Octospora and Inermisia in Western Europe

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Octospora and *Inermisia* in Western Europe

R. W. G. Dennis & H. Itzerott*

Summary. A key is offered to nineteen species of *Humariaceae*, three of them new, assigned to the genus *Octospora* Hedwig ex Gray and to six species transferred to *Inermisia* Rifai.

There is a rather well defined group of small Pezizales, with yellow to orange disks and white receptacles, the members of which grow in association with mosses, and fruit usually during winter or early spring. Some species have recognizable hairs on the receptacle, especially near the margin, others have not, and on this basis they have traditionally been assigned to two genera, usually placed in different tribes if not different families. The hairy species have been referred to *Neottiella*, or more recently to *Leucoscypha*, and their taxonomy has not been particularly difficult. For the nominally hairless species a succession of names has been in vogue: *Leucoloma*, *Humaria*, *Humarina* and latterly *Octospora* which, since it dates from 1821, is at least reasonably secure from supercession on the ground of priority while the current rules of fungus nomenclature are observed. These fungi have been little studied and the naming of collections often presents considerable difficulty. In recent years one of us (H.I.) has found them rather plentifully at the appropriate season in the central Rhineland and has been able to investigate their association with different genera of mosses, a feature usually neglected by mycologists whose descriptions commonly refer to no more than an association with small mosses in general or to occurrence on mossy ground. Rather inconspicuous as they are, and neglected by modern mycologists who do not collect at the appropriate time of year, these were among the first ascomycetes to be subjected to critical microscopic study, by the pioneer bryologist John Hedwig. He discovered the presence of consistently 8-spored sacs in the hymenium of 'Discomycetes' and accordingly coined for them the generic name *Octospora* in the second Tome of his monumental 'Descriptio et adumbratio microscopico-analytica Muscorum Frondosorum nec non aliorum vegetantium e classe Cryptogamica Linnaei', dedicated to King George III and published at Leipzig in 1789. This is, of course, a pre-starting point name but it was validated for modern mycology by its adoption by S. F. Gray in his 'Natural Arrangement of British Plants', 1821. Hedwig's species of *Octospora* were printed in the following order and most of them can be recognized and assigned to a place in the modern system:

P.10 *Octospora scutellata* (L.) Hedwig, nominally = *Scutellinia scutellata* (L. ex St. Amans) Lambotte but for Hedwig it appears to have been a collective species, most of his figures suggest *Cheilymenia* spp.

P.12 *O. hirta* Hedwig = *Scutellinia* sp.; Fries identified it with *Peziza scutellata* L.

P.13 *O. leucoloma* Hedwig, selected as lectotype of *Octospora* by Korf.

P.14 *O. fasciculata* Hedwig = *Humaria hemisphaerica* (Wigg. ex Fr.) Fuckel.

P.15 *O. rhizophora* (Willd.) Hedwig = *Rhizina undulata* Fr.

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P.17 *Octospora haemastigma* Hedwig, said by Boudier to be a *Pulvinula* but this is doubtful.

P.18 *O. applanata* Hedwig = *Peziza* sp.; Boudier identified it with *P. castanea* Quélet.

P.19 *O. pustulata* Hedwig = *Peziza* sp., possibly *P. succosa* Berk.; Boudier accepted it as a *Galactinia* sp.

P.20 *O. viridans* Hedwig, not recognized; it grew on *Hypnum cupressiforme.*

P.21 *O. minuta* Hedwig, uncertain, possibly a *Mollisia*, perhaps a *Lecidea*; on rotting wood.

P.22 *O. varia* Hedwig = *Peziza varia* [Hedwig] Fr.

P.23 *O. elastica* Hedwig = *Bulgaria inquinans* Fr.

P.25 *O. porphyrospora* Hedwig = *Ascobolus* sp., unrecognizable at specific level according to van Brummelen.

P.26 *O. carnea* Hedwig, not recognized, though Fries placed it under *Bulgaria sarcoides*, viz. *Ascocoryne sarcoides* (Jacq. ex Gray) Groves & Wilson.

P.27 *O. violacea* Hedwig = *Ascocoryne sarcoides.*

P.28 *O. citrina* Hedwig = *Calycella citrina* (Hedwig ex Fr.) Boud.

P.29 *O. nana* Hedwig, uncertain, possibly a small *Peziza* sp.; Boudier thought it a *Calycella* but this seems very improbable.

P.30 *O. albidula* Hedwig = *Phialea* sp.

P.31 *O. lutescens* Hedwig = *Hymenoscyphus* sp.

P.32 *O. pyriformis* Hedwig = ? *Hymenoscyphus* sp.; Boudier's identification with *Ciboria caucus* seems improbable as it assumes Hedwig was wrong about the origin of the apothecia in shoots of dead moss. An inoperculate fungus is indicated however.

P.33 *O. tuberosa* Hedwig = *Sclerotinia tuberosa* (Hedwig ex Fr.) Fuckel.

P.34 *O. bulbosa* Hedwig = *Helvella macropus* (Pers. ex Fr.) Karsten according to Dissing, but then one must assume Hedwig did not see the ascospore walls, only the central guttules.

Out of twenty-two species of *Octospora* there were therefore eleven operculate, eight inoperculate and three of doubtful status. Clearly Hedwig's microscopic data are not to be relied upon implicity; not only has he mistaken guttules for spores, a common error, globose spores being always suspect in early descriptions, but he shows the receptacles of both *O. violacea* and *O. citrina* as composed of round cells throughout. His twenty-two species are now dispersed through five families of ascomycetes: *Helvellaceae*, *Pezizaceae*, *Ascobolaceae*, *Sclerotiniaceae* and *Helotiaceae*, and had it not been for the selection of 1 January 1821 as a starting-point date for the nomenclature of Fungi Caeteri *Octospora* would have been rejected as a superfluous name for fungi already referable to *Peziza* Dill. or *Elvella* L. Hedwig's diagnosis was brief; '*Octospora.* Truncus simplicissimus, superficie terminatus fertili concava, plana, reflexa: de qua eriguntur, thecae seminales membranulosae, elongatae, numerosissimae, ut plurimum stupa filamentosa cinctae; utrisque inter se *non cohaerentibus*, seminibus *octo* foetae' and no type species was indicated.

When S. F. Gray adopted the name *Octospora* in 1821 he ascribed it to Hedwig and assigned to it eight species of which only *O. leucoloma* bore the same name as in Hedwig's list, though three others are probably some of Hedwig's species under other names: *O. inquinans* Gray = *O. elastica* Hedwig, *O. sarcoides* Gray = *O. violacea* Hedwig and *O. lenticularis* Gray = *O. citrina*

Hedwig. Gray did not account for *O. hirta* Hedwig but *O. scutellata* he included under *Peziza* (absurdly ascribed to Pliny) along with *P. hemispherica* Pers. = *O. fasciculata* Hedwig. It seems, then, that Korf was fully justified in selecting Gray's second species, *O. leucoloma*, and formally designating it in Mycologia 46: 838 (1954) as lectotype of *Octospora* Hedwig ex Gray. There is, incidentally, an amusing irony in this revival of the long forgotten name *Octospora* for one of the very few genera of Pezizales in which several species are characterized by having tetrasporous asci. The same species is also the obvious lectotype for *Leucoloma* Fuckel 1870, established with nine species of which the first was *L. hedwigii* Fuckel, a new name for *O. leucoloma* Hedwig since this specific epithet had been adopted as the generic name. Fortunately, though these small bryophilous fungi look very much alike to the unaided eye, it is not difficult to decide which Hedwig originally intended by the name since he clearly specified the habitat as: 'Super muros nostros argillaceos, Bryo *argenteo* interspersam', and figured elliptic-fusoid ascospores with one large central guttule. Hence there seems to have been little confusion over this species by subsequent continental authors. British nineteenth century mycologists, however, evidently used the name *Peziza leucoloma* indiscriminately for any small orange-disked, sessile, operculate discomycete vaguely associated with mosses. Thus, Cooke's *Fungi Britannici Exsiccati* 229, Bathford, Oct. 1866 was *Lamprospora crouani* (Cooke) Seaver; of the fungi labelled *P. leucoloma* in Phillips's herbarium five collections are *O. humosa*, one is *Anthracobia macrocystis* (Cooke) Boud. on fine white ashes, one is *Coprobia granulata* (Bull. ex Fr.) Boud.); one in the Grove herbarium is *Inermisia fusispora*; one in Rea's herbarium is *O. rustica*.

