NOTES ON BRITISH AGARICS: IV

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ABSTRACT. Thip paper contains a discussion of and a revised key to the '*narcoticus*' group of *Coprinus* in Britain, as well as a revised key to the '*hemerobius*' group and descriptions of ten new species of *Coprinus* in preparation for the account of the genus in the next part of the British Agaric Flora.

THE "NARCOTICUS" GROUP OF COPRINUS

In Trans. Brit. Myc. Soc. 43: 198, (1960) I gave a key to the '*narcoticus*' group of *Coprinus* and included eight species, which represented the state of my knowledge of this group at that time. Since then van Waveren (Persoonia 5: 141–142, 1968) has written a paper on this group and given a key limited to seven species and one variety. In this paper van Waveren has indulged in some fairly extensive synonymy with some of which I do not agree. I also feel that the small number of taxa included in this key is an oversimplification of the situation as I see it, and that it tends to obscure the true situation. In view of recent discoveries neither of these keys is satisfactory, so I therefore give below a new one for the twelve species I now think it necessary to include in this group.

Van Waveren has elucidated and uses as a primary character the useful distinction between species with spores narrowed gradually to a large apiculus and with a conspicuous perisporial sac, and those with spores abruptly rounded at the base and without or with inconspicuous or incompletely visible perisporial sac. He also uses smell, spore size and to a certain extent habitat, as I did in my previous key.

In the genus *Coprinus* it seems to me that the presence of 2- or 4-spored basidia in two taxa is certainly usually and possibly always an indication of different species. This was established by Morten Lange in 1952 for the section *Setulosi* of *Coprinus*, in which two at present well-known and consistently 2-spored species are *C. bisporus* and *C. sassii*, and is confirmed also by cultural and interfertility studies on various species of *Coprinus* carried out by Watling and R. F. O. Kemp at Edinburgh (personal communication).

Since a consistently 3-spored taxon (that is, one with all or most of the basidia 3-spored, and not a minority of 3-spored ones mixed either with 2- or 4-spored ones), recognisable in the field belonging to this group has now been collected on dung in various parts of Britain and proved specific by cultural methods, I have taken the number of sterigmata on the basidium as a primary key character, following up a suggestion by Watling, because it seems essential to observe this character carefully in this group, and indeed, in the genus as a whole. Within this framework I have used habitat, smell, spore size and van Waveren's spore-shape distinction. I think it better to use habitat as a main character because I believe that most, if not all, species of this genus are very selective of habitat, more so perhaps than is generally realised, and that dung-inhabiting fungi do *not* grow on soil, though occasionally one might appear to do so if the dung was buried or scattered. Certainly

I have never found any of the dung-inhabiting species growing on soil nor any of the soil-inhabiting species growing on dung. I am therefore somewhat sceptic of descriptions of species of *Coprinus* which include mixed habitats such as 'growing on dung, on the ground or on soil', for I would strongly suspect such to be a mixture of two or more species. I have myself been guilty of this error in the past, having included *C. laanii*, which is obviously a good species with a special habitat on wood or sawdust unusual in this group in this country, both in *C. cineratus* and *C. cinereofloccosus*, both thought of as soil-inhabitants. I remember thinking that the locality was 'odd'; now I know it was not 'odd' but 'critical'.

Of van Waveren's seven species, *C. narcoticus*, *radicans*, *laanii*, *martinii* and *cinereofloccosus* (2-spored) are not disputed. In his paper van Waveren has correctly pointed out that the type material of *C. cinereofloccosus* is 2-spored. It is unfortunate that I erred in attributing 4-spored basidia to this taxon when describing it, a mistake I hereby rectify. There is in Britain a macroscopically similar and seemingly more common taxon with 4-spored basidia which was included in the 'Revised List of British Agarics and Boleti' (1960) in part as *C. cineratus*, although incorrect spore details were given for the latter in my former key, partly owing to confusion with *C. laanii*. This I am describing below as a new species (*C. semitalis*), for, although macroscopically similar to *C. cinereofloccosus*, it is readily distinguishable microscopically not only by the different number of sterigmata on the basidia but also by its narrower more elongate spores, which are, however, of much the same length as those of *C. cinereofloccosus*. The true 2-spored *C. cinereofloccosus* seems to be relatively uncommon, so until I can find it again and restudy it, I am not able to give a macroscopic difference between the two, but I suspect that careful observation of ample material of the two would show some distinction. The verification of specificity or otherwise of these two taxa by cultural methods has not yet been possible, because spores from them have mostly failed even to germinate.

Instead of thinking that a 2-spored taxon *must* be a 2-spored form of a 4-spored macroscopically similar taxon, I prefer in the present state of our knowledge of this genus to take the opposite approach and to regard them as two separate species until shown otherwise by cultural experiments. This would not be at all the case in some other genera of agarics, for instance *Mycena*, but it has already been many times shown that what holds good for one genus does not by any means necessarily hold good for other genera. It is possible that a similar approach to *Psathyrella*, and indeed Coprinaceae as a whole, may be a more useful one. For these reasons, therefore, the name *C. cinereofloccosus* should be restricted to the 2-spored taxon and remains as such in our list.

Van Waveren synonymises *C. cineratus* with his *C. stercorarius*. In this he may well be correct, but since we shall probably never know with certainty what Quélet was describing under this name because of lack of type material and a somewhat inadequate description by modern standards, I prefer to exclude this name from our list. The problem of *C. stercorarius* sensu Fries has already been discussed by Watling (Notes R.B.G. Edinb. 28: 48, 1968), and I agree with him that *stercoreus* is correct nomenclaturally rather than *stercorarius*, and follow him in using *stercoreus* for the small-spored *C. stercorarius* sensu Kühner & Romagnesi. This is also *C. velox* sensu J. Lange

(and hence van Waveren). What Gillet had in hand when describing his *C. velox* is another matter for conjecture, but since the epithet *stercoreus* antedates it anyway, this need not concern us here. When writing my previous key I did not think of this taxon as a member of this group because of the lack of visible perisporial sac on the spores, hence its omission from that key.

This leaves van Waveren's *C. stercorarius* unaccounted for. This is to my mind a very considerable mixture, including at least one dung-inhabiting taxon as well as the soil-inhabiting *C. saccharomyces*. Van Waveren dismisses the latter as a 2-spored form of his *C. stercorarius*, although he had not collected it himself. He does not take into account the, to me, critical habitat difference and dismisses the smell distinction as "too dubious (like all smells that are not very characteristic and distinct)". However, for those with a discriminating nose, the yeast-like smell of *C. saccharomyces* is *most* characteristic and distinct, so much so that I was able to name my second and subsequent collections in the field, which was soon confirmed by microscopical examination. These distinctions in habitat and smell are to me quite sufficient in themselves to justify this taxon at specific level. Furthermore the spore measurements he gives from the type collection agree neither with my measurements from the original spore-print, nor with those from the type material itself, nor with those from a spore-print of a later collection, all of which show a majority of spores 15–18 μm in length, with some 14, 19 or 20 μm long. The big difference in spore length and breadth between *C. saccharomyces* and van Waveren's 4-spored '*C. stercorarius*' (9–12 μm in length, $5\frac{1}{2}$–7 μm in breadth—4-spored, and 15–18 μm in length, 8–10 μm in breadth—2-spored) is too great to be explicable on the basis of 2- and 4-spored forms of the same species. In any case spores of size (14) 15–18 (20)/8–10 μm are not "exactly the same size" (as van Waveren puts it) as 13·5–16·2(17·1)/7·7–9 μm which he gives for his 2-spored '*C. stercorarius*', whatever that may be. For this additional reason as well as the distinct fundamental habitat and smell differences, *C. saccharomyces* remains in our list as a good species.

