribution dealing with taxa new to science or species not previously recorded in the western Pyrenees.

Materials and Methods

Most specimens studied are located in the personal collections of the authors, type specimens in MA-Lichen and LG; specimens from E have not been examined by us, but by Dr B. Coppins. Ascomata were measured under a binocular microscope at a magnification of × 40. Detailed microscopical examination of specimens was carried out at a magnification of × 1000. Microscopical measurements have been made in water and drawings were made of specimens mounted in water, Congo red or lactophenol cotton blue (LCB).

The Species

Arthonia amylospora Almq.

This species was previously known only from the type specimen collected in Sweden on a sterile crustose lichen referred to Pseudopodia glauca by T riebel (1989: 58–59).


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Spain: Navarra; Pto de Larrau, 1585 m, calcareous schists, on an unidentified crust [medulla I+blue (Porpidia?)], vii 1993, Etayo 11889.

Arthonia graphidicola Coppins

This species is known from England, Scotland and Ireland (Coppins 1992: 82), France (Coste 1993) and Luxembourg (Diederich et al. 1991: 9). Our specimen agrees well with the description given by Coppins (1989), except that the brown hyphae in the host thallus are I+blue.

Spain: Navarra: Leazcue, 580 m, on Graphis scripta (with Stigmidium microspilum), iii 1996, Etayo 13830.

Arthonia thelotrematis Coppins

This species is confined to Thelotrema lepadinum growing on Corylus. It is already known from the British Isles and the Azores (Coppins 1992: 87), and is thus new for continental Europe.


Arthrorhaphis aeruginosa R. Sant. & Tønsb.

Recently described by Santesson & Tønsberg (1994) from Norway, Scotland and North America. These are the first records from the Pyrenees, where the species grows at a high altitude in the subalpine belt, and from England.


Capronia hypotrichyna Etayo & Diederich sp. nov.

Capronia lichenicola a C. epilobarina ascomatibus latioribus et setis brevioribus, et a C. normandinae et C. pseudonormandinae ascosporis transverse 3-5-septatis, ascis brevioribus et ascomatibus latioribus differt.


(Fig. 1)

A scomata perithecioid, ostiolate, 130–200 μm diam., globose, black, dispersed, initially immersed, breaking through the cortex of the host thallus and partly covered by it later; setae dark brown, aseptate, simple, thick-walled, 5–35 × 3–4 μm, in many ascomata all under 10 μm long and almost invisible macroscopically; perithecial wall c. 15–20 μm thick, of textura angularis, dark brown in the outer part, hyaline in the inner part, with cells 5–8 × 2–4 μm.
Hamathecium absent at maturity; centrum I – . Asci clavate, bitunicate, wall apically thickened, epitplasma I + orange, 8-spored, 50–68 × 10–16 μm, with ascospores irregularly arranged in the ascus. Ascospores 0–3-septate when young, submuriform when mature, with 3–5 transverse and 0–1 longitudinal septa, constricted at the septa, not halonate, light grey to brownish, 12–19 × 5.5–7.5 μm.

Hosts: Hypotrachyna costaricensis (Nyl.) Hale, H. endochlora (Leight.) Hale and H. revoluta (Flörke) Hale (thallus).

Distribution: The new species is known from France, continental Spain, the Canary Islands (Gomera) and Papua New Guinea.
Notes: In the specimen from Papua New Guinea, most ascomata are densely covered by long setae that are up to 35 μm long. Some ascomata in the same collection appear to be glabrous under the stereomicroscope, and only short setae, reaching 10 μm in length, are visible using a microscope (magnification × 1000). In the European specimens, no ascomatal setae could be seen macroscopically, which led us to believe initially that a different species was involved; microscopically, however, numerous short setae can also be observed in these European specimens, which are indistinguishable otherwise from the material from Papua New Guinea. The new species could be confused with several other lichenicolous species of Capronia with submuriform ascospores: Capronia epilobarina Kondratyuk & D. J. Galloway (see Etayo & Diederich 1996: 96), C. normandinae (see below) and C. pseudonormandinae Diederich (Aptroot et al. 1997: 47–48). The distinguishing features of these species are summarized in Table 1.