A more difficult problem is to decide whether the traditional separation of smooth-excipled *Octospora* from hairy-excipled *Leucoscypha* or *Neottiella* can be justified at the generic level. All the *Octospora* species are liable to be clothed in the lower part with white anchoring hyphae and some of these on the upper part of the receptacle may simulate simple hairs. The margin is often produced above the level of the hymenium and then tends to be pulled apart into ill defined triangular lobes or to appear fimbriate. Hedwig actually figured a fimbriate white margin in his enlarged drawing of *O. leucoloma*. The problem is whether a sufficiently clear distinction can be drawn between such free hyphal tips and the relatively simple hairs found, for example, in *L. rutilans*. In *L. hetieri* and *Neottiella ricciae* the hairs are clearly differentiated, with a recognizable enlarged base marking them off from the parent hyphae, thickened walls and a tapered tip. In *L. rutilans*, however, as may be seen for example in the figures published by Rifai (1968, figs. 160–161), this is not always so, though the 'hairs' are apt to have slightly thicker walls than the parent hyphae. One of the fungi of *Grimmia* tussocks, *O. grimmiae*, has a fimbriate margin with free hyphal tips that sometimes appear slightly swollen at the base so as to be difficult to distinguish from hairs of the type in *L. rutilans*. The presence of hairs on the receptacle does not appear to be correlated with any useful ascospore character of shape, ornament or guttulation, such as might be used to support a generic distinction. *L. hetieri* has 'good' hairs and smooth spores, *O. meslinii* has ornamented spores and no hairs. The excipular structure is very similar in both groups and it becomes a question of forcing an arbitrary division at a particular point in a long series of progressively more differentiated free hyphal tips. The distinction is so subjective and open to individual interpretation that Massee, who defined *Neottiella*

as 'Allied to *Humaria* but distinguished by the downy exterior', placed *O. leucoloma* in *Neottiella* but *L. rutilans* and *O. humosa* together in *Humaria*. His '*Humaria*' is, of course, the genus so-called by Saccardo, which includes our *Octospora*, not *Humaria* Fuckel.

We feel that the division of the orange-disked bryophilous Humariaceae into two genera tends to obscure their close relationship, especially as it usually leads automatically to the genera being separated in different tribes. It seems better to break with tradition and unite the two groups under *Octospora*, without at present disturbing Boudier's original species of *Leucoscypha*, which are not bryophilous and lack carotenoid pigment. Nor do we wish to consider here the species associated with Hepaticae which may constitute a distinct group at some taxonomic level.

On the other hand, Rifai's separation of a genus *Inermisia* from *Octospora* by the absence of parallel marginal hyphae and the presence of a pseudoparenchymatous structure throughout the excipulum seems to be justifiable and to be correlated with a non-bryophilous habit.

The best specific characters within *Octospora* as here defined still seem to be those of the ascospores, arrangement in the ascus, shape, size and ornament. Guttulation, much emphasised in the past, is useful but apt to be misleading unless one is dealing with fresh mature spores, preferably those discharged naturally from the asci. Other characters, such as shape of receptacle, whether evenly bowl-shaped or with a differentiated protruding base, and excipular structure, whether the hyphae are loosely woven or tightly packed and short-celled so as to give a pseudoparenchymatous effect except near the margin, are less easy to use, especially in a key. Some species seem very closely associated with particular mosses and this is a useful feature, used in association with ascospore characters. The following key may be useful in differentiating those species we have studied in Europe. All the smooth spored species have been studied in fresh material, except for what we here call *O. leucoloma* var. *crosslandii*. This we know only from old, dried collections and its relationship with *O. leucoloma* var. *leucoloma* and *O. axillaris* needs reconsideration when fresh material is available.

Key to species of Octospora

A Ascospores smooth:
  B Ascospores often biseriate in the upper part of the ascus:
    C Asci 8-spored:
      D Ascospores somewhat tapered at the ends:
        E Ascospores predominantly with one major guttule, 18–23 μ long, apothecia typically in cushions of *Bryum argenteum*
          O. leucoloma var. **leucoloma**
        E Ascospores longer, commonly with two or more large guttules:
          F Apothecia with *Phascum cuspidatum*, ascospores up to 27 μ long
            O. axillaris var. **axillaris**
          F Apothecia with other small mosses, ascospores up to 33 μ long
            O. coccinea
      D Ascospores parallel-sided with broadly rounded ends, usually with two or more guttules; 20–29 μ long:
        G Apothecia on *Erythrophyllum rubellum*, ascospores 9–13 μ wide, often with one large central guttule flanked by smaller ones
          O. neglecta

G Apothecia in cushions of *Grimmia*, ascospores 8–11 μ wide, biguttulate . . . . . **O. musci-muralis**

C Asci predominantly 4-spored, occasionally up to 6-spored, apothecia usually with *Bryum argenteum* on sandy soil . **O. tetraspora**

B Ascospores strictly uniseriate in the ascus:

H Ascospores 17–22 × 10–12 μ rather tapered at the ends, apothecia closely associated with or upon moss:

I Apothecia with *Barbula* . . **O. leucoloma** var. **crosslandii**

I Apothecia with *Phascum* . . . . . **O. axillaris**

H Ascospores broadly rounded at the ends, 1-guttulate:

J Apothecia in cushions of *Grimmia*, ascospores 17–25 × 11–14 μ **O. grimmiae**

J Apothecia associated with other mosses or on burnt ground:

K Margin of apothecium fringed with distinct fine white hairs, on burnt ground or sandy soil, especially with *Funaria hygrometrica* or *Ceratodon purpureus*, ascospores 13–17 × 8–9 μ **O. hetieri**

K Margin of apothecia not fringed with distinct hairs:

L Apothecia usually over 2 mm. diameter, on sandy or peaty soil with *Polytrichum*, ascospores 19–23 × 11–13 μ **O. humosa**

L Apothecia smaller or not with *Polytrichum*, often associated with burnt ground:

M Disk yellow, ascospores up to 15 μ wide, thick-walled, apothecia especially with *Funaria hygrometrica* on sandy soil . . . . . **O. roxheimii**

M Disk red or orange, ascospores up to 12 μ wide:

N Ascospores over 16 μ long . . . . . **O. rubens**

N Ascospores shorter, apothecia commonly associated with *Ceratodon purpureus* . . . . **O. rustica**

A Ascospores ornamented with warts or a reticulum:

O Apothecia mostly over 1 mm. diameter, associated with *Polytrichum*, ascospores fusoid, more than 20 μ long:

P Ascospore ornament a more or less continuous reticulum **O. rutilans**

P Ascospore ornament of large discrete warts . . . . **O. vivida**

O Apothecia seldom more than 1 mm. diameter, not with *Polytrichum*:

Q Asci with 8 fully developed ascospores:

R Ascospore ornament an imperfect reticulum, apothecia associated with *Pleurozium schreberi* (known to us from literature only) **O. pleurozii**

R Ascospore ornament fine discrete warts:

S Apothecia with *Amblystegium serpens*, ascospores 13–15 × 11–13 μ **O. wrightii**

S Apothecia associated with other mosses, on soil, walls or rocks, ascospores 15–20 × 11–12 μ:

T Apothecia in cushions of *Grimmia* **O. melina** var. **meslinii**

T Apothecia on soil, with *Pohlia* and other small mosses **O. melina** var. **melina**

Q Asci at maturity 4-spored or with 4 matured and 4 aborted spores:
U Young asci with 8 spores of which 4 are completely autodigested, apothecia associated with moss protonemata in lowlands **O. phagospora**
U Mature asci with 4 finely warted spores up to 19 × 10 μ and 4 aborted small smooth spores, apothecia on *Tetraplodon* in arctic-alpine regions . . . . . **O. alpestris**

The following species, which have at some time been referred to *Humaria* Sacc. or *Octospora*, have large-celled pseudoparenchyma to the margin and are conveniently disposed in *Inermisia*. As with *Octospora* the presence or absence of spore ornament seems a character of no more than specific value. *Inermisia* differs from *Coprobia* in having guttulate ascospores. Species with apothecia deeply sunk in soil, and clothed with anchoring hyphae, approach *Sepultaria* but the hyphae are not brown walled and the orange coloured disk distinguishes them from all but *S. semi-immersa* (Karsten) Massee, which has brown hyphae.