I have no personal experience of *C. tuberosus* or *C. sclerotiger*, but am describing as new below (as *C. foetidellus*) a similar strong-smelling taxon without sclerotium or rooting stem-base, producing very small fruit-bodies with stem tomentose-pruinose at first.

The proliferation of species in this group need not cause surprise, for it has already been found similarly necessary, first in section *Setulosi* and then in section *Hemerobii*. I hope, therefore, that this treatment may lead to a better and clearer understanding of this group, although some additional taxa await further investigation.

Revised key to the 'narcoticus' group of Coprinus

1. Basidia 2- or 4-spored 2
1. Basidia 3-spored; (on dung; smell strong, nauseous; cap coarsely white mealy scaly, scales sometimes becoming pale clay-buff at centre) . . . . . *C. trisporus*
2. Basidia 2-spored; on soil or in grass 3
2. Basidia 4-spored; habitats various 4

3. Smell none; spores short, 11–13(15)/5½–7/7–8½ μm, with conspicuous perisporial sac and apiculus (Fig. 2g) *C. cinereofloccosus*
3. Smell of yeast; spores longer, (14)15–18 (20)/8–10 μm, without or with incomplete or inconspicuous perisporial sac, apiculus small and indistinct . . . . . *C. saccharomyces*
4. Spores mostly less than 9 μm long, oblong-ellipsoid with indistinct apiculus; (on dung; smell none to slight when opening out; fruit-bodies small or very small) . . . *C. stercoreus*
4. Spores 9 μm or more long 5
5. On *Carex*, *Juncus*, or *Scirpus* debris; smell none; spores ellipsoid-amygdaliform, with indistinct to moderately distinct perisporial sac, 12–16(17)/6½–8½ μm . . . . *C. martinii*
5. Not so; habitat, smell or spores otherwise 6
6. On dung or rotting vegetable matter (e.g. old potatoes); spores rounded or narrowed at base, apiculus indistinct or conspicuous, perisporial sac none to complete and conspicuous . 7
6. On soil, amongst grass, on sawdust, wood chips, or the cut surface of logs or stumps; spores narrowed at base, apiculus conspicuous, perisporial sac complete and conspicuous . . 11
7. With sclerotium or distinct long rooting stem-base; spores not showing dark lines or dots 8
7. Without sclerotium or distinct rooting stem-base (rarely slightly rooting in *C. narcoticus*, which has spores showing dark lines or dots) 10
8. Smell strong, unpleasant, of gas or acetylene; spores narrowed at base with conspicuous elongate apiculus, longer, 11½–14½ μm long (perisporial sac sometimes becoming less conspicuous as spores mature); without sclerotium, but stem rooting and often joined by mycelial cord to the stems of other fruit-bodies; on dung or rotting vegetable matter . . . . . *C. radicans*
8. Smell none, or pleasant of fried mushrooms; spores rounded at base with inconspicuous apiculus, shorter, 9–11½ μm long; on dung or dungy straw 9
9. Sclerotium small, up to 5 mm long; stem with long rooting base from sclerotium; spores with thin sometimes indistinct perisporial sac, 9–11/5½–7 μm; fruit-bodies very small; smell weak, fungussy or none . . . . . *C. tuberosus*
9. Sclerotium larger, up to 15 mm long; stem arising directly from sclerotium, not rooting; spores with large conspicuous perisporial sac, 9½–11½/5½–6½ μm; fruit-bodies small to medium; smell strong, pleasant, of fried mushrooms . . *C. sclerotiger*
10. Smell strong of gas, or like *Tricholoma sulphureum;* fruit-bodies small to medium; spores narrowed at base with conspicuous apiculus, marked with dark lines or dots, perisporial sac conspicuous, 11–13½/5½–7 μm . . . . . *C. narcoticus*
10. Smell often strong, especially as cap expands, stercoraceous; fruit-bodies very small to small; spores rounded at base with small apiculus, perisporial sac none or incomplete or indistinct, 9–11/5½–6 μm . . . . . *C. foetidellus*

11. On sawdust, wood chips or the cut surface of tree trunks or stumps; spores 9–12½/5–6/6½–8 μm, ellipsoid or slightly elongate-ellipsoid, marked with dark lines or dots . . *C. laanii*

11. On soil or amongst grass; spores 10½–13½/4½–5½/6½–8½ μm (Fig. 2,f), elongate-or cylindric-ellipsoid, not marked with lines or dots . . . . . *C. semitalis*

Descriptions of new species

Coprinus argenteus P. D. Orton, **sp. nov.** Fig. 1, a-c.

C. saichiae proxime accedit, sed a sporis majoribus et minus complanatis differt. Basidia 4-sporigera esse creditur.

Pileus longe conico-cylindricus usque ad 10/4 mm, dein expansus ± acute umbonatus usque ad 15 mm, albidus dein griseus vel leviter griseoviolaceus interdum ad discum pallide argillaceo-luteolus, postremo plerumque argenteo-griseus et rugoso-striatus, primo a velo albo adpresse squamulosus, ad marginem postremo fissuratus. *Lamellae* fere liberae, ex albo nigricantes, subconfertae, ad aciem primo alboflocculosae. *Stipes* usque ad 20/2 mm, sursum attenuatus, ad basim in orbem bulbillosum dilatatus, candidus dein hyalinus, primo minute pruinoso-striatus. *Odor* nullus. *Sporae* lentiformes, ellipsoideo-ovoideae vel globoso-triangulares, poro germinativo lato, 5–7/4–5/5–5½ μm (Fig. 1,c), in cumulo fere nigrae, sub microscopio pallide brunneae. *Cystidia* non vidi. *Cellulae veli* pilei ± cylindricae, 5–14(20) μm latae.

Surrey. Mickleham, Juniper Hill, inter graminos solo calcareo, 22 vi 1956, leg. *Carol Kemball*, *Orton* 955 (holo. K).

Cap elongate conico-cylindric up to 10/4 mm, then expanded ± acutely umbonate up to 15 mm broad, whitish then greyish or with slight violaceous or slate tinge, centre sometimes pale clay-buff, finally almost entirely silvery-grey and wrinkled-striate, at first with ± adpressed patches of white veil, margin becoming split or torn radially. *Gills* ± free, lanceolate, white then blackish, fairly crowded, edge white flocculose at first. *Stem* up to 20/2 mm, attenuated upwards with pronounced bulbous disc-like base, pure white then hyaline, minutely white pruinose-striate when fresh. *Smell* none. *Spore-print* blackish.

Spores lentiform, ellipsoid-ovoid or globose-triangular, with broad germ-pore, 5–7/4–5/5–5½ μm (Fig. 1,c), rather pale brownish sub micr. *Cystidia* not noted. *Cells of veil* on cap ± cylindric, 5–14(20) μm broad.

