

DRAFT

Artificial Keys to the Lichenicolous Fungi of Great Britain, Ireland, the Channel Islands, Iberian Peninsula, and Canary Islands

Fourth Draft Edition for Testing Only

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Introduction

These draft keys were initially developed for use on a British Mycological Society/British Lichen Society joint workshop held in Lyndhurst in the New Forest (Hampshire, UK) in February 1998. They were based on the keys I published in the *Lichenologist* in 1983 which dealt with 218 species of fungi growing on lichens in the British Isles which were lichen-forming, commensalistic, parasitic, or saprobic; it also included line-drawings of the spores on 141 species. However, Violetta Atienza (Universidad de Valencia, Spain) had been collaborating with me at the then International Mycological Institute (Egham, Surrey, UK) and in preparing the keys for the 1998 course we decided also to cover additional species also in Spain (including the Canary Islands). This was done in order to increase the number of species covered in order to facilitate the identification of specimens – fungi known or described from one region would often subsequently turn up in the other. In making the revision, I was especially pleased to recruit the assistance of Brian J Coppins (Royal Botanic Garden, Edinburgh, UK) who worked with me on the 1998 workshop.

The drafts prepared in 1998 were circulated to various colleagues for comment, and have also been used on courses, such those at Eagle Hill (Maine, USA) in 2001 and 2008, and also by individuals to whom copies were made available. Especially detailed comments were received from Paul Diederich (Luxembourg), Javier Etayo (Pamplona, Spain), and Josef Hafellner (Graz, Austria), and Navarro-Rosinés (Spain). Howard Fox generously provided details of Irish records. Violeta Atienza has worked with me on updating the perithecioid section of the keys, and this part is the most fully revised to date. I intend to incorporate all suggestions and comments into a new edition for regular publication, as well as to include additional species reported from the countries covered. This revision has not yet been completed.

The document presented here is, consequently, essentially a work still in preparation. It may thus omit species discovered in the countries since 1998, not include all subsequent nomenclatural changes proposed, nor all the comments received from the above specialists and users. There are also some entries for which further information was not immediately to hand and needs to be elaborated on or checked. Further, the full bibliographic details of papers cited are omitted here to save space, and also because they too required updating.

Notwithstanding the above **health warning** these keys therefore come with, I trust it will be of some value as it covers around 500 species, about one-third of the lichenicolous fungi known worldwide. Critical identifications, however, should ideally be made by direct comparison with type, authentic, or authoritatively determined material, along with a study of published descriptions and illustrations.

In order that the final keys are as comprehensive and practical to use as possible, all suggestions and corrections will be most welcome.

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Universidad Complutense de Madrid and Natural History Museum, London 20 August 2010

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Key to the Principal Keys

- 1 Spores produced in asci 2
 Spores not produced in asci 3
- 2(1) Hymenium not exposed at maturity; ascomata flask- or scale-like (perithecioid
 or thyriothecioid)¹ **KEY 1 (p. 4)**
 Hymenium exposed at maturity; ascomata elongate, disc-like or effuse
 (lirelliform, apothecioid, arthonioid or calicioid) **KEY 2 (p. 44)**
- 3(1) Spores produced on basidia **KEY 3 (p. 78)**
 Spores not produced on basidia **KEY 4 (p. 83)**

¹ See also [162\(161\)](#) *Spirographa fusisporella* and [119\(118\)](#) *Wernerella maheui*.

Draft at 16 August 2010

KEY 2: *Discomycetous species*¹

NB: Numbers prefixed with * indicate more than two choices.

Synopsis

- 1 Ascomata with a dry spore mass (mazaedium) or ascomata distinctly stalked (belonging to *Caliciales*) **Key 2A** (p. 44)
 Ascomata without a dry spore mass, immersed to sessile2
- 2(1) Ascospores transversely 2- or more septate, **or** acicular, sigmoid or filiform...
 **Key 2E** (p. 66)
 Ascospores 0–1-septate, or submuriform to muriform; globose, ellipsoid, ovoid, clavoid or fusiform3
- *3(2) Ascospores simple..... **Key 2B** (p. 47)
 Ascospores 1-septate, hyaline **Key 2C** (p. 54)
 Ascospores 1-septate, brown or dark greenish..... **Key 2D** (p. 60)
 Ascospores submuriform to muriform..... **Key 2F** (p. 75)

Key 2A: *Calicioid taxa*

- 1 Asci breaking down early to leave a dry spore mass (mazaedium)2
 Asci persistent, no dry spore mass produced6
- 2(1) Ascospores greenish, surface spirally ridged; mazaedium green-black3
 Ascospores brown-black, surface spirally ridged, or cracked ; mazaedium sooty black4
- 3(2) Ascomata sessile, 0.14–0.2 mm tall, 12–0.35 mm diam; ascospores (9–) 11.5–15 × 3.4–4.2 µm, 1–3(–7)-septate; on dry lignum or bark of old trees (especially *Pinus* and *Quercus*), sometimes parasitic on other *Caliciales*; England, Wales, Scotland.
 **Microcalicium disseminatum** (Ach.) Vain. 1927
 Ascomata stalked, 0.6–1.8(–2.5) mm tall; head 0.14–0.28 mm diam.; ascospores 6.7–8.2 × 2.3–2.9 µm, 1-septate; on thalli of *Psilolechia clavulifera* and *P. lucida* on underhanging rocks or exposed tree roots; Wales, Scotland.
 **Microcalicium arenarium** (Hampe ex A. Massal.) Tibell 1978
- 4(2) Ascomata ±sessile to short-stalked, 0.3–1.2 mm tall; ascospores 12–16 × 4–6 µm; thallus a farinose granular, yellowish green crust on damp siliceous rock

¹ Key 2 was initially prepared in 1998 by B J Coppins. Some changes have been made and additional information include, but it has not been fully updated. Some additional species needing to be added are listed at the end of each of the appropriate subordinate keys.

- or stonework²; Spain, England (Northumberland), Scotland (Midlothian).
See Etayo (1997), Hawksworth (1975a), Rico (1992).
..... **Calicium corynellum** (Ach.) Ach. 1803
Ascomata sessile; host thallus smooth, rimose or isidiate5
- 5(4) Ascospores 10–15 × 6–9 µm, at first spirally ridged, later coarsely cracked. On
Pertusaria coccodes, less often on *P. albescens* and *P. amara*, on trees.
Spain, England (lowland), Wales, Scotland, Ireland.
..... **Cyphelium sessile** (Pers.) Trevis. 1862
Ascospores 11–13 × 6–8 µm, with fewer, shallower ridges; On *Pertusaria*
pseudocorallina on rocks. Spain, Scotland (Argyll), Ireland (Galway, Mayo),
Wales (Brecon, Caernarvon)..... **Cyphelium marcianum** B. de Lesd. 1908
- 6(1) Ascospores simple to 1-septate, <4 µm wide7
Ascospores simple, >4 µm wide14
- 7(6) Ascospores simple, (5–)5.5–7(–9.5) × 1.8–2.7(–3) µm. On *Arthonia vinosa*.
Scotland. See Purvis *et al.* (1992). **Chaenothecopsis** sp.
Ascospores 1-septate8
- 8(7) Stalk, exciple or hypothecium with reddish pigment9
Stalk, exciple and hypothecium with brownish, greenish or greenish yellow
pigments10
- 9(8) Red pigment, K–; ascomata short-stalked. ascospores 7–11 × 2.5–3.5 µm, with
a distinct septum. On *Schismatomma cretaceum* and more rarely *S.*
decolorans; Channel Islands (Jersey), England (Devon, Dorset, E. Anglia),
Wales (Caernarvon). See Tibell (1991), Tibell & Ryman (1995).
..... **Chaenothecopsis retinens** (Nyl.) Tibell 1991
Red pigment, K+ olive green or aeruginose; ascomata long-stalked, 0.5–1.2
mm tall; ascospores 6–7 × 2.2–2.7 µm, with a pale septum. On *Chaenotheca*
stemonea and *C. trichialis*. England (NE Yorkshire), Scotland.
..... **Chaenothecopsis viridireagens** (Nádv.) A.F.W. Schmidt 1970
- 10(9) Ascospore septum darker than outer wall; ascospores 4.8–6.7(–7.6) × (1.5–)2–
2.3 µm; ascomata 0.5–1 mm tall; on *Chaenotheca trichialis*; Scotland. See
Hawksworth (1978a). **Chaenothecopsis epithallina** Tibell 1975
Ascospore septum hyaline or paler than outer wall11
- 11(10) On squamules or podetia of *Cladonia* species; ascospores (5–)6–9.5(–14) ×
2.3–3(–3.5) µm; ascomata 0.34–0.7 mm tall. England (E. Sussex), Scotland.
See Hawksworth (1978a).
..... **Chaenothecopsis parasitaster** (Bagl. & Carestia) D. Hawksw. 1978
On lignum or bark, parasitizing thalli of *Calicium* or *Chaenotheca* spp.12
- 12(11) Head with effuse, yellowish, K+ purple pigment; ascomata 0.4–0.8 mm tall;
on *Chaenotheca brunneola*. Scotland.

² Now considered to be an autonomous lichen rather than a lichenicolous fungus.

- **Chaenothecopsis pusiola** (Ach.) Vain. 1927
Head with pigments that are K⁻, K⁺ dulling, K⁺ brownish or K⁺ greenish .13
- 13(12) Ascospores (5–)6–8(–11) × 2–2.6(–3.3) μm; ascomata 0.4–0.7 mm tall.
Associated with *Trentepohlia* or hosts that have *Trentepohlia* as photobiont, e.g. *Arthonia leucopellaea* and *Lecanactis abietina*. Scotland.
..... **Chaenothecopsis vainioana** (Nádv.) Tibell 1979
Ascospores 5–7(–8.5) × 2–2.5(–3) μm; ascomata 0.4–1 mm tall. Associated with globose-celled algae or the thallus of *Calicium glaucellum*. England (Hereford), Scotland. **Chaenothecopsis pusilla** (Ach.) A.F.W. Schmidt 1970
- 14(6) Ascospores ellipsoid with pointed apices, 10–15.5 × 6.5–9 μm, with surface of longitudinally arranged ridges. On *Pertusaria heterochroa*, *P. leioplaca* and *P. pseudocorallina*. Canary Islands, Spain, England (S Hampshire), Wales (Caernarvon, Pembroke), Scotland (Mid Ebudes), Ireland (Galway, Kerry, Mayo), Portugal. See (Hitch 1993). **Sphinctrina tubiformis** A. Massal. 1853
Ascospores ±globose.....15
- 15(14) Exciple in section reddish, K⁺ red; ascomata sessile to short-stalked16
Exciple in section dull brown, K⁻; ascomata with a distinct stalk17
- 16(15) Asci 8-spored; ascospores 5–7.5 × 4.5–6.5 μm; on *Pertusaria pertusa*, more rarely on other *Pertusaria* spp., incl. *P. hymenea* and *P. leioplaca*; Canary Islands, Spain, England, Wales, Scotland, Ireland.
..... **Sphinctrina turbinata** (Pers.) De Not. 1846 var. **turbinata**
Asci 4-spored; ascospores 12–16.5(–18) × 9.5–12 μm; on *Pertusaria leioplaca*; Scotland (E Perthshire).
..... **Sphinctrina turbinata** var. **tetraspora** Coppins ined.
- 17(15) Ascospores 7–10 × 6.5–8.5 μm; On *Protoparmelia oleagina*. Canary Islands, Spain, England (W. Sussex). **Sphinctrina anglica** Nyl. 1860
Ascospores 4.5–6.5 × 4–6 μm. On *Pertusaria pertusa*, or more rarely *Ochrolechia 'pallescens'*, other *Pertusaria* spp. or *Diploschistes* spp. Canary Islands, Spain, Channel Islands, Ireland (Galway).
..... **Sphinctrina leucopoda** Nyl. 1860

TO ADD TO KEY 2A:

Chaenothecopsis brevipes from Spain (Tibell & Ryman 1995:201)**Chaenothecopsis nigra** Tibell 1987; England, Scotland (E. Perth, on *Chaenotheca chrysocephala*), Wales**Chaenothecopsis rubescens** Vain. 1940; Scotland.**Chaenothecopsis subparoica** (Nyl.) Tibell 1995; England (Northumberland) on *Haematomma ochroleucum*.

Key 2B: Ascospores simple; ascomata not calicioid

- 1 Ascomata whitish, pale brownish, yellowish to pale orange; on foliose lichens of *Peltigerales*.....2
 Ascomata dark coloured, **or** if paler then not on *Peltigerales*.....4
- 2(1) Ascus apex I- 2A
 Ascus apex I+ blue 3
- 2A(2) Ascomata developing below the host surface, later innate or erumpent, immarginate, 0.3–0.7(–1) mm diam; ascospores (8.5–)10–12(–14) × 2.5–3.5(–5) µm; on thalli of *Peltigera* spp., especially *P. praetextata*. England, Wales, Scotland. See Hawksworth & Santesson (1988).
 **Skyttella mulleri** (Willey) D. Hawksw. & R. Sant. 1988
 Ascomata erumpent to superficial, to 0.33 mm diam, disc pale yellowish to pale brownish, exciple with whitish 0–2-septate glassy hairs with thickened tips to 140 × 1.5–4 µm; ascospores fusoid to leech-shaped, with somewhat attenuated ends, 8.5–16(–17.5) × 2.5–3 µm; on lower and upper surfaces of *Nephroma laevigatum* thalli; Scotland (E Inverness). See Huhtinen *et al.* (2008).
 . **Protounguicularia nephromatis** (Zhurb. & Zavarzin) Huhtinen *et al.* 2008
- 3(2) Ascus apex I+ blue with a darker blue axial tube; Ascomata 0.1–0.2 mm diam.; ascospores 10–14 × 3–4.5 µm. On thallus of cyanobacterial morph of *Sticta canariensis* [*S. dufourii*]. Canary Islands, W Scotland. See Wedin & Hafellner (1998).
 **Corticiruptor abeloneae** (P.M. Jørg.) Wedin & Hafellner 1998
 Ascus apex with an annular I+ blue ring; ascomata sessile, developing on host surface, marginate, 0.25–0.4 mm diam; ascospores (7–)8–10(–12) × 2.3–3(–3.5) µm. On thallus of *Peltigera* spp. England, Wales, Scotland. See Hawksworth (1980b).
 **Pezizella epithallina** (W. Phillips & Plowr.) Sacc. 1889
- 4(1) Without an externally visible thallus, distinct from that of the host, although gall-formation may occur; without a thalline margin5
 With an externally visible (epikapylic) thallus, distinct from that of the host, or with a thalline margin37
- 5(4) Ascomata with marginal hairs - either urceolate and immersed in the host tissues and with hairs confined to the exciple apex ('lip'), or emergent and hairs also present on the outside of the exciple (margin)6
 Ascomata without marginal hairs - if immersed in host then not urceolate ..19
- 6(5) Ascospores 1.5–2 µm wide7
 Ascospores 2.5–3.5(–4.5) µm wide9
- 7(6) Hymenium bright green; ascomata 0.12–0.34 mm diam.; hairs lacking a refractive internal apical thickening, 20–38 µm long; ascospores 5–7 × 1.5–2

- µm. Associated with thallus of *Micarea denigrata*. Scotland (Clackmannan). See Hawksworth (1982a). **Skyttea viridis** D. Hawksw. & Coppins 1982
Hymenium hyaline 8
- 8(7) Excipular hairs 20–35 µm long, with a refractive internal apical thickening; exciple olivaceous; ascomata 0.1–0.15 mm diam.; ascospores 6–7(–7.5) × 1.5–2 µm. On thallus of *Verrucaria* cf. *viridula*. Scotland (Dunbarton). See Hawksworth (1982a). **Skyttea spinosa** D. Hawksw. & Coppins 1982
Excipular hairs 10–15 µm long, wall only slightly thickened; exciple brown; ascomata 0.1–0.2 mm diam.; ascospores 5–7.5 × 1.8–2.2 µm. On thallus of *Lecanora saligna*. England (Essex, Yorkshire). See Zhuang & Korf (1989), Diederich & Etayo (2000).
..... **Unguiculariopsis lesdainii** (Vouaux) Etayo & Diederich 2000
- 9(6) Apothecium margin regularly divided by 3–4 cruciately arranged fissures; ascospores 7–8.5(–10.5) × (2.5–)3–3.5 µm. On thallus of *Diploicia canescens*. Canary Islands, England, Scotland, Channel Islands, Ireland, Wales (Merioneth). See Diederich & Etayo (2000).
..... **Rhymbocarpus cruciatus** (Sherwood *et al.*) Etayo & Diederich 2000
Apothecium margin entire or with fine radial striations..... 10
- 10(9) Exciple green; ascomata immersed, urceolate..... 11
Exciple brown; ascomata immersed to emergent and sessile..... 14
- 11(10) Ascospores 22–46 × 2.5–3 µm, falcate to sigmoid, 0(–1)-septate; hairs 8–11 × 2.5–3 µm. On thallus of *Megalospora tuberculosa*. Spain (Navarra). See Etayo & Diederich (1998).
..... **Skyttea megalosporae** Etayo & Diederich 1998
Ascospores <10 µm long, ellipsoid..... 12
- 12(11) Ascospores 4–7 × 2.5–3.5 µm; hairs 20–30 × 1.5–2 µm. On thallus of *Amandinea punctata*. England, Scotland.
..... **Skyttea buelliae** Sherwood *et al.* 1981
Ascospores 7–9 × 3–5 µm..... 13
- 13(12) Exciple 40–50 µm wide; hairs 15–20 × 3–3.5(–4) µm; ascospores 7–8.5 × 3–3.5 µm. On thallus of *Mycoblastus fucatus* (incl. *M. sterilis*). Spain, England, Scotland, Ireland. **Skyttea gregaria** Sherwood *et al.* 1981
Exciple 10–20 µm wide; hairs 12–20 × *c.* 3 µm; ascospores 6.5–8 × 3–3.5 µm. On thallus and thalline margins of *Tephromela atra*. Canary Islands, Scotland (Lanark). **Skyttea tephromelarum** Kalb & Hafellner XXXX
[= *S. elachistophora* acc. to Triebel (1989: 145).]
- 14(11) Marginal hairs strongly curved with hooked apices, 10–25 × 2–2.7 µm; ascospores 6–8 × 3–3.5 µm. On thallus of *Evernia prunastri*. Canary Islands, Spain, England, Scotland.
..... **Unguiculariopsis lettaui** (Grumann) Coppins 1990
Marginal hairs straight, slightly curved or flexuose, often >25 µm long 15

- 22(21) Ascospore apices with 1–3 μm thickened caps; ascospores 13–17(–19) \times 3–4 μm ; ascomata elongate, *c.* 2–2.5 \times 0.5–1.1 mm, convex, causing shiny blackish geniculate deformations on *Bryoria capillaris*, *B. fuscescens* and *B. subcana*. Canary Islands, Scotland (E. Inverness). See Hawksworth (1978a), Triebel & Rambold (1988). **Phacopsis huuskonenii** Räsänen 1949
- Ascospores apices attenuated but without thickened caps; ascospores (13–)16–18(–21) \times 5–7 μm ; ascomata 0.15–0.3(–0.45) mm diam., round with plane to convex, red-brown to dark brown disc, associated with contorted, gall-like, often bleached malformations of thalli of *Parmelia saxatilis* and *P. sulcata*, also on *Hypogymnia tubulosa*, *Hypotrachyna sinuosa*, *Platismatia glauca*, *P. norvegica*, *Xanthoparmelia conspersa*, *X. delisei*, *X. loxodes*, *X. mougeotii*, *X. pulla*, *X. taractica* and *X. tinctoria*. Canary Islands, Spain, Wales, Scotland, Ireland. **Nesolechia oxyspora** (Tul.) A. Massal. 1856⁴
- 23(21) Ascus apex with I+ blue tholus24
 Ascus apex without I+ blue tholus31
- 24(23) Paraphyses branched; asci *Bacidia*- or *Micarea*-type25
 Paraphyses mostly unbranched; asci *Lecanora*-type;26
- 25(24) Asci *Micarea*-type, with dark blue axial tube in K/I; ascospores 8–13 \times 4–7 μm ; epithecium reddish brown, olivaceous or green; hypothecium red-brown to dark brown; ascomata 0.2–0.5 mm diam. On *Dibaeis baeomyces*. England (Devon), Scotland. **Micarea inquinans** (Tul.) Coppins 1992
- Asci *Bacidia*-type, without dark blue axial tube in K/I; ascospores (7–)9–10.5(–11) \times (4.5–)5–5.5(–6) μm ; epithecium red-brown, K+ purplish; hypothecium pale yellowish brown to brown. On thallus of *Lecanora pseudistera*. Spain (Castellón). See Rambold (1993).
 **Tephromela campestricola** (Nyl.) Rambold & Triebel 1992
- 26(25) Ascomata in sections (especially epithecium) with bright blue to green pigment; paraphysis apices without dark brown pigment caps; on crustose lichens27
- Ascomata in sections without bright blue to green pigments; paraphysis apices with dark brown pigment caps; on foliose or fruticose lichens of the *Parmeliaceae* s. lat.29
- 27(26) Ascospores with attenuate apices. On *Lecanora polytropa* and *L. intricata*. Canary Islands, Scotland, Ireland. **Carbonea supersparsa** (Nyl.) Hertel 1983
- Ascospores with rounded apices28
- 28(27) On *Candelariella vitellina* and rarely *C. coralliza*. Canary Islands, Spain, England, Scotland. **Carbonea vitellinaria** (Nyl.) Hertel 1983
- On *Rhizocarpon geographicum* agg. Spain (Madrid). See Hafellner & Sancho (1990). **Carbonea halacysi** (J. Steiner) Hafellner & Sancho 1990

⁴ Three varieties of this species are recognized by Triebel *et al.* (1995), but see Dore *et al.* (2006).

- 29(26) Hypothecium brown to dark brown30
 Hypothecium hyaline to pale brown; ascospores 9–11(–12) × (4–)5–7(–8) µm.
 On *Hypogymnia physodes* and *H. tubulosa*. Canary Islands. See Triebel &
 Rambold (1988), Triebel *et al.* (1995).
 **Phacopsis cephalodioides** (Nyl.) Triebel & Rambold 1988
- 30(29) Exciple dark brown; ascospores 8–11 × (4.5–)5–6.5(–7) µm; not gall-forming.
 On *Flavoparmelia caperata* [CHK Unamuno, 1941]. Spain. See Triebel &
 Rambold (1988), Triebel *et al.* (1995).
 **Phacopsis thallicola** (A. Massal.) Triebel & Rambold 1988
 Exciple pale brown to brown; ascospores (10.5–)11–13(–14) × (5.5–)6–7(–8)
 µm. Forming galls on *Lethariella intricata*. Canary Islands. See Triebel *et al.*
 (1995). **Phacopsis lethariellae** Hafellner & Rambold 1995
- 31(23) Asci with a distinct tholus (*Arthonia*-type); ascomata in gall-like aggregations,
 brown to reddish brown; ascospores broadly ellipsoid, 9–12 × 5–7 µm,
 without a distinct perispore. On thallus of *Parmelia saxatilis*, *P. submontana*
 and *P. sulcata*. Canary Islands (El Hierro, Gran Canaria, Tenerife), Spain
 (Asturias), Scotland (W. Ross). See Hafellner (1998).
 **Arthophacopsis parmeliarum** Hafellner 1998
 Asci not or only slightly thickened at apex32
- 32(31) Ascospores subglobose to globose, 7–8(–9) × 5–6 µm. On *Ochrolechia*
tartarea, sometimes also *O. androgyna*, *O. frigida* and *Thamnolia*
vermicularis. Scotland (W. Inverness).
 **Geltingia associata** (Th.Fr.) Alstrup & D. Hawksw. 1990
 Ascospores ellipsoid to oblong-ellipsoid33
- 33(32) Ascomata in sections with coarsely granular dark brown pigment, K+ purplish
 brown34
 Ascomata in sections with amorphous pigment35
- 34(33) Ascus wall I+ pale blue; ascospores (7–)8.5–10.5(–12.5) × 2.5–3.5(–4) µm.
 On podetia or squamules of *Cladonia* spp., sometimes gall-forming. Wales,
 Scotland, Ireland. See Rambold & Triebel (1990).
 **Phaeopyxis punctum** (Massal.) Rambold *et al.* 1990
 [?Syn.: *Lecidea cladoniarum* Nyl. 1857.]
 Ascus wall I–; ascospores (6–)8–9.5(–10.5) × (–2.5)3–4(–5) µm. On
Trapeliopsis gelatinosa, not gall-forming. Wales, Scotland. See Triebel
 (1989), Rambold & Triebel (1990).
 **Phaeopyxis varia** Coppins *et al.* 1990
- 35(33) Apical wall of ascus slightly thickened; ascomata remaining immersed, to 0.45
 mm diam.; exciple and epihymenium olivaceous; ascospores 10–14(–15) ×
 (2.5–)3–4(–4.5) µm. On *Dibaeis baeomyces*. England (E. Cornwall), Wales.
 See Rambold & Triebel (1990), Diederich *et al.* (2010).
 **Rhymbocarpus ericetorum** (Körb.) Etayo *et al.* 2010
 [syn. *Gelatinopsis ericetorum* (Körb.) Rambold & Triebel 1990]

- Apical wall of ascus not thickened; ascomata erumpent36
- *36(35) Ascospores (9–)11–13 × (5–)6–7 μm; exciple red-brown; epihymenium pale brown. On *Placidium squamulosum*. Spain (Madrid). See Hafellner & Navarro-Rosinés (1993). .. **Llimoniella adnata** Hafellner & Nav.-Ros. 1993
 Ascospores 10–13 × 3.5–4.5 μm; exciple dark brown, K+ dulling in outer part, paler within and K+ red-brown; epihymenium brown-black, K+ dull brown. On *Lecidea fuscoatra*. Canary Islands. See Hafellner (1996), Diederich & Etayo (2000).
 Rhymbocarpus fuscoatrae (Hafellner) Diederich & Etayo 2000
 [*Llimoniella fuscoatrae* Hafellner 1996]
 Ascospores 8.5–10(–11) × 2.5–3(–3.5) μm; exciple and epihymenium orange-brown to reddish brown. On *Caloplaca citrina*. England. See Alstrup & Hawksworth (1990), Diederich & Etayo (2000), Diederich *et al.* (2010).
 ...**Llimoniella groenlandiae** (Alstrup & D. Hawksw.) Diederich *et al.* 2010
 [syn. *Unguiculariopsis groenlandiae* (Alstrup & D. Hawksw.) Etayo & Diederich 2000]
 Ascospores (8–)9–11(–14) × 2–3(–3.5) μm; upper exciple and epihymenium greenish. On *Lepraria neglecta* agg. England (Devon), Scotland (W. Sutherland). See Diederich & Etayo (2000), Kümmerling *et al.* (1993).
 **Rhymbocarpus neglectus** (Vain.) Diederich & Etayo 2000
 Ascospores (7–)9–11 × 4–5(–6) μm; exciple purple-brown to dark red-brown; epihymenium red-brown, K+ purple-red. On thalli of *Acarospora nodulosa* and *A. placoditiformis*. Spain. See Hafellner & Navarro-Rosinés (1993).
 **Llimoniella scabridula** (Müll.Arg.) Nav.-Ros. & Hafellner 1993
- 37(4) Thallus yellow-green; ascomata concolorous or slightly darker; ascospores (9–)9.5–12.5(–16) × 4.5–5.5(–6) μm. Sometimes invading thallus of *Tephromela atra* **Lecanora sulphurea** (Hoffm.) Ach. 1810
 Thallus whitish, grey, orange-grey, brown or blackish38
- 38(37) Asci multispored (>100 spores); ascospores <6 μm long; thallus grey to brown, areolate, possibly beginning as a parasite on other crustose lichens (e.g. *Acarospora* spp.). Canary Islands, Spain, SW England, Wales, Scotland.
 **Polysporina lapponica** (Ach. ex Schaer.) Degel. 1983
 Asci 8-spored; ascospores >7 μm long39
- 39(38) Paraphyses richly branched; asci *Rimularia*-type40
 Paraphyses mostly unbranched; asci *Bacidia*-, *Lecanora* or *Lecidea*-type....41
- 40(39) Thallus areolate, grey-brown to brown, forming small islets in the host thallus; ascospores (8–)8.5–14 × 4.5–7 μm. On *Lecanora rupicola*. Canary Islands, Spain, England, Wales, Scotland.
 **Rimularia insularis** (Nyl.) Rambold & Hertel 1985
 Thallus a rimose, isidiose dark brown to blackish crust; ascospores 12–16(–20) × 6.5–9(–10) μm. Overgrowing various crustose lichens on exposed siliceous rocks or rarely worked timber. England, Wales, Scotland, Ireland.
 **Rimularia furvella** (Nyl. ex Mudd) Hertel & Rambold 1987

- 41(39) Asci *Bacidia*-type; ascospores (8–)9–12 × 4.5–5.5(–6) μm. On *Lecanora varia* on lignum. Canary Islands, England, Scotland. See Poelt (1974), Hawksworth (1982a). **Ramboldia insidiosa** (Th.Fr.) Hafellner 1995
Asci *Lecanora* or *Lecidea*-type. On or amongst crustose lichens on exposed rocks.....42
- 42(41) Ascomata with a thalline margin43
Ascomata without a thalline margin45
- 43(42) Cortex of thalline exciple K⁺ yellow to red crystals (norstictic acid).
Ascospores 8–13 × 3.7–5 μm. Forming patches, mostly <3 cm across amongst *Rhizocarpon geographicum* Wales, Scotland.
..... **Protoparmelia atriseda** (Fr.) R. Sant. & V. Wirth 1987
Cortex of thalline exciple K[–].....44
- 44(43) Ascospores (7–)8.5–11 × 4–5 μm, broadly fusiform; thallus absent or of small scattered areoles. On thallus of *Lecanora epanora*, *L. handelii* and *L. subaurea*. SW England, S Wales. **Lecanora gisleriana** Müll. Arg. 1874
Ascospores 9–13 × 2–3.5(–4.4) μm, oblong-ellipsoid; thallus often >4 cm across. Overgrowing (?initially parasitic) on crustose lichens (e.g. *Aspicilia cinerea* and *Diploschistes caesioplumbeus*) on maritime rocks England, Wales. **Protoparmelia montagnei** (Fr.) Sancho & A. Crespo 1987
- 45(42) Asci *Lecidea*-type; thallus grey; ascospores 7–10 × 4–6 μm. On thalli of *Aspicilia*. Spain. [CHECK - Navarro & Hladun 1990; Hertel's key).....
..... **Lecidea tessellata** var **caesia** (Anzi) Arnold XXXX
Asci *Lecanora*-type.....46
- 46(45) Thallus yellow-green (containing usnic acid), areolate; ascospores 8–15 × 3.5–6.5 μm. On thallus of *Orphniospora mosigii*. Spain. See Llimona (1976 - CHECK). ... **Carbonea distans** (Krempelh.) Hafellner & Obermayer XXXX
Thallus grey, olivaceous or brown (without usnic acid).....47
- 47(46) Thallus brown, warty-areolate; areoles shiny, with a thick epinecral layer; ascomata marginate; ascospores simple, 10–15 × 5–9.5 μm. Canary Islands, Scotland. **Carbonea assimilis** (Körb.) Hafellner & Hertel 1987
Thallus grey, dark olive-grey or brownish grey, warty granular, matt; ascomata immarginate; ascospores 0–1(–2)-septate, (7–)12–17(–19) × (4–)4.5–5.5(–6) μm. On and amongst crustose lichens, especially *Rhizocarpon geographicum*. Spain, England, Scotland (W Inverness).
..... **Scoliciosporum intrusum** (Th.Fr.) Hafellner 2004⁵
[syn. *Carbonea intrusa* (Th.Fr.) Rambold & Triebel 1997]

⁵ *Carbonea halacsyi* (J. Steiner) Hafellner & Sancho 1990 is sometimes treated as a synonym. However, Hafellner (*in litt.*) considers it a separate species, having an indistinct (endokapylic) thallus and non-septate ascospores, and always being associated with green *Rhizocarpon* species.

TO ADD TO KEY 2B:

Carbonea aggregantula (Müll. Arg.) Diederich & Triebel, on *Lecanora polytropa* and *L. soralifera* in Canary Islands (Las Palma), England, Wales (Caernarvon, Cardigan) & Scotland.

Catillaria usneicola Etayo 2000. On *Usnea* spp., incl. *U. filipendula* and *U. wasmuthii*, apothecia to 0.1 mm diam, hymenium 20-25 µm tall, hypothecium hyaline, ascospores simple, 4.5-6 x 1.5-2 µm, Canary Islands, Scotland (Argyll Main, Easternness)

Echinodiscus lesdainii (Vouaux) Etayo & Diederich 2000 [syn. *Mollisia lesdainii* Vouaux]; on *Lecania cyrtella* (and ?*Lecanora saligna*), ascomata 50-100 µm diam, exciple with hyaline simple hairs, exciple and at last part of hymenium violet in section, asci K/I -; ascospores ellipsoid, 5-9 x 2-3 µm; UK.

Llimoniella fuscatae Hafellner & Obermayer 2007; on *Acarospora fuscata*; in Wales (Radnor); apoth, black, lecideine, 0.2-0.4 mm; ascospores broadly ellipsoid, 9-12 x 5.5-7.5 µm

Llimoniella phaeophysciae Diederich *et al.* 2010; on *Phaeophyscia nigricans*; Spain (Aragon, Castilla y Leon); ascomata in groups, 120-350 µm, black shiny exciple 40-60 µm, disc dark reddish brown to blackish; ascospores 7-11 x 6-9 µm.

Nimisiostella lichenicola Calatayud *et al.*, Syst. Ascom. 15: 111-116 (1997). On *Parmelia saxatilis*, Spain (Teruel); apothecia superficial, to 0.7 mm diam, black, marginate; ascospores 16-24 per ascus, with stellate projections, 7-10 µm diam; paraphyses branched and anastomosed

Skyttea lecanorae Diederich & Etayo 2000; on *Lecanora chlarotera*, UK

Skyttea pyrenulae Diederich, Etayo & Coppins 2000; on *Pyrenula occidentalis*; UK.

Rhymbocarpus boomii Etayo & Diederich (2000)

NOT INCLUDED OWING TO LACK OF INFO.:

Lecidea verrucariae (Metzler) Nyl. = **Toninia verrucariae** (Metzler ex Nyl.) Timdal in Rambold & Triebel (1992) (see Clauzade *et al.* 1989: 60).

Phacopsis sp. on *Sticta canariensis* [unlikely genus as all other spp. known on Parmeliaceae - could this be *Corticiraptor abeloneae* (P.M. Jørg.)?].

Rhymbocarpus aurellae (Werner) Giralt XXXX: Haf. (in litt.) suggests this is a *Polysporina*, but no material was seen by him.

Rimularia aff. **insularis** on *Protoparmelia montagnei*, Spain Clatayud & Barreno (1997)

“**Skyttea thallopila**” on *Pertusaria*, Spain Boqueres & Gomez (1986)

Add - see Hafellner's comments for *Acarospora* refs.

Acarospora epithallina H. Magn. On *Acarospora hilaris*, Canary Islands, Spain.

Acarospora hospitans H. Magn. On *Aspicilia malmeana*, Canary Islands

Acarospora microcarpa (Nyl.) Weddell On *Diploschistes*. Egea & Llimona (1983)

Acarospora reagens Zahlbr. On *Diploschistes*.

Key 2C: Ascospores 1-septate, hyaline; ascomata not calicioid

- | | | |
|------|--|----|
| 1 | Ascomata arthonioid (immarginate; exciple absent or poorly developed) or indeterminate within hymenium of host..... | 2 |
| | Ascomata lecideoid or lirelliform; exciple well-developed and usually evident, at least in young ascomata, as a raised margin | 18 |
| 2(1) | Ascomata confined to hymenium of <i>Lecanora</i> spp. | 3 |
| | Ascomata on thallus tissues, but sometimes incidentally present on host ascomata | 4 |
| 3(2) | Hypothecium hyaline to dilute brownish; ascospores 9-15 x 3-5 µm. In ascomata of <i>Lecanora dispersa</i> aggr. Spain, Britain [????], Ireland, Scotland (E. Lothian). | |

- **Arthonia apotheciorum** (A. Massal.) Almq. 1880⁶
 Hypothecium dark brown, K+ olivaceous. In ascomata of *Lecanora leptacina*.
 Scotland. **Arthonia** sp.
- 4(2) Ascomatal sections with yellowish to orange-red, K+ purple-violet pigment.5
 Ascomatal sections without K+ purple pigment.....7
- 5(4) Without a distinct epithecioid layer; ascospores 12–14 × 5–6 µm. On
Arthothelium macounii. W Scotland. .. **Arthonia cohabitans** Coppins 1989
 With a distinct epithelial layer6
- 6(5) Ascomata arising in circular concentrically zoned infection spots; in sections
 with granular orange-red pigment; ascospores 11–14 × 4–6 µm. On
Umbilicaria. Spain. **Arthonia circinata** Th.Fr. 1865
 Ascomata not in circular spots; in section with amorphous yellowish pigment;
 ascospores 10.5–17 × 5–7 µm. On *Physcia*. No confirmed records. See
 Grube *et al.* (1995). **Arthonia destruens** Rehm 1868⁷
- 7(4) Asci 4-spored8
 Asci 8-spored9
- 8(7) Ascospores 8–12(–14) × 3.5–4(–5) µm; ascomata 0.1–0.2(–0.4) mm diam., in
 groups, initially developing below surface of host; hypothecium hyaline to
 dilute brown. On *Diploicia canescens*. Canary Islands, Spain, England
 (Somerset, E. Suffolk), Ireland (Galway, Kerry). See Hafellner (1995).
 **Arthonia diploiciae** Calatayud & Diederich 1995
 Ascospores 9–15 × 5–7 µm; ascomata 0.1–0.4 mm diam.; hypothecium green-
 brown to brown-black. On saxicolous, calcicolous lichen⁸. Spain (Clauzade
et al. 1989). **Arthonia oligospora** Vězda 1973
- 9(7) Hypothecium hyaline to dilutely pigmented10
 Hypothecium dark greenish brown or brown.....14
- 10(9) Ascomata red- or purple-brown when dry, (0.2–)0.5–1.5(–2) mm diam., flat to
 convex and often surrounded by a maculate zone of individual patches of
 developing hymenia and sometimes also pycnidia; hypothecium pale brown-
 orange, ± with red-brown mottling; ascospores 9–15 × 3–5 µm. On thallus of
Peltigera spp. (esp. *P. hymenina*). Canary Islands, Wales, Scotland
 (widespread), Ireland. **Arthonia fuscopurpurea** (Tul.) R. Sant. 1960
 Ascomata black when dry11

⁶ Usually reported as *A. clemens* (Tul.) Th.Fr. 1867, which is restricted to *Rhizoplaca* spp.

⁷ The material cited by Navarro-Rosinés *et al.* (1994: 169) on *Caloplaca flavescens* is unlikely to be this species; it may be referable to *A. molendoi*.

⁸ The type from Bulgaria is on the thallus and apothecia of *Lecanora crenulata* and *Lecania nylanderiana*.

- 11(10) Ascomata surface with protruding dark hairs 10–35 µm long; ascomata 0.05–0.1 mm diam.; ascospores (10–)11–14 × 3.5–4.5(–5) µm, becoming brown; on thallus, especially amongst soralia, of *Flavoparmelia caperata*. Canary Islands (Gomera), Spain (Andalucia, Navarra, Pyrenees). Also on *Cladonia ochrochlora* and *C. subulata* in Scotland (Moray, E. Sutherland). See Etayo (1996). **Arthonia coronata** Etayo 1996
 Ascomata glabrous 12
- 12(11) Hymenium I+ blue (without pre-treatment with K); ascospores 7–13 × 3–5 µm. On thallus of *Pseudocyphellaria aurata*. Canary Islands.
 **Arthonia pelvetii** (Hepp) H. Olivier XXXX⁹
 Hymenium I+ red (without pre-treatment with K) 13
- *13(12) Paraphysis apices 4–6 µm wide; ascomata 0.2–0.5 mm diam; ascospores 11.5–16 × (4–)5–6 µm. On thallus of *Placopsis gelida*. Canary Islands, S Wales, Scotland. **Arthonia gelidae** R. Sant. 1985
 Paraphysis apices 2.5–4 µm wide; ascomata 0.1–0.35 mm diam.; ascospores 8–11 × 4–6 µm. On thallus of *Caloplaca* and *Xanthoria elegans*. Spain, England, Scotland, Ireland (Down).
 **Arthonia molendoi** (Frauenfeld) R. Sant. 1986¹⁰
 Paraphysis apices ???; ascomata 0.12–0.25 mm diam.; ascospores 12–14 × 4–6 µm. On thallus of *Phaeophyscia orbicularis*. Spain, England (W. Kent), Scotland. See Grube & Matzer (1997), Renobales (1996).
 **Arthonia phaeophysciae** Gruber & Matzer 1997
- 14(9) Ascospores soon becoming brown and warted, 12–17 × 5–6.5(–7.5) µm; hymenium I+ blue; ascomata 0.07–0.22 mm diam. On thallus of *Diplotomma* spp. England, Scotland, Ireland. **Arthonia punctella** Nyl. 1859
 Ascospores remaining hyaline and smooth; hymenium I+ red 15
- 15(14) Ascospores in range 15–21 × 6–8 µm 16
 Ascospores in range 9–15 × 3–5 µm 17
- 16(15) Ascospores with distinct K/I+ blue perispore, (13–)16–21 × (5–)6–8 µm; ascomata 0.1–0.35 mm diam. On thallus of *Porpidia glaucophaea*, Spain, Scotland. See Triebel (1989). **Arthonia amylospora** Almq. 1880
 Ascospores with indistinct, K/I- perispore, 15–20 × (5–)6–7 µm; ascomata 0.3–1.5 mm diam. On thallus of *Peltigera rufescens*. Scotland (E Sutherland) **Arthonia peltigerea** Th.Fr. 1866¹¹

⁹ Often treated as a synonym of *Arthonia fuscopurpurea*.

