NOTES ON BRITISH AGARICS: VI*

P. D. ORTON **

ABSTRACT. Three new British species of *Coprinus* are described: *C. bisporiger* P. D. Orton, *C. triplex* P. D. Orton and *C. xenobius* P. D. Orton. A discussion of *Stropharia aeruginosa* and its allies includes a key to five species and augmented descriptions of two little-known species; one new combination is made. In the appendix (by R. Watling) the names *C. heterosetulosus* and *C. pseudoradiatus* are validated.

COPRINUS

The following are latin descriptions of three new species to be included in the account of *Coprinus* for the next part of the *British Fungus Flora*.

Coprinus bisporiger [Buller ex] P. D. Orton, **sp. nov.**

[*C. bisporigera* Buller in Trans. Brit. mycol. Soc. 3:350 (1911)—*nomen nudum*; *C. bisporus* sensu Buller in Trans. Brit. mycol. Soc. 6:363 (1920) non Lange].

A sociis basidiis bisporigeribus et habitatione distinguitur.

Pileus 5–12 × 5–12 mm, ochraceus dein griseus, a setulis minutis obtectus. *Lamellae* ex albis nigricantes. *Stipes* 30–80 × 1–3 mm, aequalis, albus, ad basim strigosus. *Sporae in cumulo* violaceo-fuscae.

Sporae ellipsoideae vel leviter ellipsoideo-amygdaliformes, 12·5–15 × 6·5–8 μm. *Basidia* 2-sporigera. *Setulae pilei* cylindricae vel elongato lageniformia 45–120 × 12–24 μm.

Surrey: Richmond, Kew, ad ramulos, x 1911, *Buller* (holo. K).

Coprinus triplex P. D. Orton, **sp. nov.**

A basidiis trisporigeris, stipite marginato-bulboso et odore distinguitur. *C. trisporus* proxime accedit sed a sporis latioribus (6–7 μm) et a velo albo differt. *C. narcoticus* (Batsch ex Fr.) Fr. sensu Buller non al. ab icone et descriptione idem est.

Pileus 6–12 × 5–9 mm, subglobosus vel ovoideus, dein expansus 7–15 mm latus et ad marginem revolutus vel laceratus, griseus, subtiliter griseo flocculoso-farinoso squamulosus vulgo ad discum crassiore verrucoso-granulatus, senectute circa discum plicato-striatus. *Lamellae* liberae ex albidis umbrinae dein nigrescentes, subconfertae, primo ad aciem albo atomato-floccosae. *Stipes* 30–35 × 1–2 mm, aequalis vel sursum attenuatus, ad basim marginato-bulbosus, primo totus minute albo flocculoso-farinosus, ad bulbum radialiter griseo flocculoso-farinosus, interdum ad basim tenuiter radicatus. *Odor* aliquantum fortis, nauseosus vel stercorosus.

Sporae ellipsoideae vel leviter ovoideae, 8·5–11 × 5–6·2 μm, a perisporio non vel vix manifeste tunicatae. *Basidia* trisporigera, rarissime 4-sporigera. *Cystidia aciei lamellarum* vesiculosa vel pyriformia vulgo pedunculata, 30–70 × 16–34 μm. *Cystidia faciei lamellarum* non vidi. *Cellulae veli pilei* globosae minute verruculosae, 34–84 μm latae.

* V, *Kew Bull.* (in press)

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Mull: Gruline, Loch Baa, ad fimum vaccinum, 25 viii 1973, *Orton* 4532 (holo. E).

