

NOTES ON SOME BRITISH AGARICS: III

ROY WATLING

ABSTRACT. Two new species of *Coprinus*, *C. trisporus* Kemp & Watling and *C. sclerotiger* Watling are described. The use of the names *C. tuberosus* Quélet and *C. stercoreus* Fries are briefly discussed.

INTRODUCTION

Much recent work has been concentrated on the members of *Coprinus* section *Vestiti*, i.e., members of the *C. narcoticus* group (Orton, 1960; Kits van Waveren, 1968; Orton, 1972), but even now the picture is far from complete. This has become abundantly clear during the screening of various isolates of *Coprinus* for their mating patterns by Dr R. F. O. Kemp; there is apparently a complexity of taxa centred on *C. 'stercorarius'* for which there are insufficient names. Difficulty is experienced in the interpretation of the original diagnoses of many of the small coprini and this adds to the problem of relating these names to the material in culture. The actual culture-work will be discussed elsewhere but it is necessary here to publish notes on four species which have been accepted as autonomous in the second part of the British Fungus Flora.

***Coprinus stercoreus* Fries, Epicrisis Systematis Mycologici 251 (1838).**

The use of the name *C. stercoreus* Fries for a fairly small to very small, gregarious and often abundant coprophilous agaric (Watling, 1967) was supported by several important aspects which I have had reason to reassess.

My identification of *C. stercoreus* originates from a logical continuation of the use of the name *C. stercorarius* Fries by Kühner & Romagnesi (1953). I would suggest that the plate of Bulliard (1791) quoted by Fries in his original description, i.e. Plate 542 f. M-P, is only a magnification of figure L of the same organism on the same plate, as will be seen by a close inspection of the individual fruit-bodies Bulliard illustrated. It is true 'artist's licence' must be applied to the actual grouping and relationship in space of one fruit-body to another but other than this the parallel is too great to be merely coincidence. Fries does not mention until later in the discussion Bulliard's second plate (Plate 68) of *C. stercorarius*. Thus by adopting the epithet '*stercoreus*', which I do not believe is a mis-spelling for '*stercorarius*', the name *Coprinus stercorarius* Fries for this initially completely white agaric with small spores must be rejected. Apart from the absence of smell, the collections I described in 1967 agree well with *C. velox* Godey apud Gillet as interpreted by Kits van Waveren (1968); indeed this has been confirmed to be true by Kits van Waveren himself, who examined some of the material used in my description.

***Coprinus tuberosus* Quélet in Bull. Soc. Bot. Fr. 25: 289 "1878" [1879]. Fig. 1F.**

The correct name for the fungus which is generally called *C. stercorarius* Fries is *C. tuberosus* Quélet, 1879 (see synonymy in Kits van Waveren, 1968)

and this name is adopted here. This is a small to medium agaric with a finely mealy greyish pileus with or without a long rooting base connected or not to a small dark sclerotium. The sclerotium when present in the field has a thin, dark 'rind' and soon collapses leaving only a dark parchment-like fragment as a trace of its former presence; it may be deeply located in the substrate and then the stipe of the fruit-body has a long tapering and rooting base.