¹⁰ The material of *A. cf. destruens* cited by Navarro-Rosinés *et al.* (1994: 169) on *Caloplaca flavescens* may belong here.

¹¹ A collection on *Solorina cf. bispora* from Mid-Perthshire may belong here, but has smaller ascospores, 12–14 × 4.5–5 µm.

- *17(15) Asci pyriform; [...?]. On thallus of *Amandinea punctata*. Spain.
 **Arthonia epimela** (Norman ex Almq.) I.M. Lamb 19XX¹²
 Asci clavate; [...?]. On thallus of *Physcia* spp., incl. *P. adscendens*, *P. caesia*
 and *P. tribacia*. Canary Islands, Spain, England.
 **Arthonia epiphyscia** Nyl. 1875
 Asci broadly clavate, 28–38 × 17–17 µm; ascospores 10.5–15 × 4–5.5(–6) µm.
 On thallus of *Amygdalaria pelobotryon* and *Trapelia coarctata*. Spain
 (Asturias), Ireland (Antrim). See Hitch (1993), Triebel (1989).
 **Arthonia almquistii** Vain. 1883
- 18(1) Asci 12–16-spored; 6–9 × 2–4 µm. On thallus of *Anaptychia ciliaris* and
Ramalina bourgeana. Canary Islands, Spain. See Hafellner (1982).
 **Catillaria mediterranea** Hafellner XXXX¹³
 Asci 8-spored 19
- 19(18) Ascomata urceolate, opening by a central pore, with hairs arising from the
 margin or from around the pore; asci subcylindrical to cylindrical, K/I– ...20
 Ascomata not urceolate, without surface or marginal hairs; asci variously
 shaped, K/I– or K/I+ blue in part 21
- 20(19) Ascospores 8–13 × 2–3(–4) µm; hairs confined to around the central pore;
 lower part of exciple K+ purple, upper part of exciple and hairs K+
 aeruginose-green; asci with 2–3 µm thick apex. On thallus of *Thelotrema*
lepadinum. Canary Islands, Spain, England (S. Hants), Wales (Cardigan),
 Scotland, Ireland.
 **Skyttea nitschkei** (Körb.) Sherwood *et al.* 1981
 Ascospores 5.5–9 × 2.5–3.2 µm; hairs arising from the surface of the margin;
 outer exciple greenish grey, K+ blackish brown; asci uniformly thin-walled.
 On thallus of *Lepraria* spp., incl. *L. lobificans*. Spain (Navarra), Scotland (N
 Ebudes, E Inverness). See Etayo & Diederich (1998).
 .. **Rhymbocarpus pubescens** (Etayo & Diederich) Diederich & Etayo 2000
- 21(19) Ascomata immersed, whitish to pale brown, 0.2–0.5 mm diam., sometimes
 confluent; ascospores 12–16 × 4–6 µm. On thallus of *Peltigera* spp.,
 especially *P. lactucifolia*, and rarely *Nephroma laevigatum*. Canary Islands,
 Wales, Scotland, Ireland.
 **Corticifraga fuckelii** (Rehm) D. Hawksw. & R. Sant. 1990
 Ascomata superficial, dark grey, dark brown or black 22
- 22(21) Ascomata becoming lirelliform, sometimes in groups of 2–6, 0.15–0.5 × 0.1–
 0.2 mm; hypothecium brownish; paraphyses branched, with capitate apices

¹² The material from Catalonia cited by Navarro-Rosinés *et al.* (1994: 169) on other hosts (including *Caloplaca flavescens*, *C. teicholyta*, *Lecidella carpathica* and *Rinodina castanomelodes*) is probably referable to other species.

¹³ *Catillaria nigroclavata* (Nyl.) Schuler, with 8-spored asci, is occasionally lichenicolous (Hafellner, in litt.).]

- to 3.5 µm wide; ascospores 18–22 × 9–12 µm, finally becoming pale brown.
On *Verrucaria* [Sp? - Calc.?]. N England (S Lancashire).
..... **Melaspilea leciographoides** Vouaux 1913
Ascomata remaining ± rounded23
- 23(22) Asci clavate; ascospores 10–16 × 3–4 µm; epithecium and hypothecium
brown-green. On podetia of *Cladonia pocillum*. England (Dorset), Scotland
(Caithness, E. Sutherland, W. Ross).
..... “**Scutula**” **epicladonia** (Nyl.) Zopof 1906
[aff. *Arthonia* or *Melaspilea* s.l.]
Asci cylindrical to clavate; not on *Cladonia*24
- 24(23) With distinct olivaceous to grey, granular verrucose thallus, forming small
patches amongst associated lichens on exposed siliceous rocks; ascospores
(7–)9–14(–17) × 4–6 µm, becoming 1(–3)-septate. Spain, England, Scotland.
..... **Scoliciosporum intrusum** (Th.Fr.) Hafellner 2004
Without a visible independent thallus.....25
- 25(24) On crustose lichen (*Aspicilia calcarea*) on calcareous rocks26
On foliose or fruticose lichens27
- 26(25) Epithecium red-brown or purplish brown 26A
Epithecium dark green; ascomata 0.2–0.4(–0.6) mm diam.; ascospores (9–
)10–14 × 3.5–4.5 µm; asci *Bacidia*-type; hypothecium pale reddish brown,
K+ purple. Spain, England, Wales, Scotland, Ireland. See Timdal (1992).
..... **Toninia episema** (Nyl.) Timdal 1991
- 26A(26) Epithecium red-brown; apothecia black, thickly marginate, (0.2–)0.3–0.4 mm
diam; ascospores 1-septate, 12–16.5 × 4–5.3 µm; on *Verrucaria baldensis*,
Ireland (Co. Clare). **Toninia verrucariae** (Metzler ex Nyl.) Timdal 1992
Epithecium and hypothecium purplish brown; ascomata 0.3–0.5 mm diam.;
ascospores 10–14 × 4–5 µm. Spain. ‘**Scutula**’ **aspiciliae** Rehm XXXX¹⁴
- 27(25) On *Stereocaulon* spp.; epithecium dark reddish brown; hypothecium pale
yellowish brown; ascospores 11–20 × (3–)3.5–6(–6.5) µm. Hosts include
Stereocaulon condensatum and *S. vesuvianum*. Canary Islands, Wales,
Scotland. **Catillaria stereocaulorum** (Anzi) H. Olivier 1905
[syn. *Scutula stereocaulorum* (Anzi) Körb. 1865]
Not on *Stereocaulon*28
- 28(27) On *Lobaria scrobiculata*; asci uniformly K/I+ blue (*Catillaria*-type);
paraphyses apices capitate; ascospores (9.5–)11.5–13.5 × 4–5 µm. Scotland
(W. Ross). See Alstrup (1997).
..... **Catillaria lobariicola** (Alstrup) Coppins & Aptroot 2008
On *Peltigera* or *Solorina*; asci in K/I with fuzzy axial tube (*Scutula*-type);
paraphysis apices not or only slightly swollen.....29

¹⁴ Perhaps a form of *Toninia episema*.

- 29(28) On *Solorina*; ascomata (0.15–)0.2–0.6(–0.8) mm diam., pale to dark brown or black; exciple ± hyaline to red-brown; epithecium hyaline to pale brown or green-black; ascospores 10–12(–14.5) × 3.5–5.5(–6) µm. On *Solorina bispora* and *S. saccata*. Spain, Scotland (E. Perth, Mid-Perth). See Wedin *et al.* (2007). **Scutula tuberculosa** (Th. Fr.) Rehm 1906
[syn.: *S. krempelhuberi* Körb. 1865, *S. solorinaria* (Nyl.) P. Karst. 1885]
On *Peltigera* 30
- 30(29) Ascospores (8–)8.6–12.6(–17) × (2.5–)2.9–4.2(–4.5) µm, 1–3-septate, narrowly ellipsoid to ellipsoid; ascomata 0.1–0.3(–0.45) mm diam., pale brown to black. Pycnidia of two types: 45–95 µm diam. and containing microconidia, and/or 65–160 µm and containing mesoconidia; microconidia bacilliform to shortly filiform, ±curved, *c.* 5–8 × 1–1.4 µm; mesoconidia bacilliform to falcate, *c.* 6.2–8 × 1.7–2.3 µm; ascomata and pycnidia scattered to ±aggregated on usually bleached, infected areas of upper, or sometimes lower, surface of the host thallus. Parasitic on *Peltigera* spp., including *P. praetextata* and *P. rufescens*. Scotland (E Perthshire, W Sutherland). See Triebel *et al.* (1997).
..... **Scutula epiblastematica** (Wallr.) Rehm 1890
Ascospores (10–)11.5–14.1(–15) × (4–)4.8–5.8(–7) µm, (0–)1-septate, ellipsoid to broadly ellipsoid; ascomata 0.2–0.35(–0.45) mm diam., cream to dark brown or black. Pycnidia of two types: 80–110 µm diam. and containing microconidia, and/or (80–)150–200 µm and containing macroconidia; microconidia narrowly bacilliform to filiform, ±curved, *c.* 7.6–9.3 × 1–1.2 µm; macroconidia irregularly bacilliform, 0–1-septate, (8–)13.6–19.2(–26) × (3–)3.8–5(–5.5) µm; ascomata and pycnidia scattered or rarely aggregated on apparently undamaged areas of upper surface of the host thallus. Commensalistic on *Peltigera* spp. Probably occurs in the British Isles, but records need confirmation. See Triebel *et al.* (1997).
..... **Scutula miliaris** (Wallr.) Trevis. 1853

TO ADD TO KEY 2C:

- Arthonia colombiana** Etayo 2002: apothecia convex, 0.1–0.22 mm, orangey, epithecium K+purple; ascospores 12–15 × 4.5–5.5 µm, becoming warted when old; on *Cladonia pyxidata*, *C. squamosa* (bleached), *C. spp.* Scotland (Argyll Main, W. Ross, N. Ebudes). See Etayo (2002)
- Arthonia digitatae** Hafellner 1979; apothecia cushion-like, black, hymenial gel I+ reddish and K/I + blue; ascospores 9–11 × 3–4.5 µm; on *Cladonia macilenta* and *C. polydactyla*, discoloured whitish to pale brownish; England (S. Somerset), Scotland (Argyll, Kincardine, E. Perth).
- “**Arthonia exilis**” - not lichenicolous; prob. refers to *A. muscigena*
- Arthonia neglectula** Nyl. 1884; on *Lepraria lobificans*. Scotland (Sutherland)
- Arthonia stereocaulina** (Ohlert) R. Sant. 1993; on *Stereocaulon evolutum* phyllocladia and more rarely *S. condensatum*; Scotland (S. Aberdeen).
- Arthonia stictarum** (Tul.) Th. Fr. ? = *Plectocarpon lichenum*
[CHECK ALSO *Arthonia stictaria* Nyl. - (See Wedin & Hafellner in press)]
- Caloplaca auchon-phoenicion**
- Caloplaca epithallina** Lynge
- Caloplaca epitoninia** Breuss
- Caloplaca furax** Egea & Llimona On *Aspicilia* (close to *C. conglomerata*)
- Caloplaca grimmiae** (Nyl.) H. Olivier on *Candelariella vitellina*. Canary Islands (Hafellner 1995); see also Poelt & Kalb in *Flora* 176: 129–140 (1985)
- Caloplaca inconnexa** (Nyl.) Zahlbr. on epilithic crustose lichens, esp. *Aspicilia calcarea*

- **Abrothallus cladoniae** R. Sant. & D. Hawksw. 1990
 Ascospores not splitting into part-spores 7
- 7(6) On species of *Sticta* or *Usnea* 8
 On species of 'parmelioid' lichens 9
- 8(7) On thallus of *Sticta*; ascospores 15–17 × 6–8 µm. On *Sticta fuliginosa*, *S. limbata* and *S. sylvatica*. Canary Islands, England, Wales (Cardigan, Merioneth), Scotland, W Ireland.
 **Abrothallus welwitschii** Mont. ex Tul. 1853
 On thallus or apothecia of *Usnea*; ascospores 14–18 × 5–7 µm. Canary Islands, Spain, Scotland (Easternness, Westernness).
 **Abrothallus usneae** Rabenh. 1861
- 9(7) Ascomata sessile to often short-stalked; ascospores 10–17 × 5–7 µm. On thallus of *Hypogymnia physodes*. Canary Islands, Scotland. See Diederich (1990). **Abrothallus prodiens** (Harm.) Diederich & Hafellner 1989
 Ascomata remaining sessile; on other genera 10
- 10(9) Hymenium K–, epihymenium K+ yellowish; ascospores 13–16 × 5–8 µm. On thallus of *Pleurosticta acetabulum*. Spain. See Diederich (1990).
 **Abrothallus acetabuli** Diederich 1990
 Hymenium and/or epihymenium K+ green 11
- 11(10) Ascospores (9–)11–13.5(–14) × (3–)4.5–5.5–6 µm; mostly present as *Vouauxiomyces* anamorph. On thallus of *Flavoparmelia caperata*. W England, Portugal, Wales, W Scotland, Ireland. See Cannon (2010).
 **Abrothallus microspermus** Tul. 1852¹⁶
 Ascospores 5–8 µm wide 12
- *12(11) On *Parmelia* s. str.; ascospores 12–17(?–20) × 4.7–7(?–8) µm. Canary Islands, Spain, England, Wales, Scotland, Ireland. On *Parmelia saxatilis*, less often on *P. omphalodes* and *P. sulcata*.
 **Abrothallus parmeliarum** (Sommerf.) Arnold 1874
 On *Parmotrema*; ascospores 12–14.5 × 4.7–6.5 µm. On *Parmotrema perlatum* and *P. crinitum*. Canary Islands, England, Scotland, W Ireland.
 **Abrothallus parmotrematis** Diederich *ined.*¹⁷
 On *Platismatia glauca*; ascospores 12–14 × 4–6 µm. Canary Islands, Scotland.
 **Abrothallus cetrariae** Kotte 1909
 On *Xanthoparmelia conspersa* and *X. loxodes*; Scotland (E. Lothian), Wales (Cardigan, Merioneth). **Abrothallus caerulescens** Kotte 1909

¹⁶ A similar fungus is reported on *Hypotrachyna endochlora* from Canary Islands (Gomera) by Etayo (1996).

¹⁷ Probably *A. microspermus* which is also recorded on *Parmotrema perlatum*.

- 13(1) Ascus apex with a K/I+ blue apical dome (at least in upper part) or thick, outer gelatinized layer; asci not fissitunicate14
 Ascus apex without K/I+ blue structures; asci fissitunicate34
- 14(13) Ascus apex lacking a well-developed apical dome, but capped by a distinct, thick, K/I+ blue outer gelatinized layer; exciple pseudoparenchymatous, with distinct, \pm isodiametric lumina15
 Ascus apex with a well-developed apical dome; exciple without distinct \pm isodiametric lumina22
- 15(14) Asci multispored, with 24–40(–80) ascospores per ascus; ascospores 4–5(–7) \times 2–3 μm ; ascomata (0.1–)0.3–0.7 mm diam. On thallus of *Buellia rubella*, *Catinaria atropurpurea* and *Parmeliella triptophylla*. Scotland (E. Inverness), Spain (Navarra), Wales. See Etayo (1991), Hawksworth (1994).
 **Dactylospora microspora** Etayo 1991
 Asci 8-spored16
- 16(17) Epithymenium and hymenium K+ purple-red17
 Epithymenium and hymenium K– or dulling.....18
- 17(16) Ascospores (7–)9–12(–14.5 \times 4–5(–7) μm ; ascomata (0.2–)0.3–0.8 mm diam. On thallus of *Baeomyces rufus*. Spain, England, Wales, Scotland, Ireland.
 **Dactylospora athallina** (Müll. Arg) Hafellner 1979
 Ascospores (11–)12–16.5(–19) \times (4.5–)5–6.5(–7.5) μm ; ascomata (0.2–)0.3–0.5(–0.6) mm diam. On thallus of *Amygdalaria pelobotryon* and *Porpidia glaucophaea*. N England, Scotland. See Triebel (1989).
 **Dactylospora purpurascens** Triebel 1989
- 18(16) On foliose thallus of *Lobaria*; ascomata (0.14–)0.2–0.6 mm diam.; exciple with scattered, blue-violet, K+ green granules. On *Lobaria pulmonaria* and *L. virens*. Canary Islands, Spain, England (Dorset), Scotland, Ireland (Kerry). See Hawksworth (1975a). ... **Dactylospora lobariella** (Nyl.) Hafellner 1979
 On thalli (and sometimes ascomata) of crustose lichens19
- 19(18) On *Amygdalaria* or *Porpidia*20
 On *Ochrolechia* or *Pertusaria*21
- 20(19) Ascospores (7–)7.5–10(–12) \times (3.5–)4–5(–6) μm ; ascoma margin often radially striate; exciple and hypothecium dark red-brown; ascomata 0.2–0.4(–0.6) mm diam. On thallus and ascomata of *Amygdalaria consentiens*. Scotland (Angus). See Triebel (1989).
 **Dactylospora amygdalariae** Triebel 1989
 Ascospores (7.5–)9–12(–13.5) \times (4–)4.5–5.5(–6) μm ; ascoma margin smooth; inner exciple and hypothecium dilute to medium brown; ascomata (0.15–)0.2–0.4(–0.5) mm diam. On *Porpidia macrocarpa* and *Porpidia* sp. (sterile). Scotland (Mid-Perthshire). See Triebel (1989).
 **Dactylospora australis** Triebel & Hertel 1989

- 21(19) Ascoma margin smooth; usually some ascospores 2- or 3-septate; 8.5–13.5(–16) × (3.5–)4.5–6(–7) μm; ascomata 0.22–0.66 mm diam., sometimes elliptic. On *Ochrolechia parella* (cortex KC–). Spain, England, Wales, Scotland, Ireland. **Dactylospora parellaria** (Nyl.) Arnold 1877
 Ascoma margin rough or radially striate; ascospores persistently 1-septate, 8.5–12(–15) × 4–7.5 μm; ascomata 0.25–0.5(–0.7) mm diam. On *Pertusaria amarescens* and *P. flavicans* (cortex KC+ orange). Spain, Scotland, Wales, Ireland (Antrim, Galway). **Dactylospora saxatilis** (Schaer.) Hafellner 1979¹⁸
- 22(14) Hamathecium of simple to sparingly branched paraphyses; asci with distinct K/I+ blue apical dome23
 Hamathecium of branched and anastomosed paraphysoid-like filaments; asci with apical dome K/I+ blue only in upper part.....29
- 23(22) Ascomata with thalline margin, with photobiont cells visible in sections of exciple; ascospores with distinct internal thickenings at apices and/or septum24
 Ascomata without a thalline margin; no photobiont cells visible in sections of exciple; ascospores without distinct internal thickenings26
- 24(23) Thalline margin concolorous with disc; ascomata 0.3–0.5 mm diam.; ascospores 11.5–17 × 6–9 μm; thallus inapparent or with pale brown areoles. Forming small patches on the thallus of *Lecanora rupicola* [closely resembling *Rimularia insularis*]. Canary Islands, Spain, Wales (Anglesey). See Calatayud *et al.* (1995), Hafellner (1995a, 1995d), Navarro-Rosinés & Hladun (1987). **Rinodina insularis** (Arnold) Hafellner 1979
 Thalline margin concolorous with thallus; thallus always well-developed...25
- 25(24) Thallus dark brown to black, rimose-areolate, scurfy-isidioid; ascomata to 0.8 mm diam., with a scurfy thalline margin; ascospores 13–19 × 6.5–10 μm. On thallus of *Aspicilia* spp. [superficially resembling *Rimularia furvella*]. Canary Islands, Spain (Albacete). See Hafellner (1995a, 1995d), Mayrhofer & Poelt (1979). **Rinodina obnascens** (Nyl.) H. Olivier
 Thallus dark grey to brown, areolate; areoles smooth, not becoming scurfy or isidioid; ascomata to 0.4 mm diam.; ascospores 14.5–20 × 7.5–11 μm. Forming small patches to 2 cm diam. On thallus of *Aspicilia caesiocinerea*. Andorra, Scotland (Angus). See Purvis *et al.* (1992). **Rinodina parasitica** H. Mayrhofer & Poelt 1979
- 26(23) Ascospores >7 μm wide27
 Ascospores <7 μm wide28
- 27(26) Ascospores 10–15(–17) × 7–8.5 μm. Canary Islands, Spain, England (S. Somerset), Scotland (Roxburgh). **Buellia badia** (Fr.) A. Massal. 1853

¹⁸ The material cited by Navarro-Rosinés *et al.* (1994: 174) on *Lecanora diffracta* should be re-assessed.

- Ascospores 16–20 × 7–10 µm. On *Rhizoplaca melanophthalma*. Canary Islands. **Buellia vouauxii** Calat. & Barreno 1995
- 28(26) Ascospore surface striate; thallus sections C+ red; medulla I+ violet; ascospores 8–12 × 4.5–6.5 µm. Often lichenicolous on *Schaereria fuscocinerea*. England (Northumberland), Scotland, Ireland (Donegal).
..... **Buellia uberior** (Nyl.) Anzi 1888
Ascospore surface smooth or faintly warted; thallus sections C–; medulla I–; ascospores 11–13.5 × 4–5.5 µm. Sometimes on crustose lichens (incl. *Caloplaca marina*) on maritime rocks. **Buellia sequax** (Nyl.) Zahlbr. 1931¹⁹
[Syn. *B. caloplacivora* Llimona & Egea XXXX].
- 29(22) Thallus bright yellow to yellow-green (pulvinic acid derivatives present) ...30
Thallus grey to brown or inconspicuous (pulvinic acid derivatives absent) .32
- 30(29) Ascospores with a swollen perispore; not on *Baeomyces*.....31
Ascospores without a distinct perispore, (9–)11–17 × 6–10 µm. On thallus of *Baeomyces rufus*. England, [?Wales], Scotland (Moray), Ireland.
..... **Epilichen scabrosus** (Ach.) Clem. 1909
- 31(29) Medulla I+ violet; ascospores 9–14 × 4–8 µm. On thallus of *Pleopsidium flavum*. S Spain **Rhizocarpon effiguratum** (Anzi) Th. Fr. 1874
Medulla I–; ascospores 9–18 × 5–10 µm. On thallus of *Sporastatia polyspora* and *S. testudinea*. C Spain (Avila). **Rhizocarpon pusillum** Runemark 1956
- 32(29) Ascospores (7–)10.5–14.5(-17) × (5–)6–9(-10) µm, without a distinct perispore. On thallus of *Baeomyces* ?. Spain (Azuaga & Gomez 1996 - n.v. CHECK for host). **Epilichen glauconigellus** (Nyl.) Hafellner 1979
Ascospores 18–23 µm long; not on *Baeomyces*33
- 33(32) With a distinct brown thallus; ascospores 18–23 × 9–11 µm. On *Pertusaria rupicola*. Canary Islands, Spain. **Rhizocarpon epispilum** (Nyl.) Zahlbr. 1926
Without an independent thallus; ascospores 18–23 × 11–15 µm. On *Pertusaria pseudocorallina*, *P. flavicans* and other *Pertusaria* spp. N Wales, Scotland, W Ireland (Cork, Galway, Mayo).
..... **Rhizocarpon advenulum** (Leight.) Hafellner & Poelt 1976
- 34(13) Ascomata rounded35
Ascomata elongate (lirelliform or star-shaped)36
- 35(34) Ascomata long-enclosed, eventually opening by a pore, 0.2–0.4 mm diam.; ascospores 13–17 × 6–9 µm. On thallus of *Phaeophyscia* spp., especially *P. orbicularis*. Canary Islands, England (S. Essex, N. Wiltshire), Scotland. See Hafellner (1979). **Buelliella physciicola** Poelt & Hafellner 1979

¹⁹ UK collections of the *B. sequax* complex have a non-lichenicolous, chasmolithic thallus, and are referable to *B. abstracta* (Nyl.) H. Olivier 1903.

- Ascomata soon opening, with an exposed disc, 0.2–0.8 mm diam.; ascospores 15–22 × 4–11 µm. On thallus of *Diploschistes scruposus*. Spain. See Hafellner (1979).“**Karschia**” **anziana** (Rehm) Vouaux 191X²⁰
- 36(34) Ascospores >9 µm wide37
 Ascospores <9 µm wide38
- 37(36) Ascomata 0.3–1.5 × 0.2–0.5 mm; disc remaining slit-like; ascospores 19.5–27(–32) × 9.5–13.5(–16) µm. Forming orange-brown patches on thallus of *Graphis elegans*, with ascomata developing in the decaying hymenium of the host. Wales and SW Ireland. **Melaspilea diplasio**spora auct. angl.
 [non (Nyl.) Müll.Arg. 1887²¹]
 Ascomata 0.15–0.5 × 0.1–0.2 mm; disc exposed; ascospores 18–22 × 9–12 µm. On *Verrucaria* sp. England (Lancashire).
 **Melaspilea leciographoides** Vouaux 1913
- 38(36) Ascomata in dense, star-shaped clusters 0.3–0.6 mm diam.; ascospores *c.* 9 × 3–4 µm [??]. On thallus of the cyanobacterial anamorph of *Sticta canariensis* [i.e. “*S. dufourii*”]. W Scotland (Argyll), W Ireland (Galway).
 **Hemigrapha atlantica** Diederich & Wedin 2000
 [syn. *H. astericus* auct. europ. non (Müll.Arg.) R. Sant. ex D. Hawksw. 1975]
 Ascomata simple or sparingly branched, not in star-shaped clusters;
 ascospores larger39
- 39(38) Ascospores 10–13.5(–16) × 5–7.5 µm; ascomata 0.1–0.5 × 0.1–0.2 mm. On thallus of *Phaeographis dendritica*. England (S Devon), SW Ireland.
 **Melaspilea lentiginosa** (Lyell ex Leight.) Müll.Arg. 1887
 Ascospores 17–20 × 6–8 µm; ascomata 0.3–0.4 × 0.1–0.2 mm. On thallus of an unidentified whitish yellow crust, probably a *Pertusaria* sp. Canary Islands, Portugal, Spain.
 **Labrocarpon canariensis** (D. Hawksw.) Etayo & Pérez-Ortega 2010
 [syn. *Melaspilea canariensis* D. Hawksw. 1982]

SPECIES TO ADD TO KEY 2D:

- Abrothallus** aff. **cladoniae** R. Sant. & D. Hawksw. - reported from Spain (Catalonia) on ‘*Lecanora* gr. *subfusca*’ by Navarro-Rosinés *et al.* (1994: 168)
- Buellia adjuncta** Th.Fr. - British records refer to *B. pulverea* (see Hawksworth 1982a)
- Buellia lecanoricola** Renobales *ined.* 1996; on *Lecanora albescens* from Spain (Renobales 1996) (Haf. *in litt*) and also Scotland.
- Buellia pseudosaxatilis** Samp. ? doubtful taxon. It was described from Portugal on a saxicolous *Pertusaria*, but the type material has not been traced (Hafellner 1979).
- Dactylospora** aff. **homoclinella** (Nyl.) Hafellner - reported on *Buellia griseovirens* from Spain (Catalonia) by Navarro-Rosinés *et al.* (1994: 173). *D. homoclinella* s. str. occurs on the saxicolous *Lecanora cenisia* and related species, and *Tephromela atra* (Hafellner 1979).

²⁰ ? = *K. talcophila* (Ach. ex Flot.) Körb. 1865; the material supporting the record in Marcos (1993) needs checking.]

²¹ British material named as this species occurs in the apothecia of *Graphis elegans* and appears to require a new scientific name.

Dactylospora tegularum (Arnold) Hafellner 1979; on *Caloplaca arenaria*, Scotland (Mid-Perth) – add after cplt 19. Ascomata 0.1-0.25 mm diam (smaller than *D. saxatilis*).

“**Karschia**” **latipizae** [? or *latypizae*] (Harm.) Keissl. - on *Lecidella carpathica*. Identity uncertain acc. to Hafellner (1979, 1995: 41).

Rinodina canariensis Matzer *et al.* 1994; Canary Is. see Matzer *et al.* (1994 - Nordic. J. Bot. 14:105-111) (Haf. in litt)

Rinodina epimilvina H. Mayrhofer 1984; on ??, Spain (Giralt & Llimona 1997) (Haf. in litt)

Key 2E: Ascospores 2- or more septate, or acicular, sigmoid or filiform; ascomata not calicioid

- 1 Ascomata arthonioid2
Ascomata lecideioid, lirelliform, perithecioid or in multilocular stroma that often develop within galls.....17
- 2(1) Ascomata inhabiting hymenium of host ascomata3
Ascomata inhabiting host thallus or superficially developed on disc of host ascomata7
- 3(2) Ascomata effuse, with asci and paraphysoids intermixed with those of the host; ascospores (1-)2(-3)-septate, (11-)12.5-17(-20) × (3-)3.5-5(-6) µm, hyaline. On mostly saxicolous *Lecidella* spp. (incl. *L. stigmatea*). Canary Islands, Spain (Granada), Britain [WHERE??]. See Hertel (1969), Triebel (1989). **Arthonia intexta** Almq. 1880
Ascomata discrete; ascospores (1-)2-3-septate, 11-17 × 5-6.5. On *Lecanora*6
- 6(5) On *Lecanora rupicola*, rarely *L. muralis*. Canary Islands, Spain, England, Scotland, Wales, Ireland. **Arthonia varians** (Davies) Nyl. 1861²²
[Syn. *A. glaucomaria* (Nyl.)Nyl. 1856]
On *Lecanora carpinea*. Scotland (Aberdeenshire). See Triebel *et al.* (1991)
..... **Arthonia subfuscicola** (Linds.) Triebel 1991
- 7(2) Hymenium I-, K/I-; ascospores 2-3-septate, 14-17(-20) × 5-7 µm; often associated with a *Vouauxiomyces* anamorph. On apothecia or thallus of *Ramalina calicularis*, *R. farinacea*, *R. fastigiata* and *R. fraxinea*. England, Scotland, W Ireland (Galway, Leitrim).
..... **Abrothallus suecicus** (Kirschst.) Nordin 1964
Hymenium I+ red or blue, K/I+ blue8
- 8(7) On the fruticose thallus of *Ramalina* or *Roccella* spp.; ascospores 1-3-septate, c. 10-16 × 3-6 µm; ascomata rounded, convex9
On crustose lichens11

²² A similar fungus is known on *Lecanora helicopsis* in Ireland (H. Fox, in litt.). This and the material cited by Navarro-Rosinés *et al.* (1994: 170) on *Lecanora marginata* and *L. gr. pulicaris* may be referable to other species.

- 9(8) On *Roccella* spp. (incl. *R. canariensis*, *R. fuctiformis*). Ascospores oblong-ellipsoid, $10\text{--}12 \times 4\text{--}4.5 \mu\text{m}$, 3-septate with cells \pm equal, hyaline but pale brownish and verruculose at maturity; ascomata 0.1–0.2 mm diam.; epihymenium dark olivaceous; hypothecium hyaline to pale brownish. Canary Islands. See Diederich (1995), Hafellner (1996).
 **Arthonia follmanniana** Diederich 1995
 On *Ramalina* spp. 10
- 10(9) Ascospores “spinilformaj, etc.”. On *Ramalina farinacea*, ascomata developing in the host soralia. Spain. **Arthonia farinacea** (H. Olivier) R. Sant. 1960
 Ascospores “oblongaj, etc.”. Pycnidia abundant, 0.2–0.3 mm diam., 5–6-locular; conidia straight or curved, 1-septate, $9\text{--}12 \times 4\text{--}5 \mu\text{m}$. On thallus of *Ramalina fraxinea*. Canary Islands. See Clauzade *et al.* (1989), Hafellner (1995a). **Arthonia insidens** (Vouaux) Clauzade *et al.* ined.
 [Syn. *Celidium insidens* Vouaux 19XX]
- 11(8) Ascospores without enlarged upper cell, 2–3-septate, $10\text{--}13\text{--}14 \times 3\text{--}4 \mu\text{m}$; ascomata 0.08–0.3 mm diam., black, convex; paraphysoids with brown-capped apices, 3–6 μm wide. Associated with an immersed or minutely granular, whitish thallus with green photobiont (cells 6–12 μm diam.). Scotland. **Arthonia myriocarpella** Nyl. [NB: This is not lichenicolous, but a syn. of *A. mediella*]
 Ascospores with an enlarged upper cell (macrocephalic) 12
- 12(11) Ascomata white- or red-pruinose 13
 Ascomata not pruinose 14
- 13(12) Ascomata white-pruinose, 0.15–0.3 mm diam 13A
 Ascomata red-pruinose, in stellate aggregations *c.* 1–2.5 mm wide; epithecium with orange-red, K+ purple-violet pigment; ascospores 3-septate, $17\text{--}23 \times 7\text{--}8 \mu\text{m}$. On thallus of *Pyrenula* sp. Canary Islands. See Grube *et al.* (1995), Hafellner (1995a). **Arthonia tavaresii** Grube & Hafellner 1995
- 13A (13) Ascomata rounded; epithecium pale brownish with numerous, minute crystals that dissolve in K; ascospores 3(–4)-septate, $14\text{--}21 \times 6\text{--}6.5 \mu\text{m}$. On thallus of *Porina guaranitica*. Canary Islands. See Etayo (1996).
 **Arthonia garajonayi** Etayo 1996
 Ascomata rounded to angular or elongated; epithecium red-brown, K+ pale green; ascospores 3–4-septate, $16\text{--}22\text{--}24 \times 5\text{--}7 \mu\text{m}$; often apparently lichenicolous and parasitic on *Phylctis argena*; England (N. Devon, Dorset, S. Hants, W. Sussex), Scotland (E. Perth), Wales.
 **Arthonia zwackhii** Sandst. 1903
- 14(12) Ascomata linear to more usually stellate, in clusters 0.2–1 mm diam., dark brown; ascospores 2–3-septate, $11\text{--}15\text{--}17 \times (4\text{--})4.5\text{--}5.5\text{--}6 \mu\text{m}$, hyaline or becoming brown and warted; hypothecium hyaline. On thallus of *Schismatomma quercicola*. England (S Hants, W Cornwall, S. Wilts), Wales (Merioneth), Scotland (Kintyre), SW Ireland. See Coppins (1989).

-**Arthonia invadens** Coppins 1989
 Ascomata mostly fleck-like to polygonal, if elongate then not forming stellate clusters 15
- 15(14) Host thallus with trebouxioid photobiont; ascospores (2–)3(–4)-septate, 14–20 × 6–7 µm; hypothecium hyaline or pale brownish and K+ olivaceous. On thallus of *Pertusaria pustulata*. Spain. See Etayo (1993).
**Arthonia pantherina** Etayo 1993
 Host thallus with *Trentepohlia* as photobiont..... 16
- 16(15) Ascospores (13–)14–17 × 4.5–5 µm, 2–3-septate [?–4], hyaline or becoming brown and warted; hypothecium hyaline. On thallus of *Graphina anguina* and *Graphis scripta*. Spain, SW England (S Hants), Wales, W Scotland (Caithness, W Ireland. See Coppins (1989).
 **Arthonia graphidicola** Coppins 1989
 Ascospores 11–14 × 4.5–5 µm, 2(–3)-septate, hyaline or becoming brown and warted; hypothecium reddish brown, K+ olivaceous. On thallus of *Thelotrema lepadinum*. SW England (N Devon), W Scotland, W Ireland, Wales (Merioneth). See Coppins (1989).
 **Arthonia thelotrematis** Coppins 1989
- 17(1) Ascomata in multilocular stroma that often develop within discrete galls ... 18
 Ascomata unilocular, not within galls 21
- 18(17) Ascomata 0.2–0.5 mm diam., 1–3-locular, immersed in galls; asci 4–8-spored; ascospores 20–26 × 6–8 µm, 3-septate, hyaline, or often brown when over-mature. On thallus of *Pannaria sampaiana*. Spain (Navarra), Scotland (Argyll, Westerness). See Diederich & Etayo (1994).
 **Arthonia sampaiana** (Diederich & Etayo) Ertz & Diederich 2005
 [syn. *Plectocarpon sampaiana* Diederich & Etayo 1994]
 Ascomata 0.4–7 mm diam.; on *Lobaria* 19
- 19(18) Ascomata reddish brown, 0.5–1.8 mm diam., up to 12-locular, with distinct radiating lines of sterile tissue separating the locules visible on the ascoma surface; asci (4–)6–8-spored; ascospores 16–25 × 6–8 µm, (1–)3-septate, hyaline. On thallus of *Lobaria scrobiculata*. Canary Islands, Spain, Scotland (Caithness, Easterness, Kintyre, N Ebudes, W. Ross). See Diederich & Etayo (1994).
 **Plectocarpon scrobiculatae** Diederich & Etayo 1994
 Ascomata dark brown to black, surface different 20
- 20(19) Ascomata forming distinct galls, 0.6–7 mm diam., with a thalline margin formed of host issue and a constricted base; asci 4–8-spored; ascospores 16–25 × 4–9 µm, 3-septate, hyaline. On thallus of *Lobaria pulmonaria*. Canary Islands, Spain, England (Devon), Scotland, W Ireland (Galway, Kerry). See Diederich & Etayo (1994)
 **Plectocarpon lichenum** (Sommerf.) D. Hawksw. 1984

- Ascomata plane to only slightly convex, 0.4–1.1 mm diam., forming indistinct galls represented by a thin ring around the ascoma; asci 8-spored; ascospores 22–26 × 7.5–9 µm, 3-septate, hyaline. On thallus of *Lobaria pulmonaria*. Canary Islands. See Diederich & Etayo (1994).
 **Plectocarpon macaronesiae** Diederich *et al.* 1994
- 21(17) Ascus apex without K/I+ blue structures or (*Kalaallia* and some *Opegrapha* spp.) with minute blue ring around apex of ocular chamber; asci fissitunicate or not; ‘paraphyses’ branched and anastomosed22
 Ascus apex with a K/I+ blue apical dome (at least in upper part) or thick, outer gelatinized layer; asci not fissitunicate; ‘paraphyses’ branched and anastomosed or simple.....46
- 22(21) Asci with a distinct apical dome, sometimes with a K/I+ blue apical ring around an ocular chamber, mostly fissitunicate; ascomata rounded or lirellate23
 Asci without, or with a shallow, apical dome, never with a K/I+ blue apical ring, fissitunicate or not; ascomata rounded, never lirellate.....39
- 23(22) Host a corticolous crustose lichen with *Trentepohlia* as photobiont.....24
 Host lichen without *Trentepohlia* as photobiont.....26
- 24(23) Asci 4-spored; ascospores (14–)15–18 × 4.5–5(–6) µm, hyaline but old spores with brown granules on the perispore; ascomata rounded to shortly lirellate, 0.14–0.46 × 0.12–0.24 mm, with disc soon expanding, scattered or clustered; exciple in K with greenish tinge. On thallus of *Thelotrema petractoides*. Scotland, W Ireland (Galway). See Coppins (1987).
 **Opegrapha brevis** Coppins 1987
 Asci 8-spored25
- 25(24) Ascospores 13–17 × 4–6 µm, hyaline but old spores with brown granules on the perispore; ascomata lirellate, 0.14–0.6(–0.8) × 0.1–0.14 mm, with disc remaining slit-like, simple or 1–3-furcate, scattered or often in dense clusters up to 1 mm across; exciple in K with greenish tinge. On thallus of *Thelotrema lepadinum* and *T. macrosporum*. Canary Islands, England (S. Hants), N. Scotland, Ireland, Wales (Merioneth). See Coppins (1987).
 **Opegrapha thelotrematis** Coppins 1987
 Ascospores (11–)12–15 × 3.5–4.8 µm; ascomata 0.3–0.8(–1) × 0.1–0.12(–0.2) mm, mostly in clusters, 0.7–1 mm across; exciple in K with faint greenish tinge. On *Arthonia radiata*. Wales, W Scotland, W Ireland.²³
 **Opegrapha arthoniicola** Coppins & S.Y. Kondrined.²³
- 26(23) Host a corticolous crustose lichen27
 Host a fruticose, foliose or saxicolous crustose lichen30

²³ A similar species is found on *Arthonia cinnabarina* in W Scotland and W Ireland.