Coprinus xenobius P. D. Orton, **sp. nov.**

A sociis sporis et cellulis veli interdum diverticulatis distinguitur. *Pileus* 2–7 × 1–4 mm, ellipsoideus vel cylindrico-ellipsoideus, dein expanso-convexus vel depressus 2–8 mm latus, interdum ad marginem radialiter fissus, ex albo albidus saepe ad discum griseo-luteolobrunneus dein grisescens, primo e velo albo piloso-tomentosus dein ± adpresse minute flocculoso-fibrillosus vel laxe elongato fibrilloso-squamulosus, senectute ± laevis et circa discum striato-sulcatus et interdum ad marginem radialiter fissus. *Lamellae* ex albidis griseo-luteolobrunneae dein nigrescentes. *Stipes* 20–40 × 0·3–2 mm, aequalis vel ad basim leviter incrassatus, albus dein hyalinus vel griseus, primo totus albo vel albido flocculoso-fibrillosus dien glabrescens. *Odor* nullus. *Sporae in cumulo* fusco-brunneae vel fusco-nigrae.

Sporae ellipsoideae vel cylindrico-ellipsoideae (9–)10–13·5 × (5–)5·5–6·5 μm, aliquantum crasso-tunicatae, poro germinativo medio. *Basidia* 4-sporigera. *Cystidia aciei lamellarum* sphaeropedunculata, vesiculosa vel pyriformia, 14–54 μm lata. *Cystidia faciei lamellarum* ± cylindrica interdum ad apicem angustiora, 58–100 × 20–30 μm, ad apicem 15–25 μm lata. *Cellulae veli pilei* anguste-tunicatae hyalinae cylindricae vel leviter fusiformes interdum diverticulatae, 3–12(–14) μm latae.

Perthshire: Camghouran, ad fimum vaccinum vetustum, 22 v 1972, *Orton* 4501 (holo. E.)

Inverness-shire: Nethy Bridge, 4 vii 1972, *Orton* 4503 (E).

Stropharia

A discussion follows of stirps *Aeruginosa*—those species with a viscid cap and blue-greenish colours.

I have long been puzzled about the exact delimitation of *S. aeruginosa* and *S. albocyanea*, but did not investigate this thoroughly until I received *Documents Mycologiques*, fasc. 3 (1972), kindly sent me from Lille by Dr M. Bon. This paper drew my attention to the fact that Tuomikoski (Karstenia 2:31, 1953) had already recognised and redescribed *S. cyanea* (=*Agaricus cyaneus* Bolton ex Secretan) from Finland, and that Bon (Doc. Mycol. fasc. 3:28, 1972) himself had found it necessary to describe a new species from sand-dunes, *S. ochrocyanea*. This means that there are now four west European taxa described from this stirps, in addition to *S. inuncta*, which is, however, clearly distinct from the other four. I have collected *S. cyanea* more than once, and can now give a key delimiting these species and a description of *S. cyanea* which is, at least in England and lowland Scotland, not uncommon, and is seemingly more common than *S. aeruginosa*.

I find, however, that there is a nomenclatural problem over *S. albocyanea*, for Fries seems to have made an error is ascribing the epithet *albocyanea* to Desmazières, which has been taken for granted and copied ever since. On checking up the reference given by Fries in his validating description (Epicrisis 210, 1838), I find that Desmazères described the taxon as '*Agaricus pseudo-cyaneus*' and not *A. albocyaneus*i. He describes the cap as being 20–40

mm broad and 'parfaitement blanc ou d'une teinte aerugineuse recouvert d'une viscosité très remarquable', the stem as 60–100 × 3–4 mm 'pourvu d'une cortine très-fugace', and the flesh as white, soft and rather thick. The relatively small size, slender stem and soft flesh are particularly appropriate for the taxon I have collected and believe to be *A. albocyaneus* Fries. Fries gives *A. pseudocyaneus* Letellier as a synonym of *A. albocyaneus* in *Hymenomycetes Europaei* and I feel sure that *A. pseudocyaneus* Desmazières is the same taxon as *A. albocyaneus* Fries, but since the epithet *pseudocyaneus* has priority it should be used and I therefore propose the new combination:—

Stropharia pseudocyanea (Desm.) P. D. Orton, **comb. nov.**

Syn.: *Agaricus pseudocyaneus* Desmazières, Catalogue des plantes omises dans la botanographie belgique, Lille 22 (1823).

