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Field Mycology

Field Mycology is a quarterly magazine, published by the British Mycological Society. It provides articles about fungi of interest to the field mycologist, covering all aspects of identification, conservation, recording and collection, for all levels of expertise.

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Book Reviews

Front cover: *Calonarius* (= *Cortinarius* p.p.) *sodagnitus,* showing the bright red reaction on the cap to 10% KOH solution. Under *Fagus* on calcareous soil, North Downs Way, Surrey, October 2021. Photograph © Geoffrey Kibby. Back cover: *Hydnum reginae*, newly described from Surrey, England. See the article on p. 77. Photograph © Geoffrey Kibby.

EDITORIAL

IMPORTANT NOTICE

For anyone interested in basidiomycete fungi the *Checklist of the British & Irish Basidiomycota* (Legon & Henrici, 2005), along with its online updates, should be considered an essential reference work. Not only does it list the species regarded as authentically British but it also gives valuable information on synonymies, habitat, recommended iconographies and frequency. The printed version is still available from www.summerfieldbooks.com for £38.50.

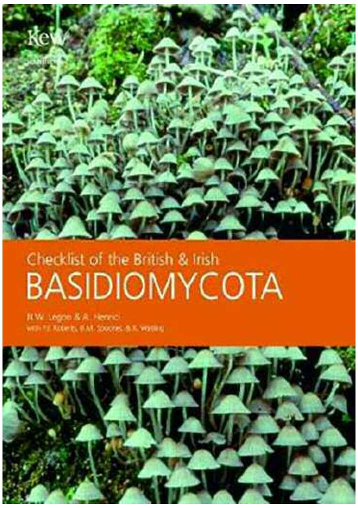
At the present time there are 10 online updates available as well as two useful compendia of the updates. Their home however has now moved to a new site, Paul Cannon's excellent Fungi of Great Britain and Ireland website:
https://fungi.myspecies.info/content/checklists

This useful website also includes provisional checklists of the ascomycetes and a link to the British Lichen Society's database; thus making it a one-stop 'shop' for information on British and Irish fungi.

I cannot imagine how I would be able to write my books or produce this magazine without the knowledge contained in this work and its updates. It should be in the library of everyone interested in recording the fungi that they find.

Reference

Legon, N.W. & Henrici, A. (2005).
Checklist of the British & Irish Basidiomycota
Royal Botanic Gardens, Kew.



While putting this column together an article appeared in most of the online news sites and in several printed newspapers, detailing the discoveries made during a survey in the Cairngorms in Scotland.

The survey studied the fungal DNA extracted from soil samples at different altitudes from 55 of the 58 Munros in the Cairngorms National Park in 2021 and was undertaken by the James Hutton Institute.

It resulted in 2,748 separate taxa being recovered including some new to Britain and at least one new to science. These included *Amanita groenlandica*, a species known to occur in alpine and subalpine localities across the Palearctic but not authentically recorded in Britain (previous British reports of this species seem highly doubtful based on their DNA). Also *Acrodontium antarcticum*, an ascomycete species formerly known from Antarctica.

The unknown to science species is particularly interesting as it is a species of *Squamanita*. This is a parasitic genus whose species are host specific and when they invade their host replace the spore-producing part of the fruitbody with its own, resulting in a strange chimaera. Of course, what is not known here is what the host is for this new species. That will have to wait until infected fruitbodies are found above ground.

Several *Squamanita* species are known in Britain, all uncommon to rare. Another species was also recorded during the survey: *S. contortipes*, one of the rarer British species which parasitises *Galerina* spp. (see FM14(2):58, and 16(2):71 for more on this species).

As Project manager Keilidh Ewan of Plantlife said: "There are more living organisms in just one teaspoon of soil than there are people on the planet, and soil biodiversity has a hugely important role to play in the functioning of ecosystems". Projects such as this one will undoubtedly continue to surprise us with more and more species new to these islands and indeed to science.

Geoffrey Kibby

Fungal Portrait: 91

Three bleeding *Mycena* species

Geoffrey Kibby

Fig. 1. *Mycena crocata* on a mossy fallen branch, Mousells Wood, Bucks, October, 2019, showing its bright orange juice. Inset: cheilocystidium. Photograph © Geoffrey Kibby.

The genus *Mycena* is well represented in Britain with over 60 species present (even more if you include the more recently separated genera such as *Atheniella*, *Phloeomana*, *Roridomyces*, etc). Many of the species are small and often require detailed microscopy to identify the species or even molecular sequencing to be sure of what you have. So it is nice when you have some species which are so striking in the field as to be easy to identify.

Three such species are shown here, all of which bleed a coloured juice when scratched or broken. All are common and likely to be found in the appropriate habitat during the course of the fungal season.

Mycena crocata (Schrad.) P. Kumm.

This is one of our larger and most distinct species and is characterised by the bright, almost fluorescent orange juice with which it is filled.

When young the 1–3 cm conical cap is a pale cream-ochre to greyish ochre, aging to darker brown. The stem is a pale to dark orange or red-brown and if broken will bleed bright orange juice which will readily stain your fingers. The photo above shows some of the orange liquid on the pale, almost white gills.

M. crocata often grows in large troops on fallen twigs, branches and woody debris in deciduous forests and is particularly common where the soil is calcareous. Microscopically it is worth looking at the cheilocystidia which look like swollen clubs with numerous small protrusions or spikes.

Mycena haematopus (Pers.) P. Kumm.

Unlike the previous species *M. haematopus* grows in fasciculate clusters, usually on fallen logs or wet, often mossy trunks of deciduous trees. Its bluntly conical caps are 2–4 cm across, and a dark to pale reddish or vinaceous brown,

Fig. 2. *Mycena haematopus*. The specimen at left shows the dark blood-red juice where scratched. Photograph © Geoffrey Kibby.

often with a whitish 'bloom'. The cap margins usually have distinctive small triangular 'teeth'. The stems are of a darker vinaceous hue and if broken bleed a deep burgundy-red juice which stains the fingers dark reddish brown.

The species is very common in mid to late autumn throughout Britain and is one that any beginning mycologist can easily learn to identify.

Mycena sanguinolenta (Alb. & Schwein.) P. Kumm.

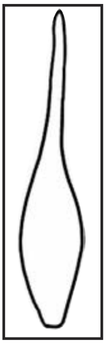
Fig. 3. *Mycena sanguinolenta* with distinctive reddish gill edges. Epping Forest, Essex, Oct. 2021. Photo © Geoffrey Kibby.

Somewhat smaller than the preceding species with caps reaching about 1–2 cm across, its most distinctive character, apart from the red juice that bleeds from the stem when broken, is the red edges to the pale cream gills. You may require a hand lens to see these clearly although they are often easily visible even to the naked eye.

The caps are pale to dark vinaceous or reddish brown and often have darker radial streaks. The stems are reddish to vinaceous brown. They do not bleed quite as freely as *M. haematopus* but in young specimens is usually visible.

The species grows in small troops, often on fallen needle litter in coniferous forests but also on fallen coniferous wood, and is quite widespread, especially as you go further north in the country. Both this species and *M. haematopus* have distinctive, sharply pointed, fusiform cheilocystidia.

This is one of a number of species with coloured gill edges but the others will not bleed when broken.



cheilocystidia shape in *M. haematopus* and *M. sanguinolenta*

Hydnum reginae newly described from Britain

Geoffrey Kibby[1] & Kare Liimatainen[2]

ABSTRACT

A recent British collection of *Hydnum albidum sensu* European authors was investigated and described as a new species (Kibby & Liimatainen, 2022). Its relationship the North American *H. albidum* Peck and to other pale *Hydnum* species is discussed here.

INTRODUCTION

Hydnum albidum Peck (1887) was described from North America and Peck's original description is reproduced in full here:

"*Hydnum albidum*. Pileus fleshy, thin, convex or nearly plane, subpruinose, white, flesh white; aculei white; stem short, solid, central or eccentric, white; spores subglobose, .00016 to .0002 in. in diameter. Plant 1 to 2 in. high, pileus 1 to 1.5 in. broad, stem 3 to 5 lines thick. Ground in thin woods. Sandlake. June and July. The species is closely allied to *Hydnum repandum*, with which it appears to have been united by some authors, but its small size, white color and smaller spores appear to me to make it worthy of specific distinction. It is quite unlike *Hydnum candidum*. The pileus is often irregular and lobed on the margin."

Note that as described by Peck *H. albidum* was rather small and the entire fruitbody, including the spines, was described as white. The spores reached .0002 in. in diameter which is aprox. 5 µm. Swenie *et al.* (2018) were unable to get an ITS sequence from the holotype of *H. albidum* and designated an epitype accompanied by a full description which is in broad agreement with Peck's original description including the small size, coloration of the fruitbody and spores.

White-capped collections of *Hydnum* from Europe have historically been referred to *H. albidum* despite discrepencies in their macroscopic appearance: usually much larger and the spines soon developing a distinctly salmon-pink coloration. Their spores are of a similarly small size but rather more ellipsoid-ovoid in shape than those described by Peck.

Fig. 1. *Hydnum reginae*. Holotype on left, on soil in *Fagus* leaf litter, North Downs Way, White Downs, Surrey, 13 October, 2021. Photograph © Geoffrey Kibby.