Capronia normandinae R. Sant. & D. Hawksw.

This species, confined to Normandina pulchella, is already known from Chile, Madeira and Scotland (Hawksworth 1990: 395–397) and from Papua New Guinea (Aptroot et al. 1997: 47), and is therefore new to continental Europe.


Dacampia rufescents (Vouaux) D. Hawksw.

Hawksworth (1986: 497–500) reported this species on Peltigera rufescens from northern France and Great Britain.


Guignardia olivieri (Vouaux) Sacc.

This species is known from many European countries, and from Israel, mostly on Xanthoria parietina (Clauzade et al. 1989: 47; Etayo 1996; Kondratyuk et al. 1996: 60–61; Navaarro-Rosinés et al. 1994; Santesson 1993: 87).

Spain (all on Xanthoria parietina): N avarro: W of Pamplona, Sierra de Urbasa, P. de Urbasa, vii 1991, Diederich 9631 & Etayo 5946; Cilveti, on Acer, xii 1994, Etayo 12251; alto de Erro, 800 m, iv 1995, Etayo 12877; Iragui, 700 m, Quercus faginea wood, iii 1996, Etayo 13808. Soria:
**Table 1.** The features distinguishing the known lichenicolous *Capronia* species with submuriform ascospores*1*

<table>
<thead>
<tr>
<th>Species</th>
<th>C. hypotrachynae</th>
<th>C. epilobarina</th>
<th>C. normandinae</th>
<th>C. pseudonormandinae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascomatal diam.</td>
<td>130–200</td>
<td>50–70</td>
<td>100–150</td>
<td>100–150</td>
</tr>
<tr>
<td>Setal length</td>
<td>5–35</td>
<td>35–70</td>
<td>25–50 (–90)</td>
<td>10–30</td>
</tr>
<tr>
<td>Ascospore septa</td>
<td>3–5 × 0–1</td>
<td>3–5 × 0–1</td>
<td>(3–)5(–6) × 0–1(–2)</td>
<td>3 × 0–1</td>
</tr>
<tr>
<td>Ascospore size</td>
<td>12–19 × 5–5–7·5</td>
<td>17–23 × 3–5–7</td>
<td>15–21 × 7·5–9</td>
<td>12·5–16 × 6·7·5</td>
</tr>
<tr>
<td>Host</td>
<td>Hypotrachyna species</td>
<td>Libaria species</td>
<td>Normandina pulchella</td>
<td>Host of <em>Lauderlindsaya simodense</em></td>
</tr>
</tbody>
</table>

*All measurements are given in μm.*
Llimoniella pubescens Etayo & Diederich sp. nov.

Llimoniella lichenicola, a L. neglecta excipulo pubescenti et ascosporis brevioribus interdum 1-septatis differt.

Typus: Spain, Navarra, alto de Lizarraga, 900 m, on Fagus, on Lepraria lobificans, iv 1992, Etayo 3052 (MA—Lichen—holotypus; LG, hb. Diederich, hb. Etayo—isotypi).

(Fig. 2)
Ascomata apothecia, lichenicolous on the thallus of Lepraria, at first immersed, later erumpent, 0·09–0·25 mm diam., black, initially closed, opening by a pore, covered by black hairs, attached to the substratum by a narrow foot. Ectal exciple greenish grey, K+ blackish brown, 20–25 μm thick in the lower part, 10 μm thick laterally, prosoplectenchymatous, not carbonized; hairs greenish grey, wall thin and uniform, smooth, non-septate, 15–30 × 3–4 μm (2 μm thick near the apex). Hymenium olivaceous green, more strongly pigmented in the upper and in the lower parts, 40–45 μm tall. Paraphyses filiform, 1·5–2 μm thick. Asci cylindrical, 35–52 × 5·5–6·5 μm, wall uniformly thin, not reacting with iodine, 8-spored. Ascospores hyaline, ellipsoid, 0–1-septate, 5·5–9 × 2·5–3·2 μm.