One striking distinguishing feature of *S. pseudocyanea* seems to me to have been missed, or at least not stressed, by most authors, and that is the soft stem, quite different from the relatively firm broader stem of *S. aeruginosa* and *S. cyanea*. Fries stresses that his *Agaricus albocyaneus* is softer than *A. aeruginosus* in his validating description (219, 1838) where he described it as 'prior [*A. aeruginosus*] tenuior, minor et praecipue mollior' and uses the same words in *Hymenomycetes Europaei* (289, 1874). In *Monographia* (412, 1867), he describes the stem as 'mollis'. I find that it is often difficult to extract the stem intact from the grass in which it is growing without squashing it, and believe this is a useful distinguishing feature.

Some early authors seem to have missed the significance of the colour change of the cap, which is from blue-greenish to cream or white. Desmazières describes the cap as 'parfaitement blanc *ou* d'une teinte aerugineuse' (italics mine) and Fries in his first (1838) description of *A. albocyaneus* gives the cap as '*e viridi albicante*' (italics as in Fries) and uses the same words in *Hymenomycetes Europaei* (1874). In *Monographia* (1867), however, he changed this to 'junior *lacteus* nitens, dein *aerugineovirens*' (italics as in Fries). Unfortunately this description is the one which has been most frequently translated into English in earlier British works and may have led to confusion. *S. pseudocyanea*, and also *S. cyanea* and *S. ochrocyanea*, change colour very considerably according to age and weather conditions, so that colour differences are hardly of use in distinguishing these species. *S. albocyanea* var. *virginea* J. E. Lange is surely simply a sterile or semi-sterile condition and not of taxonomic significance. [A similar taxon is *Psilocybe semilanceata* var. *caerulescens* (Cooke) Sacc. which represents a colour change which may or may not take place according to certain as yet unspecified conditions and is also worthless taxonomically.] One has therefore to look for other characters for separating species in this group.

There is a clear habitat difference between the two grassland species, *S. pseudocyanea* and *S. ochrocyanea*, and the woodland or shade-loving *S. aeruginosa*, but *S. cyanea* may occur in woodland or in the open in waste places or under nettles, and has also been found abundantly on sand-dunes amongst rotting grass (T. J. Wallace, in litt.). There is no doubt that the blue-green colour of *S. aeruginosa* is more lasting, but more striking differences between the latter and *S. cyanea* (and *S. pseudocyanea*) are the more persistent white scales on the cap and the membranous more persistent ring. In addition to this, *S. cyanea* can be clearly distinguished microscopically as it is the only species with numerous ± pointed chrysocystidia on the gill-

edge, the others having ± clavate cystidia on the gill-edge and the chrysocystidia all or nearly all facial. *S. cyanea* also has consistently pale gills.

On the other hand, the presence of rhizoids at the stem-base is not of taxonomic significance, for all our species may show them on occasion. Cap shape also is of no significance, for although *S. aeruginosa* (and seemingly also *S. ochrocyanea*) tend to have convex caps, all our species can vary from convex to strongly umbonate. Spore size and shape are much the same for all four taxa, although, according to Bon, *S. ochrocyanea* and *S. cyanea* have slightly broader spores. I have not noted this for *S. cyanea*, but have not yet drawn spores with a *camera lucida* not having a spore print available at the moment, so must refrain from positive comment, but I am doubtful if the differences are sufficiently clear-cut to be decisive.

S. ochrocyanea was described from sand-dunes by Bon and we have, I suspect, this taxon in dunes in SW England (in particular at Rock in Cornwall), and also possibly on basic grassland in Surrey. Unfortunately I have no specimens or notes to back this up, so I cannot record it as yet, but I include it in the key for completeness and in the hope that it will eventually be recorded. The diagnostic features according to Bon are broader thicker-fleshed cap (than *S. pseudocyanea*), which soon becomes yellowish or ochraceous except for the margin, short firmer stem, slightly broader spores, ± clavate obtuse marginal cystidia which are not chrysocystidia, and poorly developed veil. The macroscopic characters mentioned agree well with my recollection of specimens gathered in Cornwall, which, however, were put on one side, rather indefensibly I fear, as small pale *S. aeruginosa*. This attitude is now inexcusable, and I hope the following key will enable others to name examples of this stirps more precisely.