Key to species of Inermisia

A Ascospores smooth:
B Ascospores fusoid, 18–26 × 7·5–10 μ:
C Gregarious on a dense white subiculum on coniferous debris **I. buchsii**
C Not so, but gregarious on peaty soils or after burning **I. fusispora**
B Ascospores ellipsoid:
D Ascospores with one large central guttule, apothecia on soil or walls:
E Ascospores 18–21 × 9–11 μ, apothecia sunk in soil to the rim **I. gyalectoides**
E Ascospores 15–16·5 × 9·5–10 μ, apothecia sunk amongst moss, e.g. *Barbula* spp. . . . . **I. pilifera**
D Ascospores with many small guttules, 13–16 × 8–10 μ **I. deformis**
A Ascospores covered with fine low warts, 18–22 × 11–12 μ, on rotting wood . . . . . **I. lecithina**

The following notes on individual species indicate what appear to be the salient characters, and also suggested synonymy, but it must be realized that even when authentic specimens have been available it is often difficult to recover structure adequately from dried specimens and the synonymies are open to revision if better material comes to light.

Octospora alpestris (*Sommerf.*) *Dennis & Itzerott*, comb. nov.

Peziza alpestris Sommerf., Suppl. Florae Lapponicae: 290 (1826).
Peziza carneola Sauter in Mitteil. Ges. Salzburger Landesk. 18(2): 7 (1878).
Humaria carneola (Sauter) Saccardo, Sylloge Fungorum 8: 123 (1889).
Octospora carneola (Sauter) Dennis, British Cup Fungi: 34 (1960).
Leucoscypha alpestris (Sommerf.) Eckblad in Nytt Mag. Bot. 15: 49 (1968).

Apothecia sessile, solitary, disk up to 2 mm. diameter, concave, bright orange, margin paler, denticulate, receptacle saucer-shaped, smooth. Asci

up to 170 × 13 μ, 8-spored at first but the four lower spores aborting; upper ascospores broadly elliptical, 13–19 × 7·5–10 μ, with one or occasionally two large guttules, wall densely set with minute warts.

In leaf axils of *Tetraplodon*, hence earlier British authors interpreted it as *P. axillaris* Nees. This is an arctic-alpine fungus found in the Alps and at high altitudes in the Scottish Highlands as well as in Scandinavia where it fruits in late summer and autumn. The type locality is Saltdal in north Norway, 67° N.

Octospora axillaris (*Nees ex Pers.*) *Moser* in Gams, Kleine Kryptogamenflora 11A; 110 (1963).

Peziza axillaris Nees ex Pers. Mycologia Europaea 1: 314 (1822) & Fr., Syst. Myc. 2: 145 (1822).
Leucoloma axillaris (Nees ex Pers.) Fuckel in Jahrb. Nass. Ver. f. Naturkunde 23/24: 318 (1870).
Humaria axillaris (Nees ex Pers.) Saccardo, Sylloge Fungorum 8: 130 (1888).
Helotium axillaris (Nees ex Pers.) Boudier, Hist. Class. Discom. d'Europe: 114 (1928).
Humaria sublutea Velenovský, Monographia Discomycetum Bohemiae: 325 (1934).

Nees von Esenbeck (1816) described this species in two places, on p. 258 is the longer version in German: 'Parasitischer Becherschwamme. Peziza axillaris mihi. Halbkuglich vertieft, mit abgerundetem Rande, am Grunde blasser. Feste Substanz. Höchstens 1/4 Linie Durchmesser. Wächst im Frühlinge in den Blattwinkeln verschiedener Moosarten (*Phascum cuspidatum*, *Syntrichia ruralis* etc.), wo sie beym ersten Blicke für eine evolutive Knospe (Propagulum) gehalten werden kann. Fig. 267. Auf Syntrichia ruralis. Anmerkung. Durch die Form, und den stets stumpfen, abgerundeten Rand unterscheidet sich diese Art standhaft von allen Formen der *Peziza leucoloma* Pers.—durch Farbe und vertiefte Scheibe von *Peziza haemastigma* Pers. In Parasiten erblüht der Gipfel dieser Reihe.'

On p. 67 of the accompanying, separately paged 'Ueberblick des Systems und Erklärung der Tafeln' this is summarised 'Halbkuglich, vertieft, stumpfrandig, pomeranzengelb, am Grunde blasser, parasitisch auf Moosen' and accompanied by a Latin diagnosis, 'Hemisphaerica, excavata, margine obtuso, aurantia, basi pallidior, in muscis parasitica'.

Thus two hosts were cited from the outset so that it is possible that more than one taxon was covered by the diagnosis. Persoon and Fries made no further contribution to the circumscription, though the latter indicated he had seen a dried specimen, and as Nees chose to figure the fungus on *Tortula ruralis* there is a case for indicating that as the type host. However, the first person to amplify the diagnosis and supply microscopic data seems to have been Fuckel, who dealt with the fungus on *Phascum cuspidatum* which he distributed as his Fungi rhenani 1176. This distribution fixed the tradition of the species and it seems best to accept it.

He indicated 8-spored asci, 174 × 14 μ, with uniseriate biguttulate ascospores 24 × 10 μ, and measurements from the Kew example of F. rhen. 1176 confirm this, with ascospores 18–26 × 9–11 μ. Cooke's statement that the same material yielded ascospores 012 × ·005–006 mm. must be due to a gross error in calibration, giving a figure exactly half the true size.

On soil amongst plants of *Phascum cuspidatum* there occurs an *Octospora* which it appears impossible to separate from *O. axillaris* except by its larger apothecia, 1–2 mm. diameter. The disk is flat, orange-yellow with a narrow white margin, not protruding above the disk and neither fimbriate nor lobed; receptacle saucer-shaped without a basal protuberance, sunk in soil to the margin and clothed with white anchoring hyphae throughout. The excipular structure is like that of *O. leucoloma*, the asci are cylindric-clavate, 8-spored, the ascospores 20–27 × 9–12 μ, mostly with two large guttules, the paraphyses straight or very slightly curved, 4–5 μ wide above. This seems to be the fungus Velenovský called *Humaria sublutea* and it is probably one of those which has passed as *P. convexula* Pers., the type of which is not an *Octospora* at all. There seems no point, however, in treating it as more than a forma *terrestris* of *O. axillaris*.

A variety of *O. axillaris* found on *Phascum acaulon* seems distinguishable by its smaller uniguttulate ascospores, 17·5–21·5 × 10–12 μ, but the material available is insufficient to justify formal description as a new taxon. We place it here because of its association with *Phascum*.

Octospora coccinea (*Crouan*) *van Brummelen* in Persoonia Suppl. 1: 213 (1967).