Hosts: Lepraria species, including L. lobificans Nyl. The host of the type specimen has been studied by TLC and contains atranorin, zeorin, stictic and constictic acids. The other specimens were too small for TLC analysis.

Distribution: Known from the Spanish Pyrenees, Scotland and Papua New Guinea.

Notes: The new species is similar to L. neglecta (Vain.) T riebel & Rambold, from which it is distinguished by the presence of excipular hairs, and by shorter ascospores that become 1-septate [the ascospores measure 9–11(–14) × 2–3(– 3·5) μm in L. neglecta]. It may be conspecific with a specimen with excipular hairs mentioned by Kümmerling et al. (1993) on Lepraria sp., and illustrated by those authors (loc. cit.: 155, fig. 2). Limoniella neglecta seems to be confined to species of the Lepraria neglecta-group (Kümmerling et al. 1993). The new species is known from L. lobificans and possibly another unidentified species from New Guinea, both not belonging to the L. neglecta-group.


Muellerella hospitans Stizenb.

Our collections seem to represent the first Iberian records of this species growing in apothecia of Bacidia fraxinea and B. rubella.

Spain: Navarra: La Barranca, Urdain, 525 m, on Bacidia rubella, ii 1988, Etayo 4041; Sierra de Urbasa, Cargadero, 920 m, on B. fraxinea, iii 1991, Etayo 5816; ibid., Crezmendi, 1100 m, Etayo 469; Le texture, 580 m, Fagus wood, on B. rubella, iii 1996, Etayo 13789.

Opegrapha anomea Nyl.

Opegrapha pertursariae
(Vouaux) Hafellner

(Fig. 3)
Two closely related Opegrapha species with elongate ascomata and 3-septate ascospores have been described on Pertusaria: O. anomea has hyaline ascospores, 23–26 × 7–9 μm, and is known from France on P. amara; O. pertusariae, with ascospores hyaline when young, brown at maturity and 20–26 × 8–9 μm, is known from the Canary Islands on P. exalbescens (Clauzade et al. 1989: 63; Hafellner 1994: 16). As the colour of the ascospores may depend only on the degree of maturity, we propose to consider both taxa provisionally as synonymous. The ascospores in our specimens are 3-septate, hyaline when young, brown at maturity and 22–26 × 7–8·5 μm.

**France:** Pyrénées-Atlantiques: Col de Suscousse near ski station, on Fagus, on Pertusaria albescens, vi 1992, Etayo 12678 & Printzen (hb. Etayo); SW of Larrau, near the road to Spain, in a Fagus wood, on P. amara, vii 1990, Diederich 9179.

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**Fig. 3.** Opegrapha anomea (Etayo 12678 & Printzen). A, Immature asci and paraphyses (left), mature asci with hyaline ascospores (right); B, Mature ascospores. Scales: A–B = 10 μm.
Plectocarpon sampaianae Diederich & Etayo

This cryptic species, restricted to Fuscopannaria sampaiana, was previously known from two collections in Spain and Scotland (Diederich & Etayo 1994). It is new for France.

**France:** Pyrénées-Atlantiques: Bois d’Astaquieta, road to Occabe and Esterencuby, 1200 m, iv 1995, Etayo 12895.—**Great Britain:** V.C. 97, Westerness: N side of Loch Sunart, 1 km SE of Salen, An Cnap, c. 17/695.641, iii 1983, Coppins 9323 & Jørgensen (E); 3 km E of Glenfinnan, Drochaid Sgainnir, 17/931.799, vi 1978, Coppins 3533 (E). **V.C. 98,** Argyll M ain: Loch Creran, Glasdrum, 27/00.45, v 1976, Coppins 1829 & Tibell (E); Inverary, Glen Shira, SW of Kilblaan, 27/126.130, i 1978, Coppins 3533 (E).—**Spain:** Navarra: Lanz, 750 m, on Fagus, x 1994, Etayo 12591. (All specimens on Fuscopannaria sampaiana.)