Surrey. Mickleham, Juniper Hill, in chalk grassland, (? on grass stems), 22 vi 1956, leg. *Carol Kemball*, *Orton* 955 (holo. K).

Closely related to *C. saichiae*, but with smaller more conspicuously lentiform spores. The basidia are believed to be 4-spored (not noted). It would seem to belong to section *Herbicolae*.

Coprinus foetidellus P. D. Orton, **sp. nov.** Fig. 1, d–e.

A habitu *C. stercoreo* affinis, sed a sporis majoribus et probabiliter a pileo crassiore squamuloso differt. Basidia 4-sporigera esse creditur.

Pileus longe cylindrico-ellipsoideus 1–4/0·5–2 mm, dein expansus usque ad 7 mm latus, interdum senectute depressus, primo pallide griseus, squamulis

crassis griseis ad discum crassioribus et interdum ochraceotinctis vel aculeatis obtectus, senectute flocculosus vel fere laevis. *Lamellae* nigricantes. *Stipes* 28–60/0.5 mm, fere aequalis, pallide griseus, primo toto griseotomentosus. *Odor* aliquantum fortis, stercorosus. *Sporae* oblongo-ellipsoideae, 9–11/(5)5½–6 *µm* (Fig. 1,e), a perisporio tenuissima interdum imperfecte tunicatae. *Cystidia aciei lamellarum* clavata, cylindrico-clavata vel irregularia, 20–40/10–16(20) *µm*. *Cystidia faciei lamellarum* ± cylindrica, ca. 64/20 *µm*. *Cellulae veli* pilei globosae vel ± ellipsoideae, verruculosae, 16–46 *µm* latae, simul passim cellulae pauces filamentosae 2–6 *µm* latae. *Cellulae veli* stipitis similes etiam fere cylindricae, usque ad 18 *µm* latae.
Somerset. Horner Water, ad fimum equinum, 1 ix 1967, *Orton* 2960 (holo. E).

Cap elongate cylindric-ellipsoid 1–4/0·5–2 mm, then expanded up to 7 mm broad, sometimes depressed when old, at first pale grey with slightly darker thick grey mealy scales, those at apex coarser and sometimes tinged ochraceous or pointed, becoming flocculose or ± smooth when old. *Gills* becoming black. *Stem* 28–60/0·5 mm, equal, pale greyish, entirely tomentose-pruinose when fresh. *Smell* quite strong, stercoraceous.

Spores oblong-ellipsoid, 9–11/(5)5½–6 *µm* (Fig. 1,e), apiculus small and indistinct, perisporial sac showing as complete or incomplete very thin pale transparent outline. *Marginal cystidia* clavate, cylindric-clavate or irregular, 20–40/10–16(20) *µm*. *Facial cystidia* ± cylindric, about 64/20 *µm*. *Cells of veil scales* on cap globose or ± ellipsoid, warted, 16–46 *µm* broad, with a few filamentous cells 2–6 *µm* broad here and there. *Cells of veil* on stem similar, together with some ± cylindric cells up to 18 *µm* broad.
Somerset. Horner Water, on horse dung, 1 ix 1967, *Orton* 2960 (holo. E).

Resembling *C. stercoreus* most closely, but differs in larger spores and probably also in more coarsely mealy cap. Basidia seemingly 4-spored (not noted). It belongs to the '*narcoticus*' group.

Coprinus latisporus P. D. Orton, **sp. nov.** Fig. 1, m–n.

A sporis majoribus et velo albo a sociis distinguitur. Probabiliter pileus major crescit.

Pileus primo ovatus 5–6/4–5 mm, niveus dein ad discum versus griseascens, minute atomato albofarinosus, ad marginem leviter lacerato-crenatus. *Lamellae* anguste adnatae, leviter ventricosae, ex albo nigricantes, subconfertae, L 28 l 0(1), ad aciem primo alboflocculosae. *Stipes* 20–24/1–1½ mm, niveus, albofarinosus. *Caro* tenuissima, ad discum pilei leviter grisea. *Odor* nullus. *Sporae* forte lentiformes, ellipsoideae vel ovoideae aut obscure globoso-sexangulatae, 14–16/8–9/10–12½ *µm*, (Fig. 1,n), in cumulo umbrinonigrae. Basidia 4-sporigera. *Cystidia* non vidi. *Cellulae veli* globosae vel late ellipsoideae, 26–90 *µm* latae, laeves, tenuitunicatae.
Somerset. Bossington, ad fimum vaccae, 30 x 1957, *Orton* 1145 (holo. E).

Cap ovoid at first, 5–6/4–5 mm, snow-white then greyish from the margin in, minutely white atomate granular-mealy, margin slightly fringed crenate. *Gills* narrowly adnate, slightly ventricose, white then blackish, fairly crowded,

L 28 l 0(1), edge white flocculose at first. *Stem* 20–24/1–1½ mm, ± equal, white and white mealy like the cap. *Flesh* very thin, slightly coloured in cap centre. *Smell* none. *Spore-print* blackish-umber.

Spores markedly lentiform, ellipsoid or ovoid in side-view, indistinctly angular-globose in face-view, 14–16/8–9/10–12½ *µm* (Fig. 1,n) germ-pore slightly excentric. *Basidia* 4-spored. *Cystidia* not seen. *Cells of veil* globose or broadly ellipsoid, 26–90 *µm* broad, cell-walls smooth and rather thin.
Somerset. Bossington, on cow dung, 30 x 1957 *Orton* 1145 (holo. E).

It could be mistaken for a small *C. niveus*, but differs from that species in its differently shaped spores, which are less elongate in side-view and more rounded and less angular in face-view, and in the smaller fruit-body with less copious veil.

Coprinus megaspermus P. D. Orton, **sp. nov.** Fig. 1,f.

A sociis a sporis vix lentiformibus permagnis facile distinguitur.

Pileus ovoideus, 11/12 mm, dein expansus ad discum depressus, 25–30 mm, juventute fere ferrugineus dein ad discum fulvus vel cinnamomeus et ad marginem versus argillaceo-luteolus et forte plicato-striatus, vix deliquescens, circa discum senectute cinnamomeotinctus. *Lamellae* ± liberae, nigricantes, confertae, L ca. 50 l 0–1, ad aciem albidoflocculosae. *Stipes* 52–60/2 mm, aequalis vel ad basim leviter incrassatus, albus dein pallide argillaceo-luteolus, laevis, ad basim tomentosus. *Caro* ad discum pilei admodum crassa. *Sporae* ellipsoideae vel ellipsoideo-ovoideae interdum leviter lentiformes, 15–18/8½–9½/10–11 *µm* (Fig. 1,f), in cumulo nigro-umbrinae. *Basidia* 4-sporigera. *Cystidia aciei lamellarum* ± lageniformia, ca. 50–60/18–20 *µm*, ad apicem conicum vel cylindrico-obtusum 8–10 *µm* lata. *Cystidia faciei lamellarum* non vidi. *Cellulae cuticulae* pilei 12–28 *µm* latae. *Setulae* et sphaerocystes desunt.
Norfolk. Hedenham Wood, ad terram, 24 x 1971, *Orton* 4132 (holo. E).