Ascobolus coccineus Crouan in Ann. Sci. Nat. Bot. IV, 7: 175 (1857).
Leucoloma coccinea (Crouan) Fuckel in Jahrb. Nass. Ver. f. Naturkunde 23/24: 318 (1870).
Peziza corallina Cooke in Grevillea 3: 73 (1874), *non Peziza coccinea* Bull. ex St. Amans (1821).
Aleuria corallina (Cooke) Gillet, Champignons France, Discomycetes: 51 (1879).
?*Peziza muralis* Quélet in Grevillea 8: 116 (1880).
?*Humaria muralis* (Quélet) Quélet in Compt. Rend. Assoc. Franç. Avancem. Sci. (Congrès Rouen, 1883): 509 (1884).
Humaria coccinea (Crouan) Quélet, Enchiridion Fungorum: 289 (1886).
Neottiella corallina (Cooke) Massee, British Fungus Flora 4: 372 (1895).
Humarina coccinea (Crouan) Seaver, The North American Cup-fungi (Operculates): 137 (1928).
?*Humaria coccinea* var. *muralis* (Quélet) Grelet in Rev. Mycol. 8: 7 (1943).

Peziza corallina Cooke was a mere change of epithet required when *Ascobolus coccineus* was transferred to *Peziza* where that specific name was preoccupied by *P. coccinea* Bull. ex St. Amans so Massee's suggestion that the two names may represent different species is inadmissible on nomenclatorial grounds. *Peziza muralis* Quélet was described as having spores cymbiform, 20–30 μ long, with 2 to 3 guttules, growing amongst *Bryum argenteum* and *Phascum muticum*. The Crouan's material has been studied by Madame Le Gal (1960) and found to be the present fungus.

Apothecia are scattered, with a flat disk up to 3 mm. diameter, orange-yellow with a narrow, paler, membranous margin; the disk has been variously described, 'rouge' according to the Crouans, 'orange' according to Boudier and Grelet, 'un beau jaune d'or, puis orange' according to Quélet for *H. muralis*. The receptacle is bowl-shaped, with no basal protuberance and has an excipulum of rather closely woven hyphae becoming parallel in the protruding margin. Asci are clavate, up to 240 × 24 μ according to Le Gal,

normally 8-spored; ascospores irregularly biseriate above, fusoid, (21)–25–33(–36) × 8·5–10(–12) μ, usually with two large guttules, often with two further small polar guttules; paraphyses straight or slightly curved and enlarged up to 6–12·5 μ wide at the apex. Apothecia occur mainly amongst *Mniobryum* but also with *Bryum argenteum*, *Ceratodon purpureus* and *Pottia*.

The Crouans stated the spores were 'non attenuées aux extremités', hence Massee's doubts as to the identity of the fungus but this appears to have been a typographical error, for their figures 17 and 18 in the same paper indicate spores acutely pointed at each end and this was confirmed by Madam Le Gal's study of their material.

Octospora grimmiae *Dennis & Itzerott*, sp. nov.

Apothecia ad 3·5 mm. diam., late sessilia, anguste marginata, fimbriata, disco aurantiaco. Asci 130–150 × 13–16 μ, cylindracei, apice truncati,

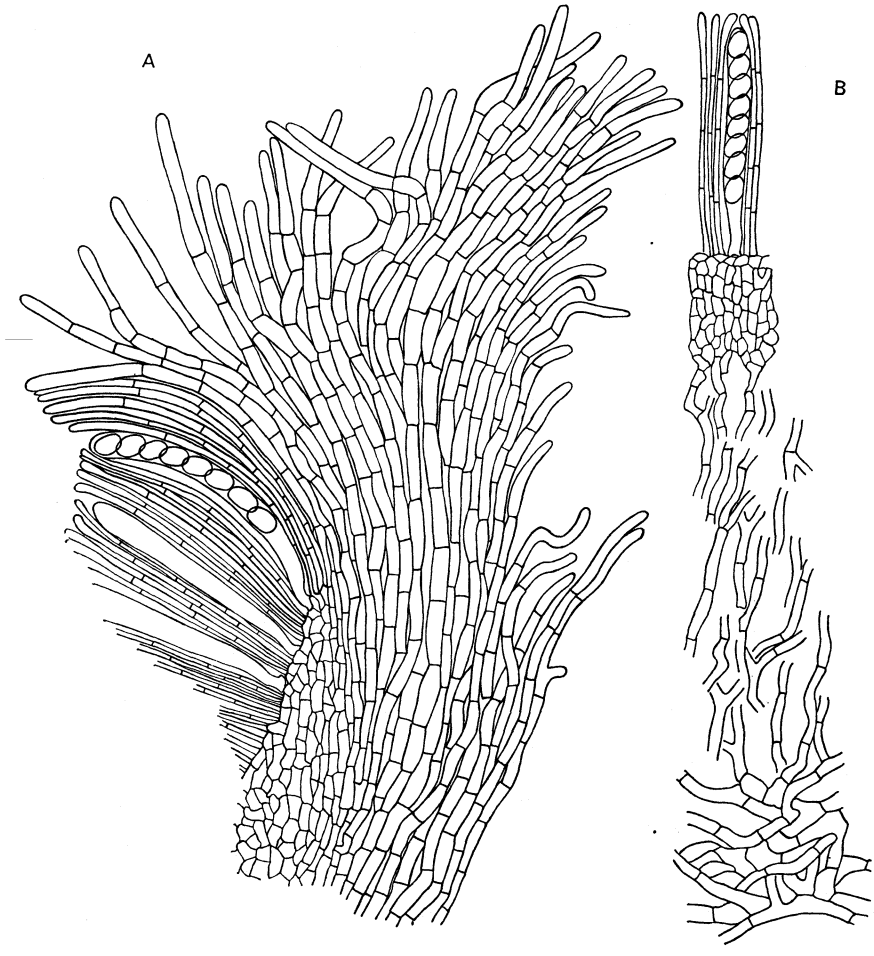


FIG. 1. *Octospora grimmiae*, vertical sections of apothecium: **A** from margin; **B** from central region. Both × c. 200.

octospori; ascosporae uniseriatae, late ellipsoideae, laeves, 17–25 × 11–14·5 μ, guttula unica magna impletae. Paraphyses filiformes, apice rectae, clavatae, usque ad 8 μ diam. Excipulum e hyphis cylindraceis tenuiter tunicatis instructum. Hab. in *Grimmiae*, Grünstadt, Rheinpfalz, 5·1.1972 (holotypus, K).

The excipular hyphae are about 10–15 μ wide, colourless and rather loosely woven, becoming subparallel on the flanks of the hymenium and running out at the margin into free, obtuse, hair-like tips. In its loose structure of broad hyphae and in ascospore shape, as well as in the association with cushions of *Grimmia*, this species shows marked affinity with *O. meslinii*, but the ascospores remain perfectly smooth, even when examined under an oil-immersion lens.

Octospora hetieri (*Boudier*) *Dennis & Itzerott*, comb. nov.

Neottiella hetieri Boudier in Bull. Soc. Mycol. France 12: 12 (1896).
Patella hetieri (Boudier) Seaver, The North American Cup-fungi (Operculates): 164 (1928).
Leucoscypha hetieri (Boudier) Rifai in Verh. Kon. Ned. Akad. Wetensch. Afd. Nat. II 57, (3): 172 (1968).

The excipular structure has been figured by Rifai who indicates a thick flesh of hyaline, woven hyphae passing at the surface into a tightly packed almost pseudoparenchymatic layer 3 or 4 cells thick, from which more thickly walled hyphae run out as the straight, obtuse, sparingly septate hairs. The small, elliptical, smooth ascospores, 13–17 × 8–9 μ, with one central guttule, are characteristic, as is the association especially with *Funaria hygrometrica* or *Ceratodon purpureus* on burnt ground.

Octospora humosa (*Fr. ex Pers.*) *Dennis*, British Cup Fungi: 33 (1960).

Peziza humosa Fr. ex Pers., Mycologia Europaea 1: 297 (1822) & Fr. Syst. Myc. 2: 71 (1822).
Aleuria humosa (Fr. ex Pers.) Gillet, Champignons de France, Les Discomycètes: 56 (1879).
Humaria humosa (Fr. ex Pers.) Quélet, Enchiridion Fungorum: 289 (1886).
H. leucolomoides Rehm in Rabenhorst, Kryptogamen Flora, Ed. 2, 1(3): 938 (1894).
H. ignea Velenovský, Novitates Mycologicae Novissimae: 148 (1947).