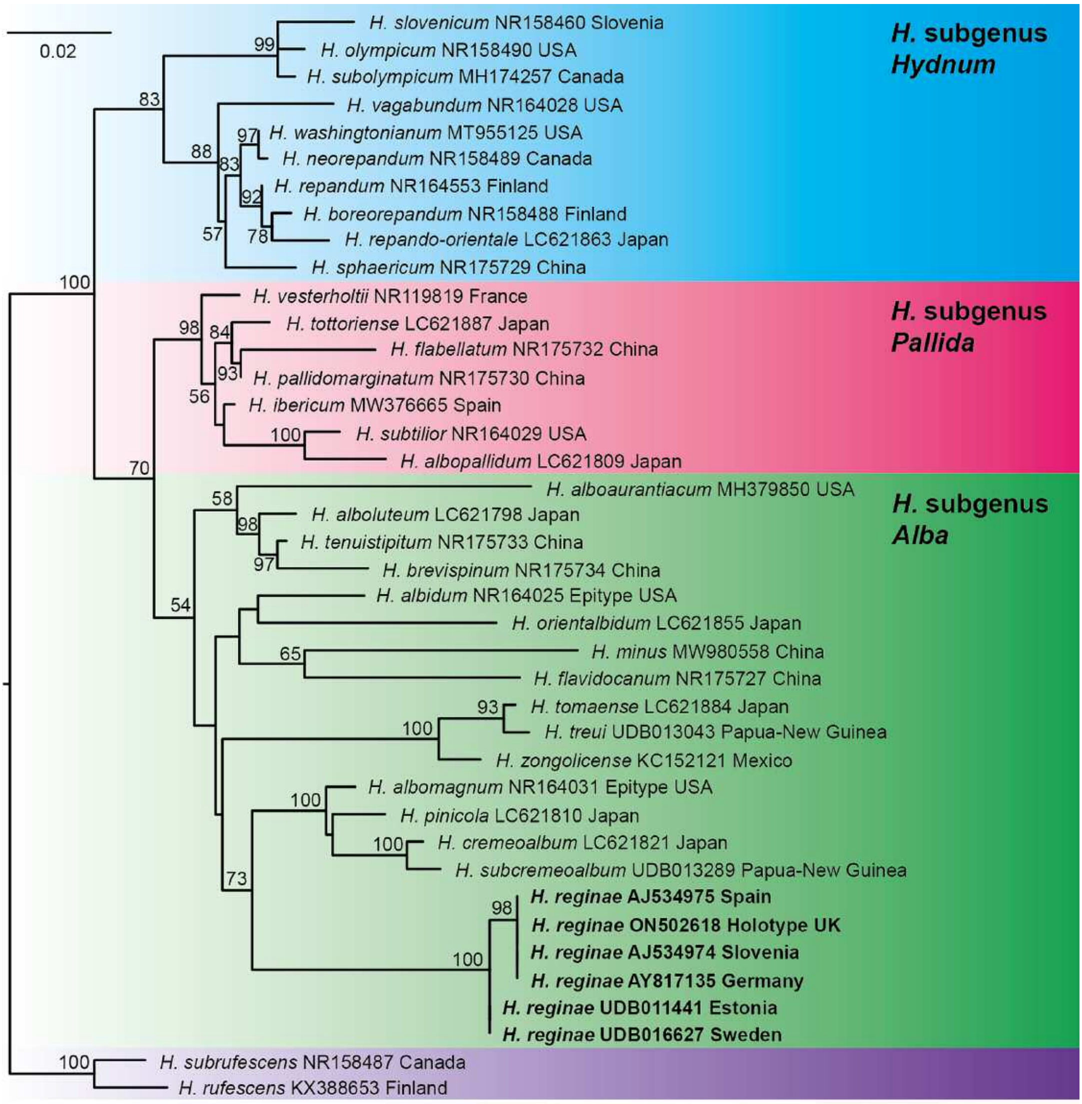


Fig. 2. Topology resulting from the RAxML analysis of ITS and LSU. Bootstrap (BS) values > 50% are indicated above or near branches. The new species described is in bold, the sequences from mainland Europe were all originally identified as *H. albidum*.

MATERIALS AND METHODS

Microscopy

Specimens were mounted in Congo Red in ammonia, Melzer's reagent or lactoglycerol and studied on a Euromex iScope Pli 1153 light microscope using bright field optics. Spore measurements were made at x1000, Spore measurements are given as a range covering 90% of measured spores with 5% extreme values given within parentheses. All structures were photographed using a Toupcam 12MP camera and Touplite software.

Colour terminology

Colour descriptions are from the British Mycological Society colour chart (Rayner, 1970).

DNA sequencing and analyses

Total DNA was extracted from dry specimens employing a modified protocol based on Murray & Thompson (1980). PCR reactions (Mullis & Faloona 1987) included 35 cycles with an annealing temperature of 54 °C. The primers ITS1F and ITS4B (Gardes & Bruns 1993) were employed to amplify the ITS rDNA region. PCR products were checked in 1% agarose gels, and amplicons were sequenced with one or both PCR primers. Sequences were corrected to remove reading errors in chromatograms.

To study the phylogenetic placement of *H. reginae*, the sequences of all the species representing *Hydnum* subgenera *Alba*, *Hydnum* and *Pallida* were downloaded from GenBank and incorporated in our analysis using *H. rufescens* and *H. subrufescens* from *H.* subgen. *Rufescentia* as the outgroup. The ITS and LSU alignment of 40 sequences was produced with the program MAFFT v. 7.0 (Katoh & Standley 2013) under default settings and is composed of 954 nucleotides (including gaps). Sequences were subjected to Maximum Likelihood (ML) analysis as implemented in RAxML version 8 (Stamatakis 2014) with 1000 bootstrap replicates under the GTRGAMMA model.

Results

Our tree (Fig. 2) recovered the three subgenera reported by Niskanen *et al.* 2018 but with significantly greater bootstrap support (BS), this probably due to the inclusion of further recently described species. Our subgenus figures were *Hydnum* (83%), *Pallida* (98%) and *Alba* (54%).

The American epitype of *H. albidum* and the new *H. reginae* are both placed in the still weakly defined sg. *Alba* but seemingly in different sections. All the included European collections previously assigned to *H. albidum* appear conspecific with *H. reginae*.

Taxonomy

Hydnum reginae Kibby, Liimat. & Niskanen
IF559703
Holotype: UK England, North Downs Way, White Down, Surrey, TQ113487, 13 October 2021. Under *Fagus*, Coll. G. Kibby, M. Tortelli & C. Soler.
K-M 000265258, GenBank no: ON502618,
Kibby, G.G. & Liimatainen, K. (2002).
Nomenclatural novelties. Index Fungorum 523:1.
Figs. 1, 3, 4 & back cover

Etymology: *reginae* = Latin for a queen, in honour of Queen Elizabeth II's Platinum Jubilee.

Basidiomata medium to large, growing isolated or in confluent groups. Pileus 50–150 mm diam, very irregular in outline, rounded to elongate-ellipsoid, fleshy, initially convex then plane to depressed and frequently with very irregular lumps and bumps, glabrous to slightly velutinous. Colour initially pure white then slowly pale cream to yellowish cream. Margin involute and remaining so, sinuous and often lobed with age (Fig. 1 & back cover). **Spines** decurrent, conical near the pileus margin becoming increasingly flattened near the stipe and often with two to three points per spine; 5–8 x 0.5–1 mm. Colour pale luteous at first, soon pale salmon pink (Fig. 3). **Stipe** cylindric to slightly clavate, 20–40 ◊ 30–40 mm, concolorous with the pileus, basal mycelium white. **Context** white to greyish cream in the base of the stipe. **Odour** ill-defined but pleasant, slightly sweet. **Flavour** mild, soapy then slowly slightly bitter. **Macrochemical reactions**: KOH + context = no reaction, Guaiac + context no reaction.

Basidiospores ovoid to broadly ellipsoid, thin-walled, hyaline, non-amyloid, (4.5-)4.9–5.4 x 3.8–4.3 µm, av = 5.1 x 3.9 µm, Q = 1.2–1.4, av Q = 1.3 (Fig. 4). **Basidia** 35–40 x 5–6 µm, 4- to 6-spored, sterigmata 3–4 µm. **Hyphae** of the apex of the spines cylindrical, thin-walled, hyaline with cylindrical to clavate ends, 3–4 µm diam. **Clamp connections** present.

Ecology and distribution

The English collections (holotype and paratypes) were from deciduous forest, mainly *Fagus* on calcareous soils in leaf litter or emerging from bare soil. So far known also from Estonia, Germany, Slovenia, Spain, and Sweden.

A collection of what appears to be the same species but awaiting sequencing has also been recorded in Wales from open calcareous grassland with *Helianthemum* on the Great Orme.

Fig. 3. Close-up of the spines of *H. reginae*. Photograph © Geoffrey Kibby.

Fig. 4. Spores of *H. reginae*, the scale bar = 10 µm. Photograph © Geoffrey Kibby.

The pallid fruitbodies and the small spores would place this species in subgenus *Alba* (Niskanen *et al.*, 2018) which includes *H. albidum* sensu stricto and it would appear to be the only European representative of this subgenus to date. Other pallid species in Europe are usually easily distinguished by their larger and often differently shaped spores and differently coloured spines. Perhaps most similar in appearance is the white to cream-coloured *H. boreorepandum* Niskanen, Liimat. & Niemalä in subg. *Hydnum*. This is known from forests of *Picea*, *Pinus* and *Betula* in Finland and differs in its more regularly shaped fruitbodies with longer stipes, less decurrent and non-pink spines, as well as larger spores.