- 27(26) Ascomata lirellate, 0.2–1 × 0.15–0.2 mm, simple or once-furcate; asci 4-spored; ascospores (5–)6-septate, 21–28 × 4.5–6 µm, hyaline but becoming brown and warted when over-mature; exciple in K with greenish tinge. On *Pertusaria leioplaca*. Canary Islands, SW England, Wales (Merioneth), Scotland, Ireland. **Opegrapha pertusariicola** Coppins & P. James 1979
Ascomata shortly oval or rounded28
- 28(27) Ascospores 3-septate 28A
Ascospores often with 4 or more septa. On *Phlyctis argena*29
- 28A(28) Ascospores 18–22 × 8–9 µm. On *Lecanora subfusca* group. Scotland (Angus). **Opegrapha lamyi** (O.J. Rich. ex Nyl.) Triebel 1989
Ascospores 17–26 × 6.5–9 µm, eventually becoming granular-brown warted; ascomata often aggregated in groups, irregularly rounded, exciple variable and often ragged, 0.2–0.6(–0.9) mm diam; asci 4(–8)-spored; on *Pertusaria albescens* and *P. amara*; Canary Islands (Tenerife), Scotland (Kintyre). See Ertz *et al.* (2004).
..... **Opegrapha anomea** Nyl. 1857
- 29(28) Ascospores 3–4(–5)-septate, 18–24(–6) × 6–8 µm; asci 8-spored; ascomata 1.8–0.4 mm diam. On *Phlyctis argena*. Wales (Montgomery), Scotland.
..... **Opegrapha zwackhii** (A. Massal. ex Zwackh) Källsten 1993
Ascospores (4–)7–8(–9)-septate, 24–30 × 5.5–6.5 µm; asci 2(–4)-spored; ascomata 0.25–0.4 mm diam. On *Phlyctis agelaea*. Canary Islands. See Etayo (1996). **Opegrapha phlyctidicola** (Vouaux) Etayo 1996
- 30(26) Host lichen fruticose; ascomata rounded, convex, to 1 mm diam.; ascospores 3-septate, 19–22 × 5.5–6 µm. On *Sphaerophorus globosus*. Canary Islands, England (N Devon), Scotland (W Inverness, W Ross).
..... **Opegrapha sphaerophoricola** Isbrand & Alstrup 1992
Host lichen foliose or crustose31
- 31(30) Ascospores 12–17 × 4–6 µm; asci lacking an amyloid apical ring. On *Xanthoria parietina*. Canary Islands, Spain, England (E Suffolk), Scotland, Ireland, Wales (Cardigan, Carmarthen, Caernarvon). See Atienza (1992).
..... **Opegrapha physciaria** (Nyl.) D. Hawksw. & Coppins 1992
Ascospores >18 µm long, or on a different host32
- 32(31) Host lichen foliose33
Host lichen crustose34
- 33(32) Ascospores soon dark brown, 18–24(–26) × 6–8 µm; ascomata shortly lirellate, 0.16–0.3 mm wide, often in gnarled clusters to 1.4 mm across; exciple in K brown with reddish or yellowish tinge. On *Dermatocarpon intestiniforme* and *D. miniatum*. Scotland. See Hawksworth (1982a).
..... **Opegrapha pulvinata** Rehm 1869

- Ascospores hyaline, 18–22 × 5–6 µm; ascomata rounded, 0.5–1 mm diam. On *Physconia distorta*. Scotland (Easternness, Mid-Perth, W Ross). See Hafellner (1994). **Opegrapha rotunda** Hafellner
- 34(32) Ascomata perithecioid, 0.05–0.1 mm diam., immersed to erumpent, arising in loose groups; exciple 6–10 µm wide, but to 40 µm wide near pore, dark brown, K⁺ olivaceous; ascospores (1–)3-septate, (14–)17.5–24 × (4–)5–7 µm, hyaline. On thallus of *Hymenelia lacustris*. England (S Somerset), Scotland (W Ross). See Alstrup & Hawksworth (1990).
 **Kalaallia reactiva** Alstrup & D. Hawksw. 1990
 Ascomata lecideoid or lirellate35
- 35(34) Most ascospores >22 µm long36
 Most ascospores <22 µm long37
- *36(33) Ascomata 0.2–0.4 mm diam., lecideoid; ascospores 17–29 × 7–9 µm, hyaline but brown and warted when over-mature; asci 8-spored. On *Lecanora rupicola* and *Protoparmelia badia*. Canary Islands, Spain, Scotland (E Lothian). See Hafellner & Sanch (1990), Hafellner (1995).
 **Opegrapha glaucomaria** (Nyl.) Källsten 1994
 [Syn. *O. maculans* (Arnold) Hafellner 1984]
 Ascomata, 0.1–0.25 mm diam., lecideoid; ascospores (21.5–)24.5–30.5 × 8.5–10 µm, hyaline but brown and warted when over-mature; asci (6–)8-spored. On endolithic thalli of *Polyblastia albida* and *P. nidulans* on limestone. NE Spain. See Navarro-Rosinés & Hladun (1995).
 **Opegrapha rouxiana** Nav.-Ros. & Hladun 1995
 Ascomata ??; ascospores 20–26 × 8–10 µm. On *Pertusaria exalbescens*. Canary Islands. **Opegrapha pertusariae** (Vouaux) Hafellner XXXX²⁴
- 37(35) Ascospores becoming brown due to pigmented granules developing in the perispore, 14–22 × 5–8 µm; exciple in K brown with reddish tinge; ascomata 0.22–0.6(–0.7) × 0.2–0.3 mm, shortly lirellate, or lecideoid to boat-shaped, with disc often soon exposed, occasionally once furcate, scattered or in small groups, occasionally forming dense clusters to c. 1 mm diam. On foveolate *Verrucariaceae* on limestone, esp. *Verrucaria baldensis* and other members of the *Bagliettoa* group., Spain, England, Wales, Scotland, Ireland.
 **Opegrapha rupestris** Pers. 1794
 Ascospores becoming brown due to pigmentation of spore wall, without adhering brown granules.....38
- 38(37) Ascospores soon brown, 16–22 × 6–8 µm; ascomata 0.2–0.4(–0.5) × 0.18–0.3 mm, lecideoid to boat-shaped, with disc soon exposed, occasionally once furcate or 4-stellate, scattered, or in small groups, but not forming convex clusters. On *Aspicilia calcarea* and *A. contorta* subsp. *hoffmanniana*.

²⁴ Possibly a synonym of *O. anomea* Nyl.; see Etayo & Diederich (1998).

- England, Wales, SW Ireland.
 **Opegrapha parasitica** (A. Massal.) H. Olivier 1906
 Ascospores mostly hyaline, but becoming brown when over-mature, (12.5–
)13.5–15.5(–17.5) × 3.5–4.8 µm; ascomata 0.3–0.4 × (0.12–)0.15–0.2(–0.3)
 mm, mostly aggregated in dense convex clusters to 1 mm diam. On
Verrucaria nigrescens and *V. viridula*. Spain, England (N Somerset), Wales.
 **Opegrapha verrucariae** Coppins & S.Y. Kondr. & Etayo ined.²⁵
- 39(22) Ascospores acicular, sigmoid or filiform40
 Ascospores oblong, bacilliform, fusiform or clavate-fusiform44
- 40(39) Ascomata immersed in host, perithecioid and opening by a pore; ascospores
 <50 µm long41
 Ascomata sessile; ascospores >50 µm long42
- 41(40) Excipular hairs present, 8–11 × 2.5–3 µm; asci 8-spored; ascospores 22–46 ×
 2.5–3 µm, falcate to sigmoid, 0(–1)-septate; ascomata 0.07–0.12 mm diam.
 On thallus of *Megalospora tuberculosa*. Spain (Navarra). See Etayo &
 Diederich (1998). **Skyttea megalosporae** Etayo & Diederich 1998
 Excipular hairs absent; asci 16–32-spored; ascospores (22–)25–32(–35) × 1.5–
 2.5 µm, shortly acicular to sigmoid, 0–1-septate; ascomata 0.1–0.3 mm diam.
 On wide range of hosts, including *Cetrelia olivetorum*, *Lecanora horiza*,
Lobaria pulmonaria, *L. scrobiculata*, *Ochrolechia tartarea*, *Pertusaria*
albescens, *P. pertusa*, *Phlyctis agelaea* and *Porpidia* sp. Canary Islands,
 Spain, N England, Wales, SW Ireland. See Hawksworth (1980a), Holien &
 Triebel (1996). **Spirographa fusisporella** (Nyl.) Zahlbr. 1903
- 42(39) Host tissue with aeruginose discoloration; ascospores 80–110(–120) × (2.5–
)3–4(–5) µm; ascomata sessile to sub-stipitate, to 0.4 mm diam. On *Cladonia*
 squamules or rarely podetia. England, Scotland, [? Wales], Ireland. See
 Santesson & Tønsberg (1994).
 **Arthrorhaphis aeruginosa** R. Sant. & Tønsberg 1994
 Host tissue unchanged or discoloured brownish43
- 43(42) Ascomata often remaining top-shaped, to 0.5 mm diam. at maturity;
 ascospores (50)–60(–90) × 2.5–4(–4.5) µm, 7–9(–13)-septate. On thalli of
Baeomyces placophyllus and *B. rufus*. England, Wales, Scotland, Ireland.
 See Obermayer (1994). **Arthrorhaphis grisea** Th. Fr. 1860
 Ascomata at first globose but soon becoming flattened, 0.5–0.7 mm diam. at
 maturity; ascospores (55–)65–95 × 3.5–4.5(–5) µm, 10–15-septate. On
 thallus of *Dibaeis baeomyces*. England (E Cornwall), Wales (Merioneth),
 Scotland. See Obermayer (1994). .. **Arthrorhaphis muddii** Obermayer 1994

²⁵ *Opegrapha hochstetteri* Coppins in ed. occurs on *V. hochstetteri*.

- 44(39) Mature ascomata with exposed disc; exciple indistinct, hyaline. On *Peltigera* spp., including *P. canina*, *P. didactyla*, *P. lactucifolia*, *P. leucophlebia* and *P. rufescens*. Spain, England, Wales, Scotland, Ireland.
 **Corticifraga peltigerae** (Fuckel) D. Hawksw. & R. Sant. 1990
 Mature ascomata opening by a pore; exciple distinct, dark coloured45
- 45(44) Asci 8-spored; ascomata brownish black to black 45A
 Asci 4-spored; ascomata whitish, 0.2–0.45 mm diam., without excipular hairs; exciple hyaline; ascospores 3–7-septate, 30–44 × 2.5–3.5 µm, narrowly clavate-fusiform to bacilliform. On brownish, decaying thalli of *Lobaria pulmonaria*. Spain (Navarra), Scotland. See Etayo & Diederich (1996).
 **Nanostictis christiansenii** Etayo 1996²⁶
- 45A(45) Ascomata black, 0.1–0.17 mm diam., with short excipular hairs (7.5–10 µm long); exciple dark olivaceous brown; ascospores 0(–3)-septate, 18–28(–42) × 3–3.5 µm, oblong-fusiform. On *Mycoblastus caesius*. England (Devon), Scotland (Kintyre, Skye, Westernness), Canary Islands (Tenerife). See Sherwood *et al.* (1980), Diederich & Etayo (2000).
 **Skyttea caesii** Diederich & Etayo 2000
 [syn. *Skyttea fusispora* auct., non Sherw. *et al.* 1981]
 Ascomata brownish black, (0.14–)0.17–0.26(–0.31) mm diam, opening by dentate cracks; ascospores irregularly ellipsoid to somewhat clavate, 1–3-septate, (11.5–)12.5–15.5(–16) × 4.5–5.5(–6) µm; on *Pertusaria hymenea*; Scotland (Mid-Perth, E Perth). See Diederich *et al.* (2002).
 **Odontotrema pertusariae** Etayo *et al.* 2002²⁷
- 46(21) Ascospores brown47
 Ascospores hyaline.....54
- 47(46) Hamathecium of mainly simple paraphyses48
 Hamathecium of richly branched and anastomosed paraphysoids56
- 48(47) Ascus apex with a well-developed apical dome (*Lecanora*-type); exciple without distinct, ±isodiametric lumina; ascospores, (14.5–)16–21(–23) × 6.5–8.5 µm, (1–)3-septate. On foliose *Physciaceae*, including *Physcia aipolia*, *P. tribacia*, *Physconia distorta* and *P. venusta*. Canary Islands, Spain, Scotland (Mid-Perthshire, W. Sutherland). See Hafellner (1979), Hafellner & Poelt (1980), Hafellner (1995d).
 **Buellia pulverulenta** (Anzi) Jatta 1900
 [syn. *Diplotomma pulverulentum* (Anzi) D. Hawksw. 2002]

²⁶ A similar fungus is reported from the Canary Islands (Gomera) on *Pseudocyphellaria aurata* by Etayo (1996).

²⁷ A specimen on *Pertusaria coronata* from Scotland (Moray) with somewhat smaller, 150–200 µm diam, ascomata and a thinner exciple might represent a separate species but no ascospores were found (Diederich *et al.* 2002).

- Ascus apex lacking a well-developed apical dome, but capped by a distinct, thick, K/I+ blue outer gelatinized layer (*Dactylospora*-type); exciple pseudoparenchymatous, with distinct, \pm isodiametric lumina.....49
- 49(48) Asci 16-spored; ascospores, 3(–7)-septate, (10.5–)12–18 \times 3.5–4.5 μm ; ascomata 0.12–0.4 mm diam. On *Pertusaria ophthalmiza*. Scotland (N Ebudes, Westernness). **Dactylospora ophthalmizae** Coppins ined.
Asci 8-spored50
- 50(49) Ascospores 3–7-septate, 12–24 \times 4–6(–7) μm ; ascomata (0.14–)0.2–0.4 mm diam. On terricolous or muscicolous thalli of various lichens, e.g. *Megaspora verrucosa*, *Pannaria pezizoides*, *Prothelenella sphinctrinoidella*. Scotland Angus, Banff, Mid-Perthshire). **Dactylospora frigida** Hafellner 1985
[syn. *D. urceolata* auct. angl., non (Th. Fr.) Arnold 1874, *D. deminuta* (Th. Fr.) Triebel 1989]
Ascospores 1–2- or 3-septate51
- 51(50) Ascospores mostly 1–2-septate; exciple 60–95 μm wide; ascomata round to elliptic, 0.22–0.66 mm diam. On saxicolous thalli of *Ochrolechia parella*, mainly in coastal habitats, sometimes apparently inducing the formation of soralia. Spain, England, Wales, Scotland, Ireland.
..... **Dactylospora parellaria** (Nyl.) Arnold 1877
Ascospores mostly 3-septate52
- 52(51) Ascoma margin rough or radially striate; hypothecium dark red-brown; ascospores (10–)12–15(–17) \times (4–)4.5–5.5(–6.5) μm , mid-septum often darker. On *Amygdalaria pelobotryon*. Scotland (Outer Hebrides, Westernness). See Triebel (1989).
..... **Dactylospora attendenda** (Nyl.) Arnold 1874
Ascoma margin smooth53
- 53(52) Ascospores (14–)17–21(–24) \times (4.8–)6–7(9.5) μm ; ascomata 0.2–0.8mm diam. On unidentified, sterile muscicolous crust in montane habitat. Scotland (Mid-Perthshire). **Dactylospora suburceolata** Coppins ined.
Ascospores (8–)9–12.5(–16) \times 3.5–4.5(–5) μm ; ascomata 0.14–0.45(–0.6) mm diam. On usually corticolous thalli of *Pertusaria albescens*, *P. hymenea*, *P. pertusa* (also saxicolous), *Ochrolechia subviridis* and *O. turneri*. Canary Islands, Spain, England (S. Devon, Wiltshire), Wales, Scotland, Ireland. See Cannon (2010). ...**Dactylospora parasitica** (Flörke ex Spreng.) Zopf 1896²⁸
- 54(46) Ascomata reddish yellow to black 54A

²⁸ Similar collections have been made in the UK on *Caloplaca obscurella* (E Lothian), *Micarea prasina* (Argyll), *Mycobilimbia sphaeroides* (Cumberland and Easternness), and prothallus of *Parmeliella testacea* (Westernness); these may be referable to *Dactylospora parasitaster* (Nyl.) Arnold 1875. The material cited by Navarro-Rosinés *et al.* (1994: 173) on *Caloplaca ferruginea*, *Lecanora* spp. and *Lecidella* sp. should also be re-assessed.

- Ascomata pale **orange** to orange-brown, 0.15–0.2(–0.25) mm diam, erumpent to sessile; ascospores (1–)3-septate, narrowly cylindrical to vermiform, 19–25(–31) × 2.5–3 µm; on *Cladonia arbuscula* subsp. *squarrosa*; Scotland (Moray). See Hawksworth & Santesson (1990).
 **Lettauia cladoniicola** D. Hawksw. & R. Sant. 1990
- 54A(54) Epithecium yellowish brown; ascomata reddish yellow to blackish, to 0.5 mm diam.; ascospores (1–)3–7-septate, 18–40 × 5–8 µm, often curved. On *Peltigera*. Scotland (Mid-Perth). **Bacidia killiasii** (Hepp) D. Hawksw. 1983
 Epithecium olivaceous to dark green; ascomata black; ascospores mostly 3-septate and smaller; not on *Peltigera*55
- 55(54) Ascospores 9.5–16 × 4–5.5 µm, 1–3-septate; ascomata to 0.6 mm diam. On *Lecanora* (especially *L. campestris*) or *Lecidella* (?CHECK) spp. Canary Islands, Spain, Scotland Argyll, W Inverness). See Timdal (1992).
 **Toninia subfuscae** (Arnold) Timdal 1991
 Ascospores 18.5–29 × 3–4.5 µm, (1–)3(–5)-septate; ascomata to 0.6 mm diam. On *Degelia plumbea* (?and *D. atlantica*). Canary Islands, Spain, Scotland (Argyll Main, E Inverness, W Ross). See Timdal (1992).
 **Toninia plumbina** (Anzi) Hafellner & Timdal 1991
- 56(47) Forming an independent, bright yellow-green thallus (containing rhizocarpic acid); medulla I+ blue; ascospores 3-septate to submuriform, 12–21 × 6–10 µm, dark greenish brown; epithecium brown, K+ red; ascomata 0.1–0.5(–0.7) mm diam. Initially lichenicolous on various crustose lichen genera, especially *Lecidea lactea*, on exposed siliceous rocks. N Wales, Scotland (Glen Coe).
 **Rhizocarpon intermediellum** Räsänen 1943
 Independent thallus absent; ascospores mostly 3-septate, rarely submuriform, 15–23 × 6–10 µm; ascomata 0.4–0.7 mm diam., on convex pustules c. 2–4 mm diam. On thallus of *Diploschistes* spp., especially *D. diacapsis*, on calcareous or gypsaceous ground. E & C Spain. See Llimona & Werner (1975)
 **Rhizocarpon malenconianum** (Llimona & Werner) Hafellner & H. Mayrhofer 1977

NOT TREATED IN KEY 2E

Arthrorhaphis alpina (Schaer.) R. Sant., **A. citrinella** (Ach.) Poelt and **A. vacillans** Th. Fr. & Almq. ex Th. Fr. have all been reported as sometimes beginning as parasites on *Baeomyces rufus* and later developing an autonomous thallus (Obermayer 1994). However, this early, parasitic stage has not been detected in material of these species from the British Isles.

Bilimbia vouauxii de Lesd. 1912; described from material named as *Ramalina webbii* in the Canart Islands is of uncertain identity.

Toninia verrucarioides (Nyl.) Timdal 1991 [syn. *T. cervina* Lönnr. 1858] and many other *Toninia* species that have an autonomous thallus that develops on the thallus of other, often cyanophilous crustose lichens

- Medulla I-.....6
- 6(5) Ascospores muriform with 5–10 cells in optical section, 15–28 × 7–14 µm, dark brown; epithecium dark brown, K+ purple-red; ascomata to 1 mm diam. Initially lichenicolous on various crustose lichens, especially *Aspicilia caesiocinerea*, on exposed acidic rocks. Canary Islands, Spain, England, Wales, Scotland, Ireland. .. **Rhizocarpon viridiatrum** (Wulfen) Körb. 1855
Ascospores submuriform, with fewer cells, 13.5–24.5 × 8.5–11 µm. On *Protoparmelia badia*. C Spain (Avila, Madrid).
..... **Rhizocarpon dinothetes** Hertel & Leuckert 1979
- 7(4) Forming an independent, grey to dark grey thallus.....8
Independent thallus absent.....9
- 8(7) Ascospores 19–26 × 10–14 µm, mostly cruciately divided into 4-cells. On *Lecanora rupicola*. Spain (Catalonia). See Poelt & Vězda (1984).
..... **Rhizocarpon inimicum** Poelt & Vězda 1984
Ascospores 16–22 × 9–12 µm. On *Dimelaena oreina*. Spain (correct?).
..... **Rhizocarpon renneri** Poelt 1958
- 9(7) On *Pertusaria* sp. Ascospores 15–23 × 9–12 µm, with 5–7 cell in optical section; epithecium purple-brown, K+ purple. Canary Islands, Spain.
..... **Rhizocarpon lusitanicum** (Nyl.) Arnold 1870
On *Ochrolechia parella* (saxicolous). Ascospores (18–)20–35(–40) × (10–)13–17(–19) µm, with 5–9 (? or more) cells in optical section; ascomata 0.3–0.9(–1.1) mm diam.; epithecium purple-brown, K+ purple. Scotland (Westernness), Wales (Radnor).
..... **Rhizocarpon ochrolechia** (Poelt & Nimis) Hafellner 1992
On *Diploschistes* sp.; ascospores mostly 3-septate, rarely submuriform, 15–23 × 6–10 µm; ascomata 0.4–0.7 mm diam., on convex pustules c. 2–4 mm diam. On thallus of *Diploschistes* spp. especially *D. diacapsis*, on calcareous or gypsaceous ground. E & C Spain. See Llimona & Werner (1975).
Rhizocarpon malenconianum (Llimona & Werner) Hafellner & H. Mayrhofer 1977

TO BE INCLUDED SOMEWHERE (NOT SURE WHICH KEY AS DESCRIPTION NOT TO HAND!)

Perigrapha superveniens (Nyl.) Hafellner 1996 [syn. *Metasphaeria superveniens* (Nyl.) Sacc. & D. Sacc. 1905]: Roccellaceae?

IRISH RECORDS

Note that the Irish County distributions are still to be added into Key 2 from H. Fox's mss list with (DLH).

Draft at 16 August 2010

KEY 1: *Pyrenocarpous species*

1	Ascospores brown at maturity	2
	Ascospores colourless at maturity (sometimes slightly yellowish or brownish when over mature)	114
2 (1)	Ascospores transversely septate to muriform	3
	Ascospores non-septate	101
3 (2)	Ascospores transversely septate	4
	Ascospores muriform	86
4 (3)	Ascospores 1-septate	5
	Ascospores 2- or more septate ¹	65
5 (4)	Ascomatal internal structure pseudoparenchymatic	6
	Ascomatal internal structure consisting of branched and anastomosing hyphae (paraphysoids or pseudoparaphyses), gelatinised or absent (not pseudoparenchymatic).....	15
6 (5)	Ascomata connected by a net of usually superficial ² brown vegetative hyphae ³	7
	Ascomata not connected by a net of brown vegetative hyphae	14
7 (6)	Vegetative hyphae mostly formed by a single row of cells or hypha (not plurihyphal).....	8
	Vegetative hyphae mostly of strands formed from several hyphae (plurihyphal)	10
8 (7)	Ascospores hyaline, sometimes becoming brown when over-mature	9
	Ascospores brown at maturity, 10-12 (-13) x 5.5-7 (-8) μm ; on thalli of <i>Diplotomma epipolium</i> ; north-east and east Spain. See Calatayud <i>et al.</i> (2002). Lichenostigma epipolina Nav.-Ros. <i>et al.</i> 2002	
9 (8)	Ascomatal shape ellipsoid, 60-100 x 30-45 μm diam; ascospores hyaline, sometimes brown with age, 8-10 (-11) x 3-4 (-5) μm ; on thalli of <i>Xanthoparmelia</i> species; Canary Islands, and Spain (La Rioja, Madrid, Zaragoza, Tarragona, Valencia, Canary Islands). See Hafellner & Calatayud (1999). Lichenostigma cosmopolites Hafellner & Calat. 1999 Ascomatal shape ellipsoid, 60-100 x 30-45 μm diam; ascospores hyaline, only overaged spores becoming brownish, 7-9 (-10) x 4-5 μm ; on thalli of species of the <i>Buellia epigaea</i> group; Spain. See Hafellner (1999). Lichenostigma semiimmersa Hafellner 1999	
10 (7)	Strands of vegetative hyphae arranged radially	11
	Strands of vegetative hyphae not arranged radially	12
11(10)	Ascospores mainly less than 7.5 μm in width	11A

¹ See also 14(12) *Lichenostigma rouxii*, 15(8) *L. rugosa*, and 48(47) *Sphaerellothecium araneosum*.

² Immersed in XX (XX) *Lichenostigma radicans*.

³ See also 46(45) *Sphaerellothecium* species

- Ascospores (11-)11.5-14.5(-16) x (5.5-)6.5-8.5(-9.5) μm , 1-2(-3) septate; ascomata elongate, (45-)55-90(-120) x 35-55(-60) μm ; vegetative strands 15-42.5(-49) μm wide, composed of 4-6 rows of cells; macroconidia on the vegetative strands multicellular, dark brown, warty, 9.-17(-18.5) x (7.5-)8.5-13(-14.5) μm ; on *Pertusaria rupicola*; Spain (Catalonia). See Fernández-Brime *et al.* (2010).
 **Lichenostigma rupicola** Fernández-Brime & Nav.-Ros. 2010
- 11A (11) Vegetative hyphae strands sometimes ramified, ramifications short, deviating more or less rectangularly; ascospores (8-) 9-10 (-11) x (4-) 5-6 (-7) μm ; mostly on *Pleospidium* species; Canary Islands. See Calatayud *et al.* (2002).
 **Lichenostigma subradians** Hafellner *et al.* 2002
- Vegetative hyphae strands with several ramifications in acute angle; ascospores (8-) 9-12 (-13) x (4-) 5-6 (-7) μm ; mostly on yellow *Acarospora* species; rare, Spain (Castellón). See Calatayud, *et al.* (2002).
 **Lichenostigma gracilis** Calat. *et al.* 2002
- 12 (10) Hyphal strands superficial 13
 Hyphal strands immersed, to 180 μm long, smooth; ascomata cushion-like, 90- 170 μm wide; ascospores 1-septate, (9-)10-13(-14) x 5-7(-7.5) μm ; on *Aspicilia fruticulosa* and *A. hispida*; Spain (Aragón, Castilla La Mancha). See Calatayud & Barreno (2003).
 **Lichenostigma radicans** Calat. & Barreno 2003
- 13 (12) Ascomata oblong-elongated in shape, in number of 1 per hyphal strand, (50-200 x 30-60 μm); ascospores 1-septate, (9-)10-13 x 6-8.5 μm ; on the thalli and apothecia of different species of *Lobothallia* and *Aspicilia*; Canary Islands, England, Spain (frequent). See Navarro-Rosinés & Hafellner (1996).
 **Lichenostigma elongata** Nav.-Ros. & Hafellner 1996
- Ascomata oblong-elongated in shape, in number of 2-3 per hyphal strand (80-120 x 35-70 μm); ascospores 1(-3)-septate, (10-)10.5 –13.5 (-15.5) x (5.5-)6-7 (-8.5) μm ; found on the thalli of *Squamarina cartilaginea*; frequent in Spain. See Calatayud *et al.* (2002).
 **Lichenostigma rouxii** Nav.-Ros. *et al.* 2002
- 14 (6) Ascomata aggregated, 50-200 μm diam; ascospores 1(-4)-septate, 10-13 x 5-7 μm ; on the thallus of several *Diploschistes* spp.; Spain (especially north and east provinces), Canary Islands, England (S. Devon), Scotland (Argyll). See Thor (1985).
 **Lichenostigma rugosa** G. Thor 1985
- Ascomata non-aggregated, 70-100-120 μm ; ascospores 1-septate, 9-12 x (4-)4.5-6 μm ; on *Usnea* species and *Pseudevernia furfuracea* and many fruticose lichens; Canary Islands, Spain (Aragón), British Isles (rare). See Hafellner (1983). **Lichenostigma maureri** Hafellner 1983
- 15 (5) Asci 16-100 spored 17
 Asci 2-8 spored 20
- 16 (15) Asci 16-64-spored 17
 Asci 64-100 spored; Ascomata less than 150 μm in diam, subglobose, usually completely immersed and arising singly; ascospores brown, (4.5-)5-6 (-8) x (1.5)2-3 (-3.5) μm ; on *Bacidia sabuletorum*, *Toninia lobulata*, *Opegrapha herbarum*, *Protoblastenia rupestris*, *Catillaria scotinodes*, *Caloplaca*, *Fulgensia* and *Lecanora* species, almost always on calcareous rocks; widespread, especially in the south of the British Isles, Ireland, Spain (especially in northern and eastern areas, Canary Islands). See Hawksworth (1979a) and Kiliás (1978).

- **Muellerella lichenicola** (Sommerf.) D. Hawksw. 1979
- 17 (16) Ascospores more than 3 µm in width, dark brown 18
 Ascospores mostly less than 3 µm in width, pale brown 19
- 18 (17) Ascospores ornamented (x 1000) 6-10(-13.5) x 3-5.5 (-6) µm; ascomata more than 150 µm diam, usually superficial and immersed only at the base; asci 16-64 spored, on *Huilia*, *Lecidea*, *Lecidella*, *Rinodina cana*, *Tephromela atra*, *Dimelena oreina*, *Aspicilia contorta* and other crustose lichen thalli, almost always on siliceous rocks; widespread and common, especially in upland areas of the British Isles, Canary Islands, Ireland, Spain. See Hawksworth (1979a)..... **Muellerella pygmaea** (Körber) D. Hawksw. 1979 [Two varieties can be separated (Triebel, 1989):
 Ascomata 125-200 µm diam; ascospores 6-8 x 3-5 µm, pale brown; on *Schaereria tenebrosa*, *Lecanora albescens*, *L. campestris* subsp. *dolomitica*, and *Sarcogyne* sp.; England (Oxford), Wales, and Spain (León, Huesca).
var. **athallina** (Müll. Arg.) Triebel 1989
 Ascomata (150-) 175-250 (-350) µm diam; ascospores (7.5-) 8-10 (-13.5) x (3.5-) 4-5 (-6) µm; on *Lecidea* species; Scotland, Spain (Santander, Canary Islands).]
var. **pygmaea**]
 Ascospores smooth (x1000), 6.5-8.5 x 4-5.5 µm; ascomata 200-250 µm diam; on *Ophiopharma ventosa*, and *Rhizocarpon* spp.; England, Spain (Cordoba)..... **Muellerella ventosicola** (Mudd) D. Hawksw. 2003
- 19(17) Ascospores (6-) 7-9(-11) x (2-)2.5-3.1 µm, 1-septate, pale brown; ascomata 170-240 µm diam; interascal hyphae present; asci 32-64-spored; on *Polysporina simplex*; Spain (Castellón). See Calatayud & Navarro-Rosinés (2001)
 **Bellemerella polysporinae** Calat. & Nav.-Ros. 2001
 Ascospores (6-) 6.5-8 x 1.7-2-2.4 µm, (0-)1-septate, pale brown; ascomata 140-190(-230) µm diam; interascal hyphae present; asci 32-64-spored; on *Acarospora fuscata*; Spain (Castellón). See Calatayud & Navarro-Rosinés (2001)
 **Bellemerella acarosporae** Calat. & Nav.-Ros. 2001
- 20 (16) Interascal tissue (hamathecium) of branched and anastomosing hyphae (paraphysoids or pseudoparaphyses) 21
 Interascal tissue (hamathecium) absent or gelatinised (periphyses sometimes present) 46
- 21 (20) Ascomata arising singly; walls consisting of angular pseudoparenchymatous cells 22
 Ascomata arising in groups united by a dark clypeus; walls consisting of compacted interwoven hyphae 43
- 22 (21) Asci 4 to 8-spored 23
 Asci 2-spored; ascospores dark brown, verrucose, variable in size, 25-35(-44) x 8-10 (-14) µm; on *Verrucaria baldensis* and probably other calcicolous pyrenocarpous lichens on limestone; England (Gloucester).
 **Polycoccum dzieduszkykii** (Boberski) D. Hawksw. 1980
- 23(22) Asci mainly 4-spored (see also *Polycoccum maculans* and *P. microsticticum*) 24
 Asci mainly 8-spored 25
- 24(23) Asci 4-spored; ascospores (14-) 15-17 (-18) x (7-) 8-9 (-10) µm, coarsely

- verruculose; ascomata 100-230 μm immersed in gall-like swellings; on *Buellia zoharyi*; central Spain. See Calatayud & Atienza (2000).
 **Polycoccum epizoharyi** Calat. & V. Atienza 2000
- Asci 4 (-5) spored; ascospores (25-) 30-32 (-36) x 8-10 (-11) μm , rugulose with labyrinthiform ornamentation; ascomata 300-400 (-500) μm , not forming gall-like swellings; found on thalli of *Peltigera* species; Scotland (Inner Hebrides, Tiree), Spain (Asturias, Málaga). See Vězda (1970)
 **Polycoccum crassum** Vězda 1970
- 25(23) Ascomata mainly less than 150 μm diam 26
 Ascomata mainly exceeding 150 μm diam 33
- 26(25) Ascospores less than 7 μm in width 27
 Ascospores mainly exceeding 7 μm in width 31
- 27(26) Ascomata arising in convex gall-like swellings 28
 Ascomata arising singly, not forming gall-like swellings 29
- 28 (27) Ascomata 30-60 (-100) μm diam; ascospores 12-14.5 x 4.5-7 μm ; on squamules of *Cladonia cervicornis* Scotland (Isle of Skye). See Etayo & Diederich (1998).
 **Polycoccum microcarpum** Diederich & Etayo 1998
 Ascomata 70-120 μm diam; ascospores (12-)13-16(-17) x 5-6(-7) μm ; on *Trapelia placodioides*; Scotland (Kirkcudbright, Mid-Perth) and Wales (Cardigan). See Kocourková & Berger (1999).
 **Polycoccum minutulum** Kocourk. & F. Berger 1999
- 29 (27) Asci 8-spored 30
 Asci 5-6 (-8)-spored; ascospores 12.5-16 x 5.5-6.5 μm ; ascomata 100-160 μm diam; on *Ramalina subgeniculata*; Canary Islands (Teneriffe), no recent records. See Pitard & Harmand (1912).
 **Polycoccum maculans** (Vouaux) Hafellner **XXXX**
 [syn. *Didymosphaeria maculans* Vouaux 1912]
- 30 (29) Ascospores (10-) 11-14 (-15) x (5.5-) 6-7 μm ; asci 8-spored; ascomata 85-120 μm diam; immersed in the thallus areoles of *Caloplaca rubelliana*; Spain (Valencia). See Atienza *et al.* (2003).
 **Polycoccum rubellianae** Calat. & Atienza 2003
 Ascospores 9-11.5 (-13) x 4.5-6.5 (-7) μm , the lower cell often somewhat tapered; ascomata 80 μm diam; asci 8-spored; on *Diploschistes scruposus*, also reported from *Rhizocarpon obscuratum* and *Rhizocarpon* sp.; Canary Islands (La Palma), England, Scotland, ? Spain (the record from Tarragona is dubious). See Hawksworth (1979a), and Atienza, Calatayud & Hawksworth (2003).
 **Polycoccum arnoldii** (Hepp) D. Hawksw. 1979
- 31(26) Ascospore wall rugose 32
 Ascospore smooth walled, (18-) 19-26 x 5.5-7(-8) μm ; asci 8-spored; ascomata 75-100 μm diam; on *Placopsis gelida* and *P. lambii*; Canary Islands, England (Teesside), Scotland (Mid-Perth, W. Inverness, Outer Hebrides), and Wales (Cardigan). See Hawksworth & Diederich (1988).
 **Polycoccum squamarioides** (Mudd) Arnold 1874
- 32 (31) Ascospores (10-)11-14(-18) x (6-)7-8(-8.5) μm ; asci sometimes 4-6-spored, but then with 4-2 abortive spores visible in younger asci; ascomata (50-) 100-150 μm diam; growing on *Acarospora fuscata*, also reported on *Buellia stellulata*, *Ionaspis lacustris* and other species of *Acarospora* subgen. *Phaeothallia*; England, Ireland (S. Kerry, W. Galway, Wicklow, W.

- Donegal), Spain (Castellón, Cuenca), Wales. See Calatayud & Barreno (1994).
 **Polycoccum microsticticum** (Leight.) Arnold 1891
 Ascospores (16-) 18-22 x 6-8 μm ; asci 6-8-spored; ascomata 75-150 μm diam, occurring in groups of up to 8 ascomata and bleaching the infected thallus areoles of the host; immersed in the thallus of *Immersaria olivacea*; Spain (Valencia). See Calatayud & Rambold (1998).
 **Polycoccum decolorans** Calat. & Triebel 1998
- 33 (25) Ascospores mainly less than 20 μm in length.....33
 Ascospores mainly exceeding 20 μm in length..... 38
- 34 (33) Ascospores without a prominent swelling at the septum..... 35
 Ascospores smooth, with a prominent (markedly after K) swelling at the septum, (14 -)14.5-18 x (7-)8-9(-10) μm ; ascomata 150-250 μm diam arising in galls in the thallus of *Leptochidium albociliatum*; Spain (Jaen). See Calatayud, Sanz & Aptroot (2001).
 **Lichenopyrenis galligena** Calat., Sanz & Aptroot 2001
- 35 (32) Ascomata not forming galls 36
 Ascomata forming galls37
- 36 (35) Ascospores, (12-)13.5-16(-18) x 4-6(-7) μm , smooth to very finely verruculose, attenuated at both ends; ascomata 125-175 μm ; on *Peltigera* thalli, sometimes forming swellings on the thallus; England (S. Lancashire, S.W. Yorkshire), Scotland, Spain (Asturias Gerona, Lérida, Huesca, Albacete). See Hawksworth (1978), Martínez & Hafellner (1998).
 **Polycoccum peltigerae** (Fuckel) Vězda 1969
 Ascospores (12-)14-15 (-17.5) x (7-) 8.5-10 (10.5) μm , ascomata 200-300 μm diam; infecting thallus areoles of *Lecidea fuscoatra*; Canary Islands, England (S. Devon). See Hawksworth (1994), Hafellner (1996).
 **Polycoccum kernerii** J. Steiner 1893
- 37 (35) Ascospores 10-13 x 4.5-6 μm , monostichously arranged; ascomata 250-350 μm , [180-200 μm in Vouaux (1913)], forming galls?; on *Teloschistes flavicans*; Spain (Canary Islands). See Etayo (1996a).
 **Polycoccum infestans** (Speg.) Etayo 1996
 Ascospores 13-14.5 x 5-6 (-7.5) μm , monostichously arranged; ascomata 150-200 (-300) μm ; forming galls on thallus and apothecia of *Xanthoria parietina*; England (S. Devon). See Hawksworth (1994).
 **Polycoccum slaptoniense** D. Hawksw. 1994
- 38 (33) Ascospores mainly exceeding 25 μm in length 39
 Ascospores mainly less than 25 μm in length..... 40
- 39 (38) Ascospores (20-)25-30(-36) x 14-18 μm , coarsely verrucose; ascomata (150-) 200-250 (-300) μm , not forming gall-like swellings; on *Thelidium incavatum*, *Verrucaria calciseda* and other pyrenocarpous lichens on hard limestones; England (N.W. Yorkshire, Gloucestershire), Ireland (Fermanagh), Scotland (Lismore, Banff). Spanish reports based on misidentifications. See Swinscow (1966).
 **Polycoccum marmoratum** (Krempelh.) D. Hawksw. 1980
 Ascospores 25.5-30 x 11.5-15 μm , smooth, with a gelatinous sheath 1.5-2 μm thick lost on ejection; ascomata (50-) 100-200 (-250) μm diam, not ostiolate, the upper part eroding to appear apothecioid; on *Verrucariaceae* on hard limestones, especially *Verrucaria* spp.; England (S. Devon, N. Somerset), Spain (Asturias, Catalunya, Navarra, Vizcaya). See Atienza &

- Hawksworth (2008), Navarro-Rosinés & Roux (1990, as *Polycoccum opulentum*⁴).
 **Lichenothelia renobalsiana** D. Hawksw. & V. Atienza 2008
- 40 (38) Ascomata forming galls 41
 Ascomata not forming galls..... 42
- 41 (40) Ascospores (13.5-)16-19(-23) x (6-)7.5-9 µm; asci 8-spored; ascomata 150-200 µm diam; mainly on *Physcia caesia*, but also known from *P. aipolia*, *P. .. dubia* and *P. tribacia*; widespread in the British Isles: England (Somerset), Ireland, Scotland (Ayr, Midlothian), Wales (Carmarthen), Canary Islands (common), but rare in mainland Spain (Madrid). See Hawksworth (1975), Cannon (2010)..... **Polycoccum pulvinatum** (Eitner) R. Sant. 1993
 Ascospores 14-22 x 8-10µm; ascomata 150-200 µm, forming gall-like swellings to 2.5 mm diam; growing on *Stereocaulon* spp.; British Isles: Scotland (Banff, Mid-Perthshire, S. Aberdeen). See Hawksworth (1978).
 **Polycoccum trypethelioides** (Th.Fr.) R. Sant. 1960
- 42 (40) Ascomata, 100-200 µm diam, immersed in the thallus of the host; ascospores (17-) 18-23(-25) x (6-) 7-10 (-11)µm; growing on *Dimelena oreina*; Spain (Madrid). See Calatayud & Rico (1995).
 **Polycoccum evae** Calat & V. J. Rico 1995
 Ascomata 150-200 µm diam; ascospores (16-)20-24 (-27) x (6-)10-11(-12) µm; asci (4-) 8-spored; immersed in the thallus areoles of *Sporastatia*; rare in Spain and in the British Isles.
 **Polycoccum sporastatiae** (Anzi) Arnold 1874
- 43 (21) Ascospores mainly exceeding 7 µm wide 44
 Ascospores less than 7 µm wide 45
- 44(43) Ascospores (15-) 19-22 (-26) x (6-) 7-9 (-10) µm; ascomata 60-120 (-150) µm diam, arising in necrotic patches on several *Squamarina* species; England, Spain (Navarra, Aragón, Cataluña, Canary Islands). See Navarro-Rosinés *et al.* (1994b).
 **Clypeococcum epicrassum** (H. Olivier) Nav.-Ros & Roux 1995
 Ascospores 14-17(-21)x 7-10 µm, ascomata convex gall-like structures 250-350 (-700) µm diam; on *Umbilicaria vellea* and *Umbilicaria cinereascens*; Spain (Sierra de Gredos). See Hawksworth (1982).
 **Clypeococcum grossum** (Körber) D. Hawksw. 1982
- 45 (43) Ascospores (13.5-)14-16(-18) x (5.5-)6-7(-7.5) µm; ascomata mainly 60-150µm, aggregated in groups of 10-20; parasitic on *Cetrelia olivetorum* on which it forms neat round holes in the thallus, and also on *Neofuscelia pulla*; England, Scotland, Spain (Asturias, Canary Islands). See Hawksworth (1977a), Santesson (1960)
 **Clypeococcum cladonema** (Weddell) D. Hawksw.
 Ascospores (9-)10-12(-13) x (4-)5-6(-6.5)µm; ascomata 50-100 µm, aggregated in groups of less than 10; parasitic on *Hypocenomyce scalaris*, infected squamules becoming brown, bleached and finally dead; England (widespread), Ireland (Wicklow), Scotland (widespread), Spain (Lugo). See Hawksworth (1980a)
 **Clypeococcum hypocenomycis** D. Hawksw. 1980

⁴ *Polycoccum opulentum* (Th. Fr. & Almq.) Arnold 1874 is only correctly reported from Sweden; it has ascospores (26-)28.5-29.5(-31.5) x (14-)15-19(-20) µm, delicately to coarsely fissurately reticulate to warty, with a thick gelatinous sheath 2-3 µm thick, ascomata ca 130 µm diam, and occurs on *Polyblastia hyperborean*. See Atienza & Hawksworth (2008).

