

## Synaptospora a New Genus of Amerosporous Ascohyemiales (Ascomycetes).

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A contribution in honour of Professor Dr. Franz Petrak on the occasion of his 70th birthday on the 9th October, 1956.

With Plates II and III.

In 1951 Hughes (3) gave a detailed account of the genus *Orbicula* Cooke with *O. parietina* (Schrader ex Fries) Hughes as the type species. The globose perithecia are non ostiolate with a dull purplish-brown rather delicate peridium. The cylindrical, 8-spored asci break down at maturity to release the ascospores into the perithecial cavity forming a dry yellow powder. The ascospores are globose or subglobose, uniseriate, yellow to light yellowish-brown, frequently with the wall collapsing at maturity. This species is not related to the *Aspergillaceae*, *Phaeotrichaceae* or the genus *Preussia*. Its affinity will be discussed in a separate paper. A second species, *Orbicula tartaricola* (Nylander apud Leighton) Cooke was briefly described and illustrated by Hughes (3) who recognized that it is probably not congeneric with *O. parietina*.

*O. tartaricola*, known from two collections on lichens in Wales, has dark non ostiolate perithecia and eight, uniseriate, dark-brown ascospores which become fused in groups of two to five. A third species collected on decorticated wood in Ontario is very similar in structure to *O. tartaricola*. Because of the smaller ascospores, the minute ostioles, and the different habitat, this is described as a new species and made the type of a new genus.

*Sphaeria variolariae* was described by Massalunga (4) in 1855 from a specimen collected in Northern Italy on the thallus of *Pertusaria communis*. This species was transferred by Saccardo (5) to *Orbicula*. From the description it appears to belong in the genus *Synaptospora*.

### *Synaptospora* Cain, gen. nov.

Perithecia superficialia, globose, without ostiole or with a minute simple opening at apex. Peridium black, opaque, carbonaceous, roughened with irregular thickened areas. Asci 8-spored, cylindrical, thin-walled, arranged in parallel layer lining a large part of inner peridium. Paraphyses filiform, septate, mixed with asci. Ascospores uniseriate, dark-brown, at first ellipsoid and separatae, becoming more

or less compactly fused in groups of two to eight and then characteristically flattened along the area of contact.

Perithecia superficialia, globosa, non ostiolata vel apertura minima praedita. Peridium perithecii nigrum, opacum, carbonaceum, verrucosum. Asci cylindranei, octospori, stipitati, tenuiter tunicati, parallele dispositi. Paraphyses filiformes septatae. Ascosporae uniseriatae, atro-fuscae, primum ellipsoideae, demum plerumque in catenas conglutinatae.

Derivation: *synaptos*, συναπτος, joined together, and *spora, spora*, seed.

Type species: *Synaptospora Petrakii* Cain.

Key to Species.

Ascospores when ellipsoid measuring 10–12  $\mu$   $\approx$  8–9.5  $\mu$ .

On lichen thalli 2. *S. tartaricola*.

Ascospores smaller, when ellipsoid measuring 6–11  $\mu$   $\approx$  5–6  $\mu$ .

On decaying wood 1. *S. Petrakii*.

### 1. *Synaptospora Petrakii* Cain sp. nov.

Perithecia scattered or aggregated in small groups, superficial, globose, 250–350  $\mu$ , non ostiolate or with small, indistinct, circular ostiole measuring 20  $\mu$  diam., black, coarsely roughened with elevated areas; perithecial peridium 20–30  $\mu$  thick, with thickened patches up to 50  $\mu$ , black, opaque, carbonaceous; cells of peridium mostly 7–15  $\mu$  diam., very indistinct, irregular, black. Asci 70–80  $\mu$   $\approx$  8–9  $\mu$ , cylindrical, 8-spored, with a thickened, annular structure just below truncated apex; narrowed below into a short stipe, arranged in parallel layer lining a large part of the inner peridium. Paraphyses 3–7  $\mu$  broad, septate, filiform or with some of the shorter cells somewhat swollen, intermingled with asci, indistinct in dry specimen. Ascospores uniseriate, dark-brown, 1-celled, ellipsoid, 6–11  $\mu$   $\approx$  5–6  $\mu$  (when solitary and mature), usually becoming fused obliquely in groups of two to eight (more commonly three to five), and then somewhat irregular in shape, being more or less flattened along the area of contact; groups of four ascospores measuring 21–27  $\mu$  in length; usually one large refractive globule in each ascospore (sometimes several smaller ones in addition). Germ pore or slit not observed but an indistinct dark line present on wall of a few ascospores.

On blackened surface of old decorticated log of *Betula papyrifera*, North of Bolton, Peel Co., Ont., Canada, Oct. 8, 1955, coll. R. F. Cain. (TRTC 32168 type).

Peritheciis sparsis vel subdense gregariis, superficialibus, globosis, nigris 250–350  $\mu$ , verrucosis, non ostiolatis vel ostiolo minimo, obscuro, orbiculato, 20  $\mu$  diam. praeditis. Peridio nigro, opaco, carbonaceo, 20–30  $\mu$  (50  $\mu$  in verrucis), e cellulis obscuris, irregularibus, nigris, 7–15  $\mu$  constituto. Ascis octosporis, cylindraneis, 70–80  $\mu$   $\approx$  8–9  $\mu$ , superne late rotundatis, ad apicem annulatis, basi in stipitem

brevem attenuatis. Paraphysibus septatis, 3—7  $\mu$ , filiformibus vel ventricosis. Ascosporis uniseriatis, atro-brunneis, non septatis, ellipsoideis (sic unico in maturitate), 6—11  $\Rightarrow$  5—6  $\mu$ , plerumque in catenas 2—8 (saepe 3—5) oblique compressas conglutinatis. Named in honour of the eminent mycologist Dr. F. Petrak of Vienna.