H. reginae appears to be genuinely rare in Britain and confined to calcareous soils. It is possible that it has been passed over as just pale-coloured specimens of the common *H. repandum* although it is so striking in the field that this seems unlikely. The Surrey population was in a relatively small stand of *Fagus* on fairly steep slopes and was even observed pushing out through roadside embankments below the tree line. The possible occurrence with *Helianthemum* in Wales is particularly interesting and it may be that searches on similar sites around the country will reveal more populations.

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Didymium vernum, a second Butterbur inhabiting myxomycete in the UK

Jurgen Nieuwkoop[1]

A search in May 2022 on the underside of *Petasites hybridus* (Common Butterbur) leaves in Northumberland not only revealed *Didymium tussilaginis*, but also *D. vernum*. The latter is a new record for England and the UK while the former is considered a rare species. Presumably both species occur on a wider scale and the scarcity is an expression of the fact that their habitat is rarely investigated for myxomycetes. This article aims to increase awareness and promote further searches in spring 2023.

History

Kuhnt *et al.* (2014) published an article on two *Didymium* species on the underside of Common Butterbur leaves. The most common of these was first found in Cheshire in England in 1870 and described under several names before Massee in 1892 gave it its current name: *Didymium tussilaginis*. In the following years the species was largely forgotten or synonymized with other taxa until the 2014 article drew attention to this clearly recognizable species. Ing mentions the species in the supplement to the enlarged edition of his handbook (Ing 2020). Besides *D. tussilaginis* Kuhnt *et al.* described another species on Butterbur leaves new to science: *D. vernum*.

Description

Description of both species follows Kuhnt, Baumann & Nowotny (2014).

Didymium tussilaginis (Berk. & Broome) Massee

Sporocarps irregularly rounded, rarely oblong plasmodiocarps, light grey, often conspicuously flat, sessile on a broad base, 0.2–0.4 mm tall, 0.4–1.5 (-2.5) mm wide, scattered or in loose groups, sometimes growing in groups of 5–25 sporocarps; **Stalk** absent; **Columella** inconspicuous, but mostly appearing as a clearly distinct, thin, chalky base, white, dirty white to beige, slightly shiny, sometimes with hump-like outgrowths or short ridge-like elevations (representing a pseudocolumella?); **Hypothallus** ± conspicuous, whitish to beige, common to a group of adjacent sporocarps, but aggregated hairs of lower leaf surface of the host plant appear like a larger extended hypothallus; **Peridium** simple, membranous, under the magnifying glass mostly with metallic, sometimes light blue iridescence, under transmitted light almost translucent, very pale brown or pale yellow, usually only sparsely covered with calcareous scales, these fine crystalline or mostly amorphous with irregular, angular shape, 5–20 (-32) µm in size; **Capillitium** whitish under the lens, almost colourless in transmitted light or pale brown, rarely darker brown, irregularly branched or sometimes reticulate, often with small inclusions of crystalline or amorphous calcium, 0.6–3 (-5) µm in diameter, somewhat elastic, mostly smooth, some threads with darker swellings; **Spores** free, in mass dark brown, by transmitted light pale brown to violaceous brown, with a wall of uniform thickness, without obviously lighter germination pore, densely and irregular spinulose, occasionally with ± conspicuous groups of slightly darker spines, spores spherical, (11-) 12–13 (-15) µm or slightly ovoid (11-) 12–14 (-16) x (10-) 11–13 (-14) µm; **Plasmodium** dark lilac to grey.

Didymium vernum Kuhnt, K. Baumann & Nowotny

Sporocarps irregularly rounded, more rarely short plasmodiocarps, light brown, to orange-brown, sessile, 0.3–0.8 mm tall, 0.8–2.3 mm wide, scattered or in loose groups, sometimes slightly gregarious; **Stalk** absent; **Columella** absent, but with a conspicuous calcareous base appearing as a thin crust with a rough surface, bright orange to orange-brown; **Hypothallus** conspicuous, common to a group of adjacent sporocarps, light orange-brown, partly with lime crystals; **Peridium** simple, membranous, under the lens brown or blue, shiny, irregularly opening, colourless in transmitted light or pale yellow, sometimes irregularly mottled with yellowish, rounded, large patches, covered with scattered, large calcareous scales, these yellowish orange in transmitted light, showing a crystalline structure, or sometimes irregular angular in shape, (8-) 25–65 (-90) µm; **Capillitium** usually rather sparse, gray to whitish under the magnifying glass, almost colourless to light brown in transmitted light, occasionally with dark brown thickenings, irregularly branched, (0.5-) 0.8–1.8 (-2,5) µm in diameter, with swellings up to 4.5 µm thick, sometimes much wider ramifications, threads usually smooth; **Spores** free, dark brown in mass, ± light brown by transmitted light, with a wall of uniform thickness, without conspicuous germination pore, irregularly and delicately spinulose, sometimes with indistinct groups of darker spines, spores round or slightly ovoid, spherical spores (9-) 9,5–11 (-12) µm, ovoid ones (9,5-) 10–11 (-12) x (8-) 9–10 (-11) µm; **Plasmodium** unknown (just before fruiting dark yellowish orange).


Figure 1. *Didymium tussilaginis* (Berk. & Broome) Massee on the underside of a leaf of Common Butterbur.


Figure 2. *Didymium vernum* Kuhnt, K. Baumann & Nowotny on the underside of a leaf of Common Butterbur.

Pictures represent Dutch material and are made by Hans van Hooff. For more pictures of both species and many other Myxomycetes see: https://www.mycologen.nl/onderzoek/systematiek-taxonomie/myxomyceten/soortenoverzicht

Distribution

In the original publication, *D. vernum* is recorded at six sites in Germany and one in France. Targeted searches revealed the species at two sites in the Netherlands (Klunder & Van Hooff 2018) and one in Denmark (Danish Myxomycetes). *D. tussilaginis* is more common: known in seven vice counties in England (Ing 2020), 20 localities in Denmark (Danish Myxomycetes), 12 in The Netherlands (Verspreidingsatlas), many in Germany and one in Austria (Kuhnt *et al.* 2014). The map on the Global Biodiversity Information Facility also shows some dots in southern Norway (GBIF).

In Northumberland both species were found along a small stream some 10 km north of Alnwyck. Furthermore *D. tussilaginis* was found along the River Aln just north of Alnwyck and along the River Wharfe in Burnsall in the Yorkshire Dales.

Abundance

To find both myxomycetes it is necessary to turn over quite a lot of Butterbur leaves. The best spots seem to be alongside wherever water is nearby. In the Netherlands Common Butterbur also grows on road verges, but such sites were mostly unproductive. When it is present, turning of about 30–40 leaves on average is sufficient to find *D. tussilaginis*. It was found in 33% of searched populations of *Petasites hybridus* in Denmark. In a search by the author in April and May 2022 in The Netherlands the success-rate was 35% (5 out 14). And in England in May 2022 even 100% (3 out of 3). The English records of *D. tussilaginis* were made within 5 minutes of searching and in two out of three sites there were several leaves with the myxomycete present.

D. vernum takes more searching-time before it turns up. In The Netherlands in 2022 it was present in 7% of searched populations of *Petasites hybridus* (1 out of 14). In England the score in May 2022 was 33% (1 out of 3). Usually, the number of leaves with *D. vernum* is lower than with *D. tussilaginis*, so more turning is required.

Ecology

Both species are found on the underside of leaves of *Petasites hybridus*. They are present between the middle of April and early June. As stated, Butterbur plants near water on more or less moist soils provide the best chance. Common Butterbur flowers first (in separate male and female plants) and afterwards the leaves appear. Probably the plasmodium develops in the soil and creeps up the Butterbur leaf stems while the leaves are still inrolled. The inrolled leaves provide protection against dehydration and damage by rain. They are then lifted up by the growing leaf. When the leaves unfold the myxomycetes are already developed and remain protected against wash-off by rain.

As far as the experience of the author reaches, *D. vernum* is always accompanied by *D. tussilaginis*, albeit nearly always on separate leaves. The latter is often found as the single *Didymium* species present.

Records

Didymium tussilaginis

UK, Northumberland, Ellingham, along Charlton Burn S of Tinely Farm, riverside in wooded valley, on the underside of *Petasites hybridus* leaves, leg. J. Nieuwkoop 23-05-22, Herbarium Nieuwkoop M0464

UK, Northumberland, Alnwyck, along River Aln, riverside in wooded valley, on the underside of *Petasites hybridus* leaves, leg. J. Nieuwkoop 24-05-22, Herbarium Nieuwkoop M0466

UK, Yorkshire Dales, Wharfedale, Burnsall, along River Wharfe, riverbank near village green, on the underside of *Petasites hybridus* leaves, field record J. Nieuwkoop 29-05-22.

Figure 3. The site of *Didymium vernum* and *D. tussilaginis* along the Charlton Burn south of Tinely Farm in Northumberland: a slightly shaded small stream with Common Butterbur on its sloping banks.

Didymium vernum

UK, Northumberland, Ellingham, along Charlton Burn S of Tinely Farm, riverside in wooded valley, on the underside of *Petasites hybridus* leaves, leg. J. Nieuwkoop 23-05-22, Herbarium Nieuwkoop M0465.

Thanks

Hans van Hooff and Bruce Ing kindly read the manuscript and gave useful suggestions.