Cap ovoid, 11–12 mm, then expanded with depressed centre, 25–30 mm, ± rusty-tawny at first then fulvous, sienna or cinnamon at centre with outer part clay-buff and strongly plicate-striate, hardly deliquescing, becoming tinged cinnamon around the centre when mature. *Gills* ± free, blackening, crowded, L ca. 50 l 0–1, edge whitish flocculose. *Stem* 52–60/2 mm, equal or with slightly swollen base, white then discolouring pale clay-buff, smooth, base white tomentose. *Flesh* rather thick at centre of cap. *Spore-print* blackish-umber.

Spores ellipsoid or ellipsoid-ovoid, sometimes slightly lentiform, 15–18/8½–9½/10–11 *µm* (Fig. 1,f). *Marginal cystidia* ± lageniform, about 50–60/18–20 *µm*, apex from conical to cylindric-obtuse and 8–10 *µm* broad. *Facial cystidia* not seen. Cap without setules or sphaerocysts; cells of cap cuticle 12–28 *µm* broad.
Norfolk. Hedenham Wood, on soil, 24 x 1971, *Orton* 4132 (holo. E).

Resembling *C. hemerobius* in having similarly shaped not or only slightly lentiform spores (Fig. 1,i), but easily distinguished by larger spores (also from 4-spored basidia) and by its deeper coloured cap and probably also its robustness. It belongs to section *Hemerobii*. In spite of rather scanty material I have no hesitation in describing this as a new species straight away because

of its characteristic large spores. The above description may need slight modification when more material has been found, especially as regards size of fruit-body.

Revised Key to Section Hemerobii

The key I gave for the group of species of *Coprinus* without setules or sphaerocysts on the cap, section *Hemerobii*, (Notes R.B.G. Edinb. 29: 89, 1969), can now be modified to include this species and *C. nudiceps* (described below) and also some additional information about the spores of other species as follows. Cap shape is rejected as a key character as it is too variable. Basidia are 4-spored in all material I have examined. A 2-spored '*miser*' does exist according to R. F. O. Kemp (personal communication), but in the absence of adequate material and a proper description I cannot comment on it taxonomically. I would expect it to be a different species from *C. miser* (4-spored).

1. Growing on dung; spores distinctly lentiform . . . 2
1. Not growing on dung; spores lentiform or not . . . 3
2. Spores 7–8/5–6/6–7 μm; fruit-bodies often very small . *C. miser*
2. Spores 13–15½/8½–9½/10–12 μm; fruit bodies more robust . *C. nudiceps*
3. Spores distinctly lentiform 4
3. Spores not or only slightly lentiform 6
4. Spores 8–11/5½–6½/7–8½ μm, ellipsoid or slightly amygdaliform in side view, broadly ovoid sometimes slightly angled in face-view, germ-pore excentric in side-view, appearing on the profile in face-view; on soil, generally in damp places . *C. leiocephalus*
4. Spores 10 μm or more long, broader in face-view (8½–11 μm), angled or not, germ-pore central or excentric in side-view, variable in face-view; on soil or in grass 5
5. Spores with germ-pore appearing on the profile in face-view, ellipsoid or slightly amygdaliform in side-view, broadly ovoid often distinctly 5– or 6–angled in face-view, (10) 11–13/6½–7½/8½–10½ μm; in open grassland, or grassy places in woods . *C. plicatilis*
5. Spores with germ-pore inset in face-view (not appearing on the profile), ellipsoid or ellipsoid-amygdaliform in side-view, subglobose-triangular not or hardly angled in face-view, 10–12½/5–7/9–11 μm; on soil . . . . *C. galericuliformis*
6. Spores 11½–12½/6½–7/7–8 μm (Fig, 1,i) . . . *C. hemerobius*
6. Spores 15–18/8½–9½/10–11 μm (Fig. 1,f) . . *C. megaspermus*

Coprinus nudiceps P. D. Orton, **sp. nov.** Fig. 1, g–h.

A *C. misero* a sporis majoribus et habitu robustiore differt.

Pileus ellipsoideus vel ovoideus 7–15/4–8 mm, dein expansus 9–24 mm, interdum ad discum depressus, luteolus vel ochraceus dein ad discum fulvum vel cinnamomeum versus griseascens, primo laevis leviter nitidus, mox ad marginem dein ad discum versus sulcatus vel plicato-striatus, ad marginem postremo manifeste laceratus vel radialiter fissuratus. *Lamellae* liberae vel anguste adnatae, e pallide luteolo vel ochraceo mox umbrinae vel nigricantes, subconfertae, ad aciem primo albo-flocculosae. *Stipes* 30–60/½–1 mm, sursum attenuatus, leviter bulbosus (ad basim 1½–3 mm latus), ex albido