When first cut out, the ascospores are hyaline, small, regularly ellipsoid and separate. As they mature, they usually become fused in groups of two to eight. The most common arrangement is two groups of four ascospores in each. The next most common grouping is three and five. In rare cases all the ascospores are fused in one group. Occasionally there are more than two groups and rarely all of the mature spores are more or less separate.

The ostiole which is very inconspicuous can usually be detected only by sectioning the upper part of the perithecium and examining it with the compound microscope. There is no neck and the ostiole is simply a minute round pore in the peridium.

2. *Synaptospora tartaricola* (Nylander apud Leighton) Cain comb. nov.

Syn.: *Orbicula tartaricola* (Nyl. apud Leigh.) Cooke. Handbook of British fungi 2: 926, 1871.

*Sphaeria tartaricola* Nyl. apud Leighton. On *Sphaeria tartaricola*, Nyl., a new British fungus. Trans. Linnaean Soc. London 27: 159, 1870 (1871)).

On the thalli of lichens, North Wales two collections are known: 1. on *Ochrolechia tartarea* on a wall near Dolgelley, Aug. 6, 1866. Coll. W. A. Leighton. 2. on *Squamaria gelida*, Moel-y-gest near Tremadoc, Sept. 1877, coll. W. A. Leighton.

This species is described and illustrated by Hughes (3). The perithecia are similar to those in the preceding species but are described as having no ostiole. The ascospores are larger, the measurements for the mature solitary cells being 10—12  $\Rightarrow$  8—9.5  $\mu$ . They become fused in groups in the same characteristic manner in both species.

#### Relationships.

The genus *Synaptospora* is not a member of the Loculoascomycetes as indicated by type of ascus, and is therefore not related to the family *Phaeotrichaceae* (1) or the genus *Preussia*, a detailed study of which is to appear in a separate paper. In *S. Petrakii* the ascus wall is thin and delicate so that it disappears very rapidly when mounted in water. The outer wall is not thick, rigid and permanent in water mounts and does not rupture with a thimble-shaped apical portion characteristic of the Loculoascomycetes. There is a definite structure in the apex of the ascus which bears some resemblance to that found in some of the *Xylariaceae*, but it is less conspicuous than in species of *Hypoxylon*, *Rosellinia* and *Hypocopa*.

I have previously (1, 2) pointed out that the species with non ostiolate perithecia and ascocarps do not represent a related group but include many different lines which have had their origin in the various types of Ascomycetes with ostiolate perithecia, apothecia and ascocarps characteristic of the Loculoascomycetes. It would not be surprising to find related species with or without ostioles. It seems probable that all the perithecia of *S. Petrakii* eventually develop a minute ostiole and that the asci actually discharge the ascospores into the air. The presence of the apical structure in the ascus and empty asci within the perithecia would seem to indicate this. *S. tartaricola* is described as having non-ostiolate perithecia and asci devoid of any special apical structure. If so, this species appears to have recently evolved these characteristics. The cylindrical shape of the asci and their arrangement in a parallel layer indicate that they either forcibly discharge their ascospores into the air or have been derived from an Ascomycete possessing this habit. This species is entirely unrelated to *Orbicula parietina* (Schrader ex Fries) Hughes and should be removed from this genus.

The relationship of *Orbicula* which will be treated in a separate paper, is clearly not with the *Xylariales* or related orders. While *Synaptospora*, at present, cannot be placed with certainty on the basis of information now available, it appears to resemble the *Xylariaceae* more closely than any other family. The nature of the ostiole places this genus in an intermediate position between the *Plectascales* and other taxa having distinct cleistothecia and typical *Sphaeriales* with a definite conspicuous ostiole. However, it may be preferable to classify the genus with the *Xylariaceae* tentatively rather than erect a new one. The genus is not entirely characteristic of this family, however, and further study may place it in different but related taxon.

The black carbonaceous perithecia appear to exclude *Synaptospora* from any close relationship with *Sordaria*, *Podospora*, *Bombardia* or the family *Tripterosporeae* (2)). Furthermore, in the latter group, the apical structure in the ascus is more of a doughnut-shaped ring.

#### Literature cited.

1. Cain, R. F. Studies of coprophilous ascomycetes II. *Phaeotrichum*, a new cleistocarpus genus in a new family, and its relationships. Can. Jour. Bot. 34: 675—688, 1956.
2. Cain, R. F. Studies of coprophilous ascomycetes IV. *Tripterospora*, a new cleistocarpus genus in a new family. Can Jour. Bot. 34: 699—710, 1956.
3. Hughes, S. J. Studies on micro-fungi VIII. *Orbicula* and *Lilliputia*. Commonwealth Mycol. Instit. Kew. Mycol. papers 42: 1—28, 1951.
4. Massalongo, A. B. De Cryptogamis nonnullis novis agri Veronensis. Flora 38: 241—244, 1855.
5. Saccardo, P. A. Sylloge Fungorum 2: addenda p. II, 1883.

**Explanation of Plates II and III.**

- Fig. 1. Perithecia, left, in section through ostiole, and right, surface view.
- Fig. 2. Paraphyses and young asci with hyaline immature ascospores, previous to conglutination.
- Figs. 3, 4. Asci showing various arrangements of ascospores.
- Fig. 5. Ascospores conglutinate in various sized groups.
- Figs. 6, 7. Asci with ascospores conglutinate in groups of various sizes. The ascus in the upper right corner has only seven ascospores. The ascus in the upper row, third from the right, has all the mature ascospores remaining separate. In two of the asci shown in the lower row, all of the ascospores are conglutinate in a single group. The ascospores are mature in each of the asci but the shading has been omitted.
- Fig. 8. A conglutinated group of five mature ascospores, shading omitted.