The species is well characterized by the large apothecia (up to 4 lines broad, Fries; 5–10 mm. diameter, Boudier) with orange disk and pale ochraceous to whitish receptacle and broadly elliptical 1-guttulate ascospores 19–23 × 11–13 μ. In our experience it occurs in association with *Polytrichum* on sandy soil but Boudier recognized a variety *anthracobia* which we have not seen, associated with *Funaria* on burnt ground. The type of *H. ignea* grew 'ad terram humidam inter Dicranum ad picetum'. Unlike many bryophilous species which fruit in winter and early spring, *O. humosa* fruits in summer and autumn, from June onwards. Rifai thought *Leucopezis excipulata* Clements, from North America, might be a synonym, but this was described as having hairy pilose apothecia with broader ascospores, 20–24 × 15–16 μ.

Octospora leucoloma *Hedwig ex Gray*, Natural Arrangement of British Plants 1: 667 (1821).

Peziza leucoloma (Hedwig ex Gray) Pers., Mycologia Europaea 1: 296 (1822) & Fr., Syst. Myc. 2: 71 (1822).
Leucoloma hedwigii Fuckel in Jahrb. Nass. Ver. f. Naturkunde 23/24: 317 (1870).
Aleuria leucoloma (Hedwig ex Gray) Gillet, Champignons de France. Les Discomycètes: 56 (1879).
Neottiella leucoloma (Hedwig ex Gray) Massee, British Fungus Flora 4: 374 (1895).
Humarina leucoloma (Hedwig ex Gray) Seaver, The North American Cup-fungi (Operculates): 129 (1928).

As this is the type species of *Octospora* it has been thoroughly studied and figured by Rifai (1968). Apothecia are saucer-shaped, seldom more than 2 mm. diameter, with a flat orange disk and white margin which is broad but not protruding in lobes and finely fimbriate with free hyphal tips; the lower part of the receptacle is clothed with white, cylindrical, septate, anchoring hyphae but is not deeply sunk in the soil. The excipulum is formed of rather tightly woven hyphae, so as to appear almost pseudoparenchymatic with thin walled angular cells in the lower part, with the hyphae becoming parallel where they flank the hymenium.

There is no sharp division between the ectal zone, flesh and subhymenium. Asci are cylindrical, up to 250 × 2 μ, 8-spored, ascospores uniseriate or sometimes irregularly biseriate above, broadly elliptic-fusoid, smooth, usually with one large oil drop, often accompanied by one or two smaller drops, or occasionally with two drops almost equal in size, 18–23·5 × 10·5–12·5 μ. The paraphyses are straight or only slightly curved above, simple, slightly enlarged upwards to 5–6 μ wide at the tip, with yellow to orange contents. Apothecia are seated usually in cushions of *Bryum argenteum* in winter and spring, but Rifai cites a collection associated with *Funaria* and *Leptobryum* in a flowerpot. Grelet had a variety *sphaerospora*, not validly published, with ascospores 16–22 × 12–18 μ, associated with *Grimmia*. It seems likely that this was a distinct species but the spore shape and size does not accord well with our *O. grimmiae*.

Octospora leucoloma var. **crosslandii** *Dennis & Itzerott*, var. nov.

A typo ascosporiis 17–20 × 10–11 μ uniseriatis recedit. Hab. ad terram inter muscos, praecipue *Barbula recurvirostra*, Pecket Wood, Hebden Bridge, Yorkshire 10.10.1897 (holotypus, K).

Apothecia up to 2 mm. diameter, with disk at first concave, becoming flat or slightly convex, ochraceous flesh colour, margin narrow, receptacle white, saucer-shaped but with a hemispherical basal protuberance inserted in the soil, clothed throughout with white anchoring hyphae 4–8 μ wide. Excipulum like that of var. *leucoloma*. Asci cylindrical, truncate 18–200 × 14–16 μ, 8-spored; ascospores uniseriate, similar in shape to var. *leucoloma*, 17–20 × 10–11 μ, with one central guttule, smooth; paraphyses straight, clavate, 6–8 μ wide above.

This is perhaps no more than a forma of *O. leucoloma* since the morphological differences are very slight, but its association with a different genus

of mosses, its different fruiting season and the somewhat obconical receptacle, all call for recognition at some taxonomic level. This is at least in part the *Humaria convexula* of British authors but as mentioned above *Peziza convexula* Persoon as represented in the Persoon herbarium is not an *Octospora*, nor did he ever indicate for it an association with mosses.

Octospora melina (*Velenovský*) *Dennis & Itzerott*, comb. nov.

Humaria melina Velenovský, Monographia Discomycetum Bohemiae: 325 (1934).

This is a typical *Octospora* with hemispherical apothecia half sunk in soil, up to 2 mm. diameter, with a concave orange disk and even, rather narrow, paler margin, formed of parallel, obtuse, hyaline hyphae 10–12 μ wide. Eight-spored asci up to 280 × 15 μ contain uniseriate broadly elliptical ascospores 15–20 × 11–12 μ with a large central guttule and wall closely covered with small low warts up to 1 μ across. The paraphyses are distinctly curved above, clavate, about 6 μ wide. The type was amongst *Ceratodon* and *Pohlea*, September, in Bohemia. Our material is with *Dicranella heteromalla* and *Atrichum undulatum*. We have not seen material of *Humaria similis* Kirschstein in Ver. Bot. Ver. Prov. Brandenburg 64: 9 (1922) described from a collection in Sept. 1918, with ascospores 15–17 × 10–11 μ, 'dicht körnig rauh', which may possibly offer an earlier name for the species.

Octospora melina var. **meslinii** (*Le Gal*) *Dennis & Itzerott*, comb. & stat. nov.

Humaria meslinii Le Gal in Revue Mycologie II 4: 137 (1939).
Octospora meslinii (Le Gal) Svrček & Kukička in Česká Mykologie 17: 67 (1963).

This, too, is a typical *Octospora*, with hyphae rather less closely woven than usual, and finely warted uniguttulate ascospores 17–21 × 10–12·5 μ. The paraphyses may be curved or straight and apothecia occur in cushions of *Grimmia* on limestone rocks from December to February.

The differences from *O. melina* appear to be of just the same order as those between *O. leucoloma* var. *leucoloma* and var. *crosslandii*, viz. a very slender morphological divergence associated with a different genus of mosses and a different fruiting period. The latter may, of course, reflect merely the climatic difference between central Europe and the Atlantic countries.