C. tuberosus has been adopted in preference to *C. cineratus* Quélet, 1877 as there is some discussion as to the misuse of the latter name; indeed after consultation with P. D. Orton we are of the opinion that Quélet's species may refer to *Coprinus semitalis* Orton, 1972 which grows in gardens and woods. *C. tuberosus* by unanimous opinion in the literature is regarded as a synonym of *C. stercorearius* auct. pl. (Kits van Waveren, 1968), particularly those fruit-bodies with a visible sclerotium. We are aware in other instances that Fries' interpretation of several fungi altered between 1821-1830, when he was in southern Sweden, and 1874 and after when he had examined material from Uppsala and northern Sweden, as well as extra-limital specimens. This has frequently lead to confusion as to what name to use and to what fungus Fries really referred. This may be indicated in Fries' comment on fruit-bodies derived from sclerotia submitted to him by Brefeld when he considered the material he cultured represented the fungus he called *C. stercorearius* in 1857; this could indicate that he accepted a much broader species concept in this group to that held when he described *C. stercoreus*, a fact supported by the suggestion of Brefeld (1877) that his fungus was possibly a new species. However, *C. stercoreus* does occur around Uppsala (where Fries spent his later life) and I have collected it there recently growing on rather strongly weathered horse-dung. That there is still a complex in this group is supported by a collection sent to me by Dr F. H. Gleason, then of Colorado College, U.S.A. (isolate RKB: Baja California, near Arroyo Seco, on dung, legit R. K. Benjamin). It differed in the conical cap, longer and wider basidiospores, which apparently lack perispores, and more numerous hyphae in the veil than normally seen in members of this group; this latter character may be a culturally induced phenomenon.

A NEW SPECIES OF COPRINUS WITH 3-SPORED BASIDIA

The above discussion of the names *C. stercoreus* and *C. tuberosus* leaves two coprophilous agarics unaccounted for. One species, known to Dr R. F. O. Kemp for some time from fresh and cultured material, consistently produces three-spored basidia and has a very strong unpleasant odour, much stronger and more nauseous than that of *C. narcoticus* (Batsch. ex Fr.) Fr. The fungus has now been found in four widely separated localities and the presence of three-spored basidia remains constant along with other correlating microscopic details. It is quite different from any other species in the *C. narcoticus* group when grown in pure culture.

***Coprinus trisporus* Kemp & Watling, sp. nov.** Fig. 1 G-K.

A basidiis trisporigeribus, odore forte et pileo crasse farinoso-squamuloso facile distinguitur.

Pileus primo glandiformis, elongato-ellipsoideus vel cylindrico-ovoideus, 5-17.5 mm altus, 7-8 mm latus, dein plano-convexus vel expansus umbonatus,

12–18 mm, albus vel albido-pallidus, ad discum vulgo pallide argillaceo-bubalinus, primo totus albo-floccosus, vulgo ad discum squamis farinosus crassioribus interdum sordidotinctis obtectus, interdum postremo radialiter plicato-sulcatus. *Stipes* 16–23 \times 2–3.5 mm, subaequalis vel sursum attenuatus et ad basim 3.5–4.5 mm latus, albus vel pallidus, totus albo-pruinosis, cavus, ad basim obscuriore farinosus. *Lamellae* fere liberae, ex albido nigrae, confertae, ad aciem primo albo-flocculosae. *Caro* tenuis, albida. *Odor* fortis, nauseosus. *Sporae* ellipsoideo-amygdaliformes, a perisporis tenuiter tunicae, 9–10 (–10.5) \times (5.5–) 6–6.5 μ m, cum perisporio tenuitunicatae, 6–7 μ m latus. *Basidia* trisporigera. *Cystidia* aciei lamellarum sphaero-pedunculata, pyriformia vel irregulariter vesiculosa, 30–62 \times 15–40 μ m. *Cystidia* faciei lamellarum cylindrico-vesiculosa, 70–100 \times 28–48 μ m. *Cellulae veli* pilei globosae, 20–75 μ m, vel ellipsoideae, verrucoso-punctatae, 20–75 \times 10–40 μ m, etiam paucis, \pm cylindricis, 4–8 μ m latis mixtis. Scotland, Edinburgh: Blackford Glen, ad fimum equinum vetustum, solitarius vel 2–3-caespitosus, 14 xii 1968, Watling 8894 (holo. E).

Pileus at first glandiform but soon elongate-ellipsoid to cylindric-ovoid, 5–17.5 mm high, 7–8 mm wide, then expanded up to 18 mm broad, sometimes umbonate, white or whitish with the disc slightly grey or dirty ochraceous, entirely floccose at first, distinctly floccose-scaly at the centre becoming smoother with age except at disc and plicate-striate towards the margin. *Stem* 16–23 \times 2–3 mm (3.5–4.5 mm at base), subequal or attenuated upwards, white or pallid, finely pruinose becoming smooth. *Gills* free, crowded, whitish then black, edge at first white flocculose. *Flesh* thin, whitish. *Smell* strong rather nauseous.