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Further resources

Myxomycetenproject. https://www.mycologen.nl/onderzoek/systematiek-taxonomie/myxomyceten

Verspreidingsatlas. https://www.verspreidingsatlas.nl/paddenstoelen

Puccinia cyani and *Peronospora agrostemmatis*, parasites of hosts sown in wild-flower mixes

Chris D. Preston[1]

One of the most marked of the many changes in the British vascular plant flora in the 20th century was the decline of specialised arable weed species. In lowland areas the intensification of agriculture, with increasingly competitive crop varieties, improved seed-cleaning techniques and new chemical herbicides, led to the virtual elimination of many plants that had been troublesome or even pestilential weeds in the 19th and early 20th centuries. In the mainly pastoral areas of the north and west arable agricultural ceased to be practised, in part because there was no longer any need to grow oats for horses, and the weeds disappeared with their habitat. As a result, the characteristic vascular plants associated with arable land in Britain declined to a greater extent than those of any other habitat (Preston *et al.* 2002b).

As they declined, the weeds which people had formerly tried hard to eliminate came to be valued. Concern about their loss, and a parallel reduction in the floral diversity of grassland habitats, has led in recent decades to the planting of 'wild-flower mixes' in many public spaces (Fig. 1). The more showy annuals which were once arable weeds are common constituents of these mixtures as they are easy to grow and provide a floral display in their first year. The use of these mixes first became popular in the 1980s. I have vivid memories of a "lively discussion" at Kew in 1988 when Edgar Milne-Redhead recommended the sowing of wild-flower seeds on motorway verges and alongside minor roads whereas Dr John Dony "reported a confusion of locally rare plants recorded after wild flower seed sowing" and expressed his strong opposition to the practice (Briggs 1989). In the following decade the reservations expressed by Dony and many other botanical recorders were disregarded, and by 2000 species such as *Agrostemma githago* (Corncockle) and *Centaurea cyanus* (Cornflower) were being recorded with increasing frequency as a result of such introductions (Preston *et al.* 2002a). Since then the use of such mixtures has become even more popular, especially in reaction to the increasing evidence for the decline in the populations of pollinating insects.

I like to look at areas sown with wild-flower mixes, as both the species that are deliberately sown and the weeds that often accompany them can support interesting parasitic fungi or fungoids. This note deals with two that I have noticed recently, the rust fungus *Puccinia cyani* on *Centaurea cyanus* and the downy mildew *Peronospora agrostemmatis* on *Agrostemma githago*.

I first came across *Puccinia cyani* in 2017, a few months after I started looking at parasitic fungi, and mistakenly identified it as *Puccinia hieracii*, a species which, when broadly defined, infects some *Centaurea* species (though not, I now realise, *C. cyanus*) and several other composite genera (Termorshuizen & Swertz 2011). When I next found it, in 2021, I realised that it might be *P. cyani*. The identification was kindly confirmed by Nigel Stringer, and the account of this species is jointly written with him.

Puccinia cyani (by C.D.P. & R.N. Stringer)

C.D.P.'s recent records from Cambridgeshire are as follows; all were on *Centaurea cyanus* and vouchers for all gatherings will be deposited in CGE (Cambridge University Herbarium).

Cambridgeshire (v.c. 29): Patch of plants grown for pollinators, Jesus Green, Cambridge, TL449592, 12.8.2017 (III). On plants of mixed flower colours grown on allotment, Papworth Everard, TL292627, 23.8.2021 (II, III), conf. R.N.S. In large bed of plants grown from wild-flower mix on experimental plots, Cambridge

Fig. 1. *Agrostemma githago* (purple), *Centaurea cyanus* (blue) and *Cota austriaca* (yellow/white) in an annual wild-flower mix, Jesus College, 30 May 2022. Photograph © C.D. Preston.

Fig. 2. Telia of *Puccinia cyani* on a stem and leaves of *Centaurea cyanus*, Jesus College, 30 May 2022. Photograph © C.D. Preston.

University Botanic Garden, TL456572, 6.9.2021 (II, III). Annual wild-flower meadow, North Court, Jesus College, Cambridge, TL451589, 21.10.2021, 26.5.2022 and 30.5.2022 (II, III), conf. R.N.S.

Puccinia cyani produces all four stages of the life-cycle on *C. cyanus*, with the mycelium penetrating the whole of the plant. In the autumn dark chocolate brown telia (0.2–1.5 mm diameter) containing the teliospores are thinly scattered or frequent on the stems and both the upper and lower sides of the leaves of infected plants; they are normally discrete but can merge on the stems to give slightly longer aggregations. Most of the spores in these sori are teliospores (III) but they often contain a minority of urediniospores (II). In May 2022 *P. cyani* telia were present on plants of *C. cyanus* which had overwintered at Jesus College following cutting of the sward in the previous autumn (Fig. 2); some of these leaves also had very inconspicuous minute orange uredinia (up to half the size of the telia) containing urediniospores with only a few teliospores beginning to develop.

Puccinia cyani is closely related to two other rusts with urediniospore and teliospore stages occuring on other species of *Centaurea* in this country, *P. hieracii* and *P. calcitrapae*. The urediniospores of the Cambridgeshire specimens of *P. cyani* are rounded/elliptical in shape and have thin walls (Fig. 3). The spores are 24–30 µm long and 22–26 µm wide (mean 26.5 × 22.5 µm). If urediniospores are present then the arrangement of the 'pores' in the spore wall is critical to the identification of the rust species. In *P. hieracii* there are two pores present, both of which are near the top of the spore (supra-equatorial). In *P. calcitrapae* there are three pores around the middle of the spore (equatorial) and in *P. cyani* there are two equatorial pores (Fig. 3). Neither *P. hieracii* nor *P. calcitrapae* infect *Centaurea cyanus*.

The teliospores (Fig. 4) are 2-celled and measure 30–42 µm long and 22–28 µm wide (mean 36.0 × 26.0 µm). They are darker in colour than the urediniospores and as the teliospores develop the sori (telia) darken in colour. The teliospores closely resemble those of *P. hieracii* and *P. calcitrapae* but in Europe they differ in having very small warts on the surface. Savile (1970) found two varieties of this rust on cornflowers in North America, *P. cyani* var. *cyani* and var. *sublevis*, distinguished by the ornamentation of the spore wall of the teliospore. Var. *cyani* has warts on the spore surface and the surface of var. *sublevis* is smooth. Our specimens (like all the European material seen by Savile) have fine warts on the surface.

In addition to its occurrence as an arable weed, *Centaurea cyanus* has long been popular as a garden annual. Gerarde (1597, pp. 591–594) described several flower colours and flore pleno variants "sowen in gardens" and Parkinson (1629, pp. 326–328) clearly knew many more, "nourished in gardens, where they will vary wonderfully". Until recently mycological authors have associated *Puccinia cyani* in Britain with cornflowers in gardens. Plowright (1889) described the rust on *C. cyanus* as "not very rare on cultivated *Centaureae* in gardens" and the standard 20th century works on British rust fungi also treated it as a species found in gardens (Grove 1913, Moore 1959, Wilson & Henderson 1966). Both Grove and Moore regarded it as not uncommon whereas Wilson & Henderson described it as uncommon. More recent accounts imply that *P. cyani* was a parasite of the arable weed, so that Legon & Henrici (2005) say "Very rarely reported, with no recent records. The host is almost extinct in natural habitat in Britain." and Termorshuizen & Swertz (2011) echo this, giving the U.K. distribution as "earlier very rare, nowadays extinct together with the host". One would expect these general statements to be supported by individual records. However, we have not traced many localised records even though *P. cyani* was certainly widespread in Britain from Aberdeenshire south to Sussex. None of those we have traced explicitly records the rust from plants of *C. cyanus* growing as an arable weed, but in some cases this may be because this was implicitly assumed. However, there is clear evidence to back up claims of its presence on cultivated hosts. Infected plants were sent to the Royal Horticultural Society in 1901 (Anon. 1901–2) and M.C. Cooke described them as "in a deplorable condition". Shortly afterwards he covered *P. cyani* (as *P. centaureae*) in a survey of the pests of the flower garden, reporting that "in the past year or two Corn flowers in cultivation have been seriously attacked by this rust" (Cooke 1902). Unlike our material, the rust he described and illustrated bore only "snuff-coloured uredospores" on the stems and leaves.

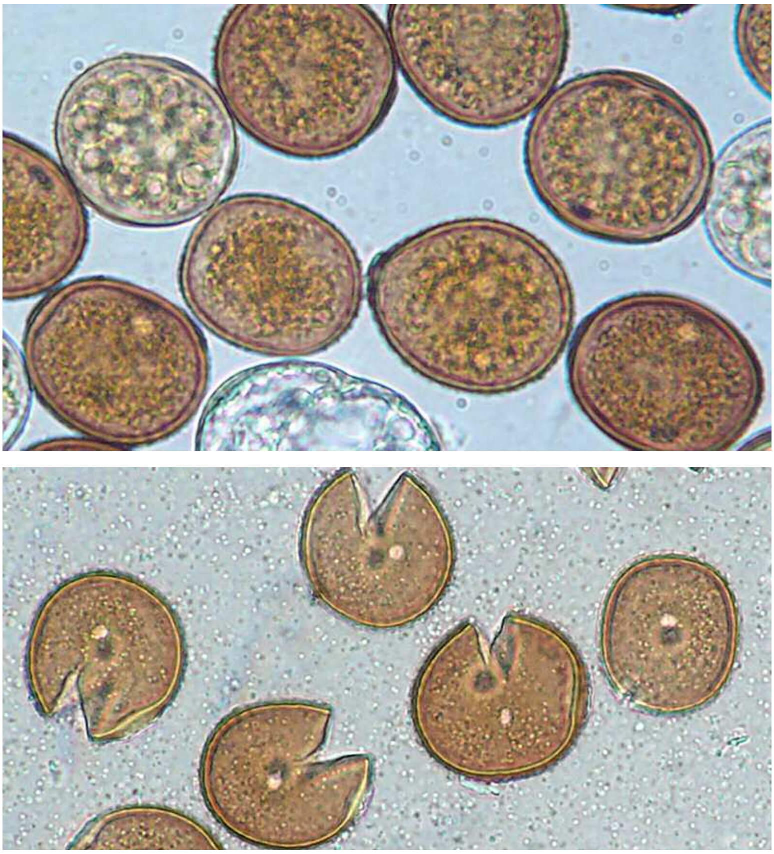

Fig. 3. Intact urediniospores of *Puccinia cyani* (above) and spores squashed to demonstrate the two equatorial pores (below), Jesus College, collected 30 May 2022. Photographs © R.N. Stringer.