Descriptions of British material of *S. cyanea* and *S. pseudocyanea* are given after the key. Colours used are as in the colour chart to the *British Fungus Flora*, Introduction (HMSO Edinburgh, 1969). Past records of *S. aeruginosa* may well include *S. cyanea* unfortunately, so they should be treated with suspicion unless accompanied by material or a description to check them.

Key to species of *Stropharia* with viscid cap and blue-greenish or dull purplish colours at least in part.

1. Stem white or tinged yellowish, quite without blue-greenish colours; cap vinaceous-grey or purplish-date at least in part, never clear blue-greenish; (in grassland; marginal cystidia clavate) . . . . . *S. inuncta*

\+ Stem, and often also cap, blue-greenish, at least in part . . 2

2. Marginal cystidia obtuse and not chrysocystidia, clavate, clavate-capitate, or lageniform-capitate; ± pointed chrysocystidia facial or only a very few on the gill-edge 3

\+ Marginal cystidia all, or almost all, ± pointed fusiform or lageniform or clavate-mucronate chrysocystidia; facial chrysocystidia also present; (gills vinaceous-buff to pale fawn, remaining pale for a long time; veil-scales on cap soon fugacious; veil forming cortinate or fibrillose-floccose often rather fugacious ring on stem; cap soon becoming yellowish; in waste places under nettles, in hedges or in woods, also on sand-dunes in rotting grass) . *S. cyanea*

3. In open grassland or on sand-dunes; fruit-bodies often small, 40 mm broad or less and stem thin, 2–6 mm broad; cap soon discolouring yellowish 4

\+ In woods, hedges or shady places; more robust—cap up to 80 mm broad, stem up to 12 mm broad; blue-green colour of cap more persistent; (white scales on cap more persistent at least in outer part; ring membranaceous, spreading, more persistent) . . *S. aeruginosa*

4. Stem soon soft, often long and flexuose; veil appendiculate at cap margin at first and forming more obvious and persistent fibrillose ring-zone and/or patches on stem; spores 7–9×4–5 μm . . *S. pseudocyanea*

\+ Stem often shorter than cap width, ('plus trapu' sec Bon); veil traces absent on cap, poorly developed and soon fugacious on stem; spores slightly broader, 7–8·5(–9)×(4·5–)5–5·5(–6) μm sec Bon . . . . . [*S. ochrocyanea* Bon]

Stropharia cyanea (Bolt. ex Secr.) Tuomikoski in Karstenia 2:31 (1953).
Syn.: *Agaricus cyaneus* [Bolton ex] Secretan, Mycographie Suisse I:109 (1833).
Stropharia aeruginosa auctt. p.p. non (Curt. ex Fr.) Quél.

Cap 30–74 mm, convex then expanded often obtusely umbonate, sometimes becoming slightly depressed around the umbo, *bluish-green or sky-blue soon discolouring* sulphur-yellow or yellowish-green (sometimes in patches) with pale bluish-green or greenish-grey margin, *finally ± entirely pale straw or sulphur-yellow to deeper straw or creamy-buff*, sometimes with luteous patches here and there, margin sometimes retaining bluish-green tinge for some time, glutinous-viscid with separable pellicle, white veil sometimes forming soon-disappearing scales at or near margin when fresh. *Gills* adnate ± emarginate with tooth, or ± subdecurrent, pale vinaceous-buff or very pale vinaceous-grey then pale fawn, *remaining pale for a long time*, darker fawn, umber or snuff-brown-fawn only when quite old, fairly crowded, L 28–42 l 3–7, edge paler then ± concolorous and even. *Stem* 40–108 × 3–12 mm, equal or slightly thickened at or near base, bluish green or sky-blue soon discolouring whitish in places then pale buff or pale olivaceous-buff from the base up, apex white pruinose, silky fibrillose-striate below this, white veil forming fibrillose-floccose sometimes fugacious ring-zone and patches or slightly reflexed floccose scales below the ring-zone, hollow (often narrowly so), base white tomentose often with white mycelial threads. *Flesh* bluish-green at first, becoming straw or whitish in cap and pale buff or olivaceous-buff in stem. *Smell* none or faintly acid-pungent. *Spores in mass* snuff-brown-umber.