Polycoccum microcarpum Diederich & Etayo sp. nov

Ascomata lichenicola, perparva, 30–60 μm diam., subglobosa, ostiolata, atra, aggregata; paries brunnea, 6–9 μm crassa, cellulis 2–4 μm. Pseudoparaphyses anastomosantes, 1·5–2 μm latae, centrum I. Asci elongato-clavati, bitunicati, 30–35 × 15 μm, 8-spored. Ascospores 1-septaeae, ovales, laeves, fuscae, 12–14·5 × 4·5–7 μm.

**Typus:** France, Pyrénées-Atlantiques, route de Arette vers Arette-la-Pierre-S’t-M artin, sous le Pic Soulauing au Bois de Guilleurs, 1300 m, futai de hêtres et de sapins, on Cladonia, vii 1989, Sérusiaux 10580 (a), James & Rose (LG—holotypus; hb. Diederich—isotypus).

(Fig. 4)

Ascomata perithecioideae, immersed in convex galls on the squamules of the host, arising by groups of 20–80, black, ostiolate, 30–60 (–100) μm diam.; wall brown, 6–9 μm thick, composed of polyhedral or clavate cells, 2–4 μm thick, at maturity dark brown and much thicker around the ostiole. Hamathecium composed of anastomosing pseudoparaphyses, 1·5–2 μm thick, I. Asci elongate-clavati, bitunicati, 30–35 × 15 μm, 8-spored, I. Ascospores brown, 1-septate, slightly constricted at the septum, cells often unequal in size, without a distinct ornamentation, 12–14·5 × 4·5–7 μm.

**Hosts:** Cladonia species, incl. C. bellidiflora (Ach.) Schaer., C. cervicornis (Ach.) Flot. subsp. cervicornis (squamules) and C. digitata (L.) Hoffm.

**Distribution:** France (Pyrénées-Atlantiques) and Great Britain (Isle of Skye).

**Notes:** Macroscopically, this species is easily recognized by the formation of gall-like swellings on the squamules of Cladonia, containing numerous extremely small ascomata. In the centre of the galls, the perithecia are often growing very close to each other and are sometimes connected by a blackish tissue. The new species is distinguished from all other species of the genus by the much smaller ascomata. Polycoccus cladoniae Diederich & D. Hawksw., which is also known from Cladonia, has larger ascomata (100–250 μm diam.), which are dispersed over the host thallus and superficial at maturity, longer asci and larger ascospores (Hawksworth & Diederich 1988).
Additional specimens examined: **France**: Pyrénées-Atlantiques: S’t-Ergrâce, Ravin de Soudet, bois d’Arbouty, i 1993, on C. bellidiflora, Etayo 3451 (hb. Etayo, hb. Diederich); 4 km from station d’Issarbe, 1375 m, on Cladonia digitata, iv 1995, Etayo 12910.—**Great Britain**: V.C. 104, North Ebudes: Skye, SW Broadford, S of grave yard, on C. cervicornis s. str., v 1987, Diederich 8158.

![Figure 4. Polycoccum microcarpum (holotype): A, Galls on Cladonia sp.; B, Asc.; C, Ascospores. Scales: A = 1 mm, B–C = 10 μm.](image-url)
Reconditella physconiarum Hafellner & Matzer

This is the first Spanish record of this recently described species, previously known from Austria, Croatia, Portugal and Sweden (Matzer & Hafellner 1990).

Spain: Navarra: Iragui, 700 m, on Quercus faginea, on Physconia distorta, iii 1996, Etayo 13788, 13851.

Roselliniopsis tartaricola (Nyl.) Matzer

A common lichenicolous ascomycete, confined to Pertusaria hemisphaerica and Ochrolechia tartarea (Matzer 1993). Our specimen had been reported by Diederich & Roux (1991: 22) as R. tropica Matzer & R. Sant. The differences between both species are explained in Matzer (1993).


