RECORDS OF BOLETI AND NOTES ON THEIR TAXONOMIC POSITION: II*

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The following new combinations, taxa and records have been made necessary as a result of the preparation of a new flora of British agarics and boleti.

NEW COMBINATIONS

Aureoboletus cramesinus (Secr.) Watling, **comb. nov.**
Basionym: *Boletus cramesinus* Secretan, Mycographie Suisse 3:39 (1833).

The combination already proposed (Watling, 1965) is invalid because of the incomplete citation of the basionym. A list of synonyms including *Aureoboletus gentilis* (Quél.) Pouzar (1957) is included in the same publication.

Although Reid (1965) has described what he considers to be *Leccinum aurantiacum*, problems still remain. The extent of the misunderstanding was not fully appreciated until several collections of the true *Leccinum aurantiacum* from under aspens were made within a few days of finding the members of this same group which appear so common in S England and are often referred to as *L. aurantiacum*. It is necessary therefore to discuss in full these collections and this is reserved for a separate paper. However, it is appropriate at this juncture to propose the following new combination:

Leccinum quercinum (Pilat) Green & Watling, **comb. nov.**
Basionym: *Leccinum aurantiacum* var. *quercinum* Pilat, Mushrooms and other fungi, footnote p. 6, 1961.

Although I have not examined the type material, there is no doubt in my mind that Pilat's specimens and the collections from various scattered places in southern England are conspecific. I have had the opportunity through the kindness of E. E. Green not only to have personally collected specimens from many different populations but to have seen over one hundred specimens sent to me in both fresh and dried condition. Green's paintings are so close to O. Usak's in Pilat (1961) that some appear as if they have been taken from the same collection.

The main differences between this fungus and *L. aurantiacum* are the rich red brown to almost chocolate pileus, the white scales on the stipe turning rapidly fuscous red brown and those at the apex black brown, and the flesh flushing red then grey touched with violaceous amethyst.

NEW TAXA

The xerocomoid boletes in the *Boletus subtomentosus-chrysenteron* complex are still perplexing even though it was hoped that with the recognition of *Boletus porosporus*, *B. spadiceus* and *B. lanatus* in Britain (Watling, 1967) some of the difficulties experienced earlier would have been overcome.

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This complex is characterised by its members having olivaceous buff, olivaceous ochre to greyish tan pilei which usually crack when mature. Dark green forms of *B. chrysenteron* have been collected but so far only one or two poor carpophores unsuitable for description; yellow forms of *B. subtomentosus* are perhaps less uncommon but a bright lime green bolete of the complex has never been described as far as the author is aware. One such taxon was collected in August 1968 under beech trees and is believed to be distinct. Although only one collection has been made so far, the characters noted which delimit it from *B. subtomentosus* etc. are so distinctive and different to any known bolete that it is believed to be a rare taxon and not simply a variant of an existing commoner species. A description of the collection is given below and a new name proposed.

Boletus citrinovirens Watling, **sp. nov.**

Pileus 32–40 mm latus, convexus, flavovirens, citrinovirens vel chlorinus, tactu badius, siccus, velutinus, vel coactus ad centrum prasinus vel olivaceus. Stipes ochraceus vel babulinus ad basim albidus et tumefactus. Tubuli sulphurei constantes; pori flavi demum sulphurei. Contextus albidus demum tarde badio, subter 'cap cuticle' castaneus vel purpureo-badius. Sporae 12–13 × 5–5·5μ subfusoideae.

Typus: Birks of Aberfeldy, Perthshire, 31 viii 1968, *E. E. Green, Watling* 6911 (holo-E)

Pileus 32–40 mm, convex, lime green, lettuce green or apple green with darker areas in places and ochraceous yellow even lemon yellow patches, bruising more brownish but commencing dark olive especially towards the margin, olive green at the disc, very felty, suede-like in texture becoming slightly smoother with age, margin strongly incurved, pleated or puckered. *Stipe* equal or slightly swollen just above the base and extended into an irregularly branched face composed of compacted mycelium, at first pale ochraceous yellow at apex becoming slightly darker towards the centre and then rapidly passing into a white basal region, rugulose then ribbed with brown, the actual ribs purplish to date brown, minutely dotted between the ribs, more yellowish towards the whitish base. *Tubes* yellow, unchanging; *pores* rich lemon-chrome, unchanging, angular. *Flesh* white with darker almost umber line under pileus 'cuticle' and date to purplish brown above tubes, brownish below 'cuticle' of stipe and becoming pinkish-purple in pileus flesh and in stipe base, or even more purplish brown in the latter, white or changing possibly tan or even olivaceous to sepia in pileus and glassy in stipe base and in mycelial foot. *Taste and smell* not unpleasant; with NH_4OH purplish brown; Phenol pinkish; KOH yellowish, HCHO pinkish; $FeSO_4$ possibly dirty olive; Melzer's solution, C_2H_5OH & Gum Guaiac negative; NH_4OH on pileus 'cuticle' purplish brown.