Fig. 4. Teliospores of *Puccinia cyani*, Jesus College, collected 30 May 2022. Photograph © R.N. Stringer.

A severe attack on cultivated cornflowers was reported from Lewes, E. Sussex, in 1936 (Salmon & Ware 1937). A specimen from High Street, Girton, Cambridge in 1954 was collected from cultivated *C. cyanus* (E) and the host of the latest *P. cyani* record we know, made by M.B. Ellis at North Parade, Southwold, E. Suffolk, in 1984, must have been a garden plant or a garden escape, as North Parade runs along the seafront at Southwold. Whatever its former habitat, the recent records from Cambridge suggest that *P. cyani* might now be frequent in British wild-flower mixes, as *Centaurea cyanus* is very commonly included in them.

In central Europe *Puccinia cyani* is described by Klenke & Scholler (2015) as in sharp decline in some areas. In Germany its host plant, formerly a very common weed throughout the country, has declined greatly since the 1950s but is still widespread (though normally only as small, relict populations). *P. cyani* is still regarded as moderately common (mässig häufig). Unlike the British situation, most records still come from arable fields and the first record on a cultivated host was apparently made as recently as 1984 (H. Thiel, in litt.).

Peronospora agrostemmatis

On 2 February 2022 I noticed many young plants of *Agrostemma githago* with rather yellow leaves growing in an area sown with a wild-flower mix in Cambridge Botanic Garden, TL456572 (the same area where I had found *Puccinia cyani* the previous autumn). Further inspection showed that a large proportion of the hundreds of *Agrostemma* plants in this population were infected by the downy mildew *Peronospora agrostemmatis*, with some or in many cases all their leaves yellowing and with dense colonies of the mildew on their lower side. There were still many infected (and some apparently uninfected) plants on 23 March, but by 21 April the number of host plants had decreased considerably; the surviving infected plants were looking very sickly and were becoming engulfed by the surrounding sward (Figs 5–9). By 22 May, when the area was dominated by a dense mass of *Cota austriaca* (*Anthemis austriaca*), there were only one or two infected *Agrostemma* plants, small plants in bud with colonies of the downy mildew on the lower leaves. A few dozen much more robust, apparently uninfected plants were coming into flower. It was difficult to avoid the conclusion that the downy mildew outbreak had caused a considerable reduction in the numbers of *Agrostemma* in the area, either by killing the host or by reducing its vigour so much that it succumbed to competition from the neighbouring plants. According to Klenke & Scholler (2015), *P. agrostemmatis* is usually found on the lower leaves of *Agrostemma* plants before they flower and infected plants are often sterile, symptoms agreeing well with those shown by the Cambridge plants. *Agrostemma githago* is also grown in the Botanic Garden's Systematic Beds, and these plants showed no sign of infection between February and May 2022.

Agrostemma githago declined almost to extinction in Britain as an arable weed between 1910 and 1960, largely as a result of improved methods of seed cleaning (Firbank 1988). Unlike *Centaurea cyanus* it was never a popular garden plant, but it is often included now in wild-flower mixes. *Peronospora agrostemmatis* has not previously been recorded in Britain (Firbank 1988, Chater *et al*. 2020). In Germany, as in Britain, *A. githago* declined almost to extinction in the 20th century and it survives in arable fields only because of conservation work; however, as in Britain, cultivated plants have become more frequent in recent years. There are many old records of *P. agrostemmatis* from Germany but very few recent ones, and the only persistent population known is in the Berlin Botanic Garden, where a population of *A. githago* is maintained for conservation reasons (H. Thiel, in litt.).

Postscript – *Paraperonospora leptosperma*

In May 2022 many of the *Cota austriaca* plants in the sward at the Botanic Garden were infected by *Paraperonospora leptosperma*, a downy mildew known in Britain from several species in *Asteraceae* tribe *Anthemideae* but perhaps not hitherto recorded from this particular host (Chater *et al*. 2020). It had clearly had a much less destructive effect on its host than *Peronospora agrostemmatis*. *Cota austriaca* was scarcely known to British botanists 25 years ago but is now a very frequent component of wild-flower mixes, grown as a substitute for the declining arable weed *Anthemis arvensis* which has proved difficult to cultivate.

Fig. 5. Numerous young plants of *Agrostemma*, including many infected plants with yellowish leaves, 7 February 2022. Photograph © C.D. Preston.

Fig. 6. A heavily infected *Agrostemma* (centre), with uninfected or less infected plants to left and right, 23 March 2022. Photograph © C.D. Preston.

Fig. 7. An infected *Agrostemma* plant struggling to compete with the surrounding vegetation, 21 April 2022. Photograph © C.D. Preston.

Fig. 8. The lower side of an infected leaf of *Agrostemma*, with a yellowing lamina and a dense colony of *P. agrostemmatis* in the proximal part, 23 March 2022. Photograph © C.D. Preston.

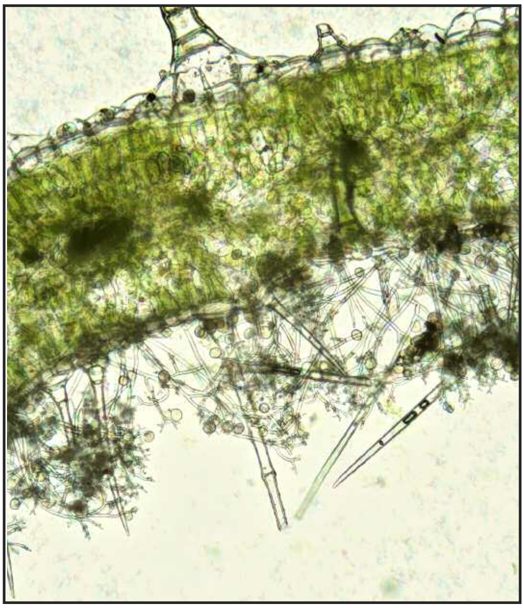

Fig. 9. Cross-section of a leaf of *Agrostemma*, with a mass of *P. agrostemmatis* amongst the hairs on the lower side, 23 March 2022. Photograph © C.D. Preston.

Acknowledgements

I thank Chantal Helm for encouraging me to record the microfungi of the Cambridge Botanic Garden, Rhona Watson for similar encouragement at Jesus College, Nigel Stringer for confirming the identity of *Puccinia cyani* and for writing the account of that species with me, Heleen Plaisier for details of the *P. cyani* specimens held at E, Pete Stroh for confirming the identity of the young *Agrostemma* plants and Hjalmar Thiel for information on the history of the species and their hosts in Germany. Arthur Chater kindly commented on a draft of this note.

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Note added in proof.

On 14 July 2022 Ray Woods found *Peronospora agrostemmatis* on a plant of *Agrostemma* growing amongst *Glebionis segetum* and other cornfield weeds in a recently sown patch of wild-flower mix by a road at Llowes, Radnorshire, SO192416.

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Forty years of *Amanita inopinata*

Alick Henrici[1]

Early History

On October 8, 1981 Irene Palmer found an unfamiliar but remarkably distinctive agaric under a stand of Sitka Spruce (*Picea sitchensis*) in Lullingstone Park, W.Kent. She was surprised to find it was equally unfamiliar to Derek Reid, head of mycology at Kew, who couldn't even assign it to a genus with any certainty. If it was an *Amanita* it was a very odd one; could it be a *Squamanita*? It would need to be sent abroad 'for expert opinion'. A year later she received the news that the expert, Kees Bas of Leiden, foremost authority on *Amanita*, had pronounced that it was indeed an *Amanita* and new to science, occupying an isolated position in the genus with no close relatives (now for some a *Saproamanita*, see below).

Surprisingly two years later Mrs Palmer also found the second known collection, October 2 1983, this time in Surrey, though near the Kent border, in a dry barren area with only various deciduous trees nearby, as she recalls in Palmer (2003). It didn't acquire a name until the publication of Reid (1987), a paper treating ten poorly known British *Amanita* species. Here it was described jointly with Bas under the name *A. inopinata* (meaning unexpected). By this time two further sites had been found, in W. Essex in 1984 and a second in Surrey in 1986. Palmer's second collection was selected as type, and the other three cited as paratypes. The prospect of further spread was stressed: "It is inconceivable that such a relatively large and very strikingly coloured agaric should have escaped notice in S.E. England where fungi have been so intensively studies for many years…This suggests that the species could be a recent introduction, but if so it is remarkable that it should have become so widespread in so short a time".