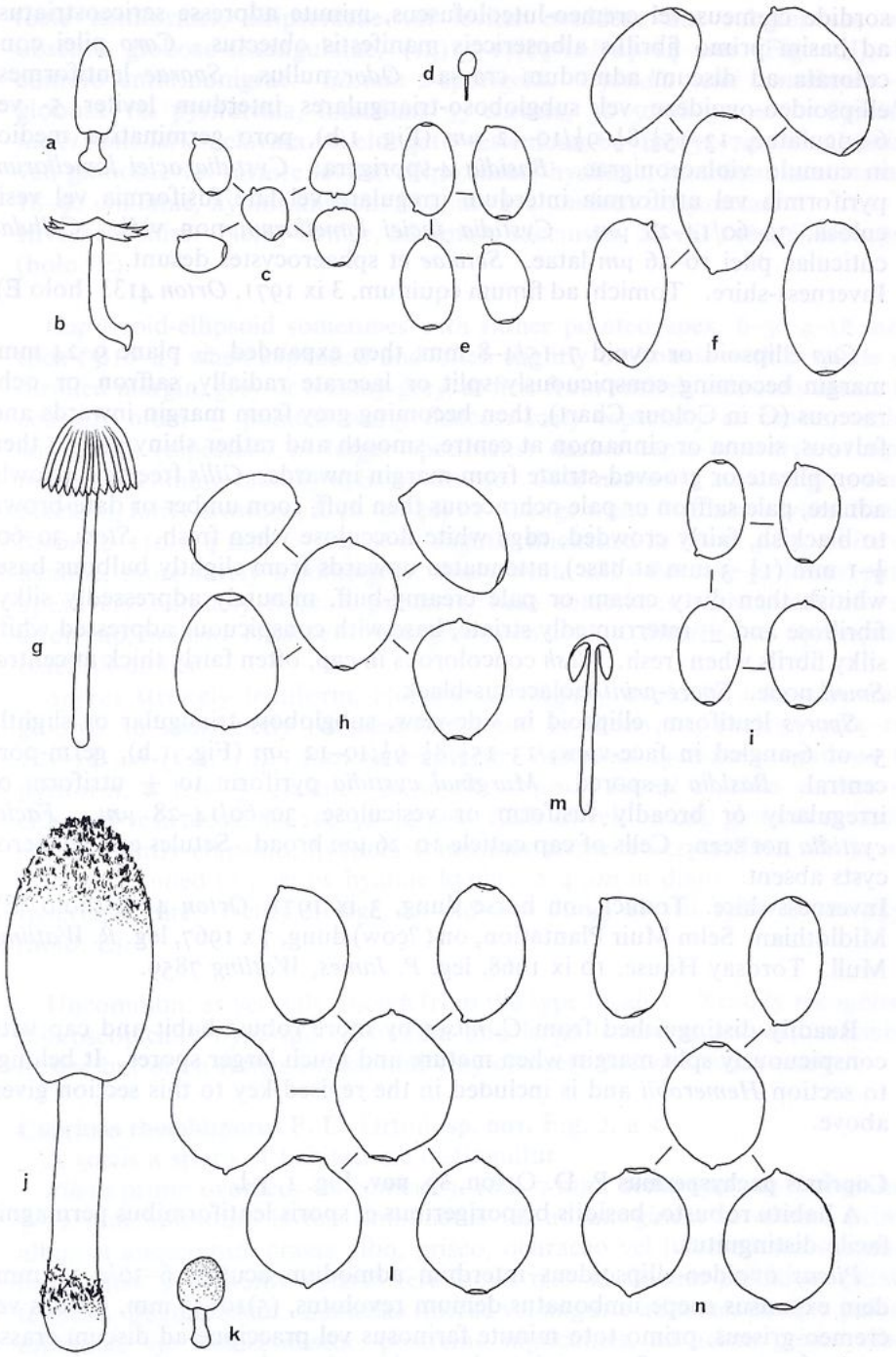

FIG. 1. a–c, *Coprinus argenteus* Orton; a, young fruit-body; b, expanded fruit-body; c, spores. d–e, *C. foetidellus* Orton: d, young fruit-body; e, spores. f, *C. megaspermus* Orton, spores. g–h, *C. nudiceps* Orton—*Orton* 4133: g, expanding fruit body; h, spores. i, *C. hemerobius* Fr. Kirkham Abbey, 3 ix 1960, spores. j–l, *C. pachyspermus* Orton: j, large, young warty-scaly fruit-body; k, small young finely-floccose fruit-body; l, spores. m–n, *C. latisporus* Orton; m, section of young fruit body; n, spores. All fruit-bodies × 1; all spores × 1000. Drawn from the type specimens unless otherwise indicated.

sordide cremeus vel cremeo-luteolofuscus, minute adpresse sericeostriatus, ad basim primo fibrillis albosericeis manifestis obtectus. *Caro* pilei concolorata ad discum admodum crassa. *Odor* nullus. *Sporae* lentiformes, ellipsoideo-ovoideae vel subgloboso-triangulares interdum leviter 5- vel 6-angulatae, 13–15½/8½–9½/10–12 *µm* (Fig. 1,h), poro germinativo medio, in cumulo violaceonigrae. *Basidia* 4-sporigera. *Cystidia aciei lamellarum* pyriformia vel utriformia interdum irregulare vel late fusiformia vel vesiculosa, 30–60/14–28 *µm*. *Cystidia faciei lamellarum* non vidi. *Cellulae* cuticulae pilei 10–26 *µm* latae. *Setulae* et sphaerocystes desunt.
Inverness-shire. Tomich, ad fimum equinum, 3 ix 1971, *Orton* 4133 (holo E).

Cap ellipsoid or ovoid 7–15/4–8 mm, then expanded ± plane 9–24 mm, margin becoming conspicuously split or lacerate radially, saffron or ochraceous (G in Colour Chart), then becoming grey from margin inwards and fulvous, sienna or cinnamon at centre, smooth and rather shiny at first then soon plicate or grooved-striate from margin inwards. *Gills* free or narrowly adnate, pale saffron or pale ochraceous then buff, soon umber or date-brown to blackish, fairly crowded, edge white flocculose when fresh. *Stem* 30–60/½–1 mm (1½–3 mm at base), attenuated upwards from slightly bulbous base, whitish then dirty cream or pale creamy-buff, minutely adpressedly silky-fibrillose and ± interruptedly striate, base with conspicuous adpressed white silky fibrils when fresh. *Flesh* concolorous in cap, often fairly thick at centre. *Smell* none. *Spore-print* violaceous-black.

Spores lentiform, ellipsoid in side-view, subglobose-triangular or slightly 5- or 6-angled in face-view, 13–15½/8½–9½/10–12 *µm* (Fig. 1,h), germ-pore central. *Basidia* 4-spored. *Marginal cystidia* pyriform to ± utriform or irregularly or broadly fusiform or vesiculose, 30–60/14–28 *µm*. *Facial cystidia* not seen. Cells of cap cuticle 10–26 *µm* broad. Setules and sphaerocysts absent.
Inverness-shire. Tomich, on horse dung, 3 ix 1971, *Orton* 4133 (holo. E).
Midlothian. Selm Muir Plantation, on (?cow) dung, 7 x 1967, leg. *R. Watling*.
Mull. Torosay House, 10 ix 1968, leg. *P. James*, *Watling* 7859.

Readily distinguished from *C. miser* by more robust habit and cap with conspicuously split margin when mature and much larger spores. It belongs to section *Hemerobii* and is included in the revised key to this section given above.

Coprinus pachyspermus P. D. Orton, **sp. nov.** Fig. 1, j–l.

A habitu robusto, basidiis bisporigeribus et sporis lentiformibus permagnis facile distinguitur.

Pileus ovoideo-ellipsoideus interdum admodum acutus, 6–30/4–18 mm, dein expansus saepe umbonatus demum revolutus, (5)10–45 mm, griseus vel cremeo-griseus, primo toto minute farinosus vel praecipue ad discum crasse ± acute verrucoso-floccoso interdum ad verticem brunneotincto squamulosus, ad marginem denique radialiter fissuratus. *Lamellae* anguste adnatae, e griseo nigricantes, subconfertae, L 20–30(40) l 1–3, ad aciem primo albofloccosae. *Stipes* 30–110/1–4 mm, fere aequalis vel deorsum leviter incrassatus, ad apicem minutissime floccoso-punctatus, ad basim interdum farinoso-squamulosus, cavus. *Caro* tenuissima, pallide grisea. *Odor* nullus. *Sporae*

forte lentiformes, ellipsoideae vel leviter ovoideae aut subglobosae vel obscure globoso-sexangulatae, (14)15–17/8½-10/12½–14 μm (Fig. 1,l), in cumulo umbrinonigrae. *Basidia* 2-sporigera. *Cystidia aciei lamellarum* ± globosa vel pyriformia, interdum ± clavata, 30–50/28–37 μm. *Cystidia faciei lamellarum* clavata vel elongato-vesiculosa, 80–200/32–74 μm. *Cellulae* veli globosae vel rariore leviter ellipsoideae, hyalinae, interdum incrustatae, 18–90 μm latae, hyphis angustis hyalinis 2–4 μm latis conjunctae.
Inverness-shire. Nethy Bridge, ad fimum vaccinum, 28 viii 1969, *Orton* 3555 (holo. E).