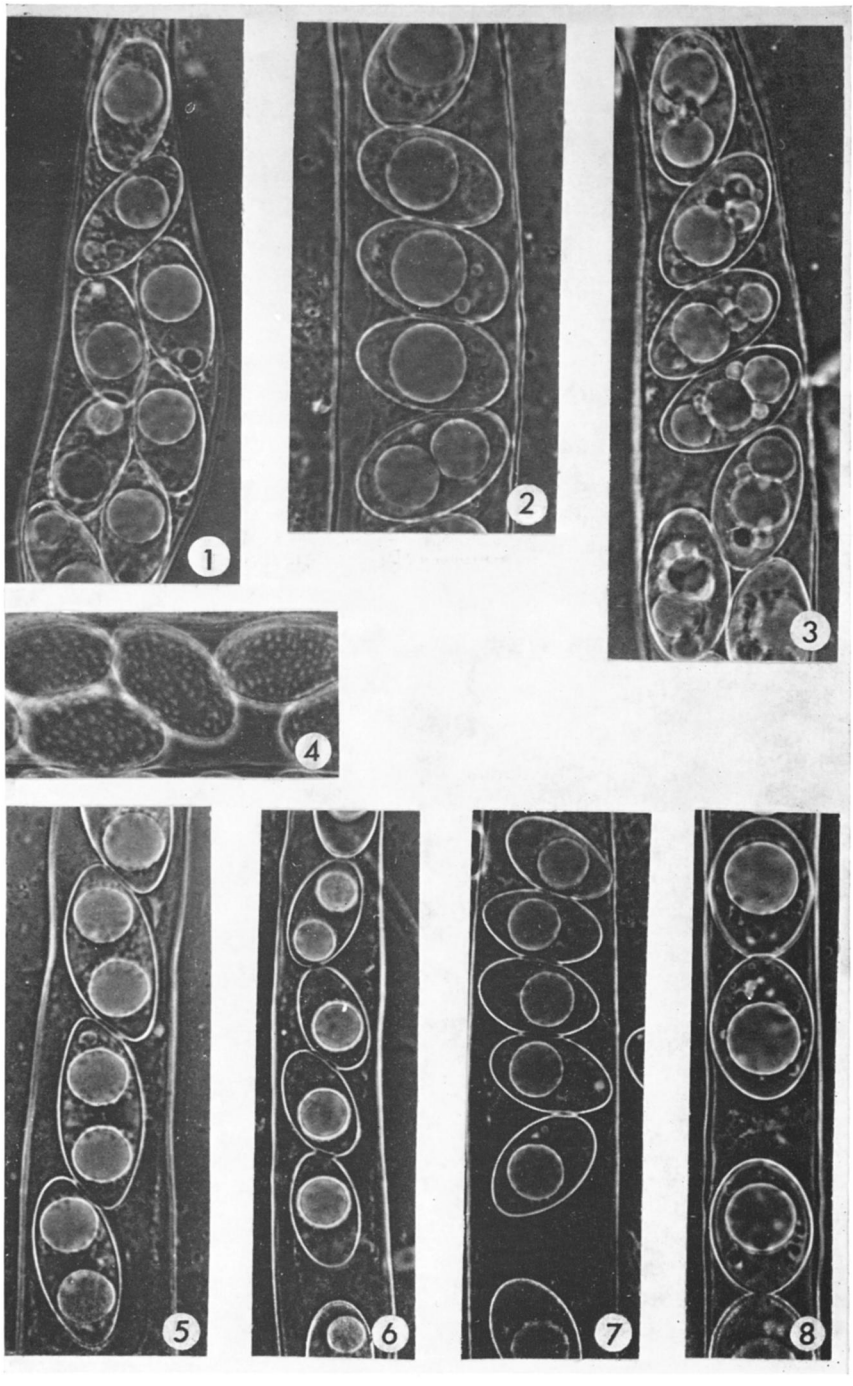
Octospora musci-muralis *Graddon* in Trans. Brit. Mycol. Soc. 58: 147 (1972).

This is a valid name for the fungus commonly known as *Humaria rubricosa*, required as there seems no justification for identifying it with *Peziza rubricosa* Fr. It is structurally a typical *Octospora*, easily recognizable by its elliptic-cylindric biguttulate ascospores 20–28 × 8–10·5 μ, strongly curved paraphyses, and occurrence in *Grimmia* cushions in December and January.

Octospora neglecta *Dennis & Itzerott*, spec. nov.

Apotheciis superficialibus, sessilibus, cupulatis, tenuiter marginati, hymenio luteo, extus pallidioribus, 1 mm. latis. Excipulum glabrum, pseudo-

PLATE 2



Photomicrographs of ascospores of *Octospora* species. **1,** *O. neglecta*, × 800; **2,** *O. grimmiae*, × 1000; **3,** *O. leucoloma*, × 1000; **4,** *O. melina* var. *meslinii*, × 1000; **5,** *O. axillaris*, × 1000; **6,** *O. rustica*, narrower spored race, × 1000; **7,** *O. rubens*, × 1000; **8,** *O. roxheimii*, × 1000.

parenchymatice versus marginem cellularum elongatis contextum. Ascis cylindraceis, octosporis; ascosporis irregulariter distichis, ellipticis, hyalinis, levibus, 20–28–29 × 9–12–13 μ, 1-guttulatis. Paraphysibus clavatis, rectis vel curvulis. Hab. in *Erythrophyllum rubellum*, Grünstadt, Rheinpfalz, Jan. 1972 (holotypus, K).

This differs from *O. leucoloma* in its more closely woven pseudoparenchymatous texture which passes into parallel hyphae on the flanks of the hymenium, terminating at the margin in clavate cells about 40 × 7–8 μ, and in the more cylindrical broadly round-ended ascospores resembling rather those of *O. musci-muralis*. They have usually one large central guttule but often an additional small droplet at each end. There are the usual hyaline anchoring hyphae on the lower part of the receptacle, which is commonly less than 1 mm. across.

Octospora phagospora (*Flageolet & Lorton*) *Dennis & Itzerott*, comb. nov.

Humaria phagospora Flageolet & Lorton in Bull. Soc. Mycol. France 30: 222 (1914).

This species is easily recognized by the mature asci with only four rather coarsely warted ascospores, 16–18 × 11–12 μ. The apothecia are small, up to 1 mm. diameter, flat and yellow, with the margin free from lobes or hairs and the excipulum has the normal *Octospora* structure. Young asci show that eight uniseriate ascospores are differentiated but four are lost by autodigestion before they attain their full size or develop the ornament.

The species seems to be very rare, for it appears to have been unknown to Boudier and to Grelet. We have it from the neighbourhood of Grünstadt in June, 1971 and April, 1972.

Octospora roxheimii *Dennis & Itzerott*, sp. nov.

Apothecia sparsa vel gregaria, sessilia, plana; cupula subhemisphaerica, margine integro, obtusiusculo, glabra, aurantiaco-luteo, latit. 1–3 mm. Asci cylindracei, 220–230 × 16–17 μ, octospori; ascosporae monostichae, sphaeroideo-ellipsoideae, laeves, 17–20 × 13–15 μ uniguttulatae. Paraphyses apicem versus leniter incrassatulae, simplices, rectae vel curvatae. Supra terram inter muscos (*Funaria hygrometrica*), Roxheim, Germania, 1.4.1972 (holotypus, K).

Distinguished by the strictly uniseriate, very broadly ellipsoid, smooth ascospores, with one very large central guttule. The excipular structure is that of a normal *Octospora*. Apothecia sometimes occur seated upon old leaves of the *Funaria*.

Octospora rubens (*Boudier*) *Moser* in Gams, Kleine Kryptogamenflora 11A, Ascomyceten: 110 (1963).

Humaria rubens Boudier in Bull. Soc. Mycol. France 12: 13 (1896).
Humarina rubens (Boudier) Seaver, The North American Cup-fungi (Operculates): 127 (1928).
Humaria sanguinea Velenovský, Monographia Discomycetum Bohemiae: 325 (1934).

Apothecia scattered, superficial, disk up to 4 mm. diameter, flat or slightly convex, deep pink, surrounded by a prominent denticulate margin; receptacle concolorous or paler, saucer-shaped, smooth. Excipulum of compactly woven hyphae, becoming parallel in the protruding margin. Asci cylindrical, up to 180 × 15–19 μ, ascospores uniseriate, elliptical with broadly rounded ends, smooth, 15–18 × 10–12 μ, with one large central guttule; paraphyses straight, clavate, 5–6 μ wide (up to 12 μ according to Boudier).

On bare soil amongst small mosses in winter and early spring, amongst *Ceratodon* according to Velenovský. The latter reported asci 250 μ long but this seems to have been exceptional, for a mount made from the lectotype of *H. sanguinea* (Herb. Krypt. Mus. Nat. Prague 151017) yielded asci about 180 × 15 μ.

Octospora rustica (*Velenovsky*) *J. Moravec* in Česká Mykologie 23: 226 (1969).

Humaria rustica Velenovský, Monographia Discomycetum Bohemiae: 327 (1934).
Octospora libussae Svrček & Kubička in Česká Mykologie 17: 65 (1963).