Kibby (2000) gave it a Fungal Portrait in the second issue ever published of *Field Mycology*, illustrated by photos from three further sites discovered in Kent in the 1990s. This provoked two notable responses. A previously unnamed and unpreserved find in 1976 had evidently been this species, found in what had since become a housing estate on the W. Sussex coast. More significantly Ridley (2000) reported that this was clearly the same thing as a species already known in New Zealand, recorded from South Island in 1971 and North Island in 1972 and 1992, though only ever recorded as *Amanita* sp. The painting he reproduced was unambiguous.

Fig. 1. *Amanita inopinata*, painted from life from a specimen at Flatford Mill, Suffolk, Oct. 2008. Painting © Geoffrey Kibby.

Subsequent literature has tended to refer to it as native to New Zealand, but Ridley put up a strong case that it seems no more likely to be native there than in Britain. To the best of my knowledge its true home remains uncertain.

Next year Bas (2001) reported in *Field Mycology* that the *Coprinus* expert Kees Uljé had found it in a young *Fraxinus* plantation in the Netherlands, causing them both to dance round the table in excitement, as Bas had never expected to see living material of the remarkable species he had jointly described. He made a prediction: "We may expect that from now on *A. inopinata* will slowly spread in Western Europe". He also noted that within *Amanita* it belonged in the 'rather aberrant' subsect. *Vittadiniae* of sect. *Lepidella*, which could well be wholly non-ectomycorrhizal (as *A. inopinata* appeared to be).

Subsequent developments

By the time of the basidio checklist (2005) *A. inopinata* had become known in eight vice-counties, throughout the south-east plus outliers in Berkshire and the southern fringes of Suffolk (Flatford Mill), this last under a hawthorn hedge with no trees in sight, as reported in Kibby (2005). In 2006 Ted Brown found 27 fruitbodies spread over a single site (Tunbridge Wells cemetery). At Flatford Mill it went on to greatly increase its range, last visited 2015 (Figs 1 & 2). Six more vice-counties have since been added, extending further north to E. Norfolk, south to the E. Sussex coast (Fig. 3) and last year making a considerable jump west to Herefordshire prompting this account. The bulk of the records have been under conifers in churchyards and cemeteries, but it is worth stressing that yews, cedars and cypresses are not ectomycorrhizal. It could be merely the bare soil under such trees that is favoured. Most finds have been in October or November.

Boniface (2011) listed all then known British records. By this time the European range had also extended to France. Fraiture & Di Giangregorio (2013) provided a meticulously documented account of its spread, following a first Belgian find in 2008 and four more Belgian sites all discovered in 2012. By then there were four Dutch sites and three in France (from 2003 onwards, all near Calais). The New Zealand sites had risen to six and a first Australian one had been newly reported. In contrast there were already 27 sites known in Britain. Maps showed all the European locations and indicated the main direction of spread, broadly east-north-east following the dominant south-west winds. It was argued that *A. inopinata* fitted the ecological

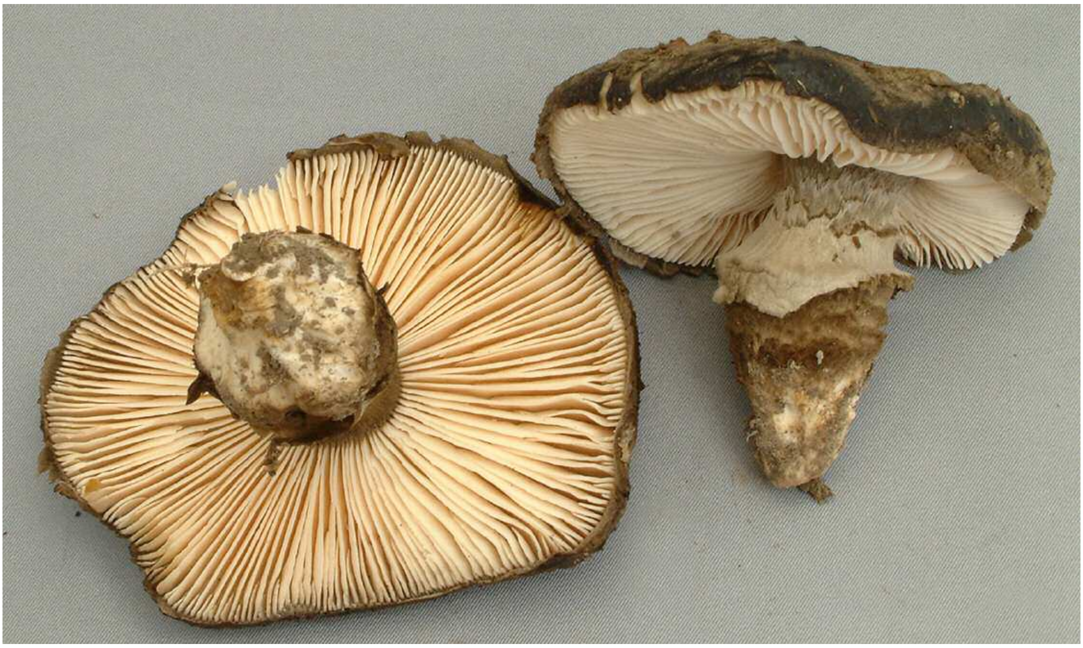

Fig. 2. *Amanita inopinata* showing the beautiful salmon-pink hue that develops in the gills as they mature. Flatford Mill, Suffolk, October 2008. Photograph © Geoffrey Kibby.

concept of an 'invasive species', widely used with reference to animals, plants and parasitic fungi. Here was a possible textbook example of an invasive fungal saprotroph. But for me 'invasive' carries the implication of disruption to the host ecosystem. This would be hard to demonstrate in the case of a fungus that tends to 'invade' poor dry soils where there is little competition.

After the above detailed report in 2013, somewhat to my surprise I have failed to locate any further reports of significant extension to its European range. An eventual spread to north Germany had been predicted, but seems not to have yet materialised (its listing in Boniface 2011 was misinformed). By contast the spread in Britain continues. The 14 vice-counties currently recorded on FRDBI are 10, 11, 13-18, 21-23, 25, 27 and last year 36.

The *Saproamanita* story

In Kibby (2020) and in Læssøe & Petersen (2020) *A. inopinata* is treated as one of three European species in the recently erected genus *Saproamanita* Redhead *et al.*, together with the even rarer *S. singeri* and *S. vittadinii*. The need for this genus was proposed and promptly strongly opposed in two long and detailed multi-authored papers. Interested readers are referred to my summary of this debate (Henrici, 2016) and the references there cited. Scott Redhead found I'd been fair (pers. comm.), though on the whole I favoured the opposition led by the *Amanita* specialist Rod Tulloss, who considered the need for a new genus as yet unproven. The same group of species appear to be treatable with less fuss as a basal subgenus of *Amanita* without, as far as I am aware, any evidence that this would render *Amanita* polyphyletic. It remains to be seen whether *Saproamanita* will eventually gain wider acceptance.

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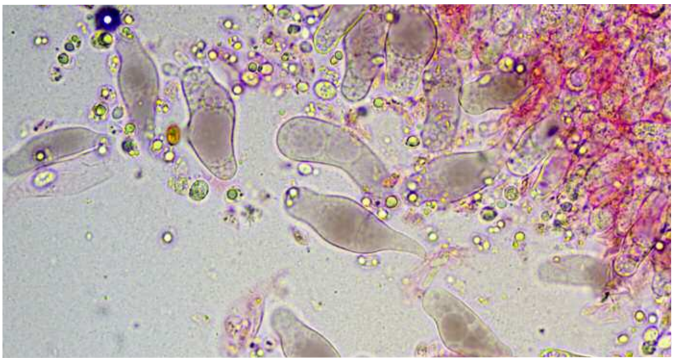
Fig. 3. A recent Oct. 2020 sighting of *A. inopinata* by Andy Overall along a coastal path in E. Sussex. It has since appeared in further locations along the same path. Photo © Andy Overall.

Readers' Finds



Mycena purpureofusca

Epping Forest in Essex is predominantly a deciduous woodland but in the portion called The Warren, in the far northwest corner, is a fairly extensive plantation of conifers. Many of these trees have been cut and stacked in very large piles and on one of these stacks this very distinctive conifer specialist was found.

Its pale gills are edged with dark purplish brown and when placed under a microscope it is easy to see the cause: numerous utriform cystidia with dark contents. The species is considered as rare in Britain outside of the Scottish Highlands and this was a first record for the forest and for Essex.

Other similar species such as *M. rubromarginata* and *M. olivaceomarginata* have very different cheilocystidia and/or a different habitat. Photos © Mario Tortelli.

Antrodia serialis

On the cut end of one of the logs in the same pile as the species above was seen this beautiful polypore, which is also a conifer specialist. It had started its growth as a resupinate then formed numerous small brackets. Other, younger collections were found almost entirely resupinate.

Its pores are rather long and irregular in shape, often with somewhat dentate margins. Like many species in the genus it has rather elongate, fusoid spores about 4–7 µm in length. It particularly favours the cut surfaces of logs and is occasional in Britain. This was a new record for Epping Forest. Photograph © Claudi Soler.

Caloboletus kluzakii newly recorded from Britain

(or will the real *C. radicans* please step forward)

Geoffrey Kibby[1] & A. Martyn Ainsworth[2]

The well known bolete *Boletus radicans* was described by Persoon in 1801. The often used but later name *B. albidus* Roques published in 1841 is considered illegitimate as the even earlier *B. albidus* Schaeff. 1774 takes precedence, however that name is considered to represent the polypore *Amaropostia stiptica*.