Cap ovoid-ellipsoid sometimes with rather pointed apex, 6–30/4–18 mm, then (5)10–45 when expanded and often slightly umbonate with revolute or inrolled margin, grey or creamy-grey, at first from entirely minutely mealy to coarsely often ± pointed warty floccose-scaly especially at centre, scales sometimes (especially in larger specimens) darker sepia-brownish at tips, margin becoming radially split or rimose. *Gills* narrowly adnate, grey then blackish, fairly crowded, L 20–30(40) l 1–3, edge white flocculose when fresh. *Stem* 30–110/1–4 mm, ± equal or slightly thickened in lower part, white or hyaline, more rarely hyaline-grey, finely white silky-floccose in lower part, apex very minutely floccose-punctate, base sometimes with traces of veil as on cap, hollow. *Flesh* very thin, grey-horn colour. *Smell* none. *Spore-print* blackish-umber.

Spores strongly lentiform, ellipsoid or slightly ovoid in side-view, subglobose to indistinctly rounded-hexagonal in face-view, (14)15–17/8½–10/12½–14 μm (Fig. 1,l). *Basidia* 2-spored. *Marginal cystidia* ± globose to pyriform, a few ± clavate, 30–50/28–37 μm. *Facial cystidia* clavate or elongate-vesiculose, 80–200/32–74 μm. *Cells* of veil on cap globose or more rarely slightly ellipsoid, hyaline, sometimes encrusted-crystalline, 18–90 μm in diam., joined to narrow hyaline hyphae 2–4 μm in diam.
Inverness-shire. Nethy Bridge, on old cow dung, 28 viii 1969, *Orton* 3555 (holo. E).

Uncommon, as yet only known from the type locality. Readily recognised microscopically by 2-spored basidia and large lentiform spores; variable in size but often rather robust and very coarsely floccose-mealy-scaly.

Coprinus rhombisporus P. D. Orton, **sp. nov.** Fig. 2, a–c.

A sociis a sporis et habitatione distinguitur.

Pileus primo ovoideus vel conicus 3–10/4–7 mm, dein expansus fere planus 7–12 mm, interdum leviter umbonatus vel ad marginem revolutus, primo albus et aliquantum crasse albo, griseo, ochraceo vel luteolofusco squamulosus, dein griseascens striatus fere laevis nisi ad discum pallidiore persistentiore squamulosum. *Lamellae* liberae vel anguste adnatae, ex albo pallide umbrinae vel violaceofuscae, postremo nigricantes, ad aciem primo albo-flocculosae. *Stipes* 25–50/½–1½ mm, aequalis vel sursum attenuatus, ad basim saepe leviter incrassatus, albus vel hyalino-albus, ad apicem fere laevis deorsum albopruinosus vel squamulosus, ad basim albotomentosus vel strigosus. *Caro* tenuissima, hyalina, ad discum albida. *Odor* nullus. *Sporae* lentiformes, ellipsoideae aut fere rhomboideae vel obscure angulato-amygdaliformes, 7–9/5–5½/5½–6½ μm (Fig. 2,c), in cumulo umbrinae vel

obscure cacainae. *Basidia* 4-sporigera. *Cystidia aciei lamellarum* sphaeropedunculata, vesiculosa vel clavata, 10–22 μm lata, rariore late lageniformia 30–60/16–26 μm. *Cystidia faciei lamellarum* cylindrico-vesiculosa, 60–90/14–24 μm. *Cellulae veli* filamentosi angustae, 3–8 μm latae, diverticulis 1–2 μm latis ornatae, tunicis ½–1 μm latis.
Norfolk. Surlingham, Wheatfen Broad, ad reliqua et caules graminis et caricis, 18 vii 1956, 27 vii 1960, 3 viii 1968, *Orton* 3249 (holo. E). Devon. Membury, 10 viii 1971.

Cap ± ovoid or conical at first, 3–10/4–7 mm, then expanded ± plane or slightly umbonate, 7–12 mm broad, sometimes becoming revolute at margin, white with rather thick white to greyish, ochraceous or buff fibrillose scales at first especially at centre, then greyish striate and ± smooth except at often more persistently scaly and paler centre. *Gills* free or narrowly adnate, white then pale umber or violaceous-date, finally blackish, edge white flocculose at first. *Stem* 25–50/½–1½ mm, equal or slightly attenuated upwards often with slightly swollen base, white or hyaline-white, ± smooth above but white pruinose or with scales as on cap towards white tomentose or strigose base. Flesh very thin, hyaline-whitish in centre of cap. *Smell* none. *Spore-print* umber or dark chocolate.

Spores lentiform, ellipsoid in side-view, ± rhomboid or indistinctly angled-amygdaliform in face-view, 7–9/5–5½/5½–6½ μm (Fig. 2,c). *Basidia* 4-spored. *Marginal cystidia* sphaeropedunculate, vesiculose or clavate, 10–22 μm in diam., more rarely broadly lageniform 30–60/16–26 μm. *Facial cystidia* cylindric-vesiculose, 60–90/14–24 μm. *Hyphae of veil* on cap narrow, 3–8 μm in diam., walls ½–1 μm thick with diverticulae 1–2 μm in diam.
Norfolk. Surlingham, Wheatfen Broad, on grass or *Carex* debris, 18 vii 1956, 27 vii 1960, 3 viii 1968, *Orton* 3249 (holo. E); Devon. Membury, 10 viii 1971.

Distinguished from its allies by spore shape and size and habitat. Distribution unknown, but it is fairly common in the Norfolk locality especially in the summer.

This species and *C. xantholepis* described below belong to a group within the section *Impexi* characterised by growing in herbaceous debris and producing rather small fruit-bodies with a veil of relatively narrow often diverticulate and sometimes thick-walled hyphae. The members of this group appear to show some diversity of spore shape, although as yet only *C. friesii* and *C. tigrinellus* have spores sometimes exceeding 9 μm in length, and what appear to be perisporial remnants are sometimes seen on the spores of one or two species. Further observations on exact habitat, colour of the veil scales on the cap, and whether the hyphae of the veil scales are thick-walled or not, are needed to clarify this group. For the moment I prefer to regard those with differently shaped spores as separate species. Pilát & Svrček have published a key to this group (Ceske Mykol. 21, 3: 136–145, 1967), but the characters they give for their new species are different from those of my British finds, hence the description of these new species. Although the hyphae of the veil scales are rather broader, *C. argenteus* (described above) also belongs to this group. So far, therefore, we have in Britain *argenteus*, *friesii*, *saichiae* and *urticaecola* with white scales on the cap, differing mainly in spore details, *tigrinellus* with blackish or dark brown

scales and relatively large spores, and *rhombisporus* and *xantholepis* with ochraceous or buff scales also differing apparently mainly in spore size. An as yet undescribed species found on three occasions in Hertfordshire with small peculiarly shaped spores apparently with perisporial remnants in places remains to be described when further material has been found.

Coprinus scobicola P. D. Orton, **sp. nov.** Fig. 2, h–j.

A sociis basidiis bisporigeribus et habitatione distinguitur; *C. episcopali* proxime accedit.