- 46 (20) Ascomata brown or black.....47
 Ascomata pale pink, orange or red-violet, 300-350 x 270-300 (-350) μm , with broad papillae; papillae 100-130 x 80 μm ; ascospores (10-) 12.5-16 x (7-)8-10 μm , verruculose, olivaceous brown⁵; immersed in the thallus of *Sticta sylvatica*; British Isles. See Rossman *et al.* (1999).
 **Xenonectriella streimannii** (S. Y. Kondr.) Rossman 1999
 [syn. *Pronectria streimannii* S. Y. Kondr. 1996]
- 47 (46) Ascomata arising from a superficial dark brown to black reticulate mycelium; hymenial gel I-⁶48
 Ascomata arising directly on the surface of the thallus; hymenial gel I+ red⁷.
52
- 48 (47) Ascospores eventually brown at maturity..... 49
 Ascospores brown at maturity..... 51
- 49 (48) Ascospores not exceeding 4 μm wide 50
 Ascospores (7.5-)9-12(14.5) x (4-)4.5-5(-5.5) μm , 1-(-3) septate; ascomata (25-)30-50(-60) μm ; spreading over the surface of *Ochrolechia parella*, *Pertusaria albescens*, *Squamarina gypsacea*, *S. lentigera*, and *S. cartilaginea*; England (Devon, S. Somerset) and Spain (Alicante, Tarragona; records from La Rioja and Navarra have smaller ascospores and are growing on *Umbilicaria*, Etayo & Breuss, 1996). See Alstrup & Hawksworth (1990), Hawksworth (1994), Zopf (1897).....**Sphaerellothecium araneosum** (Arnold) Zopf 1897
 [syn. *Echinothecium glabrum* M. S. Christ. *et al.* 1990.]
 [var. **cladoniae** Alstrup & Zhurb. 2004 has ascomata 45-60 μm diam and occurs on moribund *Cladonia subcervicornis* squamules; Scotland (Moray) and Wales (Pembroke). See Alstrup & Zhurbenko (2004).]
- 50 (49) Ascospores 8.5-10 x 3-4 μm , rarely getting brownish at maturity; ascomata 25-40(-60) μm diam, arising from large black stroma-like necrotic surfaces of the thallus of *Parmelia saxatilis* and *P. sulcata*; Spain (Navarra). See Etayo & Diederich (1998).
**Sphaerellothecium parmeliae** Diederich & Etayo 1998
 Ascospores 6-7 x 2-2.5 μm , brown; ascomata globose, 30-40 μm diam; on *Theloschistes chrysophthalmus*; Spain (Canary Islands). See Triebel *et al.* (1991).
 **Sphaerellothecium subtile** Triebel & Rambold 1991
- 51 (48) Ascospores (10-) 11.5-14(-16) x (4.5-)5-6.5(-8) μm , brown; ascomata (40-)50-70(-80) μm , spreading over the epinecral layer of *Protoparmelia badia* var. *cinereoatra*; Spain (La Rioja). See Triebel (1989).
**Sphaerellothecium contextum** Triebel 1989
 Ascospores 1(-3) septate, 9-11.5 x 3-4 μm ; ascomata black, 40-70 μm diam; vegetative hyphae irregularly immersed on the thallus of *Cladonia parasitica* which have a characteristic grey tinge; Spain (Navarra). See Etayo & Diederich (1998).
**Sphaerellothecium cinereascens** Etayo & Diederich 1998
- 52 (47) Ascospores lacking conspicuous guttules, reddish brown to dark brown prior to

⁵ See also xx(xx) *Xenonectriella leptaleae* with ascospores pale golden brown at maturity.

⁶ See also 229(228) *Sphaerellothecium minutum* with colourless ascospores and *Sphaerellothecium propinquellum* with ascospores eventually very pale brown.

⁷ See also *Stigmidium solorinarium*, *S. pseudopeltideae*, *S. placyntii*, and *S. rouxianum* with ascospores brownish with age.

- release from the asci 52
 Ascospores 2-4 guttulate, the upper cell larger, yellowish at first but becoming
 olivaceous with age⁸, 13-18 x 5-8 µm; reported on *Catapyrenium squamules*
 on Scotland but usually on *Umbilicaria* species outside the British Isles;
 British record dubious, also reported in central Spain. See Janex-Favre
 (1965).....**Stigmatidium gyrophorarum** (Arnold) D. Hawksw. 1975
 [syn. *Endococcus gyrophorarum* (Arnold) J. C. David & D. Hawksw. 1988]
- 53 (52) Ascospores mainly exceeding 13 µm in length..... 54
 Ascospores mainly less than 13 µm in length..... 61
- 54 (53) Ascospores with one or both ends attenuated 55
 Ascospores with both ends rounded 57
- 55 (54) Ascospores not caudate [syn. *Endococcus stigma* auct. non (Körber) Stizenb.]
 56
 Ascospores caudate, with the lower cell attenuated and twice the length of the
 upper, 13-21 x (3.5-) 4-5.5 µm; on *Collema auriforme*; Scotand (W.
 Inverness), Spain (Navarra), and Wales (Carmarthen). See David & Etayo
 (1994).**Endococcus caudisporus** J.C. David & Etayo 1995
- 56 (55) Ascospores 12-16 (-20) x (4-)6(-8) µm; on a wide range of saxicolous crustose
 lichens, especially, *Protoblastenia rupestris*, *Schaereria tenebrosa*,
Porpidia tuberculosa and *Lecidella carpathica*; widespread in upland areas
 ; Camary Islands, England, Ireland (Waterford, ? W. Mayo), Scotland, Spain
 (Granada, León, Cataluña), Wales. See Hawksworth (1979a)
**Endococcus perpusillus** Nyl. 1857
 Ascospores (13.5-)14.5-20(-22) x (4.5-)5-7.5(-8.5) µm; on *Rhizocarpon*
geographicum s. lat.; British Isles.
**Endococcus macrosporus** (Hepp ex Arnold) Nyl. 1878
- 57 (54) Ascospores broadly ellipsoid, mainly exceeding 6 µm wide58
 Ascospores narrowly ellipsoid, mainly less than 6 µm wide60
- 58 (57) Ascospores rugulose or becoming verruculose 59
 Ascospores smooth-walled, 13-16 x (5-)6-7 µm; ascomata semi-immersed to
 superficial 140-250 µm diam; on *Rhizocarpon lavatum*; Scotland (Ayrshire,
 W. Inverness)..... **Endococcus fusiger** Th.Fr. & Almq. 1867
- 59 (58) Ascospores (12-)14-17(-18) x 7-8.5(-9) µm, at first halonate, becoming
 granular to verruculose at maturity; common on the thalli and more rarely
 on the apothecia of *Aspicilia* spp., especially *A. grisea*; Spain (Gerona)
 and Wales (Carmarthen). See Hafellner (1994b).
**Endococcus verrucosus** Hafellner 1994
 Ascospores 12-16(-18) x (5-)7(-9) µm, with thick wall, rugulose on the
 surface; on a wide range of saxicolous crustose lichens, especially
Rhizocarpon, *Amygdalaria*, *Aspicilia*, *Porpidia*, and *Ionopsis* species;
 widespread from lowland to upland situations in the British Isles, Ireland,
 and Spain especially in eastern regions. See Hawksworth (1979).
**Endococcus rugulosus** Nyl. 1855
- 60 (57) Ascospores mainly (25-)50-80(-100) µm diam; ascospores 10.5-12(-14) x (3.5-)

⁸ See also XX(XX) *Stigmatidium squamarinicola* with ascospores eventually brown at maturity.

- 4-5.5 μm ; growing on the apothecia and sometimes the thallus of *Xanthoria parietina*, and more rarely on *X. calcicola*⁹; rare in the British Isles: England (Somerset, East Suffolk), Ireland (Clare, Kilkenny, Limerick), Scotland, Canary Islands, Spain (Tarragona, Soria), Wales (Cardigan). See Hawksworth (1982a), Cannon (2010).
-**Endococcus parietinarius** (Linds.) Clauzade & Cl. Roux 1976
[syn. *Sphaerellothecium parietinus* (Linds.) Hafellner & V. John 2006]
Ascospores (12-)14-18(-20) x 3.5-5(-6) μm , exceptionally aseptate or 2-septate; ascomata 150-200 μm **CHK**; on unidentified saxicolous crustose lichen; British Isles: Scotland (Perthshire), no recent record. See Hawksworth (1979a).....**Endococcus exerrans** Nyl. 1879
- 61 (53) Ascospores less than 5 μm wide 62
Ascospores mainly exceeding 5 μm wide.....63
- 62 (61) Ascospores 9-10.5(-11) x 3.5-4 μm , cells equal in size or the lower slightly attenuated; ascomata largely superficial, 70-100(-120) μm diam; in clusters on gall-like terminal swellings on *Usnea florida* (incl. *U. subfloridana*), *U. fragilescens* and *U. submollis* var. *ferroensis*; Canary Islands (Hierro), England (Cornwall, Devon), Wales (Carmarthen). See Steiner (1904) and Hawksworth (1982b).
-**Endococcus apiciicola** (J. Steiner) R. Sant. 1994
[syn. *E. alpestris* D. Hawksw. 1982]
Ascospores 10-13 x 4-4.5 μm , cells \pm equal in size; ascomata \pm immersed; on *Ramalina farinacea*; Spain (Toledo). This and an 1866 report on *R. siliquosa* from the British Isles needs confirmation¹⁰. See Hawksworth (1976), Martínez (2002).
-**Endococcus ramalinarius** (Linds.) D. Hawksw. 1985
- 63 (61) Ascospores mainly exceeding 10 μm in length 64
Ascospores 7-10 x (4.5-)5-6(-6.5) μm , septum thick; ascomata 100-270 μm diam; on *Porpidia* spp.; Scotland (Isle of Skye). See Sérusiaux et al. (1999).
-**Endococcus brachysporus** (Zopf) M. Brand & Diederich 1999
- 64 (63) Ascospores 10-12(-13) x (5-)6.5-7(-7.5) μm , smooth; ascomata mainly immersed (100-)150-200(-400) μm ; reported on thalli of a wide range of saxicolous crustose lichens, but especially on *Porpidia* and *Verrucaria* species; upland areas of the British Isles (frequent), Ireland, Portugal, Spain (common). See Hawksworth (1979a), Renobales (1996).
-**Endococcus propinquus** (Körber) D. Hawksw. 1979
Ascospores 10-12 x 6.5-7.5 μm , verrucose; ascomata 100-150 μm diam, immersed to semi-immersed in the thallus of *Ionaspis lacustris*; England (Cumbria), Ireland (E. Donegal), Scotland (Shetland Isles, East Lothian) an, and Orange (2002).....**Endococcus verrucosporus** Alstrup 1994
- 65 (4) Asci 2-4 (-6-8)-spored 66
Asci 8-64-spored 68
- 66 (65) Interascal tissue (hamathecium) absent or gelatinised; ascomatal wall cells with "Munk pores" (circular pores ca 1-1.5 μm diam)..... 67
Interascal tissue (hamathecium) present; ascomatal wall cells without "Munk

⁹ Also reported from *Caloplaca cerina*, *C. sublobulata*, and some other lichens, but those records are in need of confirmation.

¹⁰ This species was originally described from *Ramalina inflexa* (syn. *R. leiodea*) in New Zealand; a modern description is lacking.

pores"; ascospores (19-)20-30(-34) x (7-)8-11(-12) µm; 3-septate, the end cells often paler, septa with central pores; asci 4(-6-8)-spored¹¹; ascomata immersed to erumpent, (100-)150-250 µm diam, forming galls; on a wide range of lichens, including in the region thalli of *Baeomyces rufus*, *Diploschistes caesioplumbeus*, *Heterodermia leucomela*, *Pseudocyphellaria intricata*, *P. norvegica*, *Leptogium teretiusculum*, *Leptochidium albociliatum*, *Lobaria amplissima*, *L. pulmonaria*, *Massalongia carnosus* and *Peltigera* species, commensalistic to parasitic; British Isles (widespread), Ireland (N. & S. Kerry, W. Galway), and Spain (Asturias, Gerona, La Rioja, Palencia, Santander, Vizcaya, Canary Islands). Probably several taxa are included (Navarro-Rosinés *in litt.*). See Hawksworth (1980b, 1983b).

..... **Pyrenidium actinellum** Nyl. 1865
 [syn. *Dacampiosphaeria rivana* (de Not.) D. Hawksw. 1980,
 ? *Leptosphaeria leucomelaria* (Mudd) Vouaux 1913¹²]

67 (66) Ascomatal locules arising in superficial botryose clusters, walls very uneven and corrugated, opening irregularly, wall cells circular holes c. 1.5 µm diam; asci 2-4-spored; ascospores 3-septate, end cells+hyaline, 30-39(-41) x 8-11(-12)µm; on thalli of *Peltigera rufescens*, very rare; England (Lancashire), Scotland (W. Lothian). See Hawksworth (1980b).

..... **Lasiosphaeriopsis salisburyi** D. Hawksw. & Sivan. 1980
 Ascomata arising singly or in small groups, immersed; ascospores (2-)3(-7) septate, end cells concolorous, 16-21 x 7-12.5µm; on *Porpidia macrocarpa*; Scotland, Ireland (S. Kerry), but no recent records. See Triebel (1989).

..... **Lasiosphaeriopsis supersparsa** (Zopf) Triebel 1989

68 (65) Ascomata with dense ostiolar setae 69
 Ascomata lacking ostiolar setae 70

69 (68) Asci 8-spored, ascospores 3-septate, 12-19 x 5.5-7.5 µm; ascomata 80-120 µm diam, with setae simple, dark brown, 25-50 x 2.5-3 µm, on *Peligeria rufescens*, *P. canina*, *P. britannica* and *P. neckeri*; Spain (Guadalajara, Jaen, Lérida, Málaga, La Rioja, Teruel). See Martínez (1999)

..... **Capronia peltigerae** (Fuckel) & D. Hawksw. 1987
 Asci 64-spored, ascospores (0-)3(5)-septate, 9-10.5(-13)3-3.5 µm; ascomata 70-150 µm diam, with setae, simple, brown, 30-42 x 2.5-3.5 µm; on *Parmelina quercina*; Spain (Mallorca). See Etayo (1996b).

..... **Capronia triseptata** (Diederich) Etayo 1996

70 (68) Ascomatal wall lacking "Munk pores" (see 66) 71
 Ascomatal wall with "Munk pores"; ascospores 3-septate, (17-)18.5-21(-23) x (7-)8.5-10(-10.5) µm; on *Lecanora polytropa*; Spain (Castilla de León). See Pérez-Ortega & Halici (2008).

..... **Lasiosphaeriopsis lecanorae** Pérez-Ortega & Halici 2008

71 (70) Ascomata arising singly or in small groups, not aggregated into a stroma. 72

Ascomata grouped by a superficial, black, convex stroma up to 3-5 mm diam, ascomata about 0.25 mm diam; ascospores 3-septate, fusiform, often slightly curved, (18-)20-23(-26) x 7-8.5(-10) µm; on thalli of *Parmelia omphalodes*, *P. saxatilis* and *P. sulcata*; frequent, especially in western and upland areas; Canary Islands, England, Ireland (W. Donegal, Dublin, S.

¹¹ See also 76(75) *Leptosphaeria crozalsii* if asci 8-spored.

¹² This additional synonym is added on the basis of the conversion factor of x4345 for Mudd's measurements calculated by Kociurkova & Knudsen (2010), which indicates that the 3-septate brown spores produced in 4-spored asci measured around 30.4 x 8.7 µm.

- Kerry, Waterford, Wicklow), Scotland, Spain (Cuenca, León), Wales. See Schaechtelin & Werner (1928), Santesson (1960), Hawksworth *et al.* (2004).
 **Homostegia piggotii** (Berk. & Broome) P. Karst. 1873
- 72 (71) Ascomata opening irregularly by fragmentation of cephalothecioid plates 73
 Ascomata opening regularly, not cephalothecioid plates formed at the upper part..... 78
- 73 (72) Ascospores not exceeding 40 µm in length 74
 Ascospores (35-)42-60 x (10-)12-18(-20) µm, ellongate-ellipsoid, 3-4-transseptate, rarely with a single longiseptum, appearing smooth but sparsely verruculose, with a well-developed gelatinous sheath; asci (4-6-)8-spored; ascomata 0.3-0.35(0.4) µm; on *Aspicilia calcarea*; Wales (Breconshire), Spain (Vizcaya, Tarragona¹³). See Hawksworth (1990), Navarro-Rosinés & Roux (1995), Renobales (1996).
 **Weddellomyces macrosporus** D. Hawksw. *et al.* 1990
- 74 (73) Ascospore wall smooth or slightly granulose at maturity75
 Ascospore wall distinctly granulose-verrucose at maturity77
- 75 (74) Ascospores exceeding 10 µm in width76
 Ascospores (22-)23-30 x (7-)8-9(-10) µm, (1-)3-septate; ascomata 200-300 µm diam; asci 8-spored; on *Xanthoparmelia cf. protomatrae*; Spain (Madrid). See Calatayud & Navarro-Rosinés (1998).
 **Weddellomyces xanthoparmeliae** Calat. & Nav.-Ros. 1998
- 76 (75) Ascospores 30-40 x 11-15 µm, (1-)2(-3)-septate; ascomata 200-450 µm diam; asci 6-8-spored; on *Caloplaca erythrocarpa*; Spain (Tarragona). See Navarro-Rosinés & Roux (1995).
 **Weddellomyces erythrocarpae** Nav.-Ros. & Cl. Roux 1995
 Ascospores 26-36 x 11-13 µm, (2-)3(-5)-septate, the end cells often paler; asci 4-8-spored; ascomata 300 µm diam; on *Aspicilia calcarea*; Spain (Tarragona). See Navarro-Rosinés & Roux (1995).
 **Weddellomyces heterochrous** Nav.-Ros. & Cl. Roux 1995
- 77 (74) Ascospores 24-31 x 9.5 (-12) µm, 2-3 (-5)-septate; asci 90-120 x 20-25 µm, (6-)8-spored; ascomata (150-) 200-300 (-350) µm diam; on *Caloplaca flavescens* and more rarely *C. aurantia*; British Isles: widespread in England and Wales, Ireland (Offaly [=/+King's?], Wicklow), and Spain (Barcelona, Lerida, Vizcaya). See Hawksworth (1986), Navarro-Rosinés & Roux (1995). **Weddellomyces epicallopusma** (Weddell) D. Hawksw. 1986
 Ascospores (20-)21-26(-30) x (7-)8-9.5(-10) µm, (1-)3(-4)-septate; asci 80-90 x 18-20 µm, (4-)8-spored; ascomata 100-300 µm diam; on *Aspicilia contorta* and *A. coronata*; Spain (Tarragona). See Navarro-Rosinés & Roux (1995)
 **Weddellomyces pachyosporicola** Nav.-Ros. & Cl. Roux 1995
- 78 (72) Ascomatal internal structure of pseudoparaphyses..... 79
 Ascomatal internal structure pseudoparenchymatic, absent, or gelatinised 82
- 79 (78) Ascospore walls smooth 80
 Ascospores with verruculose ornamentation, fusiform, 3-septate, 13-16

¹³ Material with larger ascospores.

- x 4.5-5.5 µm; asci 8-spored; ascomata 200 µm diam; pseudoparaphyses 1.4-2.2 µm thick; on *Ramalina* spp.; Canary Islands, Spain (Mallorca, Granada, Navarra. See Diederich (1990).
 **Leptosphaeria ramalinae** (Desm.) Sacc. 1883
- 80 (79) Ascospores not exceeding 24 µm in length 81
 Ascospores 24-26 x 6.5-9 µm, dark brown, the apices of the end cells paler, smooth-walled; interascal tissue of knobby pseudoparaphyses; asci (6-)8-spored; ascomata 75-150 µm diam; growing on thalli regularly submerged in streams of *Verrucaria hydrela* [CHK LAUNDON]; England, Scotland¹⁴ **Pyrenidium hetairizans** (Leight.) D. Hawksw. 1986
- 81 (80) Ascospores 16-24 x 7-10 µm, 3-septate, brown; young asci 8-spored but 4-spored at maturity; ascomata 200-300 µm diam; pseudoparaphyses 1.5-1.75 µm thick; growing on *Aspicilia calcarea*, *A. contorta*, *Caloplaca aurantia*, and *C. teicholyta*; Spain (Tarragona). See Vouaux (1913).
 **Leptosphaeria crozalsii** Vouaux 1913¹⁵
 Ascospores 19-21 (-22) x 4.5-6(-6.5) µm; broadly fusiform, 3-septate, smooth walled, pale brown; pseudoparaphyses 2.5-4 µm thick; asci 8-spored; ascmta 75-125 µm; on *Peltigera* cf. *rufescens* thalli; England (Warwickshire). See Hawksworth (1980b).
 **Leptosphaeria clarkii** D. Hawksw. 1980
- 82 (78) Ascospores exceeding 12 µm in length 83
 Ascospores 9-11 x 6 µm; growing on *Pannaria*; Scotland (Perthshire), no recent records and status and position questionable.
 **Phaeospora exoriens** (Stirt.) A.L. Sm. 1926
- 83 (82) Ascospores not exceeding 16 µm in length 85
 Ascospores (16-)20(-22) x (6.5)-8(-9) µm; asci 4(-6-8)-spored; ascomata (40-)60-125(-180) µm; on *Rhizocarpon umbilicatum*; widespread in upland areas of Scotland, scattered in England, Ireland, Spain (Aragón, Granada)
 **Phaeospora rimosicola** (Leight. ex Mudd) Hepp ex Stein 1879
- 85 (83) Ascospores (12-)14-16 x (4.5-)5-8 µm asci 4(-6-8)-spored yellowish brown to brown; ascomata (90)100-125(-175) µm on a wide range of crustose lichens, including *Lecanora dispersa*, *Micarea bauschiana* and *Rhizocarpon umbilicatum*; widespread, especially in upland areas of the British Isles, Ireland, Spain (eastern Pyrenees, Cantabria). See Vězda (1963), Renobales (1996).
 **Phaeospora parasitica** (Lönnr.) Zopf 1898
 Ascospores (10-)11-15 x 3.5-5 µm, very pale brown when mature; ascomata 50-75(-100) µm diam; on *Lobaria pulmonaria* thalli; Spain (Navarra – an uncertain record). See Hawksworth (1980b), Etayo & Diederich (1996).
 **Phaeospora peltigericola** D. Hawksw. 1980
- 86 (3) Ascomatal internal structure consisting of branched and anastomosing hyphae or absent (not pseudoparenchymatic) 87
 Ascomatal internal structure pseudoparenchymatic; ascomata elongated, connected with a superficial net-like of brown vegetative hyphae; ascospores 1-septate to submuriform, 2-6 (-7) celled, (9-) 10-13 (-15) x 6-9 (-10) µm; on *Diploicia subcanescens*; Spain (Almería, Castellón, Canary Islands). Calatayud *et al.* (2002).

¹⁴ A report on *Xanthoparmelia stenophylla* from Spain (La Rioja) requires confirmation (Burgaz *et al.* 2007).

¹⁵ Requires transfer into *Pyrenidium* (Navarro-Rosinés *in litt.*).

-**Lichenostigma diploiciae** Calat., Nav.-Ros. & Hafellner 2002
- 87 (86) Hamathecial interascal filaments absent 88
 Hamathecial interascal filaments present 95
- 88 (82) Ascomata densely setose around the ostiole 89
 Ascomata with ostiole non setose 91
- 89 (88) Ascomata exceeding 70 µm wide 90
 Ascomata 50-70 µm diam; ascospores simple to submuriform, with (0-)3-5
 transverse and 0-1 longitudinal septa, 17-23 x 3.5-7 µm; with simple setae,
 straight, 35-70 x 3-4 µm; on *Lobaria pulmonaria*; Spain (Navarra). See
 Etayo & Diederich (1996), Kondratyuk & Galloway (1995).
**Capronia epilobarina** S. Kondr. & D. J. Galloway 1995
- 90 (89) Ascospores (3-)5(-6) transeptate and 0-1(-2)-longiseptate, (13)-15-21(-27) x
 7.5-9 µm; ascomata 100-150 µm diam; setae curved towards the ostiole, 25-
 50(-90) µm, tall, mainly 3-4 µm wide; on *Normandina pulchella*; Scotland,
 Spain (Navarra). See Hawksworth (1990), Etayo & Diederich (1998).
**Capronia normandinae** R. Sant & D. Hawksw. 1990
 Ascospores simple to submuriform, with 3-5 transverse and 0-1 longitudinal
 septa, 12-19 x 5.5-7.5 µm; ascomata 130-200 µm diam, with setae simple,
 straight, 5-35 x 3-4 µm; on *Hypotrachyna revoluta* and *H. endochlora*;
 Canary Islands, Ireland (S. Kerry), Spain (Navarra). See Etayo & Diederich
 (1998).
**Capronia hypotrachynae** Etayo & Diederich 1998
- 91 (88) Ascospores with less than 3 transverse septa or septa irregular 92
 Ascospores with 3 or more transverse septa 93
- 92 (91) Ascospores 17-21 x 10.5-14 µm, ellipsoid to subglobose, submuriform with
 one transversal septum and 2 longitudinal septa in each hemispore giving 8-
 celled mature spores, non halonate; asci 4-spored; on *Placopsis gelida*;
 England (Teesdale), no recent record. See Matzer (1993).
**Roselliniopsis gelidaria** (Mudd) Matzer 1993
 Ascospores with (1-)4(-6)-celled, septa irregular, 11.5-15(-18) x (6.5-)7.5-10(-
 12) µm, halonate; host lichens mainly on calcareous rocks; on
Catapyrenium lachneum, *Protoblastenia calva*, *P. incrustans* or *P.*
rupestris, *Aspicilia calcarea*, *Catillaria nigroclavata* and *Hymenelia*
similes; England (Westmorland), Ireland (Clare, E. Cork, Fermanagh,
 Queen's) Scotland (Ben Lawers), Spain (Cataluña, Vizcaya)¹⁶. See Vězda
 (1970), Triebel (1989), Renobales (1996).
**Merismatium discrepans** (J. Lahm) Triebel 1989
 [syn. *Merismatium lopadii* auct. Brit., non (Anzi) Zopf 1898].
- 93 (91) Ascospores non halonate, host lichens on soil, bryophytes, bark, wood or
 siliceous rocks 94
 Ascospores 22-35 x 8-14(-16) µm, submuriform, 5-8-septate, with gelatinous
 sheath; ascomata 0.15-0.25 µm; host lichens mainly on calcareous rocks;
 on *Staurothele orbicularis* and sterile calcicilous lichens; widespread in the
 British Isles, Spain (Tarragona, Gerona, Vizcaya). See Purvis *et al.* (1992),
 Renobales (1996), Roux *et al.* (2002).
**Merismatium deminutum** (Arnold) Cl. Roux & Nav.-Ros. 2002
 [syn. *Polyblastia deminuta* Arnold 1861]

¹⁶ Etayo (1996a) mentioned *Merismatium* aff. *lopadii* on *Hypotrachyna revoluta* in the Spanish Pyrenees and on *H. endochlora* in the Canary Islands (Gomera).

- 94 (93) Ascospores submuriform to muriform, 8 to 23-celled, (14-)15-24.5(-32) x (6.5-) 8-12(-15) μm ; ascomata (150-) 200-250 (300) μm diam, with roundish goniocysts (15-) 25-40 μm ; on *Leptogium* species; Spain (Oviedo). See Triebel (1989)
 **Merismatium nigrtellum** (Nyl.) Vouaux 1913
 Ascospores (10.5-)13.5-16.5(-17.5) x (3.5-)4-5.5(-6) μm , mainly 3-transseptate rarely (0-)1 longiseptate; ascomata (100-)125-150(-250) μm , goniocysts roundish, (15-) 25-45 (-60) μm ; on *Lopadium pezizoideum* and *Mycobilimbia berengeriana*; Spain (Oviedo, Tarragona¹⁷). See Triebel (1989).
 **Merismatium decolorans** (Rehm ex Arnold) Triebel 1989
- 95 (87) Ascospores biserially arranged in the asci 96
 Ascospores uniserially arranged in the asci 98
- 96 (95) Ascospores with 3 transsepta, broadly ellipsoid, exceeding 7 μm in width 97
 Ascospores with 7 transsepta, 2-3(-4) longisepta, sometimes angular in the upper cell, cylindrical-fusiform, 21-25 x 5-6.5 μm ; asci 8-spored; ascomata c. 250 μm diam; on *Leptogium burgessii* and *Pannaria rubiginosa*; Scotland (W. Inverness), Spain (Navarra). See Hawksworth (1975a), Etayo (1994a), Etayo & Breuss (1996), Halici & Hawksworth (2008).
 **Dacampia leptogiicola** (D. Hawksw.) D. Hawksw. 2008
 [syn. *Pleospora leptogiicola* D. Hawksw. 1975]
- 97 (96) Ascospores with 3 transverse septa, sometimes with 1-2 additional oblique septa, 18-23 x 7-11.5 μm , finely verruculose, dark brown; asci 8-spored; ascomata 200-350 μm diam; on *Pertusaria pseudocorallina* and an unidentified crustose lichen; Ireland (S. Kerry, W. Galway, W. Mayo). See Hawksworth (1978b, 1980b[?]), Alstrup & Hawksworth (1990).
 **Weddellomyces periphericus** (Taylor) Alstrup & D. Hawksw. 1990
 Ascospores with 3 transsepta (1 A-transsepta; 2 B-transsepta), 1-2 longisepta and rarely 0-1 angular septa in the basal cell, somewhat constricted at all transsepta, smooth, golden-brown, (23-) 24.5-27 x 11-13 μm ; ascomata numerous, up to 30, forming infection spots that are 2-3 mm diam; on *Peltigera rufescens* and *P. praetextata*; England, Scotland, Spain (Navarra, Toledo). See Hawksworth (1986).
 **Dacampia rufescentis** (Vouaux) D. Hawksw. 1986
- 98 (95) Asci 8-spored 99
 Asci 2(-4)-spored; ascospores with 4-5-transsepta and 3-4-longisepta, minutely verrucose, (28-)34-36(-39) x (10-)13-14.5(-16) μm ; on *Rhizocarpon* cfr. *reductum*; Scotland (Angus). See Halici & Hawksworth (2008), Cannon (2010).
 **Dacampia rhizocarpicola** D. Hawksw. 2008
- 99 (98) Ascospores less than 30 μm in length 100
 Ascospores 30-36 x 11-16 μm , with 3-5 transverse septa, central segments with one longiseptum and sometimes one B-transseptum, smooth-walled, red-brown, somewhat attenuated at the apices; reported as lichenicolous on *Leptogium tenuissimum*, *Solorina crocea*, and an unidentified white crustose lichen, but now regarded as an independent lichen; rare, England, Scotland, Spain (Gerona, Santander). See Hawksworth (1983a); Eriksson (1982), Hawksworth (1975a), Kiliás (1978), Riedl (1969), Henssen (1995).
 **Dacampia hookeri** (Borrer) A. Massal. 1853
- 100 (99) Ascospores with 3 (-5) transsepta and 1 (-2) longisepta, 18-25 x 8-10 μm ,

¹⁷ An uncertain record as the specimen had small spores (Navarro-Rossinés *et al.* 1994a).

- somewhat constricted at all transsepta; ascomata 250–450 µm diam; on *Solorina saccata*; Spain (Tarragona). See Vouaux (1913), Henssen (1995).
 **Dacampia engeliana** (Sauter) A. Massal. 1854
- Ascospores with 5(–6) transsepta and 1 longisepta, (19–)21.5–26 x 8–9 µm; on *Peltigera rufescens*; Spain (Madrid). See Earland-Bennett *et al.* (2006).
 **Dacampia peltigericola** D. Hawksw. & Hitch 2006
- 101 (2) Asci more than 8-spored 102
 Asci (1–) 2 to 8-spored 105
- 102 (101) Hamathecial interascal filaments present; asci with an I+ blue gelatinous cap 103
 Hamathecial interascal filaments absent; asci without a distinct gelatinous I+ blue cap 104
- 103 (102) Ascospores 5–7 x 4–5.1–6 µm; asci up to 100-spored; ascomata immersed in thalli and apothecia of *Lecanora frustulosa*; Spain (Zaragoza, Gerona, Tarragona). See Hafellner (1985).
 **Rosellinula frustulosae** (Vouaux) R. Sant. 1988
 Ascospores 7–11 x 4.5–5.5–6.5 µm; asci up to 50-spored; ascomata immersed in thallus areoles of *Aspicilia cinerea* and *Lecanora praepostera*; Spain (La Rioja, Madrid), Wales (Pembrokeshire), and Scotland (Roxburgh). See Hafellner (1985). **Rosellinula haplospora** (Th. Fr. & Almqu.) R. Sant. 1986
- 104 (102) Ascospores 2.5–3.5(–4) x (1.5–) 2–2.5 µm, ellipsoid to almost subglobose; asci 150–300 spored; ascomata immersed in the hymenium of *Bacidia rubella* and *B. fraxinea*; occasional in the British Isles, England (S. Devon) to Scotland; Spain (Navarra). See Hawksworth (1975a), Vězda (1963).
 **Muellerella hospitans** Stizenb. 1863
 Ascospores 5–7 (–9.5) x 2.5–3 (–3.5) µm, narrowly ellipsoid to ellipsoid; asci 150 spored; ascomata becoming more or less superficial; on thalli of *Arthonia radiata*; Channel Islands (Jersey), Ireland, Scotland (Kincadine)¹⁸, Spain (Tarragona). **Muellerella polyspora** Hepp ex Müll. Arg. 1862
- 105 (101) Ascospores smooth, not halonate, with germ pores 106
 Ascospores ornamented when mature, halonate when young, without germ pores, mostly non-septate or becoming 1 (–5) septate 107
- 106 (105) Ascospores globose to ellipsoid, mostly non-septate but rarely 1-septate with septa not located in the middle of the spore (cells unequal in size), smooth, with 2 or more apical rounded germ-pores; asci 2-spored; on thalli of *Ochrolechia tartarea*, *Pertusaria hemisphaerica*, also reported on *Placopsis pupillaris*¹⁹; widespread in the British Isles; Canary Islands, England, Ireland (Derry), Scotland, Wales. See Matzer (1993) Hughes (1951), Hawksworth (1975a, 1978a).
 **Roselliniopsis tartaricola** (Nyl. ex Leight.) Matzer 1993
 Ascospores ellipsoid, non-septate, with 2 germ-pores, one near each apex, 10–13(–14) x (8–)9–11 µm; asci 8-spored; on *Placopsis lambii*; Scotland (W. Inverness, Mid-Ebudes). See Alstrup *et al.* (1994).
 **Roselliniopsis ventosa** (Rostrup) Alstrup 1994
- 107 (105) Ascospores smooth or very finely ornamented 108

¹⁸ However, some records belong to *M. hospitans*.

¹⁹ See also 87(86) *Roselliniopsis gelidaria* with submuriform ascospores.

- Ascospores verruculose, (13-)15-21(-24) x 6-10(-13) μm ; asci(5-)8 spored; on *Physconia distorta*; Scotland (W. Ross) and Spain (Navarra). See Matzer & Hafellner (1990).
 **Reconditella physconiarum** Hafellner & Matzer 1990
- 108 (107) Hymenium K/I -, interascal filaments present 109
 Hymenium K/I+ blue, interascal filaments absent; ascospores brown at maturity, simple, with a finely ornamentation, 18-22 x 8-11 μm , halonate; asci 8-spored; on *Ionopsis epulotica*; Spain (Aragón). See Etayo (1994b).
 **Phaeosporis phaeosperma** (Arnold) Clauz. *et al.* 1989²⁰
- 109 (108) Ascospore cells (if septate spores present) unequal in size; asci 2- 8-spored 110
 Ascospore cells (if septate spores present) equal in size; asci always 8-spored 113
- 110 (109) Ascospores mainly exceeding 25 μm in length 111
 Ascospores mainly not exceeding 25 μm in length 112
- 111 (110) Ascospores 15-52 x 16-17 μm ; asci (1-)2-8-spored; on *Cladonia squamules*; British Isles (widespread), Canary Islands, Ireland (Wicklow). See Hawksworth (1978a), Matzer & Hafellner (1990).
 **Roselliniella cladoniae** (Anzi) Matzer & Hafellner 1990
 Ascospores 17 (-28-) 29 x 9-13 (-14) μm ; asci (4-)6-8-spored; on *Xanthoparmelia mougeotii* and *X. pulla*; Scotland(Outer Hebrides), Spain (Castellón). See Hawksworth (1978a), Matzer & Hafellner (1990)
 **Roselliniella atlantica** Matzer & Hafellner 1990
 [syn. *Adelococcus groedensis* auct., non (Zopf) Keissler 1930]
- 112 (110) Ascospores 16-26 x 6-8-11-13 (-15) μm ; asci (4-) 6-8-spored; on *Nephroma laevigatum*; Scotland (W. Ross). See Hawksworth (1975), Matzer & Hafellner (1990).
 **Roselliniella nephromatis** (P. Crouan) Matzer & Hafellner 1990
 Ascospores 12-15 x 6-7 μm ; asci 8-spored; on *Trapelia* spp.; England (Essex, N. Somerset), Scotland (E. Lothian), and Spain. See Keissler (1930), Hoffmann & Hafellner (2000).
 **Roselliniella microthelia** (Wallr.) Nik. Hoffm. & Hafellner 2000
- 113 (109) Ascospores 11-18 (-21) x 7-13 μm ; on *Acarospora cervina* and *A. glaucocarpa*; England (W. Yorkshire), Spain (Granada, Aragón). See Watson (1948), Matzer & Hafellner (1990).
 **Adelococcus alpestris** (Zopf) Theiss. & Syd. 1918
 Ascospores (12-) 14-19 (-21) x (6-) 7-12 μm ; on *Hymenelia similis* and *Verrucaria hochstetteri*; Spain (Tarragona). See Matzer & Hafellner (1990), Navarro-Rosinés *et al.* (1994a).
 **Adelococcus interlatens** (Arnold) Matzer & Hafellner 1990
- 114 (1) Ascospores simple, not vermiform 115
 Ascospores transversely septate, muriform or vermiform 127
- 115 (114) Ascospores with \pm pointed ends 116
 Ascospores with rounded ends 118
- 116 (115) Ascospores \pm symmetrical 117

²⁰ The type species of *Phaeosporis* Clem. 1909 is probably not congeneric with the type of the genus, *P. melasperma* (Nyl.) Clem. 1909 which has distinctively ornamented ascospores.