Skyttea megalosporae Etayo & Diederich sp. nov.

Ascomata lichenicolae, in thallis M egalosporae crescentia, immersa, primo clausa, poro aperientia; excipulum viride, pilis viridulis, 8–11 × 2.5–3 μm; hypothecium hyalimum; epihymenium viridulum; paraphyses filiformes, simplices. Asci 45–55 × 5–6 μm, apice incrassati, I –, 8-spore. Ascospores hyalinae, falcatae ad sigmoides, extremitatibus acutis, 0(–1)-septatis, 22–46 × 2.5–3 μm.

Host: M egalospora tuberculosa (Fée) Sipman (thallus), sometimes accompanied by Dactylospora microspora Etayo, D. cf. urceolata (Th. Fr.) Arnold or Sclerococcum hawksworthii Etayo & Diederich.

Distribution: Common in the western French and Spanish Pyrenees.

Notes: The new species is similar to S. fusispora Sherw., D. Hawksw. & Coppins, but the ascospores are longer (20–28 × 2.5–3.5 μm in S. fusispora), more curved, sigmoid, and with acute apices (see Sherwood-Pike et al. 1980:
According to the original description of *S. fusispora*, the apothecia in our new species are also smaller, and the exciple and excipular hairs more greenish.

The curved, sigmoid ascospores are also reminiscent of *Spirographa*, another genus of the Odontotremataceae. The recently described *Spirographa vinosa* Holien & Triebel has ascospores that are similar to those of *Skyttea megalospora*, except that they are up to 5-septate (Holien & Triebel 1996). As *Spirographa vinosa* differs from *Skyttea megalospora* in having superficial apothecia lacking excipular hairs, we believe that both species are not congeneric, and that the new species is better placed in the genus *Skyttea*.


**Sphaerellothecium cinerascens Etayo & Diederich sp. nov.**


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**Fig. 5.** *Skyttea megalospora* (Etayo 12955): A, Habit, on the thallus of *Megalospora tuberculosa*; B, Ascospores; C, Excipular hairs; D, Ascus apex. Scales: A =100 μm. B–D =10 μm.
clavati, crassitunicati, 8-spori, 31–40 × 8·5–11 μm. Ascosporae 1-septatae, ovales, fuscae, 9–11·5 × 3–4 μm.


(Fig. 6)
Ascomata perithecioid, 40–70 μm diam., subglobose, ostiolate, black, dark brown when wet, first semi-immersed, later superficial, scattered or in groups. Vegetative hyphae 2–3 μm thick, brown (orange brown in KOH), branched-anastomosed, not or slightly constricted at the septa, not forming a superficial net on the host thallus, irregularly immersed, visible at a high magnification. Ascomatal wall brown, paraplectenchymatous, formed by isodiametric cells, 4–8 μm diam.; ostiole not prominent. Hamathecium without any visible paraphysoids or periphysoids at maturity, I –; periphyses developed in the upper part of the ascoma, simple, small, less than 10 × 1.5 μm. Asci clavate, 31–40 × 8.5–11 μm, wall apically thickened, young asci with a large ocular chamber, ascoplasma I+ yellow to orange, 8-spored, with ascospores irregularly arranged. Ascospores 1-septate, rarely 3-septate when mature, oval to ellipsoidal, slightly constricted at the septum, not halonate, brown (grey-brown in KOH), 9–11.5 × 3–4 μm.

Host: Cladonia parasitica (Hoffm.) Hoffm. The thallus of the host changes to a characteristic grey tinge when colonized by S. cinerascens.

Distribution: Known from oceanic woods of the western Pyrenees in Spain and France.

Notes: We include this species provisionally in the genus Sphaerellothecium because of the I– reaction of the hamathecium and the asci, the brown ascospores and hyphae, and the absence of setae on the ascomatal wall. Hamathecial filaments have not been found with certainty and should be looked for carefully on richer material.

