ASCOZONUS MONASCUS, A NEW SPECIES OF ASCOMYCETES FROM GREAT BRITAIN

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Ascozonus monascus Brumm. & M.J. Richardson, a new coprophilous ascomycete from Scotland, is described and illustrated. It is characterized by ascomata developing only a single multispored ascus, with a subapical ring and a small operculum at the apex, and a few excipular cells near the base.

At the end of December 1998 the second author incubated rabbit dung from the neighbourhood of Edinburgh in a moist chamber. After seven days numerous apparently naked asci developed on the dung surface, on bundles of mycelial hyphae and on the surface of fruit-bodies of other coprophilous fungi.

From the structure of the asci, with a conspicuous, subapical ring, a conical apex, and a small operculum it is clear that this fungus belongs to Ascozonus (Renny) E.C. Hansen. Since it does not agree with any of the species of Ascozonus described thus far, it is described as a new species.

Ascozonus monascus Brumm. & M.J. Richardson, spec. nov.


Etymology: from Greek, μονος, alone, sole, single, and σακ, a leathern-bag or sack: with a single ascus.

Ascomata solitaria, in small groups, or closely gregarious, sometimes forming a waxy-looking crust, superficial, sessile, 45–60 μm diam., 150–180 μm high, consisting each of a single ascus surrounded by a small number of paraphyses and some excipular cells near the base, at first subglobular and closed (cleistohymenial, Fig. 1D), then opening and oblong-ellipsoid, white. Hymenium and hypothecium not differentiated. Excipulum reduced to a few thin-walled, isodiametric, rounded cells about 10–30 μm diam. (textura globulosa) near the base of the ascus, extending about 50–60 μm up the ascus; without cilia or hairs.

Asci broadly clavate with a short curved base, with a conical pointed apex, 112–145 × 39–50 μm, with a 1.2–1.5 μm thick subapical ring 35–40 μm diam. at the inner side of the wall, ending with an operculum (or 'apical disk') 5–9 μm across, reaching a thickness (after

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Fig. 1. *Ascozonus monascus*. A. Lateral view of living ripe fruit-bodies, × 400; B. detail of fruit-body in median section without ascospores, showing appressed paraphyses (p) and excipular cells (ex), × 1000; C. lateral view of fruit-body, showing layer of paraphyses covering the ascus, × 600; D. median section through fruit-body in early mesohymenial phase, showing ascus mother cell surrounded by a closed layer of excipular cells, × 1600; E. detail of ascus apex with subapical ring (sr) and operculum (op), × 2000; F. ascospores, × 1600 (all from holotype of *A. monascus*).
swelling) of 2.5 μm in the centre, 150–200-spored, opening at the top along the operculum above the subapical ring with a bi-labiate or laciniate split; the wall not staining blue with iodine. Ascospores united in a single ovoid cluster 57–80 × 32–38 μm, arranged as if radiating from a central spindle and ejected together, fusiform-ellipsoid with rounded or truncate ends, often slightly asymmetrical (length/width ratio 2.2–2.7, average 2.38), hyaline, 8.7–9.8(–11.5) × 3.6–4.1(–4.6) μm, without oil drops or granules, not easily producing air-bubbles, smooth. Paraphyses rather scarce, septate, sinuous, bending inwards at the apex to cover the ascus apex, hyaline, 2.0–2.5 μm thick, enlarged up to 4–7 μm at the tip, not embedded in mucus.

Habitat — Only known from dung of rabbits.


As in other species of Ascozonus, the tiny, delicate, white fruit-bodies develop on the surface of the dung as well as on hyphal bundles or fruit-bodies of other fungi.

An ascospore number between 150 and 200 as in A. monascus has not been recorded before in the genus. The highest ascospore number in Ascozonus till now was found in A. subhirtus (Renny) E.C. Hansen with up to 128 spores per ascus, but it has many asci in a fruit-body, and a well-developed receptacle with a ciliated margin and several rows of connate hairs below.

In an unpublished series of exact ascospore counts in multi-spored strains of Thelebolus and Ascozonus the first author could confirm the constant spore number within any given strain as found by Wicklow & Malloch (1971) in Thelebolus. As a result of successive mitoses the spore number found was up to 2^n, with the restriction that, as in 8-spored ascomycetes, sometimes in a certain line one or a few abortive spores are produced.

Little attention has been paid to the early development of the ascomata in species of Ascozonus. The descriptions and images published by Renny (1871, 1873, 1874) suggest the presence of paragymnohymenial ascomata (Van Brummelen, 1967), but in A. monascus the ascogenous system is extremely reduced; neither remnants of an ascogonium nor of an antheridium could be found near the base of young asci. As in Lasiobolus monascus Kimbr., the ascus directly develops from the ascogonium (Kimbrough, 1974; Kimbrough & Benny, 1978). In the early stages the ascogonium and the ascus-mother-cell are completely surrounded by excipular cells (Fig. 1D). During the prehymenial or early mesohymenial phase these cleistohymenial ascomata open and the hymenium, here consisting of a single ascus surrounded by several paraphyses, becomes exposed. The ripening ascus shows a restricted receptacle at its base, and remains enclosed with a tight single layer of appressed paraphyses (Fig. 1C).

The operculum at the top of mature asci is often found encircled by an irregular collar consisting of the swollen ends of twelve to twenty paraphyses (Fig. 1B).

While the operculum in most species of Ascozonus shows a diameter of 2 to 3 μm, it reaches a width of 5 to 9 μm in the present species.

Studies of ascus apex ultrastructure in species of Ascozonus (Van Brummelen, 1974, 1978, 1994, 1998) revealed a most peculiar and constant apical apparatus described as the Ascozonus type. The Ascozonus type of ascus apical structure shows clear resemblance to both the Thelebolus type and the Octospora type by the presence of a subapical ring in the lateral ascus wall at some distance below the ascus tip; while in Ascozonus and Thelebolus
the subapical ring is a constant prominent wall thickening which acts as a barrier against dehiscence of the ascus top below the level of the ring, it is a far less pronounced structure, at some distance below the future rather roughly delimited operculum, in the Octospora type (typical of the Pyronemataceae). The last can be made visible by staining, electron microscopy, or post-mortem water imbibition of wall layers.

Samuelson (1978) in a study of the ascus apical apparatus in representatives of the Pyronemataceae, studied the ascus of _A. woolhopensis_ (Renny) E.C. Hansen. He failed to find the typical operculum and arrived at the remarkable conclusion that the apical apparatus in this species most clearly resembled that of _Anthracobia melaloma_ (Alb. & Schw.: Fr.) Boud.

REFERENCES


Brummelen, J. van. 1974. Light and electron microscopic studies of the ascus top in _Ascozonus woolhopensis_. Persoonia 8: 23–32.