Apothecia superficial, up to 3 mm. diameter with flat pinkish orange disk and scarcely protruding even margin; receptacle shallow bowl-shaped, smooth. Excipulum of closely woven hyphae so as to appear almost pseudoparenchymatous below but passing into parallel hyphae towards the margin. Asci 150–190 × 11–15 μ, cylindrical, 8-spored; ascospores elliptical, smooth, uniseriate, 13–16 × 9–11 μ, paraphyses straight or slightly curved above, 3–6 μ wide. On burnt ground or amongst *Ceratodon purpureus* on sandy soil.

It seems possible that Velenovský included more than one entity in his concept of *Humaria rustica*, for his Tab. 26, Fig. 21, so labelled, includes two groups of ascospores, one distinctly more elongated and tapered at the ends than the other. Unfortunately no apothecium could be recovered from the packet of the older collection, 'in carbonaria, Struharov, Mnichovice, Aug. 1926' but his second collection, 'Bozkov, Mnichovice, Aug. 1931' yielded ascospores 13–14 × 8 μ, matching the more elongated spores in the figure. *Octospora libussae* Svrček & Kubička was not figured by its authors but when one compares the brief descriptions of these two species the differences appear very slight and to lie largely in apothecial size and in association with burnt ground or not; as set out in Table 1.

TABLE 1. Differences between *Humaria rustica* and *Octospora libussae*

	Humaria rustica	*Octospora libussae*
Apothecia	'1–3 mm. succinea'	'0·5–0·6 mm. armeniaco-subrosello'
Asci	150–200 × 10 μ, 8-spored	170–190 × 13–15 μ, 8-spored
Ascospores	12–18 × ? μ, 1-guttulate, globose-ellipsoid	14·5–16·5 × 9·5–12 μ, 1-guttulate, widely ovoid-ellipsoid
Paraphyses	'apice clavatae, 5–7 μ'	'apice rectae vel subcurvatae ad 6·5 μ.'
Substrate	'In carbonariis'	'Terram arenosam muscosam'
Associated moss	*Ceratodon*	*Ceratodon purpureus* [in type packet]

On the evidence available the differences seem of no more than varietal value at best and it is tempting to suppose that the Struharov collection yielded the more broadly elliptical spores of the left-hand group in Velenov-

ský's figure. This indicates strictly uniseriate ascospores for *H. rustica* and though the arrangement of the spores was not mentioned in the diagnosis of *O. libussae* the type yields uniseriate-spored asci, 150 × 13 μ.

In the neighbourhood of Grünstadt we find two small yellow Octosporas, one on burnt ground with apothecia about 1 mm. diameter, asci 135–160 × 12–13 μ and ascospores broadly rounded, 12–16 × 9–11 μ, the other with apothecia up to 2·5 mm., asci up to 190 × 11 μ, and more ellipsoid ascospores 12–16 × 9–10 μ, on sandy soil with *Ceratodon*. These could well be the two components of Velenovský's *H. rustica* but they do not correspond precisely with the apparent differences between *H. rustica* and *O. libussae* set out above for in our material the broader spores and asci are associated with burnt soil. The Bohemian collections were in June (*O. libussae*) and August (*H. rustica*) whereas ours were in winter and spring, December to April.

For the moment we prefer to treat *O. rustica* as a collective species covering a number of races of *Octospora* with small uniseriate, uniguttulate, smooth ascospores, associated with terrestrial mosses such as *Ceratodon* and *Funaria*.

Though Czech authors recognize both *O. rustica* and *O. libussae*, the main distinction seems to lie in habitat, the former associated with burnt soil and the latter not. No apothecia could be found on the lectotype of *O. rustica* but a second collection, Boskov, Aug. 1931 also cited by Velenovský does not appear specifically distinct from the type collection of *O. libussae*. Both are associated with *Ceratodon*, and obviously closely akin to *O. rubens*.

Octospora rutilans (*Fr.*) *Dennis & Itzerott*, comb. nov.

Peziza rutilans Fr., Syst. Myc. 2: 68 (1822).
Leucoloma rutilans (Fr.) Fuckel in Jahrb. Nass. Ver. f. Naturkunde 23/24: 318 (1870).
Aleuria rutilans (Fr.) Gillet, Champignons de France. Les Discomycètes: 53 (1879).
Scypharia rutilans (Fr.) Quélet in Comp. Rend. Assc. Franç. Avanc. Sci. 14: 551 (1886).
Sepultaria rutilans (Fr.) Lambotte, Flore Mycol. Belge Suppl. 1: 302 (1887).
Humaria rutilans (Fr.) Saccardo, Sylloge Fungorum 8: 133 (1889).
Neottiella rutilans (Fr.) Dennis, British Cup Fungi: 28 (1960).
Leucoscypha rutilans (Fr.) Rifai in Verh. Kon. Ned. Akad. Wetensch. Afd. Nat. II. 57: 164 (1968).

Apothecia superficial, disk reddish orange, up to 13 mm. diameter, receptacle white, cup-shaped with a short stem-like base, downy-hairy. Excipulum of woven hyphae, becoming compact and almost pseudoparenchymatic at the surface but running out into thicker-walled, slightly tapered, sparingly septate hairs up to 250 × 10 μ. Asci cylindrical, up to 310 × 20 μ, 8-spored; ascospores uniseriate, fusoid-elliptic, 20–25 × 12–13·5 μ, with one or two large guttules, the wall ornamented by a more or less complete coarse-meshed reticulum. Paraphyses straight, up to 5 μ wide. On sandy or peaty soils, commonly with *Polytrichum juniperinum* and *P. piliferum*, in autumn and winter.

As indicated in the introduction, the generic position of this much shuffled fungus depends on the value placed on the simple, white, non-rooting hairs.

Octospora tetraspora (*Fuckel*) *Korf* in Mycologia 46: 838 (1954).

Ascobolus tetrasporus Fuckel in Hedwigia 5: 4 (1866).
Leucoloma tetraspora (Fuckel) Fuckel in Jahrb. Nass. Ver. f. Naturkunde 23/24: 317 (1870).
Peziza tetraspora (Fuckel) Cooke in Grevillea 3: 73 (1874).
Aleuria tetraspora (Fuckel) Gillet, Champignons de France. Les Discomycètes: 207 (1886).
Humaria muralis var. *tetraspora* (Fuckel) Quélet, Enchiridion Fungorum: 287 (1886).
H. tetraspora (Fuckel) Saccardo, Sylloge Fungorum 8: 121 (1889).
Humarina tetraspora (Fuckel) Seaver, The North American Cup-fungi (Operculates): 134 (1928).

This has the structure of a typical *Octospora* and may, indeed, be no more than a four-spored variety of *O. leucoloma*, since it too, grows with *Bryum argenteum* and differs only in the largely 4-spored asci. Actually, as Fuckel pointed out, the number of ascospores is inconstant, as many as six may mature in one ascus. Hence, though he stated the spore size to be 24 × 12 μ, his own material in Fungi rhenani 1856 yields apparently mature ascospores with a wide range in size, 21–30 × 11·5–16 μ. The spore shape and guttulation closely resembles that of *O. leucoloma*. Boudier's Tab. 393, with ascospores said to be 28–50 × 10–13 μ and Cooke's measurements 32–35 × 10 suggest that there may perhaps also be a 4-spored state of *O. coccinea* passing under this name.

Octospora vivida (*Nylander*) *Dennis & Itzerott*, comb. nov.

Peziza vivida Nylander in Flora 48: 467 (1865).
Aleuria vivida (Nyl.) Gillet, Champignons de France. Les Discomycètes: 54 (1879).
Humaria vivida (Nyl.) Quélet, Enchiridion Fungorum: 290 (1886).
H. rutilans var. *vivida* (Nyl.) Rehm in Rabenhorst, Kryptogamenflora, Ed. 2, 1(3): 961 (1894).
Neottiella vivida (Nyl.) Dennis, British Cup Fungi: 28 (1960).
Leucoscypha vivida (Nyl.) Dennis & Rifai in Rifai in Verh. Kon. Ned. Akad. Wetensch. Afd. Nat. II. 57: 168 (1968).