Two similar fungi have been described on species of Cladonia: Echinothecium cladoniae Keissl., a name of uncertain application and not validly published, refers to a lichenicolous fungus with setose perithecia (Santesson 1993: 79). Sphaerellothecium cladoniicola E. S. Hansen & Alstrup differs by a distinct superficial net of vegetative hyphae, hyaline ascospores and shorter asci (Hansen & Alstrup 1995: 35–37).

Most other species of Sphaerellothecium described by Hafellner (1993: 760–762), Triebel (1989) and Triebel et al. (1991) differ either in the presence of a distinct superficial net of dark hyphae or by hyaline ascospores, which become brownish only when post-mature. Sphaerellothecium coniodes (Nyl.) Cl. Roux & Diederich and S. propinquellum (Nyl.) Cl. Roux & T. Triebel both have larger ascospores (Roux & T. Triebel 1994: 527–533). In S. atryneae (Arnold) Cl. Roux & T. Triebel, the ascospores remain hyaline or pale for a long time and are slightly larger, the asci are broader, and the vegetative hyphae are thicker (Roux & T. Triebel 1994: 525–527).

The epithet cinerascens refers to the green thallus of the host turning greyish in the presence of the parasite.

Sphaerellothecium parmeliae Diederich & Etayo sp. nov.


Typus: France, Pyrénées-Atlantiques, S of St-Jean-Pied-de-Port, forêt d'Iraty, 0·5km S of Chalet Pedro, 1000m, on Fagus, on Parmelia saxatilis, vii 1991, Diederich 9690 & Etayo (LG—holotypus; E, IMI, M, UPS, hb. Diederich—isotypi); ibid., on P. sulcata, Diederich 9689 & Etayo (GZU, hb. Diederich—topotypi); ibid., vii 1990, on P. saxatilis and P. sulcata, Diederich 9233, 9239 (hb. Diederich—topotypi).

(Fig. 7)

Ascomata perithecioid, ostiolate, 25–40(–60) μm diam., globose, black, semi-immersed to superficial, arising from large black necrotic areas of the

Fig. 7. Sphaerellothecium parmeliae (holotype): A, Section through an ascoma, showing dark layer in the host thallus; B, Asci; C, Ascospores. Scales: A–C =10 μm.

**Sphaerellothecium parmeliae Diederich & Etayo sp. nov.**


Typus: France, Pyrénées-Atlantiques, S of St-Jean-Pied-de-Port, forêt d'Iraty, 0·5km S of Chalet Pedro, 1000m, on Fagus, on Parmelia saxatilis, vii 1991, Diederich 9690 & Etayo (LG—holotypus; E, IMI, M, UPS, hb. Diederich—isotypi); ibid., on P. sulcata, Diederich 9689 & Etayo (GZU, hb. Diederich—topotypi); ibid., vii 1990, on P. saxatilis and P. sulcata, Diederich 9233, 9239 (hb. Diederich—topotypi).

(Fig. 7)

Ascomata perithecioid, ostiolate, 25–40(–60) μm diam., globose, black, semi-immersed to superficial, arising from large black necrotic areas of the
host thallus, black thallus areas and ascomata covered by a hyaline epicortex. Vegetative hyphae brown, smooth-walled, 4–5 µm diam., branched, often forming a superficial net on the host thallus. Ascomatal wall composed of dark brown textura angularis with cells 4–7 × 2–5 µm. Hamathecium without any visible paraphyses or periphyses at maturity, I – ; periphyses developed in the upper part of the ascoma, simple, small, less than 10 × 1.5 µm. Ascii ellipsoid, 19–23 × 9–12.5 µm, bitunicate, wall apically thickened, with a distinct ocular chamber, ascoplasma I lugol + orange or reddish, 8-spored, with ascospores irregularly arranged in the ascus. Ascospores 1-septate, oval, slightly constricted at the septum, not halonate, hyaline, rarely becoming brownish at maturity, 8.5–10 × 3–4 µm.