- Ascospores flattened on one side, 14-26.5 x 3.5-5.5 μm ; asci 8-spored; ascomata immersed in the host hymenium; in *Umbilicaria crustulosa* apothecia; Spain (Avila). See Creveld (1981), Hafellner & Sancho (1990).
 **Gyrophthorus crustulosae** (Creveld) Hafellner & Sancho 1990
- 117 (118) Ascospores 16-21 x 5-6 μm ; asci 4 (?-8) spored, often expelled with the spores; on *Leptogium* species; rare, south-west England, south-west Ireland. See Mitchell & Henssen (1966), Eriksson (1981), Hoffman & Hafellner (2000) **Obryzum corniculatum** Wallr. 1825
 Ascospores 19-26 x 6-8(-11.5) μm ; asci 8-spored; on *Aspicilia caesiocinerea* and *A. calcarea*; England, Scotland, Wales, Spain (Vizcaya, Cantabria, Navarra). See Zehetleitner (1978) **Verrucaria aspiciliicola** R. Sant. 1984 [syn. *V. aspiciliae* Zehetl. 1978]
- 118 (115) Asci more than 8-spored 119
 Asci 4-8 spored 120
- 119 (118) Paraphyses branched; ascomata 100-350 μm wide and high, when fully developed hymenium fully exposed to form small discs; paraphyses absent; ascospores 4-6 (-7.5) x 1.5-2 μm on *Dibaeis baeomyces*; England, Scotland. See Poelt & Hafellner (1975).
 **Thelocarpon lichenicola** (Fuckel) Poelt & Hafellner 1975
 Paraphyses simple; ascomata 100-150 μm diam, bright yellow, pruinose, citrine green when fresh; ascospores 4-6 x 1.5-2 μm or (6-)8-10(-12) x 3 μm ; a lichenicolous lichen on the thallus of *Dibaeis baeomyces*, *Peltigera* and *Solorina* species; upland areas of the British Isles, Ireland (Down). See Salisbury (1966), Ahti (1973)
 **Thelocarpon epibolum** Nyl. 1866 [The longer-spored morph, var. **epithallinum** (Leighton ex Nyl.) G. Salisb. 1953, occurs on *Peltigera* thalli in Spain and rotting wood; according to Ahti (1973).]
- 120 (118) Interascal filaments present 121
 Interascal filaments absent 123
- 121 (120) Ascospores exceeding 12 μm in length 122
 Ascospores 8-10(-11) x 3-5 μm ; ascomata 100-150 μm diam, subhyaline to pale reddish or olivaceous near the ostiole, forming bullate deformations on *Thamnolia vermicularis*: Scottish Highlands and Wales (no recent records). See Hawksworth (1980a), Hoffmann & Hafellner (2002).
 **Thamnogalla crombiei** (Mudd) D. Hawksw. 1980
- 122 (121) Ascospores 14-16 x 7-9 μm ; ascomata 200-250 μm ; diam, black, ostiole broad and \pm urceolate; on crustose lichens on calcareous substrates, including *Aspicilia contorta*, *Candelariella aurella*, *Lecanora albescens*, *L. crenulata*, *L. dispersa*, *Lecidella stigmatea* and *Verrucaria parmigera*; occasional; British Isles, Spain (Cataluna, La Rioja). See Etayo (1994a), Hoffmann & Hafellner (2000).
 **Zwackiomyces lecanorae** (Stein) Nik. Hoffm. & Hafellner 2000
 Ascospores 12-15 x 5-6 μm ; ascomata 110-150 μm ; diam, brown, ostiole not broad and urceolate; forming galls on *Umbilicaria vellea*; Spain (Avila). See Hafellner & Sancho (1990).
 **Gyrophthorus perforans** Hafellner & Sancho 1990
- 123 (120) Ascospores less than 11 μm in length 124
 Ascospores exceeding 11 μm in length 125

- 124 (123) Ascospores 7-8 x 3 µm; growing on *Cladonia*; Wales (Merioneth) **Guignardia fimbriata** auct. brit., non (Vain.) Keissler 1930²¹
 Ascospores 7-11 x 6-8 µm; growing on *Caloplaca flavescens* and *Lecanora albescens*; England, Ireland. See Zehetleitner (1978), McCarthy (1988)..... **Verrucaria latericola** Erichsen 1943
 [syn. *V. granulosa* Clauz. & Zehetl. 1978, *V. insularis* auct., non (A. Massal.) Jatta 1900]
- 125 (123) Ascomatal walls dark brown to black throughout 126
 Ascomatal walls hyaline except around the ostiole; ascospores 15-20(-24) x 4-7(-8) µm; forming bullate galls on *Xanthoria parietina*; England (Cumbria, Derbyshire, S. Devon, Dorset, and E. & W. Kent), Spain (Cataluña, Navarra, Rioja, Soria, Mallorca, and Valencia), and Wales (Cardigan). See Hawksworth (1975), Hoffmann & Hafellner (2000).
 **Teloggalla olivieri** (Vouaux) Nik. Hoffm. & Hafellner 2000
- 126 (125) Ascospores 17-25 x 8-9 µm; on *Lecanora muralis*; Spain (Calatayud, Tarragona). See Zehetleitner (1978).
 **Placocarpus schaeereri** (Fr.) Breuss 1985
 Ascospores 11.5-16.5 x (4-)4.5-6.5 µm; on *Ionaspis lacustris*; Ireland (? W. Galway), Scotland (Lanark, Mid-Perth), and Wales (Caernarvon, Cardigan, Merioneth). See Orange (2002).
 **Verrucaria conturmatula** Nyl. 1879
- 127 (114) Ascomatal wall colourless, pale brown, or undifferentiated; in the hymenium of *Rinodina* or *Lecidea* species 128
 Ascomatal wall brown and clearly differentiated; not in the hymenium of *Rinodina* or *Lecidea* species 129
- 128 (127) Ascomata inhabiting the hymenium of *Rinodina* species, at first perithecioid but apothecioid when mature, wall colourless to pale brown, 60-130 x (40-)50-110 µm diam; asci (6-)8-spored; ascospores (12-)13-16(-17.5) x 5.5-7(-8) µm, hyaline to pale brown 1(-3) septate; growing on *Rinodina trachytica*; Spain (Mallorca). See Navarro-Rosinés, Cl. Roux & Giralt (1996).
 **Wernerella maheui** (Werner) Nav.-Ros., Cl. Roux & Giralt 1998
 [syn. *Leptosphaeria mahehui* Werner 1939]
 Ascomata inhabiting the hymenium of *Lecidea* species, perithecioid but with a poorly differentiated wall; wall colourless, (50-) 100-150(-225) µm diam; asci (2-)4-8-spored; ascospores 2(-3) septate, (9-)11-14(-16) x (3.5-)4-5(-7), hyaline; forming gall deformations on apothecia of lecideoid lichens; Scotland (Aberdeen). See Triebel (1989).
 **Hymenobia aporea** (Nyl.) D. Hawksw. & O. E. Erikss. 1992
 [syn. *H. insidiosa* Nyl. 1854]
- 129 (127) Asci (1-)2-8-spored 130
 Asci 32-spored; ascospores elongate-ellipsoid, ends rounded, (5-)6-8(-9) x 2(-2.5) µm, each end with a hyaline hair-like appendage 5(-6) x 0.5 µm; on *Placyntiella uliginosa*; England (N. Devon). See Döbbeler (1994).
 **Epigloea urosperma** Döbbeler 1994
- 130 (129) Ascomata pink, orange, red, rose, or subhyaline (and not brownish around the ostiole); interascal tissues (hamathecium) absent 131
 Ascomata greenish, brown, black, or subhyaline (and then slightly brownish

²¹ This name is a synonym of the coelomycete (XXX) *Lichenosticta alcicornaria* (Hoffmann & Hafellner 2000); the identity of the Welsh specimen needs to be checked but may be (XXX) *Phaeopyxis punctum*.

- near the ostiole); interascal tissues (hamathecium) present or absent.. 157
- 131 (130) Ascomata orange-red or red, reacting or becoming darker with KOH and lactic acid 132
 Ascomata white to pale yellow, orange, or pinkish orange, not reacting with KOH lactic acid 133
- 132 (131) Ascospores mainly less than 15 μm in length²² 134
 Ascospores (19-)22-38(-65) x (7-)9-11(-13) μm , muriform when mature from the fusing of originally 1-septate ascospores, becoming yellowish with age; ascomata immersed, only the ostiolar region visible, red, K+ purple-red or violet, 200-300 x 150-200 μm ; on *Peltigera hymenina*; Scotland (Mid-Perth, W. Ross). See Zhurbenko (2009).
 **Xenonectriella lutescens** (Arnold) Weese 1919
- 133 (131) Ascomata orange-red, 120-150 μm diam, outer wall K+ wine red; ascospores ellipsoid, 6.5-10 x 3-5 μm ; on *Lobaria pulmonaria*; Canary Islands, Spain (Alava, Santander), Scotland (Argyll). See Etayo & Diederich (1996). **Pronectria fissuriprodiens** Etayo 1996
 Ascomata red-brown when protruding, KOH+ pale brown to black; ascospores subglobose, 9-11 x (4-) 6-8 μm , hyaline to pale golden brown, tuberculate; in apothecia of *Physcia aipolia* and *P. semipinnata*; Spain (Alicante, Tarragona, Valencia). Lowen (1990), Navarro-Rosinés *et al.* (1994a), Calatayud & Barreno (1995), Rossman *et al.* (1999).
 **Xenonectriella leptaleae** (J. Steiner) Rossman & Lowen 1999
- 134 (132) Ascomata superficial from the start 135
 Ascomata immersed in the substrate, sometimes becoming more or less erumpent, at least in the ostiolar region 144
- 135 (134) Ascospores not of two types in the same ascoma 136
 Ascospores 1(-2) - septate, of two types, macroascospores 34-50(-60) x 12-18(-20) μm , microascospores 8-17 x 3.5-7 μm ; ascomata translucent orange, with whitish lax hairs, 200 μm diam; asci mainly 6-spored; on various macrolichens, especiallyly parmelioid species, and also *Lecanora chlarotera* and *Xanthoria parietina*; Ireland (Kildare).
Nectriopsis parmeliae (Berk. & M. A. Curtis) M. S. Cole & D. Hawksw. 2001
- 136 (135) Ascospores 1-septate 137
 Ascospores 2-or more septate or muriform 141
- 137 (136) Ascospores not exceeding 3 μm in width 138
 Ascospores exceeding 3 μm in width 139
- 138 (137) Ascospores curved, 14-18 x 2.5-3 μm ; ascomata subhyaline to orange, sometimes with poorly developed white hairs, 80 μm diam; on *Parmelia sulcata*, rarely other parmelioid lichens²³; England (E. Suffolk), Portugal, Spain (Canary Islands), and Scotland (W. Ross. See Serusiaux *et al.* (1999).
Nectriopsis rubefaciens (Ellis & Everh.) M. S. Cole & D. Hawksw. 2001
 [syn. *Trichonectria rubefaciens* (Ellis & Everh) Diederich & Schroers 1999]

²² If ascospores 15-18 x 4 μm , ascomata orange-red, and asci 4-spored on *Caloplaca* spp., compare with "*Nectria*" *epicallopisma* (Arnold) Sacc. & D. Sacc. 1905 which is doubtfully reported from the British Isles.

²³ Reported from *Parmotrema* cf. *reticulata*, and also a *Ramalina* sp, in Portugal (ascospores 10-15 x 2.5-3 μm) by van den Boom (2006), but the fungus on *Ramalina* may well represent a different species.

Ascospores elongate-soleiform, (8-)10-11(-15) μm ; ascomata pinkish orange, becoming brownish when old, 100-130 μm diam, with thick-walled hyaline hairs around the ostiole, 15-20(-30) \times 3-4 μm ; on *Pertusaria amara* and *P. ophthalmiza*; Canary Islands (La Gomera and La Palma). See Etayo & van den Boon (2005).

Nectriopsis pertusariae (Etayo & van den Boon) D. Hawksw. comb. nov.²⁴ [syn. *Trichonectria pertusariae* Etayo & van den Boon 2005]

- 139 (137) Ascospores more than 12 μm in length 140
 Ascospores 9-12 \times 6-8 μm ; ascomata pale yellow to pinkish orange, 200-300 μm ; parasitic on thalli of *Lobaria* and *Peltigera* species, often causing extensive damage; occasional, England (Norfolk, S. Lancashire), north-west Scotland, Ireland (N. & S. Kerry), Portugal, Spain (Ciudad Real, Navarra, Toledo, Canary Islands). See Booth (1959), Etayo & Diederich (1996), Hafellner (1996), Serusiaux *et al.* (1999).
 **Nectriopsis lecanodes** (Ces.) Diederich & Schroers 1999
- 140 (139) Ascospores 12-18 \times 6-8 μm ; asci 4-8 spored; ascomata pink, 150-200 μm ; on an unidentified crustose lichen (see Watson, 1948); England (S. Devon), Spain (Navarra). See Vezda (1970), Serusiaux *et al.* (1999).
 **Nectriopsis indigenis** (Arnold) Diederich & Schroers 1999
 Ascospores (14-)15-20(-23) \times 5.5-8 μm ; ascomata often collapsed and appearing apothecioid when dry, pinkish to red, (150-)200-300(-350) μm diam, dark red around the ostiole, densely clothed with hairs; on *Physcia* cf. *aipolia* and *P. stellaris*; Ireland (W. Cork) and Spain (Madrid). See Earland-Bennett *et al.* (2006).
 **Nectriopsis physciicola** D. Hawksw. & Earl.-Benn. 2006
- 141 (136) Ascospores cylindrical or vermiform with long attenuated ends 142
 Ascospores vermiform, multiseptate, (45-)60-100(-120) \times (4.5-)5-7(-8) μm ; ascomata pale orange, translucent, with stiff white hairs; on thalli of *Lecanora conizaeoides*, *Placynthiella uliginosa*, and *Lepraria incana*, perhaps sometimes persisting as a saprophyte on wood; rare or overlooked, widely scattered in lowland England. See Hawksworth (1978a), Rossman *et al.* (1999).
 **Trichonectria hirta** (A. Bloxam) Petch 1937
- 142 (141) Ascospores muriform 143
 Ascospores 3 (-4) septate, "body" 21-30(-38) \times 5-7 μm with long thin attenuated ends 8-15 \times 0.8 μm ; ascomata white to pale yellow, 235 \times 215 μm ; on filaments of *Ephebe lanata*; Scotland (Argyllshire), no recent records. See Hawksworth & Pirozynski (1977), Rossman *et al.* (1999).
 **Paranectria affinis** (Grev.) Sacc. 1878
- 143 (142) Asci 8-spored; ascospores with 5-8 transverse and 1-2 longitudinal septa, body (22-) 25-32(-36) \times (9-)11-14(-15) μm , with 12 μm long ends; on *Degelia atlantica*, *Lepraria incana*, *Phaeophyscia orbicularis*, *Physcia tenella*, and *Physconia grisea*²⁵; England (Suffolk, Surrey), Scotland (Argyllshire), Ireland (W. Galway). See Hawksworth (1982a), Rossman *et al.* (1999), Cole & Hawksworth (2001).

²⁴ **Nectriopsis pertusariae** (Etayo & van den Boon) D. Hawksw. comb. nov.
 MycoBank no.: MB XXXXX

Syn.: *Trichonectria pertusariae* Etayo & van den Boon, *Nova Hedwigia* **81**: 160 (2005).

²⁵ This species and the subsp. *parvispora* occur on a wide range of foliose and crustose lichens in different countries.

- **Paranectria oropensis** (Ces.) D. Hawksw. & Piroz. 1977
 [subsp. **parvispora** M. S. Cole & D. Hawksw. 2001 has shorter
 ascospores with fewer cells; ascospore body (21.5-)23-27(-29) x (10-)11-
 14 µm, (2-)3-4(-5) transsepta and (0-)1(-2) longisepta; on *Lepraria*
incana; England (Suffolk).]
 Asci 2-or 4-spored; ascospores finally with 20-50 irregular cells, “body”
 (23-)30-45.5 x (10-)13-18(-20.5) µm, with (10-) 15-18 (-23) x 0.5-1.5
 long attenuated ends; ascomata pale orange, with hyalinenhairs on the
 surface, 300-400 µm diam; on *Peltigera rufescens*; British Isles:
 England (Derbyshire). See Hawksworth (1982a), Rossman *et al.* (1999).
 **Paranectria superba** D. Hawksw. 1982
- 144 (134) Ascospores 3-7-septate 145
 Ascospores 1-septate..... 146
- 145 (144) Ascospores 3-septate, elongate ellipsoid, hyaline, smooth, 15.5-21 x 5-6 µm;
 ascomata yellowish, 100-150 µm, not papillate; on *Evernia*
prunastri; Spain (Málaga). See Etayo (1998).
 **Pronectria casaesii** Etayo 1998
 Ascospores (3-5)7-septate fusiform, hyaline to slightly brownish, smooth
 to finely verruculose, 41-63 x 4.5-6 µm; ascomata orange-reddish to red,
 K+ violet, 150-200 µm, papilla truncatae; on *Melanelixia fuliginosa*;
 Spain (Navarra). See Etayo (1998).
 **Pronectria septemseptata** Etayo 1980
- 146 (144) Ascomata having a red ostiolar area 147
 Ascomata lacking a red ostiolar area..... 148
- 147 (146) Ascomata red-orange, purple-red around the ostiole; ascospores verruculose,
 15-16 x 8 µm; asci 90 x 12 µm; on *Collema tenax*; England (N. Devon).
 See Hawksworth (1990), Lowen (1990).
 **Pronectria tenacis** (Vouaux) Lowen 1990
 [syn. *Nectriella tenacis* (Vouaux) Weese 1914]
 Ascomata orange but red around the ostiole; ascospores smooth-walled, 22-
 28 (-33) x 3.5-4(-4.5) µm, l/w less than 5; on *Collema cristatum* and
Peltigera spp.; England (E. Cornwall, N. Devon), Scotland (Midlothian)
 and Spain (Navarra). See Hawksworth (1978a).
 **Pronectria tenuispora** (D. Hawksw.) Lowen 1990
 [syn. *Nectriella tenuispora* D. Hawksw. 1978]
- 148 (146) Ascospore wall smooth 149
 Ascospores wall verruculose or spinose 153
- 149 (148) Ascomata without white hairs around the ostiole..... 150
 Ascomata with white hairs around the ostiole, bright orange, 12-32 x 3.5-
 5.5 µm; ascospores 14.5-17 x 4-6.5 µm; asci 44 x 18-20 µm; anamorph
Acremonium pedatum Lowen [not seen in both British and Spanish
 material]; on *Hypogymnia physodes*; Scotland (Argyllshire), Ireland (W.
 Galway, W. Mayo, W. Donegal), Spain (Alava, Navarra). See
 Hawksworth (1990), Lowen (1989, 1990).
 **Pronectria anisospora** (Lowen) Lowen 1990
- 150 (149) Asci 8-spored 151
 Asci 4(-5?)-spored; ascospores (14-)14.5-18(-20) x (4-)4.5-6 µm; ascomata
 orange, 100-200 µm diam; on *Punctelia subrudecta*; England (S.
 Somerset). See Lowen (1995).
 **Pronectria oligospora** Lowen & Rogerson 1995

- 151 (150) Ascospores more than 5 µm in width 152
 Ascospores (16-)18-21.5(-23) x 4.5-4.5 µm; ascomata yellowish where exposed, wall pale orange, 120-150 µm diam; on *Collema* spp.; Spain (Navarra). See von Brackel & Etayo (2010).
 **Pronectria collematis** Etayo & Brackel 2010
- 152 (151) Ascomata pale when moist, brownish when dry; outer wall orange; asci 55-60 µm; ascospores (13-)16-21(-24) x 5-7.5 µm; producing white infections on *Endocarpon loscosii*; Spain (Navarra). See Etayo & Breuss (1996).
 **Pronectria dealbans** (Müll. Arg.) Etayo & Breuss 1996
 Ascomata deep pink when dry, yellowish or orange when moist, 100-150 µm diam; ascospores 1-septate, breaking into ovoidal cells, hyaline, smooth, 12.5-17 x 5-6 µm; on *Punctelia subrudecta*; Spain (Guipúzcoa, Navarra). See Etayo (1998).
 **Pronectria oligospora** var. **octospora** Etayo 1998
- 153 (148) Ascospores mostly less than 5 µm wide 154
 Ascospores mostly more than 5 µm wide 155
- 154 (153) Ascospores verruculose, ellipsoid, 17-24 x 4-5 µm, l/w more than 5; ascomata bright orange, dark orange and translucent around the ostiole; on *Xanthoria parietina*; England (Derbyshire), Spain (Soria). See Hawksworth (1994), Lowen & Diederich (1990).
 **Pronectria xanthoriae** Lowen & Diederich 1990
 Ascospores spinulose, ovoid, (9-)15-20 x 4.5-5 (-6) µm; ascomata orange to yellow, 220-300 x 150-270 µm diam, immersed in circular bleached ash-white patches; on corticolous *Pertusaria* species, including *P. hymenea* and *P. pertusa*; Ireland (Meath, Wicklow), Spain (Pyrenees, Canary Islands). See Rossman *et al.* (1999).
 **Pronectria pertusariicola** Lowen 1999
- 155 (153) Ascospores smooth to slightly roughened 156
 Ascospores echinulate, 12-14(-18) x 5.5-8(-10) µm; ascomata obpyriform, orange-brown immersed in bleached patches of the host, becoming darker in KOH; on *Physcia aipolia* and others foliose species of *Physciaceae*; British Isles: Scotland (Mid Ebudes), Ireland (S. Kerry, N. Tipperary, W. Donegal), Spain (Málaga, Navarra). See Rossman *et al.* (1999).
 **Pronectria echinulata** Lowen 1999
- 156 (155) Ascospores (11-) 12-15 (-17) x (4-)4.5-7 µm; ascomata pale red to orange yellow when dry, 240-340 x 250-320 µm diam; ? anamorph *Illosporium carneum* (see 203a) usually present; on *Peltigera* thalli; widespread and locally abundant in England.
 **Pronectria robergei** (Mont. & Desm.) Lowen 1990
 [syn. *Nectriella robergei* (Mont. & Desm.) Weese 1910]
 Ascospores (10-)11-14(-15) x 4.5-6(-7) µm; ascomata deep red; anamorph (known in culture) *Acremonium* sp.; parasitic, forming bleached areas on the thalli of *Anaptychia runcinata*; locally abundant in the British Isles, England (S. Devon), Scotland (E. Lothian), Ireland (S. Kerry, W. Mayo, Down), Spain (Tarragona). See Hawksworth (1980a, 1982a), Navarro-Rosinés *et al.* (1994a).
 **Pronectria santessonii** (Lowen & D. Hawksw.) Lowen 1990
 [syn. *Nectriella tinctoria* auct. p. p., non (Fuckel) R. Sant. 1960]
- 157 (130) Ascomata thyrlotheceoid, or catatheceoid, composed of two superimposed

- plates of radially arranged quadrangular cells.....158
 Ascomata perithecioid, flask-shaped 163
- 158 (157) Ascomata catathecia, with a basal plate159
 Ascomata thyriothecia, basal plate absent, 80-160 μm diam, ostiolar setae
 absent; asci 4 (-6) spored; ascospores 1-septate, 14-16 x 2.5-4 μm ;
 comensalistic on *Cetraria islandica*; Scotland (S. Aberdeenshire), no
 recent records, Spain (La Rioja). See Hawksworth (1980a), Etayo &
 Breuss (1996).
 **Lichenopeltella cetrariicola** (Nyl.) R. Sant. 1989
- 159 (158) Setae absent around the ostiolar region 160
 Setae present around the ostiolar region..... 161
- 160 (159) Cathathecia black, 90-135 μm diam; asci 8-spored; ascospores hyaline, 1-
 septate, 11-14.5 x 3.5-5 μm , with two pairs of setulae near the septum;
 on *Ramalina chondrina* and *R. cf. farinacea*; Spain (Canary Islands). See
 Aproot *et al.* (1997).
 **Lichenopeltella ramalinae** Etayo & Diederich 1997
 Cathathecia black, (75-)100-125 μm diam; asci 8-spored; ascospores
 hyaline, (0-)1-(-3) septate, (9-)12.5-15(-17) x 4.5-5 μm , with 2-4(-5)
 setulae; setulae arising on the sides or towards the ascospore apex; on
 thallus of *Verrucaria muralis*; England (E. Norfolk). See Earland-
 Bennett & Hawksworth (1999).
 **Lichenopeltella coppinsii** Earl.-Benn. & D. Hawksw. 1999
- 161 (159) Ascospores with setulae.....162
 Ascospores lacking setulae, hyalinae, 1-septate, (12-)16-20 x 2.5-3.5 μm ;
 catathecia 100-160 μm , black; on *Peltigera canina*; Canary Islands,
 Spain (widespread in north and central regions). See Spooner & Kirk
 (1990).
 **Lichenopeltella santessonii** (P. M. Kirk & Spooner) R. Sant. 1993
- 162 (161) Catathecia 75-110 μm diam, ostiolar region with 5-8 dark-brown convergent
 setae, setae simple, swollen at the base, 13-22 μm length; asci 8-spored;
 ascospores 1-septate, 11-15- x 3-3.5 μm , with 3 pairs of setulae; on the
 lower surface of the thallus of *Lobaria pulmonaria* especially in non-
 tomentose areas; Spain (Navarra). See Etayo & Diederich (1996).
 **Lichenopeltella lobariae** Etayo & Diederich 1996
 Catathecia 50-70 μm diam, ostiolar region with 3-6 dark red-brown
 divergent setae, setae simple, 12-35 μm tall; asci 4-spored; ascospores 1-
 septate, (13.5-)15-21 x (3-) 4-5 μm , with 3 pairs of setulae; on *Peltigera*
 thalli; England (Shropshire), Wales (Caernarvonshire). See Hawksworth
 (1982a), Spooner & Kirk (1990).
 **Lichenopeltella peltigericola** (D. Hawksw.) R. Sant. 1993
- 163 (157) Ascospores mostly less than 4 μm wide164
 Ascospores mostly more than 4 μm in width..... 176
- 164 (163) Interascal tissues of filaments (paraphyses or paraphysoids)165
 Interascal tissues absent or cellular (stromatic)167
- 165 (164) Ascomata perithecioid166
 Ascomata at first perithecioid, later apothecioid erumpent to sessile, black,
 (100-)200-300(-500) μm diam; paraphyses filiform to moniliform; asci 8-
 spored; ascospores filiform to sigmoid with obtuse ends (0-)1-3(-5)-
 septate, 15-32 x 3-4 μm ; on *Ochrolechia* and *Pertusaria* spcies; Wales

- (Caernarvonshire), Ireland (Co. Kerry), Spain (Navarra). See, Holien & Triebel (1996).
**Spirographa vinosa** Holien & Triebel 1996
- 166 (165) Ascomata (200-)250-400(-450) µm diam, black; asci 8-spored; ascospores filiform, straight, or sigmoid, (1-)4(-8)-septate, (20-)27-39.5(-46) x (3-)3.5-4.5(-5) µm; on *Porpidia glaucophaea* and *P. rugosa*; Scotland (Midlothian) and Wales (Caernavon). See Triebel (1989).
**Sagediopsis barbara** (Th. Fr.) R. Sant & Triebel 1989
 Ascomata 125-150(-225) µm diam, black; asci 8-spored; ascospores filiform to sigmoid (0-)3(-6)septate, 35-40x(2.5-)3-3.5(-4) µm; on *Koerberiella wimmeriana*; Scotland (North Eubudes), Wales (Caernarvonshire). See Triebel (1989).
**Sagediopsis aquatica** (Stein) Triebel 1989
- 167 (164) Asci 8-spored 168
 Asci 16-spored; ascospores 50-100 x 2-3 µm, simple but often appearing multiseptate due to included guttules; on old *Peltigera* thalli; Scotland, Wales (Glamorganshire). See Keissler (1930).
**Neolamyia peltigerae** (Mont.) Theiss. & H. Sydow 1918
- 168 (167) Ascomata spreading over the surface of the host, connected with a superficial net-like of brown vegetative hyphae..... 169
 Ascomata immersed, not connected with a superficial net-like of brown vegetative hyphae..... 170
- 169 (168) Ascomata not setose, 150-300 µm diam, internally composed of subglobose cells; cells 5-8 µm diam; ascospores bent spirally, attenuated towards the end, hyaline, 1-septate, the septum very thin often indistinct, 20-27 x 3-4 µm; on *Fuscidea cyathoides*; Spain (Alava). See Etayo (1995).
**Diederimyces fuscideae** Etayo 1995²⁶
 Ascomata setosa²⁷, 40-80 µm diam; ascospores 8-9.5 x 3.4-4.5 µm, hyaline, 1-septate, ellipsoid, apices rounded; on *Parmelia saxatilis* and *Flavoparmelia caperata*; Spain (Lugo, Soria). See Zopf (1898), Keissler (1930), Navarro-Rosinés & Gómez-Bolea (1989).
**Echinothecium reticulatum** Zopf 1898
- 170 (168) Ascospores mainly simple 171
 Ascospores mainly 1-septate 173
- 171 (170) Ascospores filiform, apices rounded never capitate 172
 Ascospores cylindrical-sigmoid, apices sometimes capitate, 25-35 (-45)50-60 x (2.5-)3-4.5(-5) µm, colourless; ascomata single, black, subspherical, 0.5-1mm diam; on crustose lichens on basic rocks or limestones, e.g. *Aspicilia radiosa*, *Caloplaca aurantia*, *Catillaria chalybeia*, *Lecanora xanthostoma*, *Protoblastenia rupestris*; England (Somerset, Derbyshire, Lincolnshire), Spain (Tarragona, Lerida, Murcia, Granada). See Aguirre-Hudson (1991), Navarro-Rosinés & Hladún (1990).
 **Sarcopyrenia gibba** Nyl. 1857
 [var. **gibba** has helically twisted ascospores and a southern distribution in Spain, and var. **geisleri** (Beckh.) Nav.-Ros. & Hladún 1990 has straight or slightly twisted ascospores and a wider distribution in Europe.]

²⁶ Suggested to be the teleomorph of (XXXX) *Phaeosporobolus alpinus*.

²⁷ See also *Sphaerellothecium* species, *Lichenostigma cosmopolites*, and *L. semimmersa*.

- 172 (171) Ascospores (45-)50-60 x (1-)2-2.5 μm , filiform, with rounded apices, colourless; ascomata black, subspherical to applanate, 500-1200 μm diam; on *Thelidium* sp., *Verrucaria nigrescens* and *V. subtruncatula*; England (W. Sussex), Spain (Tarragona). See Aguirre-Hudson (1991), Navarro-Rosinés & Hladún (1990).
 **Sarcopyrenia beckhausiana** (Lahm) M.B. Aguirre *et al.* 1990
 Ascospores 15-21 x 1.5-2.5 μm , filiform, straight or slightly curved, with rounded apices, colourless; growing on several aquatic lichens living endolithic on basic rocks as *Thelidium eitneri* and *Verrucaria flavicans*; in Spain: Cataluña, Tarragona. See Navarro-Rosinés & Hladún (1990).
 **Sarcopyrenia bacillospora** Nav.-Ros. & Hladún 1990
- 173 (170) Ascospores mainly more than 22 μm in length 174
 Ascospores mainly less than 22 μm in length 175
- 174 (173) Ascospores (22-)35-40 x 2-3 μm , filiform to sigmoid, with rounded apices, colourless; ascomata black, subspherical to applanate, 400-600 μm diam; on *Aspicilia* sp. and *Candelariella vitellina*; England (Sulfolk), Spain (Barcelona, Castellón, Lérida, Murcia). See Aguirre-Hudson (1991), Navarro-Rosinés & Hladún (1990)²⁸.
 **Sarcopyrenia cylindrospora** (P. Crouan & H. Crouan) M.B. Aguirre 1990
 Ascospores (22-)25-32(-35) x 1.5-2 μm , guttulate, acicular to slightly sigmoid; ascomata reddish brown to dark brown; asci odontremoid; commensalistic to parasitic on a wide number of hosts, including *Pertusaria albescens*, *Phlyctis agelaea*, *Lecanora horiza*, *Cetrelia olivetorum*, *Lobaria pulmonaria*, *L. scrobiculata*, *Pertusaria pertusa*, *Ochrolechia tartarea*, and *Porpidia* spp.; England (Cumberland), Wales (Cardigan), Ireland (S. Kerry), Spain (Cataluña, Alava, Navarra, Canary Islands). See Hawksworth (1980a), Giralt & Gomez-Bolea (1990), Hafellner (1996).
 **Spirographa fusisporella** (Nyl.) Zahlbr. 1903
- 175 (173) The following taxa have overlapping morphological characteristics regarding to ascomata size, ascospore size and septation, and other diagnostic characters have often been omitted from descriptions²⁹. The species circumscriptions are often unclear and require elucidation with the assistance of molecular phylogenetic methods. The species are therefore listed below in alphabetical order by the host genus – including for convenience those with ascospores mainly or entirely more than 4 μm in width:

On *Acarospora fuscata*

Ascospores 1-septate, with the lower cell thinner than the upper, 9-12 x 4-5 μm ; asci 4-8-spored; vegetative hyphae brown, ascomata 65-90 μm diam, subglobose, almost sessile on squamules of *Acarospora fuscata*, also on an unidentified lichen thallus; **British Isles**, Spain (W. Pyrenees). See Vouaux (1912), Unamuno (1941), Etayo & Breuss (1996).
 **Stigmatidium fuscatae** (Arnold) R. Sant. 1993

On *Anaptychia ciliaris*

Ascospores 1-(3)-septate?; ascomata abundantly developed; on the lower

²⁸ Navarro-Rosinés & Hladún (1990) also studied a collection of an unidentified *Sarcopyrenia* sp. from Spain (Almería) with ascospores 0 (-2)-septate, 20-28 x 2-3 μm , on the thallus of a cyanolichen, probably *Lichinella stipitula*.

²⁹ See also the species of the *Stigmatidium psorae* group with interascal filaments present in the early stages, but not always easily seen; i.e. (XXX) *S. psorae*, (XXX) *S. rouxianum*, and (XXX) *S. squamarinicola*.

part of the thalli of *Anaptychia ciliaris*; England (Hertfordshire, Isle of Man, W. Gloucestershire), Scotland (E. Lothian). Ireland (S. Kerry), Spain (Cataluña). See Hawksworth (1994).

..... **Stigmatidium hageniae** (Rehm) Hafellner 1988

On *Arthonia radiata*

Ascospores 17-23 x 4-5 µm, 1(-3) septate; ascomata globose 100-200 µm, diam; on *Arthonia radiata*; Scotland (W. Inverness-shire), Spain (Canary Islands). See Pitard & Harmand (1911), Hafellner (1994b).

..... **Stigmatidium arthoniae** (Arnold) Hafellner 1994

On *Aspicilia calcarea*

Ascospores 22-30 x 4.5-9 µm, 1-septate; ascomata aggregated into small groups. Ireland (W. Galway, Down, Antrim; no recent records). Reports from *Pertusaria* spp. refer to *S. eucline*. See Kocourková & Knudsen (2010).

..... **Stigmatidium aggregatum** (Mudd) D. Hawksw. 1975

On *Degelia plumbea*

Ascospores clavate to ellipsoid, 1-septate, the upper cell somewhat broader, (9-)11-16 (19.5) x (3-) 4-5 (-6) µm, epispore finely verruculose to smooth at maturity; ascomata (55-) 80-110 x (50-)100-130 µm diam, globose to subglobose; immersed in the surface layers of the thallus of *Degelia plumbea*; Scotland (Argyllshire, Isle of Skye, W. Inverness-shire), Ireland (W. Galway), Spain (León, Navarra). See Santesson (1993), Etayo(1994a), Hawksworth (1994), Roux & Triebel (1994).

..... **Stigmatidium degelii** R. Sant. 1993

On *Dermatocarpon*

Ascospores ellipsoid, 1-septate, with the upper cell broader than the lower, 17-20 x 4.5-5 µm; ascomata 50 x 100 µm diam; immersed in the thallus of *Dermatocarpon* cf. *miniaturum*; Spain (Asturias). See Keissler (1930), Santesson (1960)..... **Stigmatidium stygnospila** (Minks) R. Sant. 1960

On *Ephebe lanata*

Ascospores 1-septate, 16-20 x 4-5 µm; ascomata 70-125 x 60-120 µm diam, globose to subglobose; on *Ephebe lanata*, forming galls; British Isles, no recent reports. See Henssen (1963)³⁰.

..... **Stigmatidium ephebes** (Henssen) D. Hawksw. 1975

On *Graphis scripta*

Ascospores 14-19 x 3-5 µm, 1-septate; asci 8-spored; ascomata 80-120 µm diam, **clypeus present?**; periphysoids present; usually on *Graphis scripta*; British Isles, Ireland (S. Kerry, Londonderry). See Keissler (1930), Hawksworth (1975a).

..... **Stigmatidium microspilum** (Körber) D. Hawksw. 1975

On *Lecania* species

Ascospores 1-septate, 14-18 x 3.5-5 µm; ascomata minute, half-globose; immersed in the surface layers of the thallus of *Lecania cyrtella* and *L. turicensis*³¹; England (Somerset, in need of confirmation), Spain (Tarragona). See Hawksworth (1975a).

..... **Stigmatidium punctillum** (Arnold) D. Hawksw. 1975

On *Lecanora chlarotera* s. lat. species

Ascospores (11-)12-14(-16) x (2.5-)3-4 µm, 1(-3)-septate; epispore finely verruculose; ascomata subglobose, 40-85 x 30-77 µm diam; on *Lecanora chlarotera* s. lat.; Scotland (S. Aberdeen), Spain (Castellón, Ciudad Real, Cuenca, La Rioja, León, Lugo, Navarra, Lugo, Tarragona, Valencia, probably also Granada and Malaga [Werner (1975), as *Pharcidia epicymatia*], Canary Islands). See Werner (1975), Roux & Triebel (1994).

..... **Stigmatidium congestum** (Körb.) Triebel 1991

³⁰ The original description suggests that this species may belong to *Didymellopsis* (J. C. David, pers. comm.).

³¹ Spanish material mentioned on *Caloplaca marmorata*, and *Arthopyrenia* sp. should be confirmed.

On *Lecanora polytropa*

Ascospores ellipsoid, halonate, 1-septate, with the lower cell slightly attenuated, (8.5-) 9-13 (-14) x (3.5-) 4-5 (-6) μm ; vegetative hyphae colourless; ascomata 65-75 x 40-55 μm diam; immersed on the ascoma of *Lecanora polytropa*; Spain (Cuenca). See Roux & Triebel (1994).

..... **Stigmatidium squamariae** (B. de Lesd.) Cl. Roux & Triebel 1994

On *Lecidella* species

Ascospores hyaline, 1-septate, rounded at both ends, (11-)12-15(-16) x 3-4 μm , perispore finely verruculose at maturity, not halonate; ascomata 60-90 x 42-75 μm diam, subglobose to oblongue, abundant, 13-20 (-40); immersed in apothecia of *Lecidella elaeochroma*; Scotland (E. Sutherland), Spain (Navarra). See Roux & Triebel (1994), Roux *et al.* (1995).

..... **Stigmatidium lecidellae** Triebel *et al.* 1995

On *Lobaria pulmonaria*

Ascospores hyaline, soon becoming brownish, 1-septate, clavate, 9.5-13.5 x 3-4 μm ; ascomata 40-70 μm diam, immersed to emergent; on thallus of *Lobaria pulmonaria*; Spain (Navarra). See Etayo & Diederich (1996)

..... **Stigmatidium sp.**

On *Mycobilimbia* species

Ascospores (10.5-)11.5-16 (-16.5) x (2.5-) 3-4 (4.5) μm , 1(-3)-septate, not halonate; vegetative hyphe pale brown; ascomata globose 60-90 x 55-75 μm diam; on *Mycobilimbia* species; Scotland, Spain (Navarra). See Roux & Triebel (1994).

..... **Stigmatidium mycobilimbiae** Cl. Roux *et al.* 1994

On *Pannaria conoplea*

Ascospores rounded at both ends, 1-septate, both cells more or less equal in size, epispore not or scarcely visible, not forming a halo, (10.5-)12-14(-14.5) x 3-4(-5) μm ; ascomata 55-65 x 50-60 μm diam; partially to completely immersed on the thallus of *Pannaria conoplea* (syn. *P. rubiginosa*); Ireland (W. Galway). See Roux & Triebel (1994).

..... **Stigmatidium mitchellii** Cl. Roux & Bricaud 1994

On *Peltigera* species

Ascospores oblong to elongate- ellipsoid to subclavate, 1-septate, the upper cell somewhat broader, (8.5-)9-11.5 (-12) x (2.5-)3-4(-4.5) μm , halo not or hardly visible; ascomata 50-70 x 45-65 μm diam, globose, crowded together; on dead or dying parts of the thallus of several *Peltigera* species; Scotland (Mid-Hebrides, ETC), Spain (Oviedo). See Santesson (1960, 1994a), Hawksworth (1975a, 1980b), Roux & Triebel (1994).

..... **Stigmatidium peltideae** (Vain.) R. Sant. 1960

Ascospores (10-)10.5-14 x 3.5-5.5 (-6) μm , subclavate to oblong, 1-septate, smooth hyaline and halonate at first, pale brown, without a halo and with a finely verruculose surface at maturity; ascomata 90-100 μm ; vegetative hyphae brown; producing slight decoloration on the thallus of various *Peltigera* species; Spain (Asturias, Burgos, Cáceres, León, Lérída, Madrid, Navarra, Segovia, Tarragona, Teruel). See Roux & Triebel (1994).

..... **Stigmatidium pseudopeltideae** Cl. Roux & Triebel 2003

Ascospores oblong, elongate ellipsoid or slightly subclavate, rounded at both ends, 1-septate, apical cell broader and shorter than the lower, (12-)13-15(-15.5) x 3.5-5(-5.5) μm , with a halo; ascomata 55-70 x 50-65 μm diam, crowded together; immersed in dying parts of the thallus of *Peltigera leucophlebia*; Scotland (Mid-Perthshire). See Roux & Triebel (1994).

..... **Stigmatidium leucophlebiae** Cl. Roux & Triebel 1994

On *Pertusaria* species

Ascospores 1-septate, 11.5-18 x 4.5-6 μm ; ascomata globose to subglobose, closely aggregated in groups of 3-12, ascomatal walls often confluent; in

the thallus of *Pertusaria hemisphaerica*, *P. pseudocorallina*, or more usually *P. lactea*. Scotland (Berwickshire, Mid-Perthshire, Moray), Wales (Cardigan, Denbigh), and Ireland (W. Galway, Down, Antrim). See Kocourková & Knudsen (2010) and Matzer & Hafellner (1990).

..... **Stigmatidium eucline** (Nyl.) Vězda 1970
[syn. *S. aggregatum* auct. angl. p.p.]

On *Physcia caesia*

Ascospores ellipsoid to oblong, 1-septate, not halonate, with the lower cell being longer and narrower than the upper, (8-)9-13(-16) x (3-)7 µm; ascomata 30-80 x 40-70 µm diam, globose to elongate ovate, immersed in the thallus of *Physcia caesia*; Scotland (W. Sutherland, E. Inverness-shire), Spain (Canary Islands). See Matzer & Hafellner (1990), Hitch (1997).

..... **Stigmatidium pumilum** (Lettau) Matzer & Hafellner 1990

On *Placynthium species*

Ascospores hyaline to pale brown, 1-septate, ellipsoid to oblong, rounded at both ends or somewhat attenuated, (7.5-)9.5-12(-13.5) x 3 (-4) µm, perispore forming a thin halo; halo 0.5µm in width; ascomata 50-70 x 45-65 µm diam, globose; on thallus of *Placynthium nigrum*; Spain (Tarragona). See Roux & Triebel (1994)

..... **Stigmatidium placynthii** Cl. Roux & Nav.-Ros. 1994

On *Pleurosticta species*

Ascospores hyaline, 1-septate, ellipsoid to oblong, rounded at both ends or somewhat attenuated, (7.5-)8-10.5(-11) x 3-4(-4.5) µm, or without gelatinous sheath; asci 8-spored; ascomata 50-85 µm diam; Hymenial gel I-; on thallus of *Pleurosticta acetabulum*; in Spain Albacete, Burgos, Teruel and Valencia. See Calatayud & Triebel (2001).