Since this only differs from *O. rutilans* in that the ascospore ornament consists of small warts instead of a reticulum, and the ornament of *O. rutilans* commences as separate warts, Rehm's reduction of the species to varietal rank under *H. rutilans* seems well founded. Associated with *Polytrichum juniperinum* and *P. piliferum*.

Octospora wrightii (*Berk. & Curtis*) *J. Moravec* in Česká Mykologie 23: 227 (1969).

Peziza wrightii Berk. & Curtis in Ann. Mag. Nat. Hist. III, 15: 444 (1865).
Barlaea wrightii (Berk. & Curtis) Saccardo, Sylloge Fungorum 8: 112 (1889).
Lamprospora wrightii (Berk. & Curtis) Seaver in Mycologia 6: 15 (1914).

The structure is much that of an *Octospora* but the marginal hyphae run out into quite thick-walled, septate, obtuse hairs, as is often the case in

Lamprospora, so that the species has as much justification as *O. rutilans* for transfer to *Leucoscypha* if that is to be the generic criterion. The ascospores vary in a single mount from quite globose, 11 μ diameter, to broadly ellipsoid, 13 × 9 μ, which agrees quite well with Berkeley & Broome's figures, 0·00045–0·0006 inches or approximately 11–15 μ. The fine ornament resembles that of *O. melina*. Apparently mature asci in the Welsh material measure only 130 × 13 μ but Moravec found them up to 240 × 15 μ. Boudier's spore dimensions, 14–17 μ, are doubtless about 10 per cent. too large, as is usual with him. Though the name was evidently suggested by Wright's collection from Texas (*Curtis* 3139) the diagnosis was based on the much more abundant material from Bodelwyddan, North Wales, amongst *Amblystegia serpens* on *Ulmus* bark, March 1864, which must be the typus, as already indicated by Seaver.

According to Boudier the species is not rare around Paris; Grelet had it once, in February and Moravec as late as June in Czechoslovakia. We include it here because it has been transferred to *Octospora* but if *Lamprospora* is tenable as a separate genus its place seems to lie rather there, for *Lamprospora* ascospores are not always perfectly spherical. The single rather small guttule does not fill the centre of the spore like that of *O. melina* or *O. rubens*. The broad margin torn into triangular lobes shown on Boudier's Plate 399 is also much more characteristic of *Lamprospora* than of *Octospora*.

We do not propose here to discuss in detail those species transferred to *Inermisia*, which seem less closely tied to bryophytes than the typical species of *Octospora*, but give brief synonymies to facilitate reference.

Inermisia buchsii (*P. Henn.*) *J. Moravec* in Česká Mykologie 23: 223 (1969).

Pyronema buchsii P. Hennings in Hedwigia 41: 164 (1902).
Humaria buchsii (P. Henn.) Boudier, Hist. Classif. Discom. Europe: 67 (1907).

On coniferous debris.

Inermisia deformis (*Karsten*) *Dennis & Itzerott*, comb. nov.

Peziza deformis Karsten, Fungi Fennici Exsiccati No. 628 (1867).
Humaria callichroa Boudier in Bull. Soc. Bot. France 28: 93 (1881).
Neottiella callichroa (Boud.) Saccardo, Sylloge Fungorum 8: 115 (1889).
Humaria deformis (Karsten) Saccardo, *op. cit.*: 131 (1889).
Humarina deformis (Karsten) Nannfeldt, Fungi Exsiccati Suecici No. 1362 (1946).
Octospora deformis (Karsten) Gamundi in Lilloa 30: 300 (1960).
Octospora callichroa (Boud.) Arpin in Bull. Soc. Mycol. France 84: 451 (1968).
On damp soil; the synonymy was indicated by Nannfeldt (*l.c.*).

Inermisia fusispora (*Berkeley*) *Rifai* in Verh. Kon. Ned. Akad. Wetensch. Afd. Nat. II. 57(3): 198 (1968).

Peziza fusispora Berkeley in London Journal of Botany 5: 5 (1846).
Peziza carbonigena Berkley in Hooker, Flora Tasman. 2: 274 (1860).
Peziza aggregata Berkeley & Broome in Ann. Mag. Nat. Hist. III, 18: 123 (1866).

P. roumegueri Karsten in Grevillea 7: 64 (1878).
Humaria fusispora (Berk.) Saccardo, Sylloge Fungorum 8: 133 (1889).
H. aggregata (Berk. & Br.) Saccardo, *op. cit.*: 133 (1889).
H. carbonigena (Berk.) Saccardo, *op. cit.*: 130 (1889).
H. roumegueri (Karsten) Saccardo, *op. cit.*: 132 (1889).
Leucoloma fusispora (Berk.) Rehm in Hedwigia 31: 301 (1892).
Humarina fusispora (Berk.) Seaver, The North American Cup-fungi (Operculates): 136 (1928).
Octospora carbonigena (Berk.) Dennis, British Cup Fungi: 33 (1960).
O. fusispora (Berk.) van Brummelin in Persoonia Suppl. 1: 213 (1967).

On peaty soils and burnt ground. The above is only a selection from the synonymy of this cosmopolitan fungus, covering names in *Humaria* and *Octospora* current in Europe. A more complete synonymy will be found in Rifai (1968).

Inermisia gyalectoides (*Svrček & Kubička*) *Dennis & Itzerott*, comb. nov.

Octospora gyalectoides Svrček & Kubička in Česká Mykologie 17: 66 (1963).

This is not a typical *Octospora* but it is difficult to place. The habit, sunk to the margin in sandy soil, is that of a *Sepultaria* and it clearly resembles *S. semi-immersa* (Karst.) Massee. The anchoring hyphae appear, however, to be all colourless and thin-walled instead of brown-walled as in *Sepultaria*, while ascospores are less fusoid and a little shorter than in *S. semi-immersa*. The structure is difficult to see in the dried material but as described by Svrček & Kubička, with a globose-celled excipulum sheathed in cylindrical hyphae, it recalls *I. pilifera*, from which it differs in the larger, broader spores. The type is associated with scattered small mosses, *Bryum argenteum*, *Funaria hygrometrica* and *Pottia* sp., but not very closely so and it is probably not bryophilous.

Inermisia lecithina (*Cooke*) *Dennis & Itzerott*, comb. nov.

Peziza lecithina Cooke in Grevillea 4: 110 (1876).
Humaria lecithina (Cooke) Saccardo, Sylloge Fungorum 8: 126 (1889).
Helotium lecithinum (Cooke) Massee, British Fungus Flora 4: 233 (1895).
Pustularia lecithina (Cooke) Rea in Trans. Brit. Mycol. Soc. 7: 58 (1921).

On wet decaying wood.

Inermisia pilifera (*Cooke*) *Dennis & Itzerott*, comb. nov.

Peziza pilifera Cooke, Mycographia: 50 (1876).
Leucoloma piliferum (Cooke) Rehm in Ber. Naturhist. Vereins Augsburg 26: 18 (1881).
Humaria pilifera (Cooke) Saccardo, Sylloge Fungorum 8: 122 (1889).

Immersed in soil amongst *Barbula* spp. Cooke's reference to evanescent hairs evidently led some authors like Velenovský to use this name for a truly hairy fungus but Cooke made it clear that he was referring to the sheathing and anchoring hyphae: 'The external hairs . . . seem to be of the same character as the delicate filaments at the base of *Peziza omphalodes*'.

We have not seen material of *Humaria calospora* Quélet 1885 (= *H. boudieri* Saccardo 1889) nor of *Humaria luteola* Torrend, though the fungus from Pakistan to which Cash attached the latter name is not an *Octospora* but probably a *Coprobia*, with ascospores 15–19 × 9 μ, entirely without guttules.

Humaria sabranskyana Baumler is inoperculate, probably a *Discinella* and to judge from the description, *H. sudetica* Kirschstein in Ann. Mycol. 36: 385 (1938), may well be inoperculate also.

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