Often of imposing size with a white to greyish buff cap, yellow pores that bruise blue and a fat yellow stem covered in a very fine, concolorous reticulum, *B. radicans* has for many years been one of the easier to identify species.

It remained in the genus *Boletus* until it was transferred by Vizzini (2014) to his newly erected genus *Caloboletus*, along with another familiar species *B. calopus*, which was selected to be the generic type. A number of other closely related species are found in North America and likewise transferred to *Caloboletus*. The species in *Caloboletus* are characterised morphologically by their yellow pores (never red) which bruise blue, often but not always with a reticulum on the stem, yellowish flesh bruising blue in some part and a very bitter taste to their flesh. Many species, but again not all, are bright red over some portion of their stem. A photograph of what is usually considered to be a typical *C. radicans* is shown in Fig. 1.

In 2006 a new species, *Boletus kluzakii* was described from the Czech Republic (Šutara & Špinar, 2006), to replace the earlier (1988) but illegitimate name *B. fallax* Kluzák. It was described as closely related to *B. radicans* but

Fig. 1. A collection agreeing with the typical description of *Caloboletus radicans*. Richmond Park, Sept. 17, 2020. Photograph © Geoffrey Kibby.

differing in developing a pink-flushed cap due to the presence of a reddish subcuticular layer which becomes progressively exposed as the pallid cuticle collapses and/or is worn away. The reddish cap colour immediately intensifies when scratched or bruised. Its yellow, reticulate stem is often flushed reddish brown at the base. *B. kluzakii* was transferred by Vizzini (2014) to the genus *Caloboletus* at the same time as *B. radicans*.

So in the years following its publication GK had been on the lookout for this pink-flushed species in Britain but without success. Recently however a number of reports have been surfacing on social media platforms across Europe of collections verified as *C. kluzakii* by molecular sequencing but without showing any of the characteristic pink tones in the cap. This meant that there were collections that by morphology alone were very difficult to separate from *C. radicans*.

It was not a surprise therefore when news arrived that two sequenced collections in the Kew Fungarium, identified by GK as *C. radicans* had yielded DNA barcodes that closely matched the sequence from the holotype of *C. kluzakii*. Two other Fungarium collections sequenced by David Parfitt (Cardiff) in preparation for the official Red List of British boletes (Ainsworth *et al*., 2013) and originally determined as *Boletus* (now *Butyriboletus*) *fechtneri*, had also yielded similar sequences. At the time these barcodes had been interpreted by AMA as representing *C. radicans*. Further sequencing work carried out at Kew in 2013 and 2014 by Bryn Dentinger, Kevin King and Laura Suz revealed that there were two closely related species present in Britain, but was either the true *C. radicans*? Until a sequence derived from a type or epitype of *C. radicans* becomes available for comparison, this remains a tricky question to answer.

At the time of writing, six British collections of *C. kluzakii* have been identified in the Kew Fungarium:

- K(M) 53938 coll. G.C. Dickson 15 Sept. 1991, South Hampshire VC11, New Forest, East End Pond, SZ3697, near *Quercus* sp. Received as *B. albidus*.

- K(M) 163906 coll. E.W. Brown 28 July 2009, Surrey VC17, Richmond Cemetery, near *Fagus sylvatica*. Identified by E.W.B. & A. Henrici as *B. fechtneri*.

- K(M) 163909 coll. E.W. Brown 31 July 2009, Surrey VC17, from the roadside outside Brookwood Cemetery, near to *Quercus ilex*. Identified by E.W.B. & A. Henrici as *B. fechtneri* suggesting that there must have been some

Fig. 2. *Caloboletus kluzakii*. This is the collection by Ted Brown cited above K(M) 164043 from Richmond Cemetery. Note the very slight red flush on the stem of the left-hand specimen. Photo © Geoffrey Kibby.

Fig. 3. *Caloboletus kluzakii* collected by K. Davies from the Forest of Dean, K(M) 194203. There is a narrow band of reddish pigment visible on the stem but the cap shows little evidence of any pink tones. Photo © K. Davies.

obvious red banding on the stem of this and the previous Surrey collection (see above) to give that impression.

- K(M) 164043 coll. E.W. Brown 09 Aug. 2009, Surrey VC17, Richmond Cemetery, TQ1974, under *Quercus* (Fig. 2). Its stem was perhaps a little more slender than usual for *C. radicans* and had some hints of red in some parts but was identified by GK as *B. radicans*.

- K(M) 194203 coll. K. Davies 19 Aug. 2014, West Gloucestershire VC34, Forest of Dean, Berry Hill, SO575129, near *Fagus* and *Castanea* (Fig. 3). Sent to GK as a possible *Imperator torosus* but differed from that species in a number of respects and was subsequently identified by GK as *B. radicans* and looking strikingly like 'normal' *C. radicans*.

- K(M) 194202 coll R.A. Fortey 08 Sept. 2014, Oxfordshire VC23, Henley-on-Thames, Badgemore Golf Course footpath, SU745834, in short grass near to grove of trees and near *Fagus sylvatica* & *Castanea sativa*. R.A.F. thought this was an unusual collection and noted "Taste mild and cut flesh strongly carmine in stipe base".

The collection by K. Davies was tested with Melzer's iodine solution at GK's request and found to produce a strong blue-black reaction on the stem flesh; this contradicts the usual negative reactions quoted for *C. radicans* and in the original description of *C. kluzakii* (Šutara & Špinar, 2006). The collection by R.A. Fortey was mild to taste, again in contradiction to the bitter taste usually recorded for *C. radicans* and to Šutara & Špinar's (2006) protologue for *C. kluzakii*.

Although these two collections seem to have characters which are difficult to reconcile with the descriptions of either *C. kluzakii* or *C. radicans*, the others tend to support the opinion of many boletologists expressed during online discussions that it may not be possible to definitively separate *C. kluzakii* from *C. radicans* based purely on morphological characters as many of these appear to overlap. The strong reaction of the K. Davies collection to Melzer's iodine solution when fresh (no reaction observed by AMA when the preserved material was retested in 2022) is interesting however and it would be very useful to record the reaction in as many collections of *C. radicans*/*C. kluzakii* as possible, preferably followed by sequencing to confirm which species is involved.

Those DNA-enabled mycologists who might wish to compare their own library of bolete sequences with those deposited in GenBank to try to detect further examples of *C. kluzakii* should be aware of an important and potentially confounding factor. At the time of writing, the ITS2 region of the deposited sequence derived from the holotype of this species (KU317750) is not of optimal quality. Indeed it was not retrieved as a close match during GenBank searches involving any of our sequences, a situation which others have also warned about online. In particular, Bálint Dima has suggested that anyone who has a sequence closely matching EU417872, labelled in GenBank as "*Boletus fechtneri* voucher Noordeloos MEN 9336", will have found *C. kluzakii*.

Another *Caloboletus* conundrum

Boletus calopus is another very familiar and supposedly well known species and, as already mentioned, it was made the generic type of *Caloboletus*. But it has become apparent across Europe when boletologists have produced phylogenetic trees that 'calopus' collections fall into several discrete terminal clusters. In discussions with other mycologists online it has been suggested that there may be as many as three to five species involved across Europe.

Boletus pachypus is a name included in many early books as a separate species from *B. calopus*, differing mainly in the colours of the stem and cap. In recent works it has usually been regarded as a synonym of *B. calopus* (although Species Fungorum regards *B. pachypus* as a synonym of *C. radicans*). It seems likely however that *B. pachypus* at least may be resurrected at some point, typified with a modern collection and recombined in *Caloboletus*. During studies by AMA of putative *Butyriboletus fechtneri* specimens, one collection, K(M) 169403 made by Alan Hills on 29 July 2004 from South Hampshire VC11, New Forest, Gritnam Wood, SU280060, with *Quercus* and *Fagus*, proved to be a very good match (99.7%) with GenBank sequence KU317751 labelled *B. pachypus*. This is *B. pachypus* sensu Zhao, Wu & Yang as represented by the German voucher collection MB000275. So it seems certain that we have two taxa at least in Britain, one being presumably the true *Caloboletus calopus* and the other *B. pachypus*, should that become the accepted name.

So once again carefully dried collections morphologically close to *C. calopus* are required for sequencing, particularly with a range of different trees and with accompanying detailed notes and photographs of their morphological characters. Hopefully some consistent morphological characters may be found to allow separation of the species without necessarily having to obtain sequences for every collection in future.

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Lepiota coloratipes – an agaric new to Britain

Richard Fortey[1]

On 19 October 2019 I collected a number of small, whitish mushrooms in the grounds of Gillott's School, a large comprehensive secondary school on the outskirts of Henley-on-Thames in South Oxfordshire (SU 748813). The grounds of the school are fronted by a small stretch of open parkland, with *Pinus* and *Tilia* quite closely planted, the soil beneath the trees being regularly mowed and never fertilized. The fungi made a small troop in the short sward. The general proportions and lamellae were that of a small *Lepiota*, like *L. cristata*, although the pileus colour was more subdued than is usual in that species, and the annulus was very evanescent, only evident on the immature examples, with a somewhat pruinose appearance below it. Another distinctive feature was a red coloration towards the base of the stipe. Although a modest mushroom, it seemed worthy of further investigation.

Microscopic examination of the pileal surface revealed a hymeniderm cuticle (like other species with this structure it had a tendency to crack) and that eliminated the vast majority of British *Lepiota* species, although not *L. cristata*. However, the spores were unusually small for any *Lepiota* I had seen before, broadly elliptical 3–4 x 2.5–3 µm, and nothing like the larger 'bullet-shaped' spurred spores of *L cristata* and its allies. Cheilocystidia were of the usual clavate type for the genus. As the fruitbodies began to dry a little, the red colour on the stipe became browner, and more mature specimens showed pink-brownish spotting on the rather ventricose gill surface.