..... **Stigmatidium acetabuli** Calat. & Triebel 2001

On *Polyblastia theleodes*

Ascospores ellipsoid-claviform, 1-septate, (15-)16-18(-20) x 6-7.5(-8) µm; ascomata 200 x 250 µm diam; immersed on *Polyblastia theleodes*; Scotland (Perthshire), no recent reports³². See Vouaux (1912), Keissler (1930), Navarro-Rosinés *et al.* (1994a).

..... **Stigmatidium superpositum** (Nyl.) D. Hawksw. 1975

On *Ramalina species*

Ascospores hyaline, 1-septate, 8-12 x 2.5-3.5 µm; ascomata 60 x 110 µm diam, subglobose; on thallus of *Ramalina bourgeana*, *R. cuspidata*, and *R. decipiens*; Scotland (E. Lothian, W. Ross), Ireland (S. Kerry), Spain (Canary Islands). See Hafellner (1994a).

..... **Stigmatidium epiramalina** (Vouaux) Hafellner 1994

On *Solorina species*

Ascospores hyaline to pale brown, ellipsoid to oblong, 1-septate, with a finely verruculose epispore, the lower cell slightly attenuated, (10-)10.5-13.5(-14) x 3-4(-4.5) µm; vegetative hyphae colourless; ascomata 60-125 x 57-115 µm; diam, immersed in the thallus of *Solorina saccata*; England (Derbyshire), Spain (Barcelona), and Wales (Caernarvon). See Roux & Triebel (1994).

..... **Stigmatidium solorinarium** (Vain.) D. Hawksw. 1983

On *Squamarina species*

Ascospores hyaline, 1-septate, lower cell narrower and sometimes longer than the upper one, with or without gelatinous sheath, 8-12(-14) x 3-4.5(-5) µm; asci (4-)6-8-spored; ascomata 60-100(-140)µm diam; Hymenial gel I+ violet; on thallus of *Squamarina cartilaginea*; Spain (Valencia). See Calatayud & Triebel (2003).

..... **Stigmatidium cartilagineae** Calat. & Triebel 2003

³² Material, mentioned by Navarro-Rosinés (1994) from Spain (Cataluña) as *Pharcidia maritima* B. de Lesd. 1911 on *Verrucaria muralis* probably should be included here.

- On *Thellenella muscorum*
 Ascospores 12-18 x 3-6.5 µm; ascomata in dense groups, ½-2/3 immersed, 75-140 µm diam; on thallus of *Thellenella muscorum*; Spain (Castilla y Leon). See Pérez-Ortega *et al.* (2010).
 **Stigmatidium humidum** Pérez-Ortega *et al.* 2010
- On *Toninia* species
 Ascospores hyaline, 1-septate, (10-)11.5-12.5 (-14) x (3-)3.5-4 µm; ascomata
 65 x 75 µm diam; on thallus of *Toninia tristis*, *T. toepfferii*, *T. sedifolia* and *Lecania olivacea*; Scotland (East Ross), Spain (Tarragona, Granada, Málaga, Canary Islands). See Triebel (1989).
 **Stigmatidium tabacinae** (Arnold) Triebel 1989
- On *Verrucariaceae* indet.
 Asci 4-spored³³, ascospores hyaline, ellipsoid, 1-septate, 13-14 x 4-5 µm; vegetative hyphae brown; ascomata numerous in groups of 25-40, 80-150 µm diam, sessile; on sterile thallus of *Verrucariaceae*; Spain (Navarra). See Etayo (1994a).
 **Stigmatidium tetrasporum** Etayo 1994
- On *Verrucaria aquatilis* and *V. hydrela*
 Ascospores (11-) 12-15.5 x 4-5 µm, 1-septate; ascomata numerous, globose, 45-75 µm diam; on *Verrucaria aquatilis* and *V. hydrela*; Scotland (E. Perthshire, River Isla), England (S. Somerset). See Roux & Navarro-Rosinés (1994).
 **Stigmatidium rivulorum** (Kernst.) Cl. Roux & Nav.-Ros. 1994
- On *Verrucaria mucosa*, *V. maura*, and *V. halizoa*
 Ascospores 1-septate, (7-)10-15 (-17) x (3.5-) 4-6 µm, sometimes with 2 pseudosepta; ascomata 100-150 (-170) µm diam, globose, immersed in the thallus of *Verrucaria mucosa*, *V. maura*, and *V. halizoa*, in supralittoral localities; England (S. Devon, Isle of Wight), Ireland (W. Cork, Dublin), Channel Islands, Spain (Vizcaya). See Swinscow (1965), Renobales (1996).
 **Stigmatidium marinum** (Deakin) Swinscow 1965
- On *Verrucaria nigrescens* and *V. viridula*
 Ascospores ellipsoid, 1-septate, more or less equally celled, (10-)12.5-17.5(-19.5) x (4.5-)5-6.5(-7.5) µm, halonate; halo 0.5 µm thick; ascomata 80-130 x 65-120 µm diam; immersed in the areoles of *Verrucaria nigrescens* and *V. viridula*; England (S. Essex), Spain (Tarragona), and Scotland (W. Ross). See Roux & Navarro-Rosinés (1994).
 **Stigmatidium clauzadei** Cl. Roux & Nav.-Ros. 1994
- On *Xanthoparmelia* species
 Ascospores 12-15 (-15.5) x 5-6 (-7) µm, oblong, 1-septate, smooth and halonate at first, pale brown, without a halo and with a granular surface at maturity; ascomata (65-) 70-85 (-100) µm; hymenial gel I+ violet; vegetative hyphae colourless or pale brown, I+ violet; producing slight decoloration on the thallus of a brown *Xanthoparmelia* sp.; Spain (Castellón). See Calatayud & Triebel (1999).
 **Stigmatidium neofusceliae** Calatayud & Triebel
 Ascospores 13-16 x 4-5.5 µm, hyaline, 1-septate, lower cell narrower and sometimes longer than the upper one; ascomata 60-80 µm diam; hymenial gel I-; forming black necrotic patches that become grey at their central part, on thallus of *Xanthoparmelia conspersa* and *X. protomatrae*; Ireland, Spain (Castellón). See Hafellner (1994a).
 **Stigmatidium xanthoparmeliarum** Hafellner 1994
- 176 (163) Interascal tissues (hamathecium) present 177

³³ See also (XXX) *Stigmatidium fuscatae*.

- Interascal tissues (hamathecium) absent, gelatinized or poorly developed,
periphyses sometimes present 214
- 177 (176) Ascospores submuriform or muriform178
Ascospores transeptate180
- 178 (177) Ascomata not in thalline warts, more or less immersed on the thallus.....179
Ascomata immersed on thalline warts of the thallus, 300-500 µm diam;
ascospores 24-36 x 9-14 µm, muriform with up to 2 longitudinal walls
per segment, on decaying mosses and lichens; Scotland. See Mayrhofer
& Poelt (1985).
.....**Protothelenella leucothelia** (Nyl.) H. Mayrhofer & Poelt 1985
- 179 (178) Ascospores 22-33 x 7-10µm, 7-9 transeptate, 4-6 longiseptate; ascomata
100-300 µm; diam, black, sessile to slightly immersed; overgrowing
hepatics; north Scotland, Spain (Gerona). See Mayrhofer & Poelt (1985)
and Purvis & *et al.* (1992).
.....**Protothelenella sphinctrinoidella** (Nyl.) H. Mayrhofer & Poelt 1985
Ascospores 38-50 x 10-15 µm, strongly muriform, with 4 longitudinal walls
in the central region of the spore; ascomata, 400-600 µm; diam, dark
brown half to entirely immersed, overgrowing bryophytes; Ireland,
Scotland. See Mayrhofer & Poelt (1985) and Purvis & *et al.* (1992).
.....**Protothelenella sphinctrinoides** (Nyl.) H. Mayrhofer & Poelt 1985
- 180 (177) Asci without a minute I+ blue ring around the apex of the ocular chamber
.....181
Asci with minute I+ blue ring around apex of ocular chamber; ascomata 50-
100 µm diam, immersed to erumpent arising in loose groups; exciple 6-
10 µm wide, but to 40 µm wide near the pore, dark brown, K+
olivaceous; ascospores (1-)3-septate, (14-)17.5-24 x (4-)5-7 µm, hyaline;
on thallus of *Ionaspis lacustris*; England (Cumbria, S. Somerset), Ireland
(E. Donegal), Scotland (W. Ross) and Wales (Caernarvon, Merioneth).
See Alstrup & Hawksworth (1990).
.....**Kalaallia reactiva** Alstrup & D. Hawksw. 1990
- 181 (180) Peridial cells pigmented 182
Peridial cells hyaline, or at most slightly brownish around the ostiole; asci
fissitunicate, 8-spored; interascal filaments mostly unbranched,
ascospores narrowly ellipsoid, minutely verrucose when mature or over-
mature, 3-septate, (22-)24-28(-31) x 4-6(-7) µm; in convex to basally
constricted galls; on *Xanthoparmelia* spp., especially *X. conspersa*;
Canary Islands (Gran Canaria). See Hafellner (2001).
.....**Trematosphaeriopsis parmeliانا** (Jacz.) Elenkin 1901
- 182 (182) Pigment of the peridial cells amorphous and located in the cell walls,
ascospores without verruculose episore 183
Pigment of the peridial cells forming fine granules and located in the
intercellular areas; ascospores surrounded by a finely verruculose
episore205
- 183 (182) Ascomatal wall mainly blue or green pigmented, ascospores 1-6-septate ..184
Ascomatal wall mainly brown to black-brown pigmented, ascospores 1-3-
septate..... 195
- 184 (183) Ascospores 3- or more septate 185
Ascospores 1-septate³⁴ 186

³⁴ See also (XXX) *Stigmidium psorae* which rarely has 4-5-septate ascospores.

- 185 (184) Ascospores(3-)4-6-septate, 18-23 x 4.5-6µm; asci 6-8-spored; peridial wall grey-green; on *Solorina crocea* and *Peltigera leucophlebia*; Scotland. See Hafellner (1987) and Hawksworth (1990).
 **Cercidospora lichenicola** (Zopf) Hafellner 1987
 [syn. *C. decolorella* var. *lichenicola* (Zopf) O.E. Erikss. & J.Z. Yue 1992³⁵]
 Ascospores 3-septate, 15 x 4.5 µm; ascomata black; on thallus of *Cladonia furcata*, *C. portentosa* and *C. cf. mitis*; England (S. Devon), Ireland (Co. Wexford), Scotland (W. Perth, Moray). See Alstrup (1997).
 **Cercidospora cladoniicola** Alstrup 1997
- 186 (184) Asci mainly 8-spored 187
 Asci mainly (2-)4-spored..... 193
- 187 (186) Ascospores not caudate..... 188
 Ascospores caudate with the lower cell attenuated and twice the length of the upper, 22-27 x 5-7 µm; asci 4-6-8-spored; on *Caloplaca aurantia*; Spain (Mallorca). See Hafellner (1987).
 **Cercidospora caudata** Kernst. 1894
- 188 (187) Interascal filaments rudimentary, cellular; ascomatal wall never K+ aeruginose 189
 Interascal filaments well-developed, branched and anastomosed; ascomatal wall K+ aeruginose or not 191
- 189 (188) Ascomata mainly more than 120 µm diam..... 190
 Ascomata 85-120 µm diam; ascospores (11-)13-15 (-16) x (5-) 6.5 (-7) µm, 1-septate, smooth, halonate, guttulate, .hyaline, rarely brown with age; asci (4-) 6-8-spored; vegetative hyphae colourless, I+ violet or I-; ascomata; hymenial gel I-; interascal filaments present, but rather inconspicuous; immersed in the thallus of *Squamarina cartilaginea*, *S. gypsacea*, and *S. lentigera*; Spain (Almería, Madrid, Valencia). See .. Calatayud & Triebel (2003).
 **Stigidium squamarinicola** Calat. & Triebel 2003
- 190 (189) Hymenial gel I+ violet; ascospores (16-)17.5-22(-23.5) x (5-) 5.5-7.5 (-8) µm, 1(-3)-septate, exceptionally 4-5-septatae, hyaline to pale brown with age; ascomata (100-)125-150(-200) µm diam; on *Psora crenata*; Canary Islands, Spain (Castellón, Madrid, Tarragona). See Triebel (1989).
 **Stigidium psorae** (Anzi) Hafellner 1984
 Hymenial gel I-; ascospores (14-)14.5-18 (-21) x (5-)6-7(-8) µm, 1-septate, smooth, halonate, hyaline, sometimes brown with age; ascomata 80-200 µm, immersed, producing slightly swollen areas, mostly growing in the thallus but sometimes on the apothecial discs; on *Acarospora cervina*; Spain (Teruel). See Calatayud & Triebel (2003).
 **Stigidium rouxianum** Calat. & Triebel 2003
- 191 (188) Ascomata mainly more than 150 µm diam³⁶ 192

³⁵ *Cercidospora decolorella* (Nyl.) O.E. Erikss. & J.Z. Yue 1992 occurs on algal crusts and is not considered to be lichenicolous.

³⁶ Material on *Megaspora verrucosa* should be compared with the imperfectly known *Cercidospora verrucsoaria* (Linds.) Arnold 1874 described as having ascospores which are 1-septate, colourless, ovate-oblong to subclavate and 8-spored asci. Reported from Scotland (Mid-Perth; no recent records), Spain (Gerona), and the Canary Islands (La Palma). See Hawksworth (1985), Grube & Hafellner (1990).

Ascomata 75-100(-125) µm diam, wall almost hyaline, olivaceous near the ostiole, this region aeruginose in K; ascospores 1-septate, (?13-)17.5-23 [?14-18] x (?3,5-) 5-7(-8) µm, septum refractive where it joins the spore wall; asci (4-6-)8-spored; in the hymenium of *Lecanora polytropa*, and perhaps also of *L. intricata*, *Rhizoplaca melanophthalma*, and *Aspicilia intermutans*³⁷; British Isles (widespread), Canary Islands, Ireland, Spain. See Vězda (1970). Hafellner (1987).

.....**Cercidospora epipolytropa** (Mudd) Arnold 1874 *s. ampl.*

192 (191) Ascomata, immersed, black, 150-180 µm diam; peridium wall blue green; ascospores 18-24 x 6 µm, 1-septate, colourless; asci 8-spored; on *Caloplaca carphinea* and *C. scoriophila*; Spain (Lérida, Murcia, Tarragona, Canary Islands). See Grube & Hafellner (1990).

.....**Cercidospora epicarphinea** (Nyl.) Grube & Hafellner 1990

Ascomata half immersed to immersed, black, 200-300 µm; peridium in upper part greenish; ascospores 1-septate, 12-15(-16) x 4-5 (-6) µm; asci 4-8 spored, forming greyish infections on thallus of *Baeomyces placophyllus* and *B. rufus*; Scotland (Angus). See Ihlen (1998).

.....**Cercidospora parva** Hafellner & Ihlen 1998

193 (186) Ascospores more than 20 µm long 192

Ascospores (12.5-)14-17(-20) x 3.5-4.5 µm, apices tapered; ascomata 60-120 µm diam, walls black with violaceous tinge, K+ blue-black, N + purple-violaceous; on thallus and thalline exciple of *Rinodina conradii*; Canary Islands (La Palma). See Etayo & van den Boom (2005).

.....**Cercidospora rinodinae** Etayo & van den Boom 2005

194 (193) Ascospores 20-24 x 5-7 µm³⁸ with acute ends; asci 4(-6-8)-spored; peridial wall blue-green; on *Protoparmeliopsis muralis* group species; British Isles, Canary Islands, Spain. See Santesson (1960, 1998), Hafellner (1987, 1996).....**Cercidospora ulothii** Körber 1865

[syn. *C. macrospora* (Uloth) Hafellner & Nav.-Ros. 2004]

Ascospores (22-)24-32(37) x (5-)5.5-7(-8) µm, 1-septate, colourless, elliptic-fusiform; asci (2-)4-spored; ascomata (160-)200-280 µm diam; peridial wall blue green in the upper part and colourless at the base in young ascomata, sometimes completely red tinged in old ascomata; immersed in thalli of *Squamarina lentigera* and *S. cartilaginea*; Spain (especially in the east and south). See Navarro-Rosinés *et al.* (1995).

.....**Cercidospora crozalsiana** (H.Olivier) Nav.-Ros. *et al.* 1995

195 (183) Ascospores mainly 1-septate³⁹ 196
 Ascospores mainly 3-septate 203

196 (195) Ascospores mainly exceeding 20 µm in length⁴⁰ 197
 Ascospores mainly less than 20 µm in length⁴¹ 199

197 (196) Ascomata mainly less than 400 µm diam 198
 Ascomata 400-450 µm; ascospores 1-septate, colourless when young, pale brown at maturity, 1-septate (25-)28-35 x 10-12 µm diam; peridial wall

³⁷ Navarro-Rosinés (*in litt.*): *C. epipolytropa* grows only on *Lecanora* gr. *polytropa* species, other different hosts probably have different and in some cases so far undescribed new *Cercidospora* species.

³⁸ Material from northern Spain on *Lecanora (Placodium)* sp. (th.) has larger ascospores 26-30 x 7-8 µm.

³⁹ See also (XXX) "*Arthopyrenia*" *allogena*.

⁴⁰ See also (XXX) *Didymellopsis pulposii*.

⁴¹ See also (XXX) *Pyrenocollema strontianense*.

- dark brown pigmented; asci 8-spored with ocular chamber well developed; on mosses and unidentified lichens; Spain (Gerona). See Grube & Hafellner (1990), Fryday (2004).
 **Collemopsidium bryospilum** (Nyl.) Coppins 2004
- 198 (197) Ascospores colourless, 1-septate, 20-26 x 5-10 µm, ascomata (200-)250-300 µm; peridial wall dark brown; asci mainly cylindrical, 8-spored; on *Collema glebulentum*, and *C. auriforme*; Scotland. See Grube & Hafellner (1990).
 **Didymellopsis collematum** (J. Steiner) Grube & Hafellner 1990
 Ascospores 18-25 x 8-12 µm, ovoid, colourless, 1-septate; ascomata 200-250 µm, globose, immersed; associated with freshwater *Verrucaria* species and possibly parasitic; England, Scotland (Argyll, Inverness). See Swinscow (1967), Purvis & *et al.* (1992).
 **Pyrenocollema strontianense** (Swinscow) R. C. Harris 1987
- 199 (196) Ascospores mainly more than 5 µm in width⁴² 200
 Ascospores mainly less than 5 µm in width 202
- 200 (199) Hymenial gel I- 201
 Hymenial gel I+ blue (low concentration) or red (higher concentration); ascospores (9-)11-18 x 5-7(-8) µm, 1-septate, hyaline, with a distinct gelatinous sheath (swelling in KOH); ascomata immersed, 150-160 µm diam (surface view); interascal filaments (when visible) branched and anastomosed; usually on *Ionaspis lacustris*, but also reported on *Verrucaria aethiobola*; Ireland (Antrim, Leitrim, Mayo, Sligo), Scotland (Angus, Mid-Perth, W. Inverness) and Wales (Cardigan, Carmarthen, Merioneth)⁴³. See Swinscow (1967), Orange (2002).
 **Sagediopsis lomnitzensis** (B. Stein) Orange 2002
- 201 (200) Ascospores 1-septate, distichously arranged in the asci, 15-20 x 5-7.5 µm; asci 8-spored; ascomata 100-140 µm; peridial wall dark brown pigmented; pigment on the wall cells and in the intercellular areas; on *Verrucaria nigrescens* and other *Verrucaria* species; Spain (Tarragona). See Grube & Hafellner (1990).
"Didymella" sphinctrinoides var. **lithoicae** (de Lesd.) Vouaux 1913
 Ascospores (13-)14-21(-22) x 5-7 µm, 1-septate; ascomata 170-200 µm diam; peridial wall brown pigmented; asci 4(-6)-8-spored; on *Collema auriforme*, *C. tenax* var. *ceranoides*; Ireland (Clare), Scotland, Spain (Castellón). See Grube & Hafellner (1990).
 **Didymellopsis pulposi** (Zopf) Grube & Hafellner 1990
- 202 (199) Ascospores (11.5-)13.5-15.5(-18) x 4-5.5(-6) µm, colourless, 1-septate, ellipsoid with one end attenuated; asci 4-8-spored; ascomata 140-200 µm; peridial wall dark brown pigmented; on *Gonohymenia nigrifella*; Spain (Tarragona). See Grube & Hafellner (1990).
 **Didymellopsis latitans** (Nyl.) Clem. & Shear 1931
 Ascospores (10-)11-17(-20) x 4-5 µm, hyaline, 1-septate, fusiform with acute ends; asci 8-spored; ascomata, 100-150-200 µm diam, 2-4 aggregated; in gall-like protuberances; peridial wall at first dark only in the upper part, later often completely dark; on the thallus of *Collema subfurvum*; British Isles, Spain (Asturias, Cataluña). See Santesson (1960), Hoffmann & Hafellner (2000).
 **Myxophora leptogiophila** (Minks ex G. Winter) Nik. Hoffm. & Hafellner 2000

⁴² See also (XXX) *Didymellopsis latitans*.

⁴³ The record of Smith (1926) from England (Derbyshire) is dubious.

- 203 (195) Ascospores exceeding 18 μm in length 204
 Ascospores 12-18 x 4-6 μm , 3-septate, colourless; asci 8-spored; ascomata erumpent, 200-250 μm diam; peridial wall brown; on *Ochrolechia* thalli; Scotland (E. Inverness, Mid-Perth). See Vězda (1970) and Alstrup & Hawksworth (1990).
 **Sagediopsis campsteriana** (Lindsay) D. Hawksw. & R. Sant. 1990
- 204 (203) Ascospores somewhat fusiform, 3-septate, 22-25 x (5-)5.5-6.5 μm ; asci 4(-6)-spored at maturity; ascomata 75-125 μm diam, not forming galls; peridial wall dark brown black near the ostiole; on *Stereocaulon dactylophyllum*; Scotland (Ben Alder). See Hawksworth (1982a), Hafellner (1987).
 **Cercidospora stereocaulorum** (Arnold) Hafellner 1987
 Ascospores broadly ellipsoid (18-)20-26(-28) x (7-)9-10.5 μm , 1(-3)septate, secondary septa thin and developing late, sometimes with a brownish tinge; ascomata (150-) 200-300 μm diam; peridial wall dark brown; on *Rhizocarpon umbilicatum*; Scotland (Mid-Perth), Ireland (S. & N. Kerry or W. Galway), no recent records.
 "**Arthopyrenia**" **allogena** (Nyl.) Arnold 1870
- 205 (182) Ascospores clearly warted, or with a finely verruculose epispore 206
 Ascospores mainly smooth-walled, or with a finely verruculose epispore, 1-septate, (17-)18-21(-22) x 6-7(-8) μm ; asci 4-6-spored; ascomata 120-180 (-240) μm diam; peridial wall brown; on *Physcia caesia* and *P. tribacia*; England (Wiltshire), Scotland (Fife), Spain (Valencia). See Alstrup (1993)..... **Zwackhiomyces physciicola** Alstrup 1993
- 206 (205) Ascomata globose to pyriform, peridial wall homogeneously pigmented 207
 Ascomata pyriform, peridial wall not homogeneously pigmented 209
- 207 (206) Ascospores not more than 23 μm in length 208
 Ascospores 23-31 x 9-12 μm , 1(-3)-septate, becoming brownish and more intensely verruculose with age; ascomata ca 165 μm diam, immersed to erumpent; on *Ionaspis lacustris*; England (S. Devon) and Wales (Caernarvon, Cardigan). See Orange (2002).
 **Zwackhiomyces lacustris** (Arnold) Orange 2002
- 208 (207) Asci 8-spored; ascospores with a finely verruculose epispore, 1-septate, 15-23 x (4-) 4.5-6.5(8.5) μm ; ascomata 230-280 μm diam; on *Psora lurida*; Spain (Huesca)⁴⁴. See Grube & Hafellner (1990).
 **Zwackhiomyces sphinctriniformis** Grube & Hafellner 1990
 Asci (4-)6(-8)-spored; ascospores verruculose, 1-septate, 16-23 x 4.5-8 μm ; ascomata 150-250(-270) μm ; on *Lecanora albescens* and other calcicolous lichens; British Isles (?⁴⁵) and in Spain: Cantabria. See Grube & Hafellner (1990).
 ... **Zwackhiomyces sphinctrinoides** (Zwackh) Grube & Hafellner 1990

⁴⁴ A report from Aragués del Puerto (Etayo 1994b: 257) has ascospores 24-28 x 9 μm , 6-8-spored asci, and smaller ascomata (100-200 μm diam).

⁴⁵ British records mentioned in Hawksworth (1983a) are not on *Lecanora campestris* or on other calcicolous *Lecanora* species and should be reassessed.

- 209 (206) Ascospores more than 17µm in length, epispore mainly verruculose⁴⁶ 210
 Ascospores less than 17µm in length, always with a finely verruculose
 epispore⁴⁷ 212
- 210 (209) Ascomata mainly exceeding 150 µm diam 211
 Ascomata 100-130 (-170) µm diam; peridial wall brown; ascospores
 1-septate, verruculose, (17.5-)18-22 x (6-)7-7.5(-8) µm; asci (4-)6-8-
 spored; on apothecia and thalli of *Protoblastenia rupestris*⁴⁸; Ireland,
 Scotland, Spain (Navarra, Vizcaya). See Vězda (1963) and Grube &
 Hafellner (1990).
 ...**Zwackhiomyces dispersus** (J. Lahm ex Körb.) Triebel & Grube 1990
- 211 (210) Ascospores hyaline when young, pale brown at maturity, 1-septate,
 verruculose, 17-24(-27) x 5-8(10) µm; asci 6(-8)-spored; ascomata 125-
 180(200) µm diam; on *Mycobilimbia berengeriana*; Scotland. See
 Grube & Hafellner (1990).
**Zwackhiomyces berengerianus** (Arnold) Grube & Triebel 1990
 Ascospores hyaline, 1-septate, with a finely verruculose epispore, (15-)16-20(-
 21) x 5.5-8.5(-9) µm; asci (4-)6(-8)-spored; ascomata 150-250 µm
 diam, immersed or sessile in the host thallus but always sessile on the
 host ascomata; on *Xanthoria elegans*, *Caloplaca lactea*, *Fulgensia*
australis; British Isles, Spain (Gerona, Tarragona, Navarra, Canary
 Islands). See Grube & Hafellner (1990).
 **Zwackhiomyces coepulonus** (Norman) Grube & R. Sant. 1990
- 212 (209) Ascospores more than 5 µm wide 213
 Ascospores 1-septate, 10-13.5 x 3-5µm; asci 6-8-spored; ascomata 70-
 100(-125) µm diam, peridial wall brown; on *Porpidia crustulata*; Spain
 (Oviedo, Tarragona). See Grube & Hafellner (1990).
 **Zwackhiomyces martinatianus** (Arnold) Triebel & Grube 1989
- 213 (212) Ascospores 1-septate, 14-17.5(-20) x (4-)5-7 µm; asci (4-)6-8-spored;
 ascomata 120-150 µm diam; peridial wall dark-brown; on *Clauzadea*
metzleri; British Isles, Spain (Tarragona). See Grube & Hafellner (1990).
 **Zwackhiomyces immersae** (Arn.) Grube & Triebel 1990
 Ascospores 1-septate, 14-16 x 5-6 µm; asci 8-spored; peridial wall chestnut
 brown, ascomata 50-150 µm diam; on *Acarospora lavicola*; Canary
 Islands (as "*Pharcidia lichenum*").
 **Stigidium xanthomarginale** Hafellner, unpubl.
- 214 (176) Ascomata aggregated in a stroma, opening irregularly by a trirradiate or
 cruciform split, wall cells with "Munk" pores (circular pores ca 1 µm
 diam) 215
 Ascomata arising singly, opening by a defined ostiole, wall cells without
 "Munk" pores 220
- 215 (214) Ascospores mainly exceeding 25 µm in length..... 216
 Ascospores mainly not exceeding 25 µm in length..... 218
- 216 (215) Ascospores not exceeding 40 µm in length..... 217
 Ascospores ellipsoid (0-) 1 (-3) septate, (23-)37-55 (-59) x (2.7-)4-8 (-

⁴⁶ See also (XXX) *Zwackhiomyces immersae*.

⁴⁷ See also (XXX) *Zwackhiomyces berengerianus*.

⁴⁸ Records from *Xanthoparmelia conspersa*, and the apothecia of a wide range of crustose lichens, especially *Lecanora* species, as mentioned in Hawksworth (1983a: 14), may refer to other species.

- 11) μm ; asci 2-or 4-spored; on *Solorina crocea*; Scotland (Mid-Perth, S. Aberdeen), Ireland (S. Kerry; no recent records), Spain (Palencia). See Vězda (1970) and Navarro-Rosinés & Hladún (1994).
**Rhagadostoma lichenicola** (de Not.) Keissler 1930
- 217 (216) Ascospores (0-) 1 septate, (23-) 26-34 (39) x (7.5-) 8.5-11.5 (15.5) μm ; asci 2-4 (-6)-spored; on the thallus mixed with the isidia of *Collema auriforme*; Spain (Guipúzcoa). See Navarro-Rosinés *et al.* (1999).
**Rhagadostoma collematum** Etayo & Nav.-Ros.
 Ascospores (0-) 1 (-3) septate, 22-36 x 4.5-9 μm ; asci 2-or 4-spored; on the upper part of thalli of *Solorina saccata*, and on the lower side of the thalli of *Peltigera rufescens*; material on *Solorina saccata* have slightly narrower ((21-)24-32(-36) x (4.5-) 5.5-6.5(-7) μm) ascospores; Spain (Tarragona, Navarra). See Vězda (1970), Hawksworth (1980a), Navarro-Rosinés & Hladún (1994), Navarro-Rosinés *et al.* (1999).
**Rhagadostoma brevisporum** (Nav.-Ros. & Hladún) Nav.-Ros. 1999
- 218 (215) Ascospores mainly exceeding 6 μm wide 219
 Ascospores fusiform, straight or slightly curved, 1-septate, (17-)19-23(-25) x 4-5(5.5) μm ; ascomata 300-400 μm diam; asci 4-8-spored; on thalli of *Verrucaria nigrescens*; British Isles, Spain (Tarragona). See Navarro-Rosinés & Hladún (1994).
**Rhagadostoma rugosum** Nav.-Ros. & Hladún 1994
- 219 (218) Ascospores cylindrical, 1-septate, (13.5-)15.5-21.5(-28) x (6.5-)7.5-10(-11) μm ; ascomata (150-)200(-350) μm diam; asci (4-6-) 8-spored; on thalli of *Lecania cf. turicensis*, *L. cf. atrynoides* and *Caloplaca ferrarii*; Spain (Castellón, Tarragona). See Navarro-Rosinés & Hladún (1994), Navarro-Rosinés *et al.* (1999).
**Rhagadostoma boleae** Nav.-Ros. & Hladún 1994
 Ascospores cylindrical, 1-septate, (10-)11.5-15(-17) x 6-8 (-9) μm ; ascomata 200-400 μm diam; asci 8-spored; on thalli of *Verrucaria gr. parmigera*; Spain (Tarragona). See Navarro-Rosinés & Hladún (1994)
**Rhagadostoma verrucariarum** Nav.-Ros. & Hladún 1994
- 220 (214) Ascospores transeptate221
 Ascospores muriform, with 12-20 transverse septa and 0-5 longitudinal septa in each cell, 38-58 x 13-21 μm ; asci 2-spored; ascomata subglobose, black 75-125 μm ; on *Peltigera*; Spain (Cáceres, Jaén). See Hawksworth (1980b), Martínez & Hafellner (1998).
**Norrlinia peltigericola** (Nyl.) Theiss. & Sydow 1918
- 221 (220) Ascomata with stiff brown setae; ascospores always 1-septate⁴⁹ 222
 Ascomata lacking setae; ascospores 1-7 septate 226
- 222 (221) Setae septate and apically branched 223
 Setae simple non septate 224
- 223 (222) Ascospores hyaline occasionally becoming light brown when mature, 8-12(-14 x 3-4(-5) μm ; hamathecial filaments remaining diffuse above the asci; asci 8-spored; ascomata (50-)75-130 μm diam, laterally furnished with brown apically branched setae; on *Bacidina* sp. and *Bacidia caligans*; British Isles, Spain (Navarra, Gerona). See Roux *et al.* (1994), Matzer (1996), Earland-Bennett (1995).
Wentomyces lichenicola subsp. **bouteillei** Bricaud, Cl.Roux & Sérus. 1994

⁴⁹ See also (XXX) *Echinothecium*.

- Ascospores hyaline (9.5-)11-14.5 (-16) x 3.5-5.5 µm;
hamathecial filaments absent; asci 8-spored; ascomata (40-)110-200 µm
diam, laterally furnished with brown apically branched setae; on
Fellhanera bouteillei and in *Flavoparmelia caperata*; Spain (Navarra,
Gerona). See Bricaud *et al.* (1993).
.....**Wentiomycetes** cf. **lichenicola** (Hansf.) D. Hawksw. 1980
- 224 (222) Ascospores less than 9 µm in length..... 225
Ascospores smooth, 12-16 x 3.5-4.5 µm; hamathecial
filaments always absent; asci 8-spored; ascomata 80-125 µm diam,
setose particularly around the ostiole; setae simple; on decomposing
thalli of *Peltigera leucophlebia*, *P. britannica*, *P. aphtosa*, *P.*
leucophlebia, and *P. praetextata*; Scotland (Ben Avon), Spain (Asturias,
León, Lérida, Tarragona). See Hawksworth (1980b).
.....**Raciboskiomyces peltigericola** (D. Hawksw.) M. E. Barr 1997
- 225 (224) Ascospores 4.5-8 x 1.5 (-2) µm; paraphyses filiform disappearing
at maturity; ascomata 100-150 µm diam, setose; setae simple, 20-30 µm
long, 5 µm diam at the basis; anamorph *Monocillium*; on decaying
podetia of *Cladonia rangiformis* and *Cladonia cervicornis*, probably
saprophytic; Canary Islands, Wales (Glamorgan). See Hawksworth
(1975), Hafellner (1996).
.....**Niesslia cladoniicola** D. Hawksw. & W. Gams 1975
Ascospores 4.5-8.5 x 1.5-2.5 µm; paraphyses absent at maturity;
ascomata 50-150 µm diam, superficial, setose; setae simple, rarely with
one septum, 50-85 µm long, basal part bulbous, 9-16 µm diam; on
decaying thalli of *Lobaria* sp., probably saprotrophic; northern Spain,
Scotland (E. Inverness). See Etayo & Diederich (1996).
.....**Niesslia lobariae** Etayo & Diederich 1996
- 226 (221) Ascomata sections with numerous lipid drops, interascal filaments only
visible in young ascomata 227
Ascomata sections without lipid drops, interascal filaments visible in mature
ascomata..... 240
- 227 (226) Ascospores mainly 3-4-septate..... 228
Ascospores (0-) 1-septate..... 229
- 228 (227) Ascospores (1-)3-septate, (29.5-)32-42.5(-45) x 6.5-8.5(-10) µm,
fusiform, with acute ends; asci (4-)8-spored; ascomata 220-275 µm
diam, periphyses present; immersed on the thallus of *Squamarina*
lentigera; Spain (Barcelona). See Navarro-Rosinés *et al.* (1994b).
..... **Lichenochora clauzadei** Nav.-Ros., Cl. Roux & Llimona 1994
Ascospores (0-)3-4-septate, (30-) 45-64 (-67) x 4.5-6.5 (-7) µm,
narrowly cylindrical to bacilliform; asci 2-spored; ascomata 170-240 x
140-190 µm diam, forming small galls; periphyses numerous, simple or
slightly ramified; on *Fuscopannaria mediterranea*, *Pannaria ignobilis*,
and a moruibund sterile crust on the ground; Scotland (E. Inverness-
shire), Spain (Cadíz, León), and Wales (Cardigan). See Calatayud & al.
(2000).
.....**Lichenochora mediterraneae** Calat. *et al.* 2000
- 229 (227) Ascospores mainly not exceeding 20 µm in length230
Ascospores exceeding 20 µm in length.....239
- 230 (229) Ascospores mainly not exceeding 8 µm in width231
Ascospores exceeding 8 µm in width..... 234

- 231 (230) Ascomata mainly not exceeding 200 μm in diam..... 232
 Ascomata mainly exceeding 200 μm in diam..... 233
- 232 (231) Ascospores (13-) 15-18 (-21) x (4-)5-6 (-7) μm , 1-septate;
 asci (4-6-)8-spored; ascomata 100-200 μm diam, forming small galls;
 periphyses numerous, simple;; on *Trapelia coarctata*; Canary Islands,
 England (E. Suffolk). See Hafellner & Berger (2000).
 **Lichenochora coarctatae** (de Lesd.) Hafellner & F. Berger 2000
 Ascospores (10-) 11-14 (-15) x (6-) 6.5-8 (-9) μm , 0-1-
 septate; asci 8-spored; ascomata 120-190 x 100-170 μm diam; periphyses
 numerous; on *Caloplaca marmorata*; Spain (Barcelona, Lérida). See
 Navarro-Rosinés *et al.* (1998).
 **Lichenochora epimarmorata** Nav.- Ros. 1998
- 233 (231) Ascospores (11.5-) 12-15.5 (-17.5) x (5.5-) 6-7.5 (-8.5) μm , (0-)1-septate,
 ellipsoid with acute ends; asci 8-spored; ascomata 230-300 x 200-250
 μm diam; periphyses numerous, simple or slightly ramified; on
Caloplaca sinapisperma; Spain (Navarra). See Navarro-Rosinés & Etayo
 (2001)..... **Lichenochora sinapispermae** Etayo & Nav.- Ros. 2001
 Ascospores 15-18 x 5-7 μm , 1-septate; asci 8-spored;
 ascomata 180-240 μm diam; periphyses present; on *Phaeophyscia*
cernohorskii, *P. hirsuta*; *P. orbicularis*, *Physcia apolia*, *P. biziana* and
P. caesia in England (Eastbourne), Ireland (Mid-Cork), Spain (Navarra,
 Tarragona, La Rioja), and Wales (Cardigan). See Hafellner (1989) and
 Rambold & Triebel (1992).
 **Lichenochora obscuroides** (Linds.) Triebel & Rambold 1992
 [syn. *Lichenochora thallina* (Cooke) Hafellner 1989]
- 234 (230) Asci 8-spored..... 235
 Ascospores (11-)12.5-15 x (7-) 7.5-9 μm , 1-septate; asci 4-
 spored; ascomata 140-180(-220) x 100-150 μm diam; periphyses
 numerous, simple; on *Lecidella elaeochroma*; Spain (Tarragona). See
 Navarro-Rosinés *et al.* (1998).
 **Lichenochora lecidellae** Boqueras & Nav.-Ros. 1989
- 235 (234) Ascospores more than 12 μm long 236
 Ascospores 10-12 x 8-9.5 μm , 1-septate; asci 8-spored;
 on *Physconia detersa* and *P. enteroxantha*; Scotland (Kincardine), Spain
 (Granada). See Werner (1937), Hafellner (1989).
 **Lichenochora weillii** (Wern.) Hafellner & R. Sant. 1989
- 236 (235) Ascospores mainly exceeding 10 μm wide 237
 Ascospores not exceeding 10 μm wide..... 238
- 237 (236) Ascospores (12-) 14.5-17.5 (-20.5) x (8-) 9-11.5 (-12) μm , 1-
 septate, oblong to ellipsoid; asci 8-spored; ascomata (130-) 200-320 x
 (95-)130-240 μm diam; periphyses numerous, simple or slightly
 ramified; on *Fulgensia desertorum*; Spain (Barcelona, Lérida). See
 Navarro-Rosinés *et al.* (1998).
 **Lichenochora epidesertorum** Nav.- Ros. 1998
 Ascospores (13-) 15-20 x 8-10 (-11) μm , (0-)1-septate, oblong to ellipsoid;
 asci (6-) 8-spored, \pm uniseriate; ascomata 200-280 x 200-250 μm diam;
 periphyses numerous; on *Fulgensia fulgens*; Spain (Menorca, Navarra),
 Wales (Pembroke). See Navarro-Rosinés *et al.* (1998).
 **Lichenochora epifulgens** Nav.- Ros. & Cl. Roux 1998

- 238 (236) Ascospores (10-) 14-17 (-20) x (6.5-) 7-8.5 (-9) μm ; ascomata 180-230 x 160-190 μm diam; periphyses numerous; on *Caloplaca* cf. *velana*; Spain (Cataluña). See Navarro-Rosinés *et al.* (1998).
 **Lichenochora** aff. **wasseri** S. Y. Kondr. 1996
 Ascospores (12-)13.5-17(-18) x (-7.5-)8.5-9.5 μm ; ascomata 200-300 x 140-200 μm diam; periphyses numerous; on *Caloplaca proteus*; Spain (Tarragona)⁵⁰. See Hafellner (1989), Triebel *et al.* (1991), Navarro-Rosinés *et al.* (1998).
 **Lichenochora** aff. **xanthoriae** Triebel & Rambold 1991
- 239 (229) Ascospores (18-)19.8-31.8 (-38) x (6-) 6.3-11-12 μm , 1-septate; asci (4-) 6 (-8)-spored; ascomata 250-350 x 200-250 μm diam, periphyses numerous, slightly ramified; on *Aspicilia* sp.; Spain (Tarragona). See Hoffmann & Hafellner (2000).
 **Lichenochora verrucicola** (Wedd.) Nik. Hoffm. & Hafellner 2000
 Ascospores 23-26 x 6-8 μm , 1-septate; asci 8-spored; periphyses present; on thalli of *Lecidea beregngeriana* and *L. sanguineoatra*; Scotland (Mid-Perth, W. Ross). See Hafellner (1989).
 **Lichenochora inconspicua** Hafellner 1989
- 240 (226) Ascospores 3-7-septate 241
 Ascospores 1(-3) septate..... 245
- 241 (240) Ascospores not exceeding 23 μm in length 242
 Ascospores exceeding 23 μm in length 243
- 242 (241) Ascospores 11-16 x 3-4 μm , 3-5-septate; on old trees, not definitely lichenicolous; a doubtful taxon; Ireland (Co. Kerry).
 **"Arthopyrenia" desistens** (Nyl.) A.L. Sm. 1911
 Ascospores c. 21 x 5 μm ; on an unidentified placodioid lichen; Scotland (Mid-Perthshire), no recent record.....
 **"Sphaerulina" dubiella** (Nyl.) Keiss. ex Walt. Watson 1948
- 243 (241) Ascospores (1-)3-7- transeptate..... 244
 Ascospores with (3-)4(-5) transverse septa and 0-1 vertical septa in one or more cells, hyaline, becoming very pale brown with age, elongate-ellipsoid, ends rounded to somewhat attenuated, (17-)20-24 x (4-)6.5-7.5 μm ; ascomata 200-300 μm diam, immersed in the host thallus; on *Peltigera rufescens*; Scotland (W. Inverness). See Hawksworth (1980b, 1990).
 **Leptosphaerulina peltigerae** (Fuckel) Riedl 1969
- 244 (243) Ascospores (3-5-)7-septate fusiform, hyaline to slightly brownish, smooth to finely verruculose, 41-63 x 4.5-6 μm ; ascomata orange-reddish to red, K+ violet, 150-200 μm , papilla truncatae; on *Melanelixia fuliginosa*; Spain (Navarra). See Etayo (1998).
 **Pronectria septemseptata** Etayo 1998
 Ascospores 3-5 septate, 23-27 x 4-5 μm ; ascomata golden; on *Collema*; Scotland (Perth), no recent records.
 **"Sphaerulina" dolichotera** (Nyl.) Vouaux 1913
- 245 (240) Vegetative hyphae brown,⁵¹ spreading over the thallus or immersed in apothecia of the host⁵¹ 246

⁵⁰ A dubious record, the Spanish material has both longer ascospores and larger ascomata than *L. xanthoriae*, which is described as having ascospores (10.5-)12-15(-16) x 8-9(-9.5) μm and ascomata 175-200 μm diam.