Spores ellipsoid-amygdaliform in side-view, ellipsoid or ellipsoid-ovoid in face-view, 7–9×4·5–5 μm. Basidia 4-spored, 28–32×7–8 μm. *Marginal cystidia ± pointed chrysocystidia*, from clavate-mucronate to fusiform or slightly lageniform with ± acute apex; without or with very few clavate ones, 28–55×10–16 μm, apex 2–4(–6) μm broad usually acute, rarely capitate-obtuse. *Facial cystidia* similar or more fusiform.
Typically in waste places, but also in woods or on sand-dunes on rotting grass.

Herefordshire: Shobdon, in nettles and brambles around remains of old army huts, 14 xi 1959, *Orton* 2091 (E). Norfolk: Hedenham, amongst sticks and under *Mercurialis perennis* in deciduous wood (predominantly oak on boulder-clay soil), 13 x 1974, *Orton* 4676 (E).

Readily recognised macroscopically by the rapidly discolouring cap without veil scales and persistently pale gills, and microscopically by the numerous chrysocystidia on the gill-edge. It is particularly likely to occur in waste places.

Stropharia pseudocyanea (Desm.) P. D. Orton.

Syn.: *Agaricus pseudocyaneus* Desmazières, Catalogue des plantes omises dans la botanographie belgique, Lille 22 (1823).
A. albocyaneus Fries, Epicrisis 219 (1838).
Stropharia albocyanea (Fr.) Quélet, Les Champignons du Jura et Vosges 255 (1872).

Cap 13–38 mm, conico-convex then expanded usually obtusely to rather acutely umbonate, *sky-blue or bluish-green soon discolouring* pale buish-green or greenish-grey then olivaceous-buff sometimes with grey-olivaceous centre and *finally sulphur-yellow to saffron, straw or cream* (E in Colour Chart), sometimes entirely discoloured, sometimes patchily so, glutinous or very viscid with separable pellicle, veil forming appendiculate white, pale bluish-green or greenish-grey *fugacious* scales at or near margin at first. *Gills* adnate emarginate with tooth, olivaceous-buff or vinaceous-buff then pale fawn or milky-coffee tinged umber, finally umber to purplish-date, rather crowded, L 20–32 l 3, edge finely white flocculose to conspicuously denticulate, becoming ± concolorous and even when old. *Stem* 35–70 × 2–5 mm, ± equal, usually flexuose, bluish-green or sky-blue (especially at apex) then pale bluish-green with whitish apex, or finally straw or buff from the base up, apex white floccose-pruinose or flocculose-scaly and finely silky-striate, white veil forming apical floccose-fibrillose spreading ring and adpressed upward-pointing 'V'-shaped scales, which may become reduced to a narrow ring-zone with a few patches below this with age, *soon soft* especially in lower part, narrowly hollow. *Flesh* bluish-green fading to pale bluish-green or greenish-grey then dirty whitish in cap or whitish in stem-apex, and cream (D in Colour Chart) or creamy-buff in lower part of stem, sometimes greenish-grey or grey-olivaceous horny over gills. *Smell* none to fairly strong acid-pungent.