Basidiospores 12–13 × 5–5·5μ, subfusoid, without apical differentiation or highly thickened walls, very pale honey in NH_4OH & Melzer's solution. *Basidia* 4-spored, 9–10·5μ broad; *sterigmata* extremely thin up to 3·5μ long. *Pleurocystidia* numerous, bluntly lanceolate or cylindric, 50–55 × 9–12μ, some faintly encrusted at apex in NH_4OH, thin-walled, hyaline in NH_4OH & Melzer's solution. *Hymenophoral trama* of slightly bilaterally arranged hyphae, mostly 5·5μ broad and pale yellow in Melzer's solution in contrast to golden yellow hymenium elements in the same reagent but very little differentiation between central and lateral strata, some lacticiferous hyphae

present, 4·5μ broad. *Pileus* 'cuticle' of irregular, non-gelatinised trichoderm with end-cells 25–50 × 7–9μ, disarticulating, slightly ornamented with faint spirals in NH_4OH but not in Melzer's solution, hyphae with short blunt laterals; this slightly coloured zone passing into a red brown layer of similar cells c. 6μ broad and then rapidly into trama tissue of short brick-like cells ± gelatinised and up to 10μ long, although intermixed with some longer units, ornamented or not, all yellowish brown in Melzer's solution, darker more reddish brown above the tubes.

Under *Fagus*, dry banks, Birks of Aberfeldy, Perthshire, 31 viii 1968. *E. E. Green, Watling* 6911 (Type-E).

Leccinum roseotinctum Watling, **sp. nov.**

[= *Leccinum percandidus* (Vassilkov) Watling sensu Watling in Trans. Brit. Mycol. Soc. 43:691, 1960]

Pileus 75–120 mm latus, convexus, albidus, ad centrum saepe roseolus demum roseo-vinaceus vel rufo-vinaceus, siccus demum subviscidus. Stipes 150–160 mm longus 35–40 mm crassus, albido-scabrosus vinaceo-griseus denique ligno-brunnei tactu. Contextus albus demum roseo-griseus vel vinaceus denique fusco-niger. Tubuli ventricosi albidi, demum ligno-brunnei denique vinaceo-grisei; pori vinacei demum vinaceo-grisei tacti. Sporae (11) 12–14 × 4–5μ, subfusoideae.

Typus: Badger Falls, Tomich, Inverness-shire, 30 viii 1957, *Watling* 193 c (E).

A full description of the first British record of *Boletus percandidus* is to be found in Watling (1960). It was hinted at in the same publication that some differences could be observed between descriptions of the Russian collection and that from Tomich, Inverness-shire. B. P. Vassilkov has suggested (Watling, 1960) that although similar to his species the Tomich collection could possibly be considered an independent, though related, form. Because the specimens agreed so well macroscopically except for the rose tint it was decided however at that time to adopt *Boletus percandidus* and transfer the species to the genus *Leccinum* S. F. Gray.

Through the kindness of Prof. Vassilkov I have since had the opportunity to examine the type material of *Boletus percandidus* and although macroscopically it may have many similarities with the Scottish collections, for this taxon has now been recorded at least six times over the past six years, microscopically it is quite distinct. Thus it has been necessary to describe a new taxon. The most impressive character of *Boletus percandidus*, which incidentally is also a true member of the genus *Leccinum*, is the abundance of dark lacticiferous hyphae in the hymenophoral, pileus and stipe tramas some even passing into the cortex.

The *Boletus scaber* complex has troubled both professional and amateur mycologists alike for there seem to be so many different 'forms' and so many collectors indicate that intermediates exist between these variants. The latter is not necessarily true and this becomes even more evident when anatomical details are taken into consideration. Although intermediates appear to exist between members of the genus *Leccinum* this is due in part to the fact that in their mature state many of the taxa look extraordinarily similar; a similar phenomenon exists in *Cortinarius* and as in that genus if one examines the young specimens as well, quite a different picture is