⁵¹ See also (XXX) *Sphaerellothecium araneosum* and (XXX) *S. parmeliae*.

Vegetative hyphae colourless or very pale brown, not spreading over the thallus 175

- 246 (245) Vegetative hyphae wall finely verruculose when young; interascal tissues absent; ascomata 60-80 μm diam; ascospores 1-septate, 9-13 x 3-5 μm ; on *Sphaerophorus fragilis* and *S. globosus*; Scotland (E. Inverness). See Hafellner (1993). **Sphaerellothecium minutum** Hafellner 1993
- Vegetative hyphae wall smooth; paraphysoids and periphyses present; ascomata 50-90 x 45-74 μm diam; ascospores 1-septate, (10-) 11-15 (-16) x (3-) 4-5.5 (-6) μm colourless or very pale brown at maturity; immersed on the hymenium of *Lecanora carpinea*; Scotland (Banff), Spain (La Rioja). See Roux & Triebel (1994).
 **Sphaerellothecium propinquellum** (Nyl.) Cl. Roux & Triebel 1994

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KEY 3: *Basidiomycete species*

- 1 Spores produced on basidia¹ 2
- 2 Spores not produced on basidia KEY 4
- 2(1) Basidia not formed on gills; basidiomata resupinate, pulvinate or synnemata-like 3
- Basidia formed on gills; basidiomata agaricoid; cap milky coffee to snuff brown, 5-20mm wide; stipe 10-30 x 0.7-2mm; basidia 4-spored; basidiospores (7-)8-11 x (4-)4.5-5µm; parasitic on thalli of *Peltigera hymenina*, killing the thallus; Scottish Highlands and Wales. See Orton (1977)..... **Arrhenia peltigerina** (Peck) Redhead *et al.* 2002 [syn. *Omphalina cupulatoides* Orton]
- 3(2) Basidia not septate 4
- Basidia septate 9
- 4 (3) Sclerotia absent; mycelium immersed, not funiculose; never forming circular lesions in lichen colonies 5
- Sclerotia numerous, subglobose, creamy; mycelium superficial, white, funiculose at the margins, forming massive circular brown lesions when on crustose lichens; basidiomata corticoid, effuse, creamy to buff, seasonal; basidia 2(-4) spored; basidiospores 5-9(-12) x 2.5-7 µm; on colonies of pleurococcoid algae and *Lecanora conizaeoides*, also parasitic on a wide range of other crustose and foliose lichens; extremely common and widespread within the range of *L. conizaeoides* in the British Isles. See Arvidsson (1979). **Athelia arachnoidea** (Berk.) Julich 1972
- 5 (4) Basidiomata stalked and synnemata-like 6
- Basidiomata resupinate or pulvinate, lacking a distinct swollen head (capitulum) in which the basidia arise; tremelloid haustorial branches present 8
- 6 (5) Basidiospores mainly exceeding 5.5 µm in length; synemma more than 35 µm wide 7
- Basidiospores ellipsoid, 4.5-5.5 x 2.5 µm; synemma 80-170(?-300) x 15-30(?-50) µm, pale brownish but the tips becoming white due to a mass of basidiospores; basidia (4-)6-spored; on *Micarea micrococca* (also known from *M. prasina*); Scotland (N Ebudes). See Alstrup (1993), Diederich (1996)..... **Chionosphaera lichenicola** Alstrup *et al.* 1993
- 7 (6) Synnema 70-300 x 35-200 µm, pale brownish but with a distinct pink swollen head to 400 µm wide in which the basidia arise; basidia 4-8-spored;

¹ Note that some species can have yeast-like conidia as well as basidia.

basidiospores ellipsoid to subcylindrical, 5-10 x 3-5 μm ; on *Parmelina quercina*, Spain (Mallorca), and on *Teloschistes flavicans* in the Canary Islands (Gomera). See Diederich (1996).

..... **Chionosphaera** cf. **apobasidialis** Cox 1976²

Synemma 100–200 x 50–150 μm , slightly pinkish, but white at the tips due to the basidiospores; basidia 4(?–6)-spored; basidiospores ellipsoid to subfusiform, 7–9 x 3.5–4 μm ; on *Lecidella elaeochroma* and *Melanelixia glabratula* and *M. subaurifera*; Scotland (W Inverness, W Ross, W Sutherland). See Roberts (1997).....

..... **Chionosphaera coppinsii** P. Roberts 1997

8 (5) Basidia 50-90 μm long, (2-)4-spored; basidiomata waxy to gelatinous, pale brown to reddish brown or dark brown, often elongate and with an irregular surface; basidiospores ellipsoid to ovoid or almost lemon-shaped, refractive at point of attachment, 7-9 x 4.5-6 μm ; anamorph with two kinds of conidia, crescent-shaped germination conidia or subspherical to elongate conidia in chains, each 2.5-5 μm diam; on *Cladonia* (include. *Cladina*) species, most commonly on *C. furcata* and *C. rangiformis*, often causing gall-like thallus deformations. England (Isles of Scilly), Ireland (Londonderry), Portugal, Spain (Alava, Burgos). See Diederich (1996).

..... **Syzygospora bachmannii** Diederich & M.S. Christ. 1996

Basidia 24-55 μm long, (2-)3-4-spored; basidiomata waxy to gelatinous, pinkish, pale brown, reddish brown, greyish brown to almost black, convex, often constricted below; basidiospores ellipsoid to oval or almost lemoniform, refractive at the point of attachment, 7-5-11 x 3.5-6.5 μm ; anamorph of lunate or starlike conidia rarely seen, sometimes with catenate conidia; on *Phaeophyscia orbicularis*, *Physcia aipolia*, *P. tenella*, and *Physconia grisea*; England (N. Devon), Scotland (Kintyre, Kirkudbright, E. Perthshire), Ireland (Fermanagh, Waterford, W. Galway, W. Mayo), Portugal, Spain (Navarra); also known on *Heterodermia*. See Diederich (1996).

.....**Syzygospora physciacearum** Diederich 1996

9 (3) Basidia subspherical, ellipsoid, claviform or capitate, often constricted at the septa; if claviform and with transverse septa, then basidia shorter; with basal clamps. 10

Basidia claviform to cylindrical, 20-44 x 3-6.5 μm , with 1-3 transverse septa, not constricted at the septa; lacking basal clamps; basidiomata pale pinkish to reddish brown, dark brown or black, convex, gall-like, (0.2-)0.5-2(-2.5) mm wide; basidiospores subglobose to ellipsoid with distinct apiculus, 4.5-8 x 4-7.5; anamorph with catenate conidia 3-5 x 2-3.5 μm often present; lateral or terminating branches of caespitose and pendulose *Usnea* species, basidia and basidiospores difficult to detect and often absent in the characteristic basidiomes (perhaps seasonal); widespread in the south and west of the British Isles, also the Canary Islands, Ireland, and Spain. See Galløe (1950), Diederich & Christiansen (1994), Diederich (1996).

² The lichenicolous collections may represent a distinct undescribed species; the fungus is normally saprobic on bark or mycoparasitic with dematiaceous hyphomycetes, and has much larger basidiomata which can be to 3 mm tall with a capitulum to 750 μm wide.

- **Biatoropsis usnearum** Räsänen 1934
- 10 (9) Basidia arising on or in the apothecia of the host lichen 9
 Basidia not arising on or in the hymenium of the host lichen 13
- 11 (10) Basidia with one transverse septum, rarely also an additional longitudinal septum; discrete basidiomata not developed, developing within the hymenium of the host 12
 Basidia with transverse, oblique or longitudinal septa, many long-stalked, the stalk to 20 x 2-4 µm, overall 22-26(-30) x 14-19(-23) µm; basidiomata discrete, pale to dark brown or almost black, regularly convex and subglobose to cerebriform; forming concolourous to brownish galls to 3 mm diam; basidiospores subsphaerical, 8.5-11.5 x 7.5-10 µm; on apothecia and rarely the thallus of *Pertusaria hymenae*; England (Somerset), Ireland (Fermanagh, N. Kerry, Kilkenny, Waterford, Wicklow, W. Mayo), Spain (Navarra). See Diederich (1996). **Tremella pertusariae** Diederich 1996³
- 12 (11) Basidia overall 29-39 x 8-10 µm, with one transverse septum, stalk only slightly longer than the upper cell; basidiospores subglobose, 8.5-9.5 x 6.5-8 µm; in the hymenium of *Protoparmelia badia*, neutralistic; England (Derbyshire, Leicestershire), no records this century. Diederich (1996). **Tremella protoparmeliae** Diederich & Coppins 1996
 Basidia overall 16-25 x 7-10 µm; transversely septate, about 25 % of the basidia with longitudinal septata, base stalk-like; basidiospores ellipsoid to subsphaerical, 7-8 x 6-6.5 µm; in the hymenium of *Caloplaca arnoldii* and *C. saxicola*, exceptionally also the thallus; British Isles (Somerset). See Diederich (1996). **Tremella sp.**⁴
- 13 (8) Basidiospores subsphaerical to ellipsoid, apiculus lateral and not refractive 14
 Basidiospores almost lemon-shaped, apiculus at the proximal end, refractive, 6-8.5 x 4-5.5 µm; basidiomata brown, superficial, convex, constricted below, 0.4-1.8 mm diam; on thalli of *Cetraria chlorophylla*, neutralistic; Scotland (E. Inverness-shire, E. Sutherland, W. Inverness-shire), and Canary Islands (Gomera). See Diederich (1996). **Tremella cetrariicola** Diederich & Coppins 1996
- 14 (13) Basidia all (1-)2-celled 15
 Basidia all 4-celled or mixed with 2-celled basidia 21
- 15 (14) Basidia mainly with longitudinal septa 16
 Basidia mainly with transverse septa 20

³ *Tremella cladoniae* Diederich & M. S. Christ. 1996: known from Ireland (W. Donegal; H Fox, *in litt.*) and on *Cladonia ochrochlora* from Wales (Merioneth).

⁴ Discussed and illustrated by Diederich (1996) but not formally described there.

- 16 (15) Hymenium containing numerous claviform or irregular conidiogenous cells producing star-shaped conidia at maturity 17
 Hymenium not containing conidiogenous cells and star-shaped conidia never produced 19
- 17 (16) Basidia 14-24 µm long; basidiomata well-developed 18
 Basidia 11-16 x 7-12 µm long; basidiomata reduced; forming pinkish to blackish galls; basidiospores subspherical to ellipsoid, 7-10 x 5.5-7 µm; on *Hypogymnia physodes*, often in association with *Lichenocodium lecanorae*; Scotland (Kincardine, Ross & Cromarty, E. Inverness-shire), Ireland (W. Galway, Wicklow, W. Donegal), Canary Islands, Spain (Navarra). See Diederich (1996).
 **Tremella hypogymniae** Diederich & M.S. Christ. 1996
- 18 (17) Basidiospores 5.5-7.5 x 5-6 µm; basidiomata slightly convex, the base not constricted; not forming galls, neutralistic on *Phaeographis dendritica*; England (North Devon). See Diederich (1996).
 **Tremella phaeographidis** Diederich, Coppins & Bandoni 1996
- Basidiospores 6-10 x 5-7.5 µm; basidiomata strongly convex, constricted below; forming pale brown to dark brown or blackish galls on *Lobaria pulmonaria*; Canary Islands (Gomera, Teneriffe). See Diederich (1996).
 **Tremella lobariacearum** Diederich & M.S. Christ. 1996
- 19 (16) Basidiomata pale to pinkish brown, pulvinate, 0.2-0.6 mm diam; basidiospores 6.5-8.5 x 6-7 µm; on *Normandina pulchella*; Scotland (Argyll Main, W Inverness). See Diederich (1996).
 **Tremella normandinae** Diederich 1996
- Basidiomata black from the first, pulvinate, gelatinous but drying horny, 0.2-1(-1.5) mm diam; basidiospores 7-11 x 6.5-9.5 µm; basidiospores subsphaerical, with a distinct apiculus, 7-11 x 7-9.5 µm; on *Mycoblastus fucatus*; Scotland (E. Inverness-shire), Ireland (N. Kerry), Spain (Navarra). See Diederich (1996).
 **Tremella lichenicola** Diederich 1986
- 20 (15) Basidia mainly 7-12 µm diam 21
 Basidia 15-27 x 4.5-8 µm ; basidiomata forming galls, convex, olivaceous brown to reddish brown, surface matt, 0.4-2 mm diam; basidiospores subsphaerical to ellipsoid, 6-8 x 5.5-7.5 µm; anamorph with 4-armed star-shaped conidia 8-11 µm diam with arms 1-4 µm long, sometimes also with catenate conidia; on *Phaeophyscia orbicularis*; Scotland (Kincardine) and Spain (Andalucia, Navarra). See Diederich (1996).
 **Tremella phaeophysciae** Diederich & M.S. Christ. 1996
- 21 (14) Basidia not or rarely stalked 22
 Basidia mainly distinctly stalked, 22-26 x 14-19 µm (without the stalk)
 see (XX) **Tremella pertusariae**
- 22 (21) Conidiogenous cells and star-shaped conidia absent 23

Conidiogenous cells numerous, claviform or irregular; conidia star-shaped, with 4(-5) arms, 9-20 μm diam, individual arms 3-12 μm long, one arm elongated; basidiomata reddish orange, waxy to gelatinous, flattened to pulvinate, 0.3-0.7 mm diam; basidia with longitudinal septa, 8-13 x 5-12 μm ; basidiospores ellipsoid or rarely subsphaerical, distinctly apiculate, 6-10 x 4-6.5 μm ; on *Platismatia glauca*; Scotland (Isle of Skye), Ireland (Londonderry), Canary Islands (Gomera). See Diederich & Marson (1988), Diederich (1996).

..... **Tremella coppinsii** Diederich & G. Marson 1988

23 (22) Basidiomata inducing gall formation, the basidia inside galls formed by host tissues; galls bright yellow, convex, constricted below, surface granular, no gelatinous, 0.1-0.8 mm diam; basidia 18-23 x 10-12(-14.5) μm ; basidiospores ellipsoid, apiculate, 6.5-8 x 5-6 μm ; on *Candelariella xanthostigma*; Spain (Cantabria). See Diederich (1996).

..... **Tremella candelariellae** Diederich & Etayo 1996

Basidiomata not inducing gall formation, blackish

..... see (XX) **Tremella lichenicola**

SPECIES TO ADD TO KEY 3

Tremella caloplacae (Zahlbr.) Diederich 2003 [syn. *Lindauopsis caloplacae* Zahlbr. 1906]: in apothecia of *Caloplaca* spp., including *C. arnoldii* and *C. lactea*; England (S. Somerset), Scotland (Kintyre, W Sutherland). See Diederich (*Lejeunia* 173: 31, 2003).

Tremella parmeliarum Diederich 1996: Portugal.

Tremella ramalinae Diederich 1996: Portugal.

Tremella tuckeriae Lücking & Diederich 2007: on *Ramalina cuspidate*; Ireland (S. Kerry). Basidia (3-)4-celled, pyriform, 2 transverse septa. See *Bryologist* 110: 668 (2007) and *Opusc Lich.* 4: 20 (2007).

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KEY 4: *Conidial fungi*

- 1 (2) Conidia arising from within pycnidial or acervular conidiomata (i.e. coelomycetes) 2
 Conidia not arising from within pycnidial or acervular conidiomata (i.e. hyphomycetes) 67
- 2 (1) Conidia pale greenish, or pale brown to dark brown 3
 Conidia hyaline, even in mass..... 26
- 3 (2) Conidia arising singly4
 Conidia arising in chains 23
- 4 (3) Conidia 1- or more septate 5
 Conidia not septate 12
- 5 (4) Conidia 1-septate, truncate at the base, sometimes with a basal frill; conidiogenous cells annellate or not..... 6
 Conidia more than 1-septate; conidiogenous cells not annellate 11
- 6 (5) Conidiomata becoming disc-like to sporodochial, with dark brown excipular margins visible in vertical sections; conidiophores if present branched, subhyaline 7
 Conidiomata remaining pycnidial or sometimes becoming disc-like; conidiophores cells unbranched, brownish 9
- 7 (6) Conidiophores present 8
 Conidiophores absent; conidiomata plane to slightly concave, 75–95 µm diam; conidiogenous cells 1–2(–3) annellate, 5.5–6.5 x 3–5 µm; conidia ellipsoid to obpyriform, (7.5–)8.5–10.5(–11.5) x (2.5–)3–4.5 µm; on *Hypogymnia tubulosa*; Spain (Extremadura). See Atienza (2002).
 **Minutoexcipula calatayudii** V. Atienza 2002
- 8 (7) Conidiophores simple or 2-branched, (10.5–)11–13 x 1–3 µm; conidiomata concave to convolute, 90–115 µm diam; conidiogenous cells 2–4(–5) annellate, 4.5–6.5 x 1.5–2 µm; conidia ellipsoid, 6–7(–7.5) x 2.5–4 µm; on *Pertusaria heterochroa*; Spain (Valencia). See Atienza (2002).
 **Minutoexcipula mariana** V. Atienza 2002
 Conidiophores mainly simple but sometimes branched with 2(–3) conidiogenous cells; conidiomata plane to convex, 30–100(–150) µm; conidiogenous cells 0–2(–3) annellate, 3–4.5 x 3–5 µm; conidia ellipsoid to obpyriform, 5–6(–7) x (2.5–)3(–4) µm; on *Tepromela atra*; Spain (La Rioja). See Atienza *et al.* (2009).
 **Minutoexcipula tephromelae** V. Atienza *et al.* 2009
- 9 (5) Conidia less than 7.5 µm in length 10
 Conidia 9.5–13 x 4–4.5 µm; conidiomata 50–70 µm; commensalistic in

apothecia of *Rinodina sophodes* and *R. septentrionalis*; Scotland (W. Ross), Spain. See Hawksworth & Dyko (1979).

..... **Lichenodiplis lichenicola** Dyko & D. Hawksw. 1979

10 (9) Conidia 4-7.5 x 2-3 µm, usually with a distinct basal frill; conidiomata 50-120 µm diam, outer walls subhyaline; commensalistic to parasitic in the apothecia and more rarely the thalli of *Caloplaca*, *Lecanora*, and *Pertusaria* species, also on thalli of *Evernia prunastri* and *Micarea erratica* and *Schismatomma decolorans*; widespread, Canary Islands (Gomera, Tenerife), England (Cornwall, Devon, E. Suffolk, Isle of Man, Sussex), Scotland (E. Sutherland), Ireland (Wexford), Spain (T, V, Ta, C, Ge, P, Pa). See Hawksworth & Dyko (1979), Calatayud *et al.* (1995).

..... **Lichenodiplis lecanorae** (Vouaux) Dyko & D. Hawksw. 1979

Conidia 4-5.5(-6) x (1.5)2-2.5(-3) µm, lacking a distinct basal frill; conidiomata subglobose but becoming semiglobose, 50-60(-100) µm diam, outer wall layers brownish; conidiogenous cells 0(?-1) annellate, 3-6 x (2.5-)3-4 µm; on *Cyphelium notarisii*; Spain (Castilla y León). See Atienza *et al.* (2009).

..... **Lichenodiplis crespae** Pérez-Ortega & V. Atienza 2009

11 (5) Conidia composed of clusters of globose cells [*see Phaeosporobolus*]

..... XXX

Conidia composed of radiating multicellular arms 124

12 (4) Conidiogenous cells distinct, cylindrical to ampulliform; conidia never angular..... 13

Conidiogenous cells indistinct, irregular in shape; conidia minutely ornamented, variable in shape, rounded to cylindrical to irregularly angular, 8-13 x 5-8 µm; conidiomata 60-100 µm diam; on *Phaeographis* species; Spain (Navarra). See Etayo & Diederich (1995).

..... **Coniambigua phaeographidis** Etayo & Diederich 1995

13 (12) Conidia subglobose or globose, verruculose or not; conidiogenous cells more or less hyaline 14

Conidia ellipsoid and with a truncated base, smooth; conidiogenous cells brownish 21

14 (13) Conidiomata often exceeding 100 µm diam 15

Conidiomata not exceeding 100 µm diam 18

15 (14) Conidia mainly exceeding 3.5 µm in length 16

Conidia (2-)2.5-3.5(-4) x 2-3 µm; conidiomata (60-)80-120(-150) µm diam; conidiogenous cells (5-)6-9(-11) x 1.5-2.5(-3) µm; parasitic on the podetia of scyphose *Cladonia* species, discolouring the podetia brownish; scarce; England (E. Suffolk) and Spain (T, V). See Hawksworth (1977b).

..... **Lichenonium pyxidatae** (Oudem.) Petr. & Syd. 1927¹

¹ A specimen on *Platismatia glauca* from Spain may also be distinct (Etayo 1997)..

- 16 (15) Conidia globose to subglobose, sometimes rather angular 17
 Conidia distinctly tapered towards the base, (4-)6-8(-9) x 3-4(-6) μm ;
 conidiomata 100-200 μm diam; conidiogenous cells (6-)8-13(-14) x 2-3.5
 μm ; commensalistic in apothecia of *Physcia aipolia*; rare; Canary islands
 (Gomera), Spain (Ta). See Hawksworth (1977b).
 **Lichenoconium lichenicola** (P.Karsten) Petr. & H. Syd. 1927
- 17 (16) Conidia (2.5-)3-4.5(-6) μm ; conidiogenous cells (5-)6-8(-11) x (2-)2.5-4 μm ;
 conidiomata (80-)100-175(-200) μm diam; on *Cetraria sepincola*,
Cetrelia olivetorum, *Xanthoria parietina*, *X. candelaria* s. lat., and
 especially *X. polycarpa*, infected apothecia becoming black; widespread
 but rather scarce; England (Surrey), Ireland (Wicklow). See Christiansen
 (1956), Hawksworth (1977b), Hawksworth & Minter (1980).
 **Lichenoconium xanthoriae** M.S. Christ. 1956
 Conidia 5-7(-7.5) x 3.5-5(-6) μm ; conidogenous cells (7-)8-10(-12) x (2.5-)3-
 3.5 μm ; conidiomata 100-175(-200) μm diam; in apothecia of *Usnea*
florida; rare; Ireland (Wicklow). See Hawksworth (1977b).
 **Lichenoconium cargillianum** (Linds.) D Hawksw. 1977
- 18 (14) Conidiomata mainly exceeding 50 μm diam; conidia mainly exceeding 3.5
 μm diam 19
 Conidiomata (20-)30-50(-60) μm diam; conidia 2-3.5(-4) μm diam;
 conidiogenous cells (3.5-)4-5(-6) x (2-)3-3.5(-4) μm ; pathogenic to a wide
 range of lichens, causing bleached lesions or necrotic patches on foliose
 lichens usually with several pycnidia in each infection spot and the spots
 surrounded by a black margin; hosts include *Evernia prunastri*, *Cladonia*
coniocraea, *Hypogymnia physodes* (forming holes in the lobes; very
 common), *Lecanora chlarona*, *L. conizaeoides* (see Christiansen 1980),
Flavoparmelia caperata, *Parmotrema crinita*, *Hypotrachyna laevigata*,
 and *Pertusaria hymeneae*; widespread and often common in Great Britain
 and Ireland, but evidently rarer in Portugal and Spain (T, Ta, La Rioja).
 See Hawksworth (1977b, 1981), Christiansen (1993).
 **Lichenoconium erodens** M.S. Christ & D. Hawksw. 1977
- 19 (18) Conidia subglobose to globose, less than 6 μm diam 20
 Conidia ellipsoid to clavate, truncated at the base, (6-)8-11(-14) x (3-)5-7.5
 μm ; pycnidia 60-100 μm diam, wall K+ purple; on thallus and apothecia
 of *Lecanora campestris*; England (E Suffolk). See Diederich (1986).
 **Lichenoconium reichlingeri** Diederich 1986
- 20 (19) Conidiogenous cells (4-)5-7(-8) x (2-) 3-3.5(-4) μm ; conidia (2.5-) 3-4.5(-5.5)
 μm diam; conidiomata (0.03-)0.04-0.08(-0.1) mm diam; commensalistic
 to parasitic on *Evernia prunastri*, *Lecanora conizaeoides* (the apothecia
 turning jet black; see Christiansen 1980), *Punctelia borreri*, *Parmelina*
pastillifera and especially *Parmelia sulcata*; on *Parmelia* species, a single
 conidioma is usually found in each infection spot, the spot surrounded by
 a black margin; less pathogenic than *L. erodens*; widespread and often

common; Great Britain, Ireland, Spain (A, T, V, Lu, Ta, N, Alava, Mallorca). See Hawksworth (1977b), Christiansen (1993).

..... **Lichenocodium lecanorae** (Jaap) D. Hawksw. 1979
[syn. *L. parasiticum* D. Hawksw. 1977]

Conidiogenous cells (5-)7-9(-11) x (2-)2.5-3.5(-4) µm; conidia (2.5-)3-4(-5) µm diam; conidiomata (40-)50-80(-100) µm diam; commensalistic to parasitic, often associated with other lichenicolous fungi so perhaps tending to invade already weakened thalli; on a wide range of hosts including *Bryoria fuscescens*, *Cladonia arbuscula*, *C. fimbriata*, *Xanthoparmelia conspersa*, *Melanohalea exasperata*, *M. fuliginosa*, *X. pulla*, *Physcia aipolia*, *Ramalina calicaris*, and *R. siliquosa*; mainly in the apothecia which are turned dark brown to black; occasional; Great Britain (widespread), Ireland, Canary Islands, Spain (Alava, Lu, La Rioja). See Hawksworth (1977b).

..... **Lichenocodium usneae** (Anzi) D. Hawksw. 1977

21 (13) Conidiomata 30–60 µm diam..... 22

Conidiomata 100-250(-300) µm diam; conidia reddish brown, 3.5-6 x 2.5-3.5 µm; commensalistic on the thallus of *Pertusaria leioplaca*, more rarely on *Buellia disciformis* and *P. albescens* or *P. pertusa*; widespread; Great Britain (widespread), Ireland, Channel Islands, Spain (Ta, La Go).. See Hawksworth (1975b, 1977b, 1981).

..... **Laeviomycetes pertusariicola** (Nyl.) D. Hawksw. 1981
[syn. *Lichenocodium pertusariicola* (Nyl.) D. Hawksw.]

22 (21) Conidiomata 40-60 µm wide; conidiomatal wall poorly developed; conidia olivaceous brown, 3-4 x 1.5-2 µm; in the hymenium and on the thallus of *Opegrapha niveoatra*, more rarely *O. herbarum*, eventually occupying almost the whole hymenium; Scotland (Berwick, Dunbarton, Midlothian, Peebles), Ireland, Canary Islands (La, Go), Spain (Ta Mallorca). See Hawksworth (1981).

Laeviomycetes opegraphae D. Hawksw. 1981
Conidiomata 30–50 µm diam; conidiomatal wall developed; conidia pale brown, (4-)6-8(-9) x (2.5-)3-4 µm; on *Physcia adscendens*; England (E and W Suffolk). See Kalb (1990).

..... **Laeviomycetes fallaciosus** Hafellner & Kalb 1990

23 (3) Conidiomata superficial or immersed in raised patches on the thallus; conidioma wall K – 24

Conidiomata immersed in the hymenium or exciple, sometimes also the thallus; conidioma wall K + olive-green 25

24 (23) Conidia 1-septate, dark brown, (10-)12-15(-17) x 5-7(-8) µm, sparsely verrucose; conidiomata immersed, cupuliform, arising in raised pustular black patches mainly 1-2 mm wide; on *Hypotrachyna laevigata*, more rarely *H. sinuosa*, finally leaving holes in the lobes; rare; Scotland (Argyll, Kirkcudbright, W Ross), Ireland (N. & S. Kerry, W. Galway, W. Mayo), Canary Islands (Gomera), Wales (Merioneth. See Hawksworth (1978), Etayo (1996, 2002).

-**Nigromacula uniseptata** (D. Hawksw.) D. Hawksw. 2003
 [syn. *Vouauxiella uniseptata* D. Hawksw. 1978]
 Conidia 0(–1)-septate, dark brown, 5–7.5 µm diam, irregularly densely verrucose; conidiomata superficial, initially covered by a black layer of tissue that then breaks away to reveal a sporodochial-like mass, (1–)2–3(–3.5) mm diam; on branches of *Usnea flammea* which become darkened; Ireland (W Donegal, Mayo). See Hawksworth & David (1995).
-**Zevadia peroccidentalis** J.C. David & D. Hawksw. 1995
- 25 (23) Conidia smooth-walled, (5-)6-8(-9) x 3-4 µm; commensalistic to parasitic in the apothecia of *Lecanora* species, especially *L. chlarotera*, mainly at the edges of the discs adjoining the thalline margin, infected discs often decolourized giving them a piebald appearance, sometimes also on the thallus; widespread and locally common; Great Britain, Ireland, Channel Islands, Portugal, and Spain (S, V, Lu, Ta, C, Le, Mallorca, Navarra). See Hawksworth (1976) and Sutton (1980).
-**Vouauxiella lichenicola** (Linds.) Petr. & Syd. 1927
 Conidia verrucose, 6-9 x 3.5-5 µm; host range and symptoms as in *V. lichenicola*, with which it sometimes grows; widespread but scarcer than *V. lichenicola*; Great Britain, Ireland (E. Cork), Spain (S, V, Ta, Mallorca), Canary Islands (La, Go). See Hawksworth (1976) and Sutton (1980).**Vouauxiella verrucosa** (Vouaux) Petr. & Syd. 1927²
- 26 (2) Conidia branched 27
 Conidia unbranched 32
- 27 (26) Conidia with diverging branches or attenuated or pointed arms or triangular cells..... 28
 Conidia with radiating or finger-like arms..... 31
- 28 (27) Conidia Y-shaped, non-septate, with three pointed arms or triangular cells 29
 Conidia tetra- or poly-radial, septate, with four flexuose arms, each arm (14–)18–27(–32) x 1–2.5 µm; conidiomata subglobose, immersed, dark greyish brown, 40–80 µm diam; conidiogenous cells short-ampulliform, 3–4.5 x 2.5–3.5 µm; in necrotic patches on *Cladonia pocillum* squamules; England (Derby). See Diederich *et al.* (2001).
**Cladonicola staurospora** Diederich *et al.* 2001
- 29 (28) Conidia not triangular, with a distinct stem and two diverging apical branches 30
 Conidia triangular, lacking a distinct stem and all branches of an equal size, 11-17 µm diam overall with the apical attenuations 3-4 µm long; conidiomata 50-100 µm diam; immersed in decolorized patches of the thalli of *Pertusaria pertusa*; Great Britain, Spain (Navarra). See Etayo & Diederich (1995), Punithalingam (2003).
**Cornutispora triangularis** Etayo & Diederich 1995

² An additional *Vouauxiella* sp. is mentioned by Etayo & Diederich (1996).

30 (29) Conidia 6-11.5 x 1.5-2 µm, apical attenuations gradual; parasitic on a wide range of lichens including *Lecanora conizaeoides*, *Lobaria pulmonaria*, *Platismatia glauca*, *Punctelia borreri* and especially *Parmelia sulcata*, forming black-margined decolorized necrotic patches; England (S Devon, W Somerset, N. Essex), Scotland (Kirkudbright), Ireland (Fermanagh), Channel Islands, Canary Islands, Spain (Navarra, T, Lu, Oviedo, Ta). See Hawksworth (1976, 1981), Punithalingam (2003).

..... **Cornutispora lichenicola** D. Hawksw. & B. Sutton 1976

Conidia X-XX x X-XX [larger] µm, apical attenuations abrupt and needle-like; parasitic on *Parmelia sulcata* [CHK]; England (S Devon), Canary Islands (Gomera). See Gierl & Kalb (1993), Punithalingam (2003).

..... **Cornutispora ciliata** Kalb 1993

31 (27) Conidiomata elongate, ostiole differentiated and red-brown, 80-120(-170) µm long; conidiogenous cells short-ampulliform, 3-3.5 x 2-4 µm; conidia with 5-10 arms, finger-like, each 3-4 septate, 21-27 x 2.5-3.5 µm, hyaline; in thalli of *Lobaria pulmonaria*; rare; Spain (Alava, Navarra). See Etayo & Diederich (1995).

..... **Psammia lobariae** (Diederich & Etayo) Earl.-Benn. & D. Hawksw. 2005

[syn. *Pycnopsammia lobariae* Diederich & Etayo 1995]

Conidiomata irregular, lacking a discrete ostiole; conidiogenous cells filiform; conidia with numerous arms and star-like, pale brown.

[see other **Psammia** spp.]

32 (26) Conidia 1-septate 33
 Conidia non-septate 39

33 (32) Conidioma wall translucent, pale orange or yellow to cinnamon or deep red 34
 Conidioma wall not translucent, brown or dark brown at least in the upper parts 36

34 (33) Hyaline setae not present around the ostiole; conidoma wall pale orange or deep red; on *Peltigera* species 35
 Hyaline setae present around the ostiole, 17-27 x 4-8 µm; conidiomata 60-120 µm diam, wall pale yellow to cinnamon; conidia 13-17 x 2.5-3.5; forming delimited decolorized patches on thalli of *Parmelia quercina*; Spain (Catalonia). See Boqueras & Diederich (1993).
 **Karsteniomyces llimonae** Boqueras & Diederich 1993

35 (34) Conidia (12-)15-22(-24) x 3.5-5(-6) µm; Ireland (W. Galway). See Hawksworth (1981).
 **Karsteniomyces peltigerae** (P. Karsten) D.Hawksw. 1981
 [Anamorph of *Scutula miliaris* (Wallr.) Trevis. 1853; see under that species]
 Conidia 12-16(-19.5) x 3-4(-4.5) µm. See Alstrup & Hawksworth (1990).

- **Karsteniomyces tuberculosus** Alstrup & D. Hawksw. 1990
 [Anamorph of *Scutula tuberculosa* (Th. Fr.) Rehm; see under that species]
- 36 (33) Conidia straight or tadpole-shaped, not arcuate or falcate 37
 Conidia arcuate or falcate, the base somewhat truncated, 7-8 x 1.5-2 µm, (0-)
 1(-2)-septate; conidiomata 25-40 µm diam; conidiogenous cells short-
 cylindrical to ampulliform, 4-5 x 1.5-2 µm; forming circular necrotic
 patches on thalli of *Evernia prunastri*, also common in boreal regions
 forming similar patches on thalli of *Nephroma arcticum*; Wales
 (Pembroke). See Hawksworth (1990), Marcos (1993).
 **Everniicola flexispora** D. Hawksw. 1982
- 37 (36) Conidioma wall composed of interwoven thick-walled hyphae (*textura
 intricata*); conidia not or slightly constricted at the septum 38
 Conidioma wall composed of angular pseudoparenchymatous cells (*textura
 angularis*); conidia constricted at the septum, somewhat tadpole-like, 6-9
 x (2-) 3-4µm; conidiomata 50-80(-120) µm; mainly immersed in
 apothecia of the host, especially by the junction with the thalline margin,
 sometimes also on the thallus; on *Lecanora expallens* and *L. strobilina*;
 England (E. Suffolk), Spain (Tarragona). See Giralt & Hawksworth
 (1990).
 **Diplolaeviopsis ranula** Giralt & D. Hawksw. 1990
- 38 (37) Conidia (0-)1-septate, subcylindrical to narrowly ellipsoid, not constricted at
 the septum, (7.5-)9-12 x (2.5-)3-4 µm; not intermixed with microconidia;
 conidiomata 50-80(-125) µm diam; forming galls on *Cladonia* species;
 England (E. & W. Sussex), Spain (LU, La Ri, Mallorca). See Hawksworth
 (1981).
 **Epicladonia sandstedei** (Zopf) D. Hawksw. 1981
 Conidia 1-septate, ellipsoid, often slightly constricted at the septum, 10-13 x
 3.5-4(-4.5) µm; intermixed with simple bacilliform microconidia 4-6.5 x
 1 µm; conidiomata 85-300 µm diam, immersed in apothecium-like galls
 on thalli of *Ramalina canariensis*; Canary Islands (Gran Canaria), Spain
 (Mallorca). See Etayo (1995).
 **Mixtoconidium canariense** Etayo 1995
- 39 (32) Conidia exceeding 12 µm in length or diam 40
 Conidia not exceeding 12 µm in length or diam 44
- 40 (39) Conidia globose, ellipsoid, or curved 41
 Conidia needle-like, straight, 0(-1) septate, 14-22 x 1-5 µm; conidiogenous
 cells vertically catenate; conidiomata disc-like with a raised margin, 80-
 150 µm diam; on *Pertusaria* sp. on bark; Spain (Navarra). See Etayo &
 Diederich (1996). **Hainesia pertusariae** Etayo & Diederich 1996
- 41 (40) Conidia 2.5-9 µm wide, narrowly to broadly ellipsoid. 42
 Conidia broadly ellipsoid to globose, (26.5-)30-32.5 x (12.5-)15.5-20 µm;
 conidiomata 100-200 µm diam, dark blue-green around the ostiole but

paler below, immersed to erumpent, becoming cupulate with age; commensalistic on *Pertusaria pertusa*; Spain (Castellón). See Calatayud & Atienza (1995).

..... **Epaphroconidia hawksworthii** Calat. & Atienza 1995

- 42 (41) Conidia 1-4 µm wide 43
 Conidia (14-)16-22(-26) x 6-9 µm, ellipsoid, sometimes irregularly shaped; conidiomata 130-170 µm diam, immersed; parasitic and causing pinkish brown patches on thalli of *Pseudevernia furfuracea*; Spain (Huesca, Navarra). See Etayo & Diederich (1996).
 **Diederichia psuedeverniae** (Etayo & Diederich) D. Hawksw. 2003
 [syn. *Macrophomina psuedeverniae* Etayo & Diederich 1996]
- 43 (42) Conidia 9-12(-14) x (2.5-)3-4 µm; ellipsoid, apex rounded.
 [see **Epicladonia sandstedei**]
 Conidia (10-)12-14(-16) x (3-)3.5-4 µm, cymbiform, apex pointed, tapered and broadly truncated at the base; conidiomata 75-100(-200) µm diam, finally erumpent; on thalli of *Usnea filipendula* complex; Canary Islands and Spain (O). See Hawksworth (1981).
 **Pseudoseptoria usneae** (Vouaux) D. Hawksw. 1981
- 44 (39) Conidia more than 2 µm wide 45
 Conidia not more than 2 µm in wide 58
- 45 (44) Conidiogenous cells arising singly, not in chains 46
 Conidiogenous cells in chains of almost rectangular cells which ramify through the pycnidial cavity; conidia arising at the apex of the chains and also laterally, tear-shaped, narrowed to a pointed base, (6-)6.5-10(-11) x (2-)3-4.5(-6) µm ; commensalistic on the underside of squamules and lower parts of podetia of *Cladonia* spp.; England (Shropshire), Ireland (W. Galway), Spain (Cu, Sa, La Ri, Western Pyrenees). See Hawksworth (1981). **Lichenosticta alcicornaria** (Linds.) D. Hawksw. 1980
- 46 (45) Conidia subglobose to globose or pyriform 47
 Conidia ellipsoid to lemon-shaped or curved 51
- 47 (46) Conidiomata brown to dark brown throughout; conidia pyriform and with a truncated base, minutely ornamented 48
 Conidiomata dark reddish brown around the ostiole, hyaline below, 50-100 µm, erumpent when mature; conidia subglobose, not truncated at the base, smooth-walled, 3-4 x 2.5-3 µm; parasitic and forming brown patches on *Lobaria pulmonaria*; Spain (Ala, Navarra). See Etayo & Diederich (1995). **Phoma lobariae** Diederich & Etayo 1995
- 48 (47) Conidia more than 6 µm in length 49
 Conidia 3-5(-6) x 2-3.5(-4) µm; on *Ramalina* species.
 **Vouauxiomyces ramalinae** (Nordin) D. Hawksw. 1981
 [anamorph of **Abrothallus ramalinae**, q.v.]