Spores ellipsoid slightly amygdaliform in side view, ellipsoid or ellipsoid-ovoid in face-view, 7–9 × 4–5 μm. *Basidia* 4-spored. *Marginal* cystidia clavate-capitate or ± cylindric sometimes also swollen in lower part to lageniform-capitate, 24–44 × 4–8 μm, apex 4–5 μm broad when cylindric, 4–8(–10) μm broad when clavate, 6–12 μm broad when capitate, not chrysocystidia. *Facial cystidia* obtusely or acutely fusiform or broadly lageniform, chrysocystidia, 30–40 × 8–14 μm.

In grass or grass and moss.

Norfolk: Surlingham, Wheatfen, in garden, 9 x 1971 and 25 x 1971, *Orton* 4221, 4222 (E). Perthshire: Loch Rannoch, by roadside, 7 x 1973 *Orton* 4589 (E). Devon: Membury, in field, 26 x 1974, *Orton* s.n.

Best recognised by habitat and soft stem, which is difficult to extract without squashing when it is growing amongst grass stems, and discolouring cap. It seems to appear only after the grass has been well wetted by rain or very heavy dew.

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APPENDIX: THE VALIDATION OF TWO SPECIES OF COPRINUS

ROY WATLING

During the preparation of the account of *Coprinus* for the *British Fungus Flora* it was found that the British Check-list contained two *nomina nuda*. Dried material of the first species *C. heterosetulosus* from the type collection or locality is not available but because a Scottish collection agrees in all details with the original invalid description of Locquin (1947) and with those of Lange (1952) and Lange & Smith (1953), I have no hesitation in citing material from Carriber glen near Linlithgow, Midlothian, as type. As this collection has been described in an earlier paper (Watling, 1967) only the validation is offered.

Coprinus heterosetulosus [Locquin ex] Watling, **sp. nov.**

Statura *C. ephemerus* similis; pileus tamen diametro saepe minore brunneus; deliquescens.

Basidiosporae atrorubescentes, 9·5–11(–12) × 5·5–6·5(–7) μm, subangustatae ovato-ellipsoideae, poris subexcentricis ornatae; basidia trimorpha; pleurocystidia absentia; cheilocystidia ± globosa, 15–30 μm; pileocystidia variabilia dimorpha, altera 60–105(–125) × 10·5–13·5(–21) μm, hyalina, subobtusa, altera sclerocystidia brunnea, 23–50 × 6–8 μm. Fibulatae adsunt.

Scotland. Midlothian, near Linlithgow, Carriber glen, *Watling* 2680c (holo E.)

The second species, *C. pseudoradiatus* Kühner & Josserand (1944), is considered by Dennis, Orton & Hora (1960) to be the fungus described under the name *C. radiatus* by Rea (1922). However, although seen by Rea no good recent collection has been made in the British Isles and through the kindness of Professor Robert Kühner it has been possible to examine the French material cited in his study with Marcel Josserand; these specimens I select as type. *C. pseudoradiatus*, like the far commoner *C. radiatus*, produces small fruit-bodies and because of this may have been overlooked in the past. It is immediately distinguished microscopically from the latter by its much smaller spores and globose to ellipsoid cystidia.

Coprinus pseudoradiatus [Kühner & Josserand ex] Watling, **sp. nov.**

Statura *C. radiatus* similis; pileus tamen diametro saepe majore griseus; deliquescens.

Basidiosporae 7–9 × (4–)4·5–5(–5·5) μm, ovato-ellipsoideae basis obtusis, poris centralis parvis; pleurocystidia ellipsoideo-ovoidea, 25–100 × 15–30 μm; cheilocystidia ± subglobosa, 30–40 × 22–28 μm. Cellulae hypharum veli cylindricae vel ellipsoideo-cylindricae, 40–60 × 10–30(–38) μm, ad septum strangulatae. Fibulatae adsunt.

France. Lyon, ad fimum, 17 iv 1944 (holo. in herb. Kühner, Lyon; slide at E).

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