Pileus ovoideus vel cylindrico-ovoideus, 16–22/9–11 mm, dein expanso-convexus et ad marginem laceratus usque ad 30 mm latus, griseus dein ad discum leviter sordide pallide fuscotinctus, primo ± recurvato fibrilloso ad discum crassiore albosquamulosus, dein glabrescens et ad discum versus plicato-striatus. *Lamellae* anguste adnatae vel liberae, mox griseae dein nigrae, confertae, primo ad aciem alboflocculosae. *Stipes* 35–50/2½–4 mm, sursum attenuatus, albus, primo minute flocculosus et ad basim tomentosus dein glabrescens, cavus. *Caro* tenuissima, ad discum grisea. *Odor* nullus. *Sporae* ellipsoideae vel ellipsoideo-amygdaliformes, 11½–14/7–8½ *µm* (Fig. 2,j), poro germinativo medio, in cumulo nigrinae. Basidia 2-sporigera. *Cystidia aciei lamellarum* pyriformia vel curte vesiculosa, 30–54/24–44 *µm*. *Cystidia faciei lamellarum* ± cylindrico-vesiculosa, 80–110/30–40 *µm*. *Cellulae veli* filamentosae pilei ± cylindricae vel a septis angustiores, 50–100/8–20 *µm*.
Devon. Plym Bridge, in scobe, 29 viii 1956, *Orton* 964 (holo. E).

Cap ovoid or cylindric-ovoid 16–22/9–11 mm, then expanded-convex up to 30 mm broad, sometimes split at the margin, grey then tinged clay-buff at centre, at first covered with white ± recurved fibrillose scales, those at centre often dirty brownish and thick and shaggy, then becoming ± smooth as cap expands and plicate-striate to disc. *Gills* narrowly adnate to free, soon grey then black, crowded, edge white flocculose when fresh. *Stem* 35–50/2½–4 mm, attenuated upwards, white, at first minutely flocculose with ± tomentose base, becoming ± smooth as cap expands, hollow. *Flesh* very thin, grey at disc. *Smell* none. *Spore-print* blackish.

Spores ellipsoid or slightly ellipsoid-amygdaliform with central germ-pore, 11½–14/7–8½ *µm* (Fig. 2,j), very dark sub micr. *Basidia* 2-spored. *Marginal cystidia* pyriform or shortly vesiculose, 30–54/24–44 *µm*. *Facial cystidia* cylindric-vesiculose, 80–110/30–40 *µm*. *Hyphae of veil* on cap cylindric or narrowed at septa, ca. 50–100/8–20 *µm*.
Devon. Plym Bridge, on sawdust, 29 viii 1956, *Orton* 964 (holo. E).

Superficially resembling *C. episcopalis* but well characterised by different habitat and 2-spored basidia. It belongs to section *Picacei* with narrow to fairly broad hyphae (1–20 *µm* broad) in the veil.

Coprinus semitalis P. D. Orton, **sp. nov.** Fig. 2,f.

A basidiis 4-sporigeribus, sporis elongatis et absentia odoris distinguitur. *C. cinereofloccosus* proxime accedit, sed a basidiis bisporigeribus differt. *C. laanii* a habitatione et sporis brevioribus ornatis differt.

Pileus ovoideus vel conico-ellipsoideus 13–22/6–11 mm, dein expansus

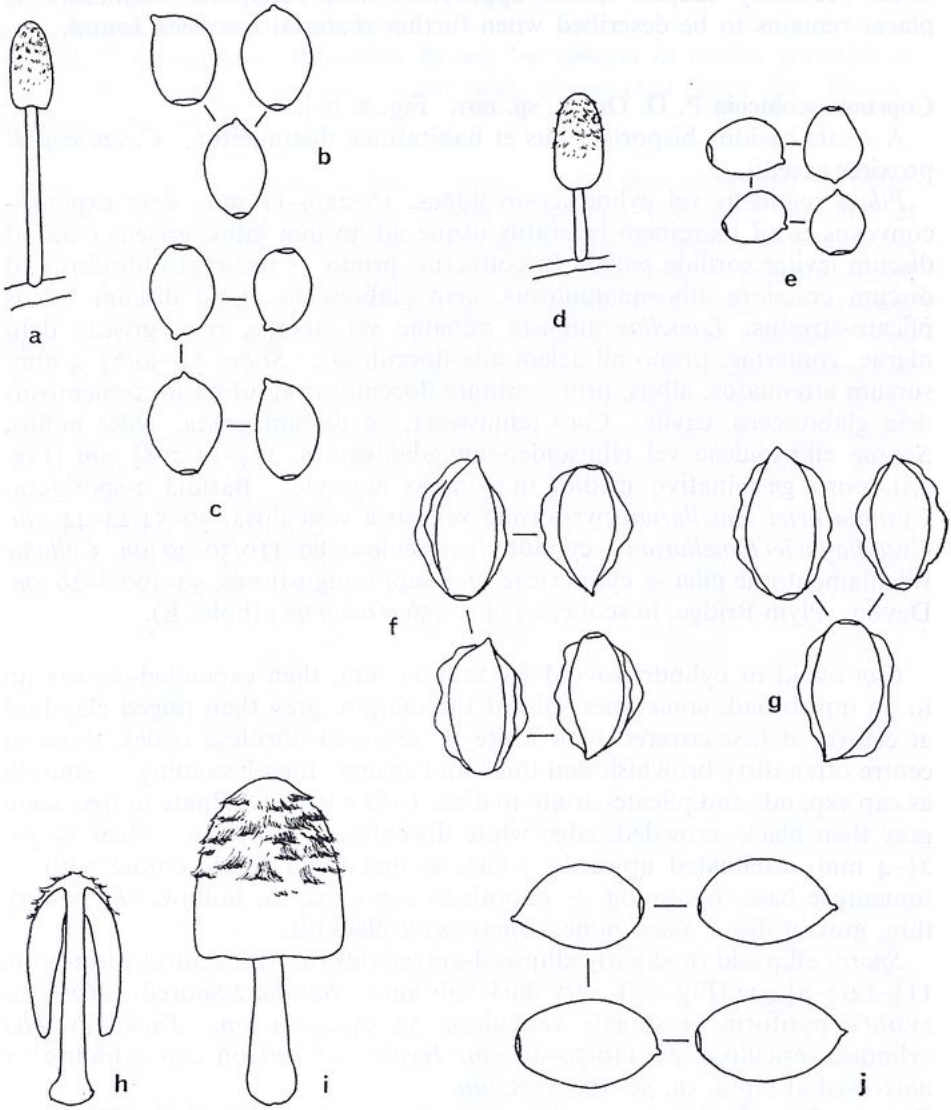

FIG. 2. a–c, *Coprinus rhombisporus* Orton—*Orton* 3249: a, 3 viii 1968, young fruit-body; b, spores c, 18 vii 1956, spores. d–e, *C. xantholepis* Orton: d, young fruit-body; e, spores. f, *C. semitalis* Orton—*Orton* 3545, spores. g. *C. cinereofloccosus* Orton from holo-type material, spores. h–j, *C. scobicola* Orton: h, section of young fruit-body; i, expanding fruit-body showing scales, j, spores. All fruit-bodies × 1; all spores × 1000. Drawn from type specimens unless otherwise indicated.