Spores broadly ellipsoid in face-view, slightly amygdaliform in side-view with thin perispore, 9–10 (–10.5) \times (5.5–) 6–6.5 μ m (with perispore 6–7 μ m broad), dark brown in ammonia and water with conspicuous germ-pore and thin, hyaline perispore prominent only after treatment with concentrated sulphuric acid. *Cheilocystidia* numerous, spheropedunculate, pyriform or vesiculose, hyaline 30–60 \times 15–40 μ m. *Pleurocystidia* similar to those on gill-edge or more cylindric-vesiculose, 70–100 \times 28–48 μ m. *Cells of veil* globose, 20–75 μ m, to ellipsoid, 20–75 \times 10–40 μ m, hyaline or with age faintly yellowish, minutely punctate to verruculose from the presence of small structural diverticulae, intermixed with a few cylindric hyphae 4–8 μ m broad. *Clamp-connections* present in culture but irregular. *Oidia* in dry heads on monocaryons when grown in culture.

Scotland, Edinburgh: Blackford Glen, on horse dung, legit R. F. O. Kemp, 14 xii 1968, Watling 8894 (holo. E).

Further material examined: Cumberland, Wigton, on horse dung from stable, 16 ix 1970, legit R. F. O. Kemp; Wales, Swansea, on dung, 24 xii 1970, R. F. O. Kemp c 65/-; England, Warwickshire, Crackley Wood, on dung, 31 iii 1970, legit M. Rotheroe, MRC 1470.

C. trisporus is heterothallic and when in culture produces characteristic dark cells submerged in the agar which radiate out from a central point. These dark cells are thickened and resemble in a simplified way the sclerotia of other members of the *C. narcoticus* group in which the darkened cells are aggregated together to form a compact tissue.

A NEW SPECIES OF *COPRINUS* PRODUCING A LARGE SCLEROTIUM

If a rather narrow species concept is adopted in *Coprinus*, and such a suggestion would be supported by cultural evidence, identification of field-collections appears to be eased. *C. tuberosus* has been indicated above as having a small sclerotium about the size of a lupin-seed which is frequently deep-seated in the substrate. However, on several occasions a fungus has been isolated in culture which produces rather large dark and often convoluted sclerotia. A fine collection of this fungus was made on Mull in the autumn of 1968 and it was then observed that the sclerotia were loose and formed on the surface of the substrate. The fruit-bodies from sclerotia so collected were not long rooted and arose directly from the large-sized sclerotium. In general appearance and in size the sclerotia produced by this fungus are similar but slightly larger than those produced by *Agrocybe arvalis* (Fr.) Singer. In general, one fruit-body is produced by each sclerotium, the fungus therefore not appearing caespitose.

***Coprinus sclerotiger* Watling, sp. nov.** Fig. 1 A-D.

A *C. tuberosus* a statura robustiore, odore forte grato et pilei crassiore squamuloso differt.