revealed. Smith, Thiers & Watling (1966 & 1967) and Blum (1967) have independently come to the conclusion that by carefully defining the fungi to which the old epithets should be attached and describing new taxa, a more orderly arrangement can be achieved which has the additional advantage that it is easier to use. The cuticle structure of the pileus has been shown to be of very great use in delimiting taxa. Two members of the group which appear in the British flora have consistently short, elliptic end-cells in the cuticle i.e. *L. carpini* and *L. oxydabile*. A third species is described below and there is little doubt that this fungus has previously been recorded in many instances as *Boletus scaber* var. *coloripes* which differs in Pearson's view only in the white flesh turning vivid yellow, red or blue at the stipe base. Similar 'forms' exist in North America where by microscopic examination they have been found to be distinct e.g. *Leccinum flavostipitatum* Snell & Dick, 1965. The taxon described below differs markedly from *L. scaber* in the structure of the pileus cuticle; it approaches *L. snellii* recently described from North America (Smith, Thiers & Watling, 1967) but differs in a few important features.

Leccinum variicolor Watling, **sp. nov.**
Pileus 35–92 mm latus, convexus, siccus demum subviscidus vel viscidus fumoso-molybdinus vel fusco-ater demum olivaceo-griseus vel plumbeus ad centrum fusco-fibrillosus ochraceus maculatus. Stipes 125–180 mm longus, 20–25 mm crassus, ad apicem albido-scabrosus ad basim griseo-scabrosus. Tubuli ventricosi albidi demum ochracei; pori albidi tactu roseoli denique ochracei. Contextus albidus demum roseus vel vinaceus denique hysginus ad basim caeruleus et cyaneus vel citrinoviridis. Sporae 12·5–16 × 4·5–6μ, subfusoideae.
Typus: Gruline House, Mull, Scotland, 7 ix 1968, *Watling* 6753 (holo-E).

Pileus up to 92 mm, convex at first, becoming plano-convex then almost plane with a wide umbo, dull black with mottlings of ochraceous at the centre and small spottings, dark greyish olive in places distinctly fibrillose almost felty with the coarser fibrils matted in very young specimens to give a coarse aspect, smoother especially at the centre, dull mat at first then more shiny and subsequently tacky, finally smooth and/or viscid, becoming more uniformly olivaceous ochre but retaining an umber or blackish flush, or the ochraceous areas extending, finally spotted blackish with subtle greenish cast throughout when mature, olive-green and blue-green at slightly inrolled margin with a fairly distinct white lip when seen from below, but hardly appendiculate. *Stipe* 125–180 × 20–25 mm, (22–25 mm at base) white at the apex with white scales, ashen grey to pale grey at middle passing into distinctly black scales towards the base and forming an indefinite network, white throughout beneath the scales, bruising pinkish in fresh buttons at apex and distinctly blue-green from base to three quarters up in young and mature specimens, in mature specimens with bulky stem the scales become brownish at apex and pass into grey or black scales towards the base, intermixed with white ones and although often quite small give the stipe a faint hint of reticulation. *Tubes* white, then with hint of cream flushing slightly pink in buttons; *pores* small up to 1 mm, round, bruising rose or finally ochraceous. *Flesh* in mature specimens intensely rose under ('cuticle' in young pilei but deep wine red throughout in adult specimens), blue

green or blue in stipe base or patchily yellow green and red even turning the blue green areas purplish; with NH_4OH bright yellow green. *Taste* and *smell* pleasant, mild.

Basidiospores 12·5–16 × 4·5–6μ, subfusoid, without apical differentiation or highly thickened walls, pale honey in NH_4OH, slightly more red brown in Melzer's solution (a small percentage even dextrinoid). *Basidia* 4-spored, 23–25 × 10–12μ, pale honey in NH_4OH & Melzer's solution and filled with oily globules; sterigmata up to 4μ long. *Pleurocystidia* fairly abundant cucurbiform to ampulliform with long flexuous neck, pale honey or colourless in NH_4OH & Melzer's solution, 35–40μ long, body 7·5–10μ broad and neck 2–3·5μ broad; *cheilocystidia* similar although more variable some even subcapitate, up to 65μ long, body 8·5μ and neck up to 5μ. *Hymenophoral trama* of bilaterally arranged hyphae from a slightly gelatinised, floccose, central strand, pale yellow in Melzer's solution and exhibiting little differentiation between the central and lateral strata, central strand in places distinctly amethyst in Melzer's solution, numerous lacticiferous hyphae present, 6–8μ broad, glistening and silvery in NH_4OH. *Cap* '*cuticle*' of erect, open, irregular trichoderm which soon collapses and becomes progressively embedded in a gelatinous matrix accentuated particularly in Melzer's solution and consisting of short, fuscous brown to sepia units, some colourless when in NH_4OH disarticulating, smooth, fusoid or more rarely swollen, i.e. broadly elliptic, end-cells 25–36 × 8·5–10μ, penultimate cells 22–50 × 7·5–9μ broad, containing vacuolar sap which in some units may become granular particularly in Melzer's solution (and also darker) but does not form pigment balls; trichoderm passing into more compacted layer at its base, pale honey in colour with but few gelatinised and coloured elements, gradually passing into pileus trama of hyaline hyphae 3–8μ broad, intermixed with numerous lacticiferous elements of similar breadth, and passing more abruptly into a compacted zone of similar colouration immediately above tubes. *Caulocystidia* forming small but discrete "packets" consisting of cells similar in shape to the cheilocystidia or with necks wider and with fuscous brown vacuolar contents in NH_4OH, often intermixed with more clavate to swollen cells (30–40μ × 9–17μ broad, neck 4–7μ broad).