Hosts: Parmelia saxatilis (L.) Ach. and P. sulcata Taylor. The perithecia are situated in large black areas of the thallus and probably kill the host.

Distribution: The species is very frequent in the western Pyrenees (France and Spain), and is also known from Finland. In addition, we have seen specimens of Parmelia saxatilis and P. sulcata from Germany and Luxembourg with similar black areas, but without any perithecia. As the host lichens are very common and widespread in Europe, the parasite is likely to occur, and even to be frequent, throughout the continent.

Notes: This species fits the concept of the genus Sphaerellothecium well, as circumscribed by Roux & T riebel (1994); the fungus has small ascomata, the characteristic iodine reactions, and the superficial net of dark brown vegetative hyphae. No paraphyses have been observed by us, which is surely due to the extremely small ascomata, in which almost no space is left between the mature asci.

In most ascomata only hyaline ascospores are present, and one has to search carefully to find a brownish ascospore. This situation is similar to that of the type species of the genus, S. araneosum (Rehm ex Arnold) Zopf, in which the ascospores remain hyaline for a long time and become brown only at maturity. The superficial net of vegetative hyphae is visible and well-developed in about 50% of the specimens, but can only be detected against the black background at a high magnification (× 80) with strong illumination. This characteristically black areas of the host thallus make it easy to detect this fungus in the field.

Sphaerellothecium araneosum is easily distinguished from the new species by large, 1–3-septate ascospores (13.5–17 × 5–7 µm), its occurrence on healthy, and not blackish, areas of the lichen thallus and by the different hosts (Ochrolechia, Pertusaria and Varicellaria species) (Roux & T riebel 1994: 519–523). The recently described S. minutum Hafellner, which also has hyaline ascospores, has larger ascomata, 60–80 µm diam., slightly larger ascospores, 9–13 × 3–5 µm, and grows on different hosts (Sphaerophorus species) (Hafellner 1993: 760–762). Echinothecium reticulatum Zopf, a fungus with a similar net of vegetative hyphae on Parmelia s. str., is distinguished by setose ascomata, which grow on more healthy, not blackish, parts of the thallus. The ascospores of other species of Sphaerellothecium described by Roux & T riebel (1994), T riebel (1989) and T riebel et al. (1991) all have larger
or brown ascospores. *Sphaerellothecium cladoniicola* E. S. Hansen & Alstrup has a very distinct net of dark superficial hyphae, slightly larger ascomata (30–60 μm diam.) and larger ascospores (8–12 × 5 μm) (Hansen & Alstrup 1995: 35–37).


### Zwackhiomyces dispersus (Lahm ex Körb.) Triebel & Grube

This species, confined to the thalli of *Protoblastenia rupestris*, is previously known from Great Britain, Germany (Grube & Hafellner 1990) and Spain (Catalunya) (Navarro-Rosinés et al. 1994).

**Spain:** Navarra: Usún, foz de Arbayún, 500 m, on shaded rocks, on *Protoblastenia rupestris*, vii 1994, Etayo 12788.

### Zwackhiomyces coepulonus (Norm.) Grube & R. Sant.

This fungus is common on species of *Caloplaca* and *Xanthoria* in Europe (Grube & Hafellner 1990). In continental Spain it is known from Catalunya (Navarro-Rosinés et al. 1994).

**Spain:** Huesca: Formigal, 1500 m, on *Xanthoria elegans*, vii 1991, Etayo 11021. N avara: W of Pamplona, Sierra de Urbasa, Pºº de Urbasa, on *X. parietina*, vii 1991, Diederich 9629 & Etayo 5692; Larra, Ilano de Eskilzarra, c. 1400 m, on *Caloplaca chalybaea*, ix 1995, Etayo 13081; ibid., near the Refugio, c. 1460 m, on *X. sorediata*, xii 1995, Etayo 13087; Arguedas, Bardenas, embalse de las cortinas, near Cabezo de Castildetierra, 400 m, on a saxicolous *Caloplaca*, iii 1993, Etayo 13850.

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### References


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