fere planus 10–22 mm latus, albidus vel pallide griseus, toto minute pallide griseofarinosus, interdum ad discum crassiore argillaceo vel pallide fusco farinoso-squamulosus, dein ad marginem glabrescens et leviter striatus postremo laceratus vel revolutus. *Lamellae* liberae, ex albo mox griseae dein nigricantes, confertae, ad aciem primo alboflocculosae vel atomatae. *Stipes* 65–96/1½–3 mm, aequalis vel sursum leviter attenuatus vel ad basim leviter incrassatus (2–4 mm latus), hyalino- vel argenteo-griseus, juventute fere omnino albo vel albido sericeo-flocculosus, et ad basim argillaceo vel griseo farinoso-squamulosus. *Caro* tenuissima, grisea, interdum ad discum pilei luteolofuscotincta. *Odor* nullus vel raro debilis. *Sporae* elongato-ellipsoideae vel ellipsoideo-amygdaliformes ad apiculum sensim angustatae, a perisporio conspicuo tunicatae, 10½–13½/4½–5½/6½–8½ *µm* (Fig. 2,f). *Basidia* 4-sporigera. *Cystidia aciei lamellarum* sphaeropedunculata, pyriformia, vesiculosa, vel leviter late lageniformia, 40–110/20–52 *µm*. *Cystidia faciei lamellarum* cylindrico-ellipsoidea vel leviter utriformia, ca. 120–140/28–35 *µm*. *Cellulae veli* pilei globosae vel late ellipsoideae, 36–80 *µm* latae, minute verrucosae.

Norfolk. Surlingham, Wheatfen, ad terram, saepe ad vias, vel inter graminos in pratis, solus, gregarius vel subcaespitosus, 11 x 1969, *Orton* 3545 (holo. E).

Cap 13–22/6–11 mm, ovoid or conico-ellipsoid then expanded ± plane and 10–22 mm broad, entirely whitish to grey, finely pale greyish granular mealy or sometimes more coarsely clay-buff or pale sepia mealy-scaly at centre, margin becoming smoother and slightly striate and finally ± torn and revolute. *Gills* free, white soon grey then blackish, crowded, edge conspicuously white flocculose or atomate when fresh. *Stem* 65–96/1½–3 mm, equal or slightly attenuated upwards or slightly thickened at base (2–4 mm broad), hyaline or silvery-grey, ± entirely white or whitish scattered silky flocculose when fresh, base with clay-buff or greyish granular-mealy flocci as on cap when fresh. *Flesh* very thin, greyish, sometimes tinged clay-buff in cap centre. *Smell* none, or rarely slightly earthy. *Spore-print* fuscous-black.

Spores elongate-ellipsoid or ellipsoid-amygdaliform gradually narrowed to the apiculus, with conspicuous perisporial sac, 10½–13½/4½–5½/6½–8½ *µm* (Fig. 2,f). *Basidia* 4-spored. *Marginal cystidia* sphaeropedunculate, pyriform or vesiculose to slightly broadly lageniform, 40–110/20–52 *µm*. *Facial cystidia* cylindric-ellipsoid or slightly utriform, ca. 120–140/28–35 *µm*. *Cells of veil* on cap globose or broadly ellipsoid, 36–80 *µm* broad, minutely verrucose.

Norfolk. Surlingham, Wheatfen, on soil (often on paths) or amongst grass in fields, singly in groups or sub-caespitose, 11 x 1969 *Orton* 3545 (holo. E). Hants. New Forest, Rufus Stone, 24 x 1969; Yorks. Cawood, Bishopwood, 26 ix 1971; Perthshire, Rannoch, Black Wood, 17 ix 1967 (on path), and previously in various localities in the Scottish Highlands. Not uncommon and widespread.

This member of the '*narcoticus*' group is distinguished by habitat, 4-spored basidia, elongate spores and absence of smell. Pending cultural evidence to the contrary, this is regarded as a separate species from the macroscopically similar *C. cinereofloccosus*. *C. laanii* differs in habitat on wood or sawdust and shorter spores marked with dots or lines.

Coprinus xantholepis P. D. Orton, **sp. nov.** Fig. 2, d–e.

A sporis submitriformibus poro germinativo lato et pileo squamulis coloratis distinguitur.

Pileus elongato cylindrico-ellipsoideus 8–10/4–5 mm, dein expansus interdum umbonatus 11–20 mm latus et ad marginem radialiter fissuratus, primo albus, ochraceo vel luteolofusco adpresse ad discum interdum aliquantum crasso et leviter recurvato squamulosus, dein glabrescens et griseus vel leviter violaceotinctus vel ad discum cremeus. *Lamellae* adnatae, albae dein argillaceo-violaceae postremo umbrinae, non confertae, admodum angustae. *Stipes* 42–58/1–1½ mm, ± aequalis, albus, sericeostriatus, ad basim vulgo leviter incrassatus et a reliquis veli primo decoratus. *Caro* alba. *Sporae* lentiformes, submitriformes vel ellipsoideo-rhomboideae poro germinativo lato, 5½–7/4½–5/5–5½ *µm* (Fig. 2,e). *Cystidia aciei lamellarum* ± vesiculosa, 15–30 *µm* lata. *Cystidia faciei lamellarum* cylindrico- vel elongato-ellipsoideae, 80–130/18–32 *µm*. *Hyphae veli* pilei diverticulatae, admodum crasso-tunicatae 2–8 *µm* latae, vel hyaline angusto-tunicatae 6–10 *µm* latae. Aberdeenshire. Loch Skene, ad caulos mortuos graminis, 19 viii 1964, *Orton* 2567 (holo. E).

Cap elongate cylindric-ellipsoid 8–10/4–5 mm, then expanded sometimes umbonate and radially split, 10–20 mm broad, at first white with numerous ochraceous or buff adpressed fibrillose scales, those at disc sometimes rather thick and slightly recurved, then becoming smooth and grey or sometimes tinged violaceous or with creamy centre. *Gills* adnate, white then violaceous-clay finally umber, not crowded, rather narrow. *Stem* 42–58/1–1½ mm, ± equal, white, silky striate, base often slightly swollen and with veil remnants at first as on cap, hollow. *Flesh* white.

Spores lentiform, submitriform or ellipsoid-rhomboid with conspicuous truncate germ-pore, 5½–7/4½–5/5–5½ *µm* (Fig. 2,e). *Marginal cystidia* ± vesiculose, 15–30 *µm* in diam. *Facial cystidia* ± cylindric or elongate-ellipsoid, 80–130/18–32 *µm*. *Hyphae of veil* on cap diverticulate, 2–8 *µm* in diam., with rather thick buff-tinted refringent walls together with some colourless ± thin-walled ones 6–10 *µm* in diam.
Aberdeenshire. Loch Skene, on dead grass stems, 19 viii 1964, *Orton* 2567 (holo. E).

Differs from others of this group with coloured scales on the cap in submitriform spores with conspicuous broad germ-pore. Basidia not noted but believed to be 4-spored. Although I have only the one collection, I am describing this as a new species since no description known to me mentions spores of this rather characteristic shape combined with coloured hyphae in the veil.

Printed in Scotland for Her Majesty's Stationery Office by Hay Nisbet & Miller Ltd., Glasgow.
Dd. 248888/3075 K6 9/72.