Material examined: In wet moss, under *Betula*, Gruline House, Mull, Scotland, 7 ix 1968, *Watling* 6753 (Type): Glen Aros, Mull, 7 ix 1968, *Watling* 6761. Specimens have also been collected in Windsor Great Park, Surrey.

Differs from *L. scaber* in the pileus colour, texture and anatomy, in colour of stipe and scales and in the colour changes of the flesh; from *L. oxydabile* in pileus colour, flesh colours and habitat and from *L. roseofractum* with reddening flesh, in stature, habitat and structure of pileus.

New Records

Chroogomphus helveticus (Singer) Moser, 1967. From mixed woodland, with exotic & native conifers, The Brand, Woodhouse Eaves, Loughborough, Leicestershire, legit *Mrs. D. Fieldhouse*, 19 ix 1968, *Watling* 6953 (E).

Boletus satanoides Smotlacha in Čas. Česk. Houb. 2:29 (1920).

Watling (1963) in a field key primarily to those boleti recorded for the

British Isles referred in the same work to several taxa which had not yet been collected in Great Britain. These taxa included *Boletus lupinus* as outlined by Bresadola (1930) and by Romagnesi (1948) and were included in the key in the belief that they or species resembling them existed in the country but were not yet recognised in the New Check List of British Agarics and Boleti (Dennis, Orton & Hora, 1960). This belief was based on the presence in various mycologists' field notebooks and in various herbaria of "odd" boletes. Since 1963, records which are backed by descriptions and paintings and/or specimens have been received particularly from the south of England. Most of these specimens belong to the *Boletus purpureus* complex and have been collected by E. E. Green within a few miles radius of Ascot, Berkshire or the New Forest, Hampshire. It is anticipated that these collections will be dealt with in a separate paper by Reid and Hora but one collection believed to represent *Boletus satanoides* was found in the East of the country by E. A. Ellis. It is here recorded for the first time for the British Isles. As full a description as possible is given from the material collected and is herewith supplemented with microscopic notes. Chemical reactions of the fresh flesh were not made by Ellis.

Pileus 200 mm, convex, pulvinate, slightly flattened towards the margin which at maturity is not inrolled, viscid after heavy rain, wrinkled, strawberry pink, darker towards the margin where it is retained for a longer time on drying. *Stipe* 80 × 60 mm, thickly cylindrical or slightly bulbous, orange above with dark red central zone separating it from the primrose to rosy pink lower half, faintly orange netted at apex and base, net disappearing and stippled towards very apex, staining blue on handling and finally blackish green blue. *Tubes* yellow staining blue, adnate with very slight decurrent tooth; *pores* similarly coloured to tubes, except for orange red orifice, becoming redder towards the stipe and more yellow towards the margin, mostly small. *Flesh* white, particularly immediately below the pileus cuticle to pale yellow, staining blue on cutting and then drying blackish olive.

Spores 10·5–12·5 × 4·5–5μ, smooth, honey yellowish in KOH, brownish yellow in Melzer's solution, inaequilateral in profile, obscurely fusoid to elongate ovoid in face view. *Basidia* 4-spored, 15–18 × 8μ, yellowish in KOH and in Melzer's solution, clavate, broadly swollen at apex. *Pleurocystidia* ventricose, rostrate, up to 20μ long, body 5·5–7·5μ broad, 2–3μ at apex; *cheilocystidia* similar in most cases and appearing to be an extension of the hymenophoral trama and disorganising to give a splayed end to the tube. *Hymenophoral trama* of gelatinised hyaline to slightly coloured hyphae when revived in KOH, somewhat divergent from a similarly coloured central strand. *Pileus surface* a layer of narrow, interwoven repent hyphae, 5–10μ broad, cinnamon coloured with or without rings or spirals or coarse ornamentation, embedded in a gelatinous matrix. *Stipe trama* non-amyloid; *pileus trama* greyish green ('amyloid') with septa possibly accentuated in Melzer's solution, of hyaline to pale yellowish hyphae closely interwoven and anastomosing, 5·5–10μ broad (up to 15μ). *Clamp-connections* possibly present. *Vascular hyphae* infrequent except in hymenophoral trama, flexuous and filled with colloidal juice, 3·5–6μ broad. *Outer layer* of pileus overlying a subcutis of mixed short and fairly long hyphae, (5–) 18–35 × 2–5·5μ, less frequently ornamented and possibly arranged with a parallel alignment.