Pileus primo subglobosus, elongato-ellipsoideus vel cylindrico-ovoideus 8-22 mm altus, 9-11 mm latus dein plano-convexus vel expansus umbonatus 11-30 mm, pallide vel sordide griseus interdum ad discum obscuriore coloratus, primo totus floccosus, vulgo ad discum squamis floccosis crassioribus interdum argillaceo- vel ochraceo-tinctis obtectus, dein ad discum versus glabrescens et sulcatus, ad marginem fissuratus et revolutus. *Stipes* 55-90 × 2-3 mm, subaequalis vel sursum attenuatus, ad basim interdum incrassatus 3-4 mm latus, griseus, floccoso-pruinosis, ad basim fibrilloso-striatus, a sclerotio obscure fusco directe crescens. *Lamellae* fere liberae ex albido nigrae, confertae, ad aciem primo albo-flocculosae. *Caro* tenuis, grisea. *Odor* fortis gratis. *Sporae* ellipsoideae vel leviter amygdaliformes (9.5-) 10-11.5 × 5-6.5 μ m, cum perisporio crasso hyalino 10.5-12.5 × 6-9 μ m. *Basidia* tetrasporigera. *Cystidia* aciei lamellarum vesiculosa vel globosa hyalina, tenuitunicata, 40-80 × 25-45 μ m. *Cystidia* faciei lamellarum ovoidea, ellipsoidea vel cylindrico-ellipsoidea, 55-120 × 20-40 μ m. *Cellulae* veli pilei globosae, 21-70 μ m, vel vesiculosae vel ellipsoideae, 11-80 × 8-38 μ m, verruculoso-punctatae etiam paucis \pm cylindricis 2.5-6.5 μ m latis mixtis.

Scotland, Mull: Glenforsa, ad stramineis fimetarios, 12 ix 1968, legit R. Watling; Henderson 1961 (holo. E).

Pileus 8-22 mm high before expanding, subglobose but soon ovoid or elongate-ellipsoid to cylindrical, very light grey or mouse-grey, darker and flushed slightly brownish at centre, with clusters of ochraceous tufts at centre and elsewhere with protuberances when fresh, then striate with black grooves and increasingly grey-brown with age, finally plane and up to 30 mm broad with revolute edge. *Stipe* 55-90 × 2-3 mm, (3-4 mm at base), pale grey, densely floccose—pruinose especially in lower part, \pm equal or attenuated upwards or thickened at base, fibrillose and often with thick radiating fibrils, arising directly from a globose, hard, white-centred, dark brown sclerotium up to 18 mm in diameter. *Gills* free, white then greyish, then dark

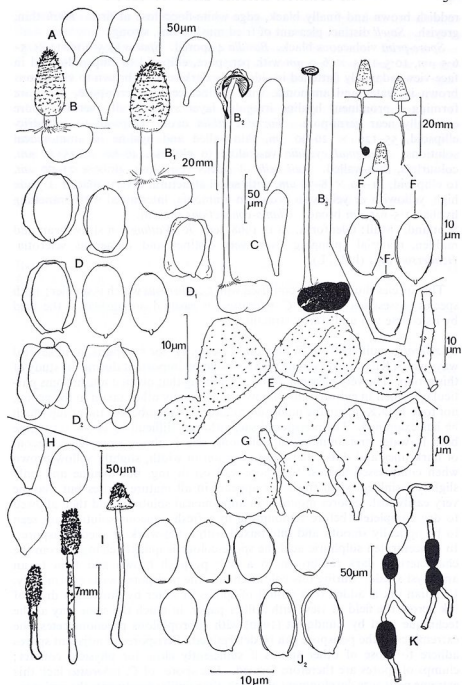


FIG. 1. A-D *Coprinus sclerotiger* (type): A, cheilocystidia; B-B₃, habit sketches showing pattern of development; C, pleurocystidia; D-D₂, basidiospores, in water (D), treated with ammoniacal solution (D₁) and with concentrated sulphuric acid (D₂); E, veil constituents; F, *Coprinus tuberosus*, Watling 195C; habit sketch & basidiospores; G-K, *Coprinus trisporus* (type): G, veil constituents; H, cheilocystidia; I, habit sketch; J-J₂, basidiospores, in water (J) and treated with concentrated sulphuric acid (J₂); K, dark swollen cells in culture (paratype—Kemp). Magnification as indicated.

reddish brown and finally black, edge white-flocculose at first. *Flesh* thin, greyish. *Smell* distinct pleasant of fried mushrooms, strong.