- 49 (48) Conidia mainly less than 5.5 μm wide 50
 Conidia (7-)7.5-10.5(-11.5) x (5-)5.5-7(-7.5) μm ; on *Platismatia glauca*
 **Vouauxiomyces santessonii** D. Hawksw. 1981
 [anamorph of **Abrothallus cetrariae**, q.v.]
- 50 (49) Conidia (6.5-)7-8.5(-9) x (4-)4.5-5 μm ; on *Pleurosticta acetabulum*.
 **Vouauxiomyces** sp.
 [anamorph of **Abrothallus acetabulae**, q.v.]
 Conidia 6.5–7.5(–8) x 4–5(–5.5) μm ; on *Flavoparmelia caperata* and more
 rarely *Parmotrema perlatum*. See Cannon (2010).
 **Vouauxiomyces truncatus** (B. de Lesd.) Dyko & D. Hawksw. 1979
 [anamorph of **Abrothallus microspermus**, q.v.]
 Conidia 6–7.5 x 4–5 μm ; on *Melanelixia* and *Melanohalea* spp. See Cannon
 (2010). **Vouauxiomyces** sp.
 [anamorph of **Abrothallus bertianus**, q.v.]
- 51 (46) Conidiomata dark brown to black or green 52
 Conidiomata hyaline to pale orange, sometimes darker around the ostiole . 57
- 52 (51) Conidia cylindrical or ellipsoid 53
 Conidia broadly falcate, (5-)5.5-6.5(-7) x 2-3 μm ; conidiomata 30-100 μm
 diam, green around the ostiole and paler below; immersed in the
 hymenium of *Lecanora persimilis* and *L. hagenii*; Spain (Ta). See
 Diederich (1990), Navarro-Rosines *et al.* (1994).
 **Lawalreea cf. lecanorae** Diederich 1990
- 53 (52) Conidia rounded at the base; conidiogenesis enteroblastic; conidiogenous
 cells subglobose to short-ampulliform 54
 Conidia distinctly truncated at the base; conidiogenesis holoblastic;
 conidiogenous cells elongate-ampulliform 56
- 54 (53) Conidiomata mainly less than 100 μm diam; on *Cladonia* species 55
 Conidiomata 100-150 μm diam; conidia 4-5.5(-6) x 2.5-3.5(-4) μm ;
 conidiogenous cells 4-7 μm diam; immersed in apothecia of *Physcia*
aipolia and *Physconia pulverulacea*; Scotland (Main Argyllshire), Spain
 (Navarra). See Hawksworth (1981).
 **Phoma physciicola** Keissler 1911
- 55 (54) Conidiomata (40-)50-100(-140) μm diam; conidia broadly ellipsoid, (4-)
 4.5-6(-7.5) x (2-)2.5-3(-3.5) μm , l/b ratio 1.7-2.2; on *Cladonia*
convoluta and *C. pyxidata* (syn. *C. pocillum*); Spain (Zaragoza). See
 Diederich *et al.* (2007). **Phoma cladoniicola** Diederich *et al.* 2007
 Conidiomata 50-100 μm diam; conidia elongate ellipsoid, (5-)6-7(-7.5) x 2-
 2.5(-3) μm , l/b ratio 2.4-3; on *Cladonia fimbriata*; Spain (Zaragoza). See
 Diederich *et al.* (2007). **Phoma foliaceiphila** Kocurk. & Etayo 2007

- 56 (53) Conidia 0(-1)-septate, 7.5-11 x 3-3.5 μm ; conidogenous cells 7-12 x 3-3.5 μm ; conidiomata 75-120 μm diam, immersed; forming brownish necrotic circular patches on *Cladonia squamules*; England (N Devon, NW Yorkshire), Scotland (Moray), Ireland (Fermanagh, W. Donegal), Wales (Glamorgan, Radnor). See Hawksworth (1981, 1986).
 **Epicladonia stenospora** (Harm.) D. Hawksw. 1981
 Conidia always non-septate, (7-)8.5-11(-12) x 2.5-3(-4) μm ; conidogenous cells 7-15 x 2.5-3.5(-4) μm ; conidiomata (50-)80-150(-180) μm diam, becoming erumpent and finally almost superficial, tending to gape open to reveal the hyaline conidial mass; on gall-like swellings of squamules and podetia of *Cladonia* spp., including *C. pocillum*; Scotland (E Sutherland). See Hawksworth (1981), Ihlen & Wedin (2006).
 **Epicladonia simplex** D. Hawksw. 1981
- 57 (51) Conidia lens- shaped to pyriform, pointed at one or both ends, (7-)8-10(-10.5) x 4-5.5(-6) μm ; conidiomata immersed, orange to brownish, mainly 100-200 μm when mature; forming convex gall-like swellings on podetia of *Cladonia uncialis*, more rarely *C. rangiformis*; rare; Scotland (Perth), Ireland (S. Kerry, Longford), Spain (Navarra). See Hawksworth (1981).
 **Bachmanniomyces uncialicola** (Zopf) D. Hawksw. 1981
 Conidia ellipsoid to obovoid, sometimes tapered towards the base, not pointed, (5-)6-8 x (2-)3-4 μm ; conidiomata superficial, whitish to pale orange, with a deep reddish ring around the ostiole, (100-)150-200(-300) μm diam; on old thalli of *Peltigera didactyla*, not forming galls; England (Worcester) and Spain (V). See Hawksworth (1981, 1982b).
 **Libertiella malmedyensis** Speg. & Roum. 1880
- 58 (44) Conidogenous cells arising singly or verticillately, not in chains; conidia all produced terminally 59
 Conidogenous cells arranged in vertical chains; conidia produced terminally and laterally; conidiomata 50-90 μm diam and 80-125 μm tall, becoming superficial; conidia 3-3.5(-4) x 1.5-2 μm ; parasitic on the apothecia and thallus of *Xanthoria parietina*; Spain (Navarra, Z). See Diederich (1990).
 **Pyrenochaeta xanthoriae** Diederich 1990
- 59 (58) Conidiomatal wall entire, continuous below the conidogenous cells; cells around the ostiole not readily separating 60
 Conidiomatal wall not entire, base formed largely by the conidogenous cells, ostiolar cells readily separating; conidiomata 20-40 μm diam; conidia subcylindrical, 2-3.5 x 1.5 μm ; commensalistic in the apothecia of *Chrysothrix chrysophthalma*, giving them a black-spotted appearance; Scotland (E Inverness, W Ross). See Hawksworth (1981).
 **Minutophoma chrysophthalmae** D. Hawksw. 1981
- 60 (59) Conidioma wall translucent, wall apricot or orange, often darker around the ostiole 61
 Conidioma not translucent, wall brown to dark brown or black 62

- 61 (60) Conidia narrowly ellipsoid, consistently curved, (4–)5–8 x 1.5–2 µm; conidiomata superficial, pale apricot to ochre, often with an orange ring around the ostiole, 150–420 µm diam; on old *Peltigera* spp. thalli, often on the underside. Spain (XXXXX; Martinez & Hafellner 19XX). See Hawksworth & Miadlikowska (1997).
 **Libertiella curvispora** D. Hawksw. & Miadlikowska 1997
 Conidia ellipsoid to obovoid, base slightly truncated, 1.5–3 x 1–1.5 µm; conidiomata slightly orange, brownish around the ostiole, 70–100 µm diam; forming pinkish discoloured patches on thalli of *Lepraria lobificans*; Spain (Navarra). See Etayo & Diederich (1995).
 **Libertiella leprariae** Etayo & Diederich 1995
- 62 (60) Conidia exceeding 5 µm in length 63
 Conidia not exceeding 5 µm in length 64
- 63 (62) Conidiomata to ca 50 µm diam; conidia narrowly ellipsoid, 6–7.5 x 2–2.5 µm; widely distributed on brownish areas of the thallus, not forming necrotic spots, on *Lobaria scrobiculata*; Scotland (W Ross). See Alstrup (1997). **Phoma lobariicola** Alstrup 1997
 [anamorph of *Catillaria lobariicola* (Alstrup) Coppins & Aptroot 2008]
 Conidiomata 40–80 µm diam; conidia narrowly ellipsoid to slightly reniform, 5–7 x 1.5–2(–2.5) µm; parasitic on thalli of *Parmelia caperata*, *P. laevigata*, *P. perlata*, *P. reticulata* and *P. sulcata*, forming pale brownish decolorized patches with black margins; widespread; England (S. Devon), Scotland (Argyllshire, Dumfriess-shire), Ireland (Fermanagh), Spain (Navarra, T). See Hawksworth (1976, 1981, 1989).
 **Phoma cytospora** (Vouaux) D. Hawksw. 1976³
- 64 (63) Conidia cylindrical to ellipsoid 65
 Conidia subglobose, 2–3 x 1.5–2 µm; conidiogenous cells subcylindrical to elongate-ampulliform, 6–9 x 2–3 µm.
 [anamorph of **Microcalicium subpedicellatum**, q.v.]
- 65 (64) Conidia less than 1.5 µm wide 66
 Conidia 3–3.5 x 2.5 µm; conidiomata 80–130 µm diam; conidiogenous cells indistinct; on *Ramalina implectens* [CHK NAME]; Canary Islands (Tenerife); no modern records.
 **Aposphaeria ramalinae** Vouaux 1911
- 66 (65) Conidia 4.5–5 x 1–1.5 µm; conidiomata (20–)30(–35) µm diam; conidiogenous cells subglobose, 3–4(–5) µm diam; on old basal parts of thalli of *Evernia prunastri*; England (S. Devon), Ireland (N. Kerry). See Hawksworth (1994). **Phoma everniae** D. Hawksw. 1994

³ The following additional *Phoma* species have also been recorded: *P. epiparmelia* and *P. peltigerae* (Martinez & Hafellner 19XX) and *P. lichenis* (Mallorca) from Spain.

- Conidia 3–5 x 1–1.5 µm; conidiomata 15–60 µm diam; conidiogenous cells short-ampulliform, 4–5 x 1–1.5 µm; on *Lecanora expallens*; Canary Islands (Gomera), Ireland (Co. Wicklow).
 **Phoma lecanorina** Diederich 1986
- 67 (1) Conidia hyaline or pinkish at maturity 68
 Conidia pale brown to dark brown at maturity 89
- 68 (67) Conidia all septate 69
 Conidia mainly simple, occasionally 1-septate 77
- 69 (68) Conidia subglobose to ellipsoid or narrowly fusiform, arising directly from the conidiogenous cells and not inside them 70
 Conidia narrowly cylindrical, truncated at the ends, 6-10(-12) x 2.5-3.5(-4) µm, arising inside elongated conidiogenous cells; conidiophores erect, brown; on *Lobaria pulmonaria*; Spain (Ala, Navarra). See Etayo & Diederich (1996). **Chalara lobariae** Etayo 1996
- 70 (69) Conidia 1-septate 71
 Conidia 2- or more septate 72
- 71 (70) Conidia arising in chains, mainly strongly truncate at both ends, 8-13 x 3-3.5 µm, walls uneven, guttulate; thallus pinkish to creamy white, tufts of conidiophores occurring over host ascomata reacting C+ red (lecanoric and schizopeltic acids); parasitic, taking over *Trentepohlia* from *Enterographa crassa*, *Lecanactis abietina* and *L. premnea* or *Schismatomma decoloran* or *S. niveum*, killing the host mycobiont, and forming an independent lichenized thallus; local; England (N Devon, Dorset, S Hants), Wales (CHK), Ireland (N. Kerry, Waterford), Canary Islands (Gomera), Spain (Pyrenees). See Hawksworth *et al.* (1980), Etayo (1998). **Blarneya hibernica** D. Hawksw., Coppins & P. James 1980
 Conidia 12-23 (-35) x 8-10 (-13) µm; conidiophores to 2 mm tall and 4-5 µm wide; overgrowing pyrenocarpous lichens on limestone, saprobic; Great Britain. See Barron (1968).
 **Trichothecium roseum** (Pers.) Link 1809
- 72 (70) Conidiophores not forming discrete dark brown to black sporodochia 73
 Conidiophores arising in convex dark brown to black sporodochia, 175-225 µm diam; conidia very thick-walled, lumina angular, 2-3-septate, truncated at the base, (17-)23-29 x (4-)6-8(-8.5) µm; on *Parmelia saxatilis* and *P. sulcata*; Scotland (Isle of Skye), Canary Islands, Spain (XXX). See Hawksworth (1984), Etayo & Diederich (1996b).
 **Lichenopuccinia poeltii** D. Hawksw. & Hafellner 1984
- 73 (72) Conidia ellipsoid or elongate-fusiform 74
 Conidia narrowly fusiform or coiled 76

- 74 (59) Conidia ellipsoid with a truncated, thickened and refractive base; conidiogenous cells with numerous annellations 75
 Conidia elongate-fusiform, with an elongated tail, (2-)3(-4)-septate, 35-65 x 5.5-7 µm; associated with *Pyrenidium actinellum* on *Peltigera collina*; Ireland (N. Kerry). See Hawksworth (1980).
 **Trichoconis lichenicola** D. Hawksw. 1980
- 75 (74) Conidia xxx xxxx xx xxxxxxxxxxxxxxxxxxxx; on thallus of *Pachyphiale carneola*; Spain (Navarra). See Etayo & Breuss (1996).
 **Refractohilum pluriseptatum** Etayo & Cl. Roux 1997
 Conidia (2-)3-septate broadly fusiform towards the apex (i.e. cymbiform), (11-)13-15(-17) x 3.5-4.5(-6) µm; conidophores erect, unbranched, to 50 x 4-5 µm; on *Parmelia s. str.* spp., sometimes persisting on the substratum after the death of the host; Scotland (N. Ebeudes). See Hawksworth (1977).
 **Refractohilum achromaticum** (B. Sutton) D. Hawksw. 1977
- 76 (73) Conidia narrowly fusiform, not coiled, to 5-septate, with a heel-like base, (60-)70-120 x 2-3.5 µm; simple ellipsoid microconidia 3-5-5.5 x 2-3 µm often also present; on *Parmeliella testacea*, also known elsewhere on *Peltigera* thalli; Spain (Navarra). See Hawksworth (1979), Etayo & Diederich (1996). **Fusarium peltigerae** Westend. 1849
 Conidia coiled, multiseptate, 17-30 x 11-20 µm; conidiogenous cells arranged in pink sporodochia; mainly on *Phaeophyscia* and *Physcia* species and *Xanthoria parietina*, somewhat pathogenic; England (S. Devon), Ireland (W. Galway, Meath), Spain (Catalunya), Wales (Cardigan). See Lowen *et al.* (1986).
Illosporiopsis christiansenii (B. L. Brady & D. Hawksw.) D. Hawksw. 2001
 [syn. *Hobsonia christiansenii* B. L. Brady & D. Hawksw. 1986]
- 77 (68) Conidia not exceeding 4 µm wide 78
 Conidia exceeding 4 µm wide 85
- 78 (77) Conidia ellipsoid; conidiogenous cells arising singly and not arranged on a vesicle on a distinct stalk 79
 Conidia subglobose, 2.5-3.5 (-4) µm diam; conidiogenous cells arranged on a subglobose vesicle at the apex of a distinct stalk-like conidiophore; saprophytic, overgrowing old pyrenocarpous lichen thalli; British Isles. See Raper & Fennell (1965). **Aspergillus glaucus** (L.) Link 1809
- 79 (78) Conidia lacking a truncated base with a refractive thickened scar, 0-1-septate 80
 Conidia with a truncated base with a thick refractive scar, cymbiform, 0-septate (8-)9-11(-14) x 3-3.5(-4) µm; conidiogenous cells 20-30(-40) x 3-4 µm, with a single conidiogenous locus, with repeated annellations; on the surface of galls on *Nephroma laevigatum* and *N. tangeriense*; England (N.

- Devon), Canary Islands, Spain (Lu). See Hawksworth (1977), Hafellner (1995). **Refractohilum galligenum** D. Hawksw. 1977
- 80 (79) Conidia arising singly, not in chains, smooth and thin-walled 81
 Conidia arising in acropetal chains, walls rugose (smooth in KOH) and thick-walled, 5.5–7 x 3–4 µm; conidiophores forming a dense whitish tomentum on the host thallus, erect, superficial, hyaline, rugose, 3–5-celled, 15–22 x 2.5–4 µm; on *Usnea* spp., including *U. flammea*, *U. florida* (syn. *U. subfloridana*), *U. hirta*, and *U. wasmuthii*; Ireland (W Galway), Scotland (S Aberdeen, E Inverness, Kintyre, Kirkudbrught, N Ebudes, Outer Hebrides). See Diederich (2002).
 **Kalbrenneriella cyanescens** (Kalchbr.) Diederich 2002
- 81 (80) Conidia exceeding 10 µm in length 82
 Conidia less than 10 µm in length 83
- 82 (81) Conidia 12–24 x 4 µm, base with a truncated scar 2.5–3 µm wide; conidiogenous cells 12–22 x 1.5–2 µm. See Lowen (1989).
 **Acremonium pedatum** Lowen 1989
 [anamorph of *Pronectria anisospora*, q.v.]
 Conidia 15–16 x 2–2.5 µm, base not truncated with a scar; conidiophores with conidiogenous cells 40–75 x 2.5–3 µm, tapering to 1–1.5 µm at the tip; on *Cladonia* sp.; Great Britain (PLACE?). See Gams (1971).
 **Acremonium rhabdosporum** W. Gams 1971
- 83 (81) Conidiophores and conidiogenous cells all thin-walled 84
 Conidiophores and lower parts of conidiogenous cells thick-walled, 25–37 x 1.5–2 µm, tapering to 0.5–1 µm; conidia 4–6 x 2–2.5 µm. See Hawksworth (1975). **Monocillium** sp.
 [anamorph of **Niesslia cladoniicola**, q.v.]
- 84 (83) Conidia 4–8 x 2.5–4 µm; conidiogenous cells thin-walled. See Lowen & Hawksworth (1986). **Acremonium** sp.
 [anamorph of **Pronectria santessonii**, q.v.]⁴
 Conidia 5.5–10 x 1.5–2 µm, 0–1-septate; conidiophores with conidiogenous cells 30–65 x 2–3; associated with algal crust and *Athelia arachnoidea* on brick (also isolated from *Cladonia* spp. and bark, etc., elsewhere); England (E Suffolk). See Gams (1971).
 **Acremonium lichenicola** W. Gams 1971
- 85 (77) Conidiogenous cells not forming sporodochia 86
 Conidiogenous cells arising in discrete sporodochia 87

⁴ Other *Acremonium*-like fungi may key out here; the status of many of these in Great Britain and Spain is currently unclear and taxa are difficult to separate without cultures; most are anamorphs of *Pronectria* species; see Lowen (1995).

- 86 (85) Conidiophores absent; conidia 0-1-septate, 15-20 x 5-6.5(-7) μm , elongate clavate to subcylindrical, base attenuated with a thickened scar; conidiogenous cells broadly ampulliform, (15-)20-25(-30) x 6-8 μm , with 1-3 discrete conidiogenous loci, lacking annellations; arising over the surface of galls on *Peltigera hymenina*; Scotland (Isle of Mull, Kirkudbright). See Hawksworth (1980b), Braun (1988).
 **Hawksworthiana peltigericola** (D. Hawksw.) U. Braun 1988
 Conidiophores present, to 60 x 3.5-6 μm ; Conidia 0-septate, (15-)18-20 x 6-7(-9) μm , obpyriform to cymbiform with a truncated and thickened refractive base; conidiogenous cells terminal, integrated, with 1-8 annellations; forming pustulate reddish brown galls to 5 mm diam on *Peltigera hymenina*; Canary Islands (Tenerife) and Spain (Guadalajara, La Rioja). See Hawksworth (1977a).
 **Refractohilum peltigerae** (Keissl.) D. Hawksw. 1977
- 87 (85) Conidia not arranged in chains, arising singly on the surface of sclerotium-like sporodochia 100-500 μm diam, broadly ellipsoid to pear-shaped, 11-15 x 7-10 μm 88
 Conidia arranged in compacted chains, often adhering in compact masses 50-100 μm tall, irregularly subglobose or angular by compression, minutely warted, mainly (4-)6-7 μm diam; sporodochia powdery, not sclerotium-like, pale pink, mainly 200-300 μm diam; on *Peltigera* thalli, especially frequent on *P. rufescens* and often associated with *Pronectria robergei* [q.v.]; England (Berkshire, Lincolnshire, N. Essex), Ireland (Dubin, S.E. Galway), Spain (O). See Killian & Werner (1924), Hawksworth (1979).
 **Illosporium carneum** Fr. 1829
- 88 (87) Conidiomata pinkish, initially immersed; parasitic and causing discolourations on thalli of a wide range of foliose lichens, especially *Parmelia* s. lat. and *Physcia* species, also various crustose lichens; widespread and common in England (Hampshire, S. Essex, E. Suffolk, Surrey, W. Yorkshire), Ireland, Canary Islands (Gomera), Portugal, Spain (Catalunya, Galicia, Madrid, Navarra, Valencia). See Hawksworth (1979), Diederich (1990) and Etayo & Diederich (1996).
Marchandiomyces corallinus (Roberge) Diederich & D. Hawksw. 1990
 Conidiomata orange, more or less superficial; on *Phaeophyscia*, *Physcia* and *Xanthoria* species; some records of *M. corallinus* belong here; England (E Suffolk, S Essex), Ireland (Killkenny, S.E. Galway, Kildare), Spain (Andalucia, Madrid, Navarra). See Etayo & Diederich (1996), Diederich *et al.* (2003).
 **Marchandiomyces aurantiacus** (Lasch) Diederich & Etayo 1996
 [anamorph of **Marchandiobasidium aurantiacum** Diederich & Schultheis 2003⁵]
- 89 (67) Conidia all 0-septate, sometimes irregularly folded 90
 Conidia (0-)1- or more septate, sometimes multicellular and recalling aggregations of simple cells 101

⁵ The teleomorph of this species has not yet been collected in the region.

- 90 (89) Conidiophores not aggregated into *Calicium*-like synnemata 91
 Conidiophores aggregated together to form capitate *Calicium*-like synnemata,
 to 250 µm tall and 25-60 µm thick; conidia globose, coarsely warted, (8-)9-
 12(-14) µm diam; on *Thrombium epigaeum* (or directly on the *Leptosira*
 photobiont); England (Herefordshire, Isle of Man). Wales (Caernarvon).
 See Hawksworth (1977a).
Leightonimyces phillipsii (Berk. & Leighton) D. Hawksw. & B. Sutton 1977
- 91 (90) Conidia irregularly folded and with unevenly thickened walls 92
 Conidia not folded and with ± evenly thickened walls 93
- 92 (91) Conidia 6-17(-20) x 5-10 µm; commensalistic to parasitic on the thalli of
Trentepohlia-containing lichens, especially *Lecanactis amylacea*,
Lecanographa lyncea and more rarely *Dirina massiliensis*, and *Opegrapha*
atra and *Schismatomma decolorans*; scattered throughout the range of *L.*
lyncea; England (Cornwall, Devon, N Essex [CHK], Hampshire, E Kent,
 Leicestershire, Norfolk, Shropshire, Suffolk, W Somerset, E & W Sussex),
 Channel Islands, Ireland (Laois, Fermanagh), Canary Islands, Spain (Majorca,
 Ta, Ge, Navarra). See Hawksworth (1975b).
 **Milospium graphideorum** (Nyl.) D. Hawksw. 1975
 Conidia 7-14(-16) x 6-10(-12) µm; conidiomata (30-)50-100(-120) µm diam;
 parasitic on thalli of *Cladonia parasitica* and *C. polydactyla*; Scotland (Argyll
 Main), Spain (Navarra). See Etayo & Diederich (1996).
 **Milospium lacoizquetæ** Etayo & Diederich 1996
- 93 (91) Conidiogenous cells arising in discrete superficial sporodochia 94
 Conidiogenous cells arising singly or in small groups, not in defined
 sporodochia, or immersed in host tissues 96
- 94 (93) Conidia mainly more than 4 µm diam 95
 Conidia 2.5-4 µm diam, smooth-walled, irregular in shape; sporodochia
 greyish brown, 39-100(-130) µm diam; on *Megalospora tuberculosa*,
 forming yellowish patches when abundant; Spain (P). See Etayo &
 Diederich (1995).
 **Sclerococcum hawksworthii** Etayo & Diederich 1995
- 95 (94) Conidia composed of 0(-1)-septate rounded cells, (3.5-)4-7(-8) µm diam;
 sporodochia dark brown to black, 100-300 µm diam; on various
Pertusaria species; Scotland (W. Inverness) and Spain (Navarra). See
 Hawksworth (1979).
 **Sclerococcum simplex** D. Hawksw. 1979
 Conidia 1-celled, rounded, warted, 4-6 x 3.5-4 µm; sporodochia greyish
 brown, 50-300 µm diam; commensalistic on *Normandina pulchella*;
 Scotland (Kintyre), Spain (Navarra). See Etayo & Diederich (1995).
 **Sclerococcum normandinae** Diederich & Etayo 1995
- 96 (93) Conidia arising singly and not in chains 97

- Conidia arising in chains 98
- 97 (96) Conidia globose, 0-septate, dark brown, coarsely warty, 3.5-6 μm diam; conidiogenous cells immersed in the host hymenium, mainly 6 x 5 μm , with a broad cup-like collarete, each bearing a single conidium; in apothecia of *Xanthoria parietina* which turn black; Canary Islands, Great Britain (widespread), Ireland, and Spain (C, T, S, Ta, Viz, Mallorca). See Hawksworth & Punithalingam (1973), Hawksworth (1979).
..... **Xanthoriicola physciae** (Kalchbr.) D. Hawksw. 1973
- Conidia narrowly ellipsoid to elongate reniform or elongate soleiform, (0-)1-septate, greyish brown, smooth, 5-9 x 2-3 μm ; conidiogenous cells arising at the apex of a stout conidiophores, subglobose to ampuliform, each bearing numerous conidia, (2.5-)4-6 μm diam, the whole enveloped in a hyaline vesicle-like membranous sheath; conidiophores dark brown, rigid, unbranched, thick-walled, 15-25(-45) x 3-3.5(-4.5) μm but sometimes to 6.5 μm at the apex; on soredia of *Cladonia* sp. squamules and of *Flavoparmelia caperata*; Spain (Gipuzkoa). See Hawksworth & Etayo (2010). **Calongia gibelluloides** D. Hawksw. & Etayo 2010
- 98 (96) Conidiophores and conidiogenous cells immersed in the tissues of the host, forming conidia at the surface; hypopodia absent 99
- Conidiophores and conidiogenous cells arising from a superficial mycelium with mucronate hyphopodia; conidia ellipsoid to almost fusiform, somewhat pointed at each end, (6-)7-13 (-15) x 4-6 μm ; on foliicolous lichens, including *Byssoloma leucoblepharum* and *B. discordans*; Spain (Ge, Gui, Navarra). See Hawksworth (1979a), Etayo & Diederich (1996b). **Ampullifera foliicola** Deighton 1960
- 99 (98) Conidia multicellular 100
- Conidia single-celled, subglobose to ellipsoid, rounded at the ends, 3-4.5 x 2.5-4 μm ; conidiogenous cells arising in the hymenium of the host; in apothecia of a wide range of crustose lichens, including *Caloplaca* spp., *Catillaria lenticularis*, *Lecanora albescens*, *Lecania erysibe*, *Strangospora moriformis* and *Trapelia placodioides*; widespread in Great Britain, Spain (La Rioja). See Diederich (1990), Hawksworth & Cole (2002).
..... **Intralichen lichenum** (Diederich) D. Hawksw. & M. S. Cole 2002
[syn. *Bispora lichenum* Diederich 1990]
- 100 (99) Conidia arising as elongated chains of cells; conidia 18-25 x 6-12 μm ; in hymenia of *Caloplaca flavocitrina*, *Scoliciosporum umbrinum*, also in the thallus of *Physcia caesia* and cf. *Psilolechia lucida*; England (N and S Essex, E Suffolk), Spain (Catalonia). See Hawksworth (1979), Hawksworth & Cole (2002).
Intralichen lichenicola (M.S. Christ. & D.Hawksw.) D. Hawksw. & M.S. Cole 2002
[syn. *Trimmatostroma lichenicola* M.S. Christ. & D. Hawksw. 1979]

- Conidia arising as irregular subglobose aggregations of cells, aggregated into amorphous masses to around 25 µm diam; conidia 6–12 x 5.5–9.5 µm; in the hymenium of *Lecania erysibe*, and immersed in the thallus of *Diploicia canescens*; England (E Suffolk). See Hawksworth & Cole (2002). **Intralichen baccisporus** D. Hawksw. & M.S. Cole 2002
- 101 (89) Conidia unbranched, subglobose, ellipsoid, fusiform or cylindrical 102
 Conidia consisting of branched, star-like whorls of arms 124
- 102 (101) Conidiomata stromatic, with distinct cellular tissues, compact, convex, constricted at the base, *Lichenostigma*-like; conidia consisting of packets of subglobose cells. 103
 Conidiomata not stromatic, lacking distinct cellular tissues, not constricted at the base; conidia as above or not 104
- 103 (102) Stromata (30-)50-75(-90) µm diam; conidia 6-12 celled, overall 15-25 µm diam; individual cells 4-6 µm diam; commensalistic on thalli of *Usnea* spp. and other macrolichens, more rarely on an unidentified yellowish sorediate crust; Canary Islands (Tenerife), England (E Suffolk), Scotland (Isle of Skye), Spain (T, Te). See Hawksworth & Hafellner (1986).
 **Phaeosporobolus usneae** D.Hawksw. & Hafellner 1986
 Stromata (20-)30-75 µm; conidia 10-20 celled, overall (9-)10-15(-17) µm, individual cells 3-4 µm diam; on thalli of *Pertusaria* species, including *P. multipuncta*, also common on *Ochrolechia frigida* in arctic regions; Great Britain (Devon) and Spain (Navarra, Ta, Sa, San, Ala). See Alstrup & Hawksworth (1990).
 **Phaeosporobolus alpinus** R. Sant., Alstrup & D. Hawksw. 1990
 [see also *Diederimyces fuscidae*]
- 104 (102) Conidia 0–1-septate 105
 Conidia 2-multiseptate, or appearing as packets of adhering subglose cells
 114
- 105 (104) Conidiophores superficial, brown to dark brown, forming sporodochia or not 106
 Conidiophores immersed in the hymenium or more rarely thallus of the host, subhyaline to pale brown, not forming sporodochia; conidia forming in chains, 1-septate when mature, ellipsoid to barrel-shaped, pale brown, smooth-walled, 5-8(-9) x 4-6(-7) µm; most commonly in apothecia of *Caloplaca*, *Candelariella* and *Lecanora* species, which are discoloured brownish and can be eventually destroyed, also in thalli of *Phaeophyscia orbicularis*; very common; Canary Islands, Great Britain, and Spain. See Hawksworth (1979).
Intralichen christiansenii (D. Hawksw.) D, Hawksw. & M. S. Cole 2002
 [syn. *Bispora christiansenii* D. Hawksw. 1979]

- 106 (105) Conidia ellipsoid to barrel shaped, both ends truncated; conidiogenous cells proliferating, with sheath-like wall remnants persisting on the conidiophores 107
 Conidia subglobose to irregularly ellipsoid, both ends not truncated; conidiogenous cells not proliferating, lacking sheath-like wall remnants on the conidiophores 112
- 107 (106) Conidia less than 15 μm in length 108
 Conidia 18-25 x 7-9 μm ; conidiophores bristle-like, 40-80 μm (-150) x 7-9 μm ; on thalli and rarely apothecia of *Phaeophyscia orbicularis*, often forming bleached patches; England (N. Devon, Huntingdon, N. & S. Essex, E. Suffolk, Wiltshire), Ireland (S. Tipperary), Spain. See Hawksworth (1979), Navvo-Rosines *et al.* (1996).
 **Taeniolella phaeophysciae** D. Hawksw. 1979
- 108 (107) Conidia 0(-1)-septate 109
 Conidia (0-)1-2-septate 110
- 109 (108) Conidia smooth-walled, 11-14 x 3.5-4.5 μm ; mycelial hyphae growing inside the hyphae of the host, ca 2 μm wide; forming grey-brown colonies on *Cladonia arbuscula*; Scotland (Ayr, Moray, Orkney).
 **Taeniolella cladiniicola** Alstrup 1993
 Conidia verrucose, 4-6(-8) x 3-5 μm ; mycelia hyphae mainly immersed, 2-4 μm wide; forming black patches on podetia and squamules of *Cladonia* spp., incl. *C. floerkeana* and *C. uncialis* (on galls of *Bachmanniomyces uncialicola*); England (Derby, W Sussex), Ireland (W Cork), Scotland (Moray). See Cannon (2010). **Taeniolella beschiana** Diederich 1992
- 110 (109) Conidia not more than 6 μm wide, (0-)1(-2)-septate 111
 Conidia 10-12.5 x 6-9 μm , 1-2 septate; conidiophores 20-40(-60) x 5-8 μm ; forming brown patches on thalli of *Graphis scripta*; Scotland (Isle of Skye), Ireland (Mid-Cork). See Hawksworth (1979).
 **Taeniolella punctata** M.S. Christ. & D. Hawksw. 1979
- 111 (110) Conidia smooth, 7-11 x 3.5-5(-6) μm , 1(-2) septate; conidiophores 15-30(-50) x 3.5-6 μm ; on apothecia and thalli of various, mainly crustose lichens, discolouring them brown to black; common; England (Buckingham, Devon, N. Essex, E. Suffolk), Ireland (S. Kerry), Spain (Ta). See Hawksworth (1979).
 **Taeniolella delicata** M.S. Christ. & D. Hawksw. 1979
 Conidia verrucose, with granular pigmentation in the walls, 9.5-12 x 4-5 μm , (0-)1-septate; forming soraliium-like brownish galls on *Cetraria aculeata*. Scotland [CHECK!]. See Diederich & Zhurbenko (1997).
 **Taeniolella rolfii** Diederich & Zhurb. 1997
- 112 (106) Conidiophores cells arising from compact sporodochia 113
 Conidiophores arising from a superficial mycelium, filiform, repeatedly septate and constricted at the septa, rough-walled, 2-3 μm thick; conidia

- formed in chains, ellipsoid to fusiform or subcylindrical, irregular in appearance, somewhat attenuated at both ends, 0-1 septate, sometimes constricted at the septum, pale brown, verruculose, 4-18(-23) x (2-)2.5-3.5 µm; on *Dirina massiliensis*; England (Somerset). See Crous *et al.* (2007). **Verrucocladosporium dirinae** K. Schub. *et al.* 2007
- 113 (112) Conidia (0-)1(-2) septate, irregularly ellipsoid, 7-9 x 3.5-5 µm; sporodochia greyish brown, 50-120 µm diam; on thalli of *Parmelia* s. lat. species; Spain (Navarra). See Etayo & Diederich (1996).
..... **Sclerococcum parmeliae** Etayo & Diederich 1996
Conidia mainly 2-celled, each cell subglobose, sporodochia XXXXXXXXXXXX µm diam; on thalli of *Lecanora rupicola*; Scotland (Berwick, East Lothian, Montgomery), Wales (Caernarvon). See Hafellner (1997 CHK).
..... **Sclerococcum montagnei** Hafellner 1997
- 114 (104) Conidia 2-3- septate..... 115
Conidia more than 3-septate or multicellular 117
- 115 (114) Conidia less than 15 µm in length or diam 116
Conidia broadly clavate, arising singly, 2-septate, the lower cell hyaline to pale brown, 25-30(-40) x 11-13 µm; conidiophores erect, thick-walled, 80-150 x 5-8 µm; on decaying thalli of *Lobaria pulmonaria*; Scotland (Kintyre), Spain .See Hawksworth (1979a), Etayo & Diederich (1996).
..... **Endophragmiella hughesii** D. Hawksw. 1979
- 116 (115) Conidia subcylindrical to obclavate, 9-14 x 3-4 µm; conidiophores mainly 40-60 x 3-4 µm; conidiogenous cells with one or more conidiogenous loci; on *Lobaria pulmonaria* and *Ramalina* sp.; Spain (Ala, Mallorca). See Hawksworth (1979a), Etayo (1996b), Etayo & Diederich (1996).
..... **Pseudocercospora lichenum** (Keissl.) D. Hawksw. 1979
Conidia irregularly ellipsoid, 7-9 x 3.5-5 µm; conidiophores scarcely differentiated [see **Sclerococcum parmeliae**]
- 117 (114) Conidia subglobose to ellipsoid 118
Conidia elongate-ellipsoid to cylindrical, 2-17 septate, sometimes branched, 12-70 x 5-7 µm; a widespread lignicolous saprophyte overgrowing *Lecanora conizaeoides* and other moribund crustose lichens on bark; England (Warwick), Scotland). See Ellis (1976).
..... **Taeniolina scripta** (P. Karsten) P.M. Kirk 1981
[syn. *Taeniolella scripta* (P. Karsten) S. Hughes 1958]
- 118 (117) Conidiophores elongated, clearly differentiated 119
Conidiophores rounded, not clearly differentiated 122
- 119 (118) Conidia composed of more than 20 cells 120
Conidia composed of less than 20 cells 121

- 120 (119) Conidia black, composed of 50 or more, more or less fused subglobose cells, overall 25-50 μm diam to 100 x 50 μm ; conidiogenous cells distinct, hyaline, dispersed, not aggregated into compact sporodochia; individual cells mainly 5-10 μm diam; usually occurring as a lignicolous saprophyte but pathogenic to *Lecanora conizaeoides*; widespread; Great Britain and Spain (Navarra). See Ellis (1976), Hawksworth (1979a) and Laundon (1992).
 **Monodictys cellulosa** S. Hughes 1958
 Conidia dark brown, 80-110 x 30-50 μm . See Rao & de Hoog (1986).
 **Monodictys lepraria** (Berk.) M.B. Ellis 1976⁶
- 121 (119) Conidia composed of 6-18 cells, cells smooth, unevenly thickened, individually mainly 4-5 μm diam; forming black patches on the surface of thalli of *Lobaria* spp.; Scotland (Isle of Skye), Canary Islands (Gomra), Spain (Navarra, Pyrenees). See Etayo & Diederich (1996b).
 **Monodictys fuliginosa** Etayo 1996
 Conidia 2-5(-6)-celled, warted, mainly 8-12 x 5-10 μm ; forming greenish black patches on thalli of *Anaptychia ciliaris*; no modern record; England (Gloucester). See Hawksworth (1975).
 **Monodictys anaptychiae** (Lindau) D. Hawksw. 1975
- 122 (118) Conidial walls evenly thickened 123
 Conidial walls unevenly thickened, somewhat *Milospium*-like; conidia 2-14(-20) celled, 9-20(-32) x 6-12 μm ; sporodochia dark brown, (40-)60-180(-210) x (40-)60-100(-180) μm ; commensalistic on *Parmelina tiliacea*; Spain (Navarra, Ta). See Boqueras & Diederich (1993).
 **Sclerococcum serusiauxii** Boqueras & Diederich 1993
- 123 (122) Conidia 2-14(-20) celled, 21-30 x 12-20 μm , individual cells 12-15 x 7-9 μm , covered with crystals; forming grey-mauve sprodochia 0.3-0.8 mm diam; previously considered lichenicolous on *Opegrapha dolomitica* and an unidentified *Opegrapha* sp., but now considered to be an independent lichen; England (S Lancs), Scotland (Argyll Main, E Lothian), Spain (Navarra). See Sparrius *et al.* (20XX).
 **Sclerococcum griseisporodochium** Etayo 1995
 Conidia 2-6(-9) celled, (8-)10-15(-17) μm diam overall, individual cells (4-)6-10 μm diam; conidiogenous cells integrated into compact black sporodochial tufts 100-500 μm diam; commensalistic on *Pertusaria corallina* and more rarely *P. pseudocorallina*, tending to depress the formation of isidia; Great Britain (widespread in upland areas), Ireland, Spain (O). See Hawksworth (1975b), Hawksworth & Jones (1981).
 **Sclerococcum sphaerale** (Ach.) Fr. 1825
- 124 (101) Conidial arms 0-3-septate, conidia overall 17-57 μm diam when lightly squashed 125

⁶ Perhaps really conspecific with *Monodictys cellulosa*.

Conidial arms 3-7-septate, conidia overall 50-80 μm diam when lightly squashed (120-160 μm when heavily squashed !), individual arms, 25-50 x 3-4 μm diam; weakly parasitic and forming pinkish patches on *Anisomeridium nyssaegenum*, *Lecanora conizaeoides*, *Lepraria lobificans*, *Psilolechia lucida*, *Schismatomma decolorans*, and coccoid green algae; England (Dorset, S Essex, Isle of Man, N Norfolk, E Suffolk) and Spain (Ta). See Hawksworth (1979c).

..... **Psammia stipitata** D. Hawksw. 1979

125 (124) Individual arms of conidia 0(-2) septate, not inflated at the distal end, 7-29 x 1.5-4 μm ; pathogenic and causing white declourized patches on *Lecania cyrtella*, *Lepraria incana*, coccoid green algae, and unidentified crustose lichen; England (N. & S. Essex, E. & W. Suffolk). See Earland-Bennett & Hawksworth (1999).

..... **Psammia simplex** Earl.-Benn. & D. Hawksw. 1999

Individual arms 1-3-septate, inflated to 6.5 μm at the distal end, individual arms 8-17 x 3.5-6.5 μm ; causing pale buff patches on *Lepraria incana* and coccoid green algae; England (E. & W. Suffolk). See Earland-Bennett & Hawksworth (1999).

..... **Psammia inflata** Earl.-Benn. & D. Hawksw. 1999