Amongst grass under *Quercus*, Wheatfen Lane, Surlingham, Norfolk. *E. A. Ellis* (E).

Unfortunately only one specimen was collected and we have little knowledge of what the fungus looked like when young; nevertheless, the mature specimens agreed in all ways with the plates and descriptions given by Mme. le Gal (1948) and Singer (1967). The structure of the spores and pileus cuticle and the Imler reaction agree well; however, it must be emphasised that the small differences which do exist in pileus characters may be due solely to differences in maturity. Thus the cap was viscid, but this is a common feature of many fully mature boletes in wet weather. The pileus surface described microscopically above may in fact represent a mixture of epicuticular elements and those from the subcutis. It has been observed on several occasions that a very good trichoderm may rapidly collapse and even erode away under adverse weather conditions to give the impression of a series of repent elements as in *Boletus edulis* and *Boletus piperatus* (see Disbrey & Watling, 1967).

If the Norfolk specimen does represent this taxon, it is valuable to note that according to continental descriptions this fungus being a typical member of the *Boletus purpureus-satanas* complex, commences growth as mouse grey, milky coffee coloured or livid chamois adpressedly and finely tomentose primordial buttons. The cap then darkens to become browner, even olivaceous brown and smoother, but on handling and at the margin a reddish flush develops. Finally at maturity this flush becomes more intense and widespread, some specimens, as the Norfolk collection, developing a rose red or strawberry red colouration throughout. The flesh is sulphur yellow often quite pale or even whitish but quickly turns green blue to blue. Thus the original flesh colours help to separate it from *Boletus purpureus*. The pores are at first vivid carmine to purple but partly lose their colour on ageing to become more orange red. The stipe is reticulate about the middle with purplish red carmine or orange red net and is punctate at apex and below where the net disappears. It thus differs from the true *Boletus lupinus* as outlined by Romagnesi (1948) by the nature of the stipe ornamentation as well as by the cap colours.

It differs from *Boletus regius* to which it might be thought related if one uses Pearson's popular key (1946) by the colour of the pileus, the flesh colour and its colour changes when exposed to the air.

The true identity of this bolete was recognised by Mme. le Gal (1948). It was in the same volume that Romagnesi described the true *Boletus lupinus* and this allowed these two controversial fungi to be compared one with the other within a few pages. The fungus is obviously that described erroneously by Bresadola as *Boletus lupinus* Fries but he indicated different colouring, and stem characters to Fries' original description. Pilat (1959 & 1961) supplied a name for this taxon considering it simply a variety of *Boletus purpureus*; he named it *B. purpureus* var *le Galiae*, in honour of Madame le Gal. Once again the concept of *Boletus purpureus* was broadened to include a further element which it is believed confuses the understanding of this group; however, it is true these fungi are very close. It was later that Singer introduced Smotlacha's earlier name *Boletus satanoides* for this same fungus, although Blum (1968) thinks they are probably different; the material at hand does not allow comment on this. The synonymy of this taxon would appear to be:

Boletus lupinus Fries s. Bresadola, Iconographia Mycol. Plate 928, 1930.
Boletus purpureus Fries auct. pl.

Boletus purpureus var. *le galiae* Pilat Nase Houby II, 4. 1959.
Boletus legaliae Pilat apud Blum Rev. Mycol. 33 (1) Suppl. 124, 1968.

Suillus nueschii Singer, from under *Larix europaea*, Linn of Dee, Aberdeenshire, 1 ix 1968, *E. E. Green & R. Watling*; *Watling* 6909 & 6918 (E).

A full description of this will appear in Notes from the Royal Botanic Garden, Edinburgh Vol. 29, no. 3 along with descriptions of *Boletus aereus*, a suspected collection of *Suillus amabilis* in the sense of R. Singer (1967) and a discussion with key to the infra-specific units of *Boletus edulis*.

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