Spore-print violaceous black. *Basidia* 4-spored. *Spores* (9.5-) 10-11 \times 5-6.5 μ m, 10.5-12.5 \times 6-9 μ m with perispore, ellipsoid to ellipsoid-ovoid in face-view, adaxially flattened in side-view, dark reddish brown to violaceous brown in water and ammonia, with distinct central germ-pore, perispore forming a prominent hyaline irregular layer swelling all over the spore especially near germ-pore. *Facial cystidia* ovoid, ellipsoid to cylindric-ellipsoid, 55-120 \times 20-40 μ m, thin-walled and hyaline in ammoniacal solutions. *Marginal cystidia* vesiculose to globose, 40-80 \times 25-45 μ m, colourless, thin-walled. *Veil cells* of pileus vesiculose, globose 21-70 μ m, to ellipsoid, 11-80 \times 8-38 μ m, with small structural diverticulae, 1-1.5 μ m high, yellowish or yellowish brown in ammonia, intermixed with branching hyphae 2.5-6.5 μ m broad. *Clamp-connections* present.

Scotland, Mull: Glenforsa, 12 ix 1968, legit *R. Watling*, on straw-heap and midden, material springing from very distinct and numerous sclerotia. *Henderson* 1961 (holo. E).

This species should not be confused with *C. tuberosus* which is smaller; both species possess sclerotia but *C. sclerotiger* is easily distinguished in the field by its coarse veil and sturdy structure.

C. sclerotiger differs from *C. tuberosus* (see fig. 1F for comparison) in several ways which Kits van Waveren (1968) considered important during his study of this group. The very pleasant odour resembling that of fried mushrooms particularly when in culture is not known to me in any other taxon in the group, nor to R. F. O. Kemp in the many score cultures of members of the group which he has examined. The perisporial sac, although difficult to see, is very large both in water and ammoniacal solutions, and is almost completely devoid of dark lines and dots. It is up to 2.5 μ m in width, slightly yellow-brown when compressed against the spore-wall on drying, but hyaline and only slightly wrinkled when fresh; it appears in all mature spores but may be very easily lost. Spores mounted in ammoniacal solutions and then allowed to dry completely before remounting in a fresh aqueous solution are seen to be optically smooth and intermixed with a net-work of shed perispores. In concentrated sulphuric acid the spore-colour is quickly changed from the characteristic dark red-brown to a pale purplish brown and then to an amethyst shade; during this colour-change the perispore swells enormously. If indian ink is added to a mount of spores in water by drawing a drop of ink across the field of view with a filter paper, in much the same way as the technique used by Lundqvist (1970) with coprophilous pyrenomycetes, the extremities of the perispore can be determined. Perispores of adjacent spores adhere to those of other spores if sufficiently close for physical contact; clumps of spores are therefore formed. The spores of *C. tuberosus* lack this extreme perispore development although after similar treatments the perispore may be located as an uninterrupted colourless external layer which may be either regular or irregular. In some places the perispore is so thin that it appears to be absent except for irregular frills where it becomes rather thicker.

The size of the fruit-bodies contained in the Mull collection, judging from later collections obtained in damp chambers by R. F. O. Kemp is at the top

end of the size-scale and this character may be more dependent on substrate than represented by the type specimens. Thus smaller sclerotia giving rise to smaller fruit-bodies have been seen by Kemp. The culture obtained from *C. sclerotiger* is typical of the *C. narcoticus* group composed of clamp-connected, broad hyphae which tend to pull down the surface of the agar; oidia are absent in the cultures. This is unlike the culture of *C. stercoreus* which is composed of thinner hyphae bearing no clamp-connections. *C. sclerotiger* is apparently homothallic and one would therefore expect some variation. The appearance of the perispore in *C. sclerotiger* resembles that in *C. cinereofloccosus* (Orton, 1960) and *C. semitalis*; it might be argued that this is a form of the latter species. Experiments have shown, however, that *C. semitalis* and *C. sclerotiger* are incompatible; the habitats are also quite different. These two species therefore are regarded as distinct.

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