After thumbing through the keys in my well-used copy of *Funga Nordica* Vol. 1 (C. Lange in Knudsen and Vesterholt 2012) the puzzling agaric was identifiable without much trouble as *Lepiota rufipes* Morgan. This species was also treated by Vellinga (2001) in the fifth part of *Flora Agaricina Neerlandica* where it was described as rare, and it was suggested that it was a southerly European species at the limit of its range in the Netherlands. That idea may have offered support to the exclusion of *L. rufipes* as authentically British in the first version of CBIB by Legon and Henrici (2005). By now, it was clear that a voucher should be prepared from my collection - which I did immediately - and sent

Fig. 1. *Lepiota coloratipes* (= *L. rufipes* ss auct. non orig.). An Italian collection from 21 Nov. 2012, in a public park in Rome. Photograph © Luigi Perrone and Tomaso Lezzi.

with some other puzzling samples to the Jodrell Laboratory, Kew. There was a distinct lack of good colour illustrations of this species, and I later regretted not photographing my collection at its best. A collection attributed to *Lepiota rufipes* was described with a good photograph in Cetto (1989) from Italy; Courtecuisse and Duhem (1995) illustrated a species under the same name with what they described as a "membraneous ring". A good description was given by Ludwig (2012, p.426-7, pl. 111.13) in the third part of his *Pilzkompendium*, accompanied by fine water-colour drawings and microscopy. One of Ludwig's collections is recorded as having slightly larger spores, but his other collection is consistent with earlier accounts. Descriptions of the smell vary from minimal to unpleasant, cristata-like, but it does seem possible that the latter might actually be *L. cristata*.

None of the foregoing explains the different species name that appears in the title of this article. The original description of *L. rufipes* was a species from North America (Morgan 1906). Examination of the type material—now in bad condition—indicated that it might actually be a specimen of *Cystolepiota seminuda*, and had nothing to do with the European species recorded as *Lepiota rufipes*. Vizzini *et al*. (2014) analysed molecular sequence data from appropriate European collections and on this basis recognized a distinct clade within *Lepiota* for what had been incorrectly termed "rufipes" in Europe. For this clade, the new species *Lepiota coloratipes* Vizzini *et al*. was proposed (Figs 1 & 2). The descrption of this new species emphasizes the relatively small size, lack of a persistent annulus, tiny spores for the genus, and the red colours on the stipe of young specimens. It was reported as occupying a rather isolated position within *Lepiota*, which given its microscopic characters is perhaps not surprising.

Fig. 2. Slightly older specimens of *L. coloratipes* showing the reddening of the stem. A Finnish collection. Photograph © Jukka Vauras.

When the diminution of Covid allowed normal service to be resumed, a second attempt succeeded at ITS sequencing my collection from Gillott's School made in 2019. It proved to be 99.5% similar to the type material of *L. coloratipes* in Vizzini *et al*. (2014) leaving no reason to doubt that this species is present in Britain, although not under the name by which it was first determined. My collection is curated in Kew as K-M 000263500. It remains to be seen whether this small fungus will be more widely recorded as climate change progresses. This note may encourage a closer look at '*Lepiota cristata*' collections that look somewhat anomalous.

Acknowledgements

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How bioluminescent fungi helped restore my mental health

James Scurry[1]

More than ten years straight in a newsroom without a proper break is a bit like overstaying your time in the Chernobyl exclusion zone. The unedited rushes (i.e. the raw news footage straight from the camera) of wars, revolutions, disasters and famines, is enough to eventually bring even the most robust and resilient person to their knees.

I can write this from the perspective of somebody who spent too much time in the radioactive zone, failing to recognise when my mind and body had had enough, and needed a visual diet of something more kind and nourishing.

In French there's a beautiful expression: 'la goutte d'eau qui fait déborder le vase.' It literally translates to: 'the drop of water that made the vase overflow,' but really it's a more poetic translation of the English expression: ‘the straw that broke the camel's back.' After a long career in television news, by Christmas last year, I had finally become that overflowing vase.

Working long 12-hour days, often including the weekends, I witnessed everything from the unimaginably brutal final moments of Colonel Gaddafi's life in the Libyan Revolution, to the rise of the Islamic State as militants overran large cities like Fallujah, Raqqa and Mosul.

As the pro-democracy hopes of the Arab Spring gave way to the bitter conflicts that would ensue in countries like Egypt, Yemen, Syria and Iraq, footage of war poured into the newsroom like an incessant flow of toxic sludge. Drop by drop, it slowly filled my internal vase.

During the peak of the conflicts, both I and my colleagues would often find ourselves faced with the unenviable task of wading through the footage, trying to figure out what we could, and what we couldn't, broadcast to the world.

Some of what I witnessed is still too awful for me to put into words. Recently, I've begun to realise how images can stay with a person, and as a result, I'm just that little bit more careful about the types of images I choose to evoke in a reader's mind.

Over the years that followed I doubled down on my workload, rarely taking weekends off and paying almost no attention to the toll my time in the radioactive zone of the newsroom was exacting - not just on my mind and body, but also on my soul.

In 2015, when I decided to train as a psychotherapist, I came to understand from an emotional, psychological and biological perspective, the resultant impact of violent imagery (vicarious trauma) on the human nervous system. I was stuck in a low level of fight or flight, with increased levels of adrenaline and cortisol slowly changing the physiology of the body.

Both body and mind wanted a break, and since I hadn't been willing (or perhaps didn't know how) to take that long overdue sabbatical, the part of me that knew better decided to make the decision for me.

In the days and weeks leading up to Christmas Day in 2021, I could feel something building inside me - like a red hot ball of magma in search of a way out. On Christmas Eve it happened, all the awfulness I'd pushed deep down inside rose to the surface and demanded to be felt all at once. This wasn't something I could disconnect my emotions from anymore; what I'd witnessed during the course of my work needed to be felt, experienced and crucially, it needed to be properly grieved.

Over the following weeks all aspects of my life ceased to function. To make sense of it I began journalling, scheduled Zoom calls with mental health colleagues, and I let myself cry over some of the awful things I'd witnessed and reported on, including the countless number of lives lost during the coronavirus pandemic. I took the smart decision to take a sabbatical and went surfing in Cornwall just as the Russian tanks crossed the border into Eastern Ukraine. It would be almost six months before I'd be back in the newsroom to see any footage of the invasion.

A few years ago I bought a sweater I quite liked. The words on the front of it say: 'And into the forest I go, to lose my mind and find my soul' (Fig. 6). It seemed prescient as I began research for a mental health book I'd started writing entitled: Back to the Garden. Maybe Mother Nature had the anecdote to assuage the wounds of my news trauma; turn off the television and get back into the garden. Just like the lyrics to the Joni Mitchell song, Woodstock:

“We are stardust
We are golden
And we've got to get ourselves
Back to the garden”

While I was off work recovering from what from the outside looked like a mental health breakdown, but to me looked like a mental health breakthrough, I drove past the Natural History Museum and saw the banners advertising the Wildlife Photographer of the Year exhibition. I had a strange impulse to park the car and go and see the exhibition....perhaps it could give me some ideas about ways to connect with nature (Fig. 1).

Fig. 1. Wildlife Photographer of the Year exhibition at the Natural History Museum, London 2021.

I entered the darkened gallery and began walking around the exquisite images from photographers all around the world: a scuba diver's crystal clear reflection in a vibrant underwater seaweed jungle off the coast of Australia; a hidden rainforest in a sunken ravine in Colombia; until finally my gaze fell on a photograph which stopped me in my tracks. Entitled Mushroom Magic, photographer Juergen Freund had skilfully managed to brave the wet rainforest and the leeches to capture the bioluminescent ghost fungi in the middle of a tropical highland rainforest in the Atherton Tablelands in Queensland, Australia on a bright full moon night (Fig. 2).

As Juergen lay on the wet rainforest floor for ninety minutes in my homeland, Australia, capturing the stunning photograph, little could he have realised the wonderful way the pixels would draw me into a dance with the world of mycology halfway across the other side of the world.

Like a mycelium network itself, Juergen's photograph seemed to be extending from the rainforests of Australia, and forging an invisible but conscious connection with my mind. And even though I wasn't in the rainforest with Juergen, just seeing the remarkable image had already given nature an opportunity to begin working her healing magic on my burnt out and exhausted mind.

Over the weeks that followed, the image of the ghost fungi kept finding its way back into my mind. I even ventured back to the Natural History Museum to see it again, mesmerised by the glow of the fungi climbing the trunk of the tree. It seemed to be beckoning me - like the trail of breadcrumbs in the fairytale Hansel and Gretel, to partake in a mycological adventure.

One morning I woke up before sunrise and sat up in bed and said out loud to myself "I think I'd like to study mycology!" A warm feeling of relief washed over me, like I'd just realised something really important. Looking back, I can now see just how much sense it made; the imagery of the beauty of the natural world providing the perfect healing salve for a mind hardened and brutalised by the incessant stream of images of violence and war. If images of death had worn me down, then images of life - in all its forms - could build me back up.

The bioluminescent fungi had quite literally led me to Kew Gardens’ gate and the respite of the natural world. Despite living just a stone's throw from Kew since I moved to London over a

Fig. 2. Me in front of Juergen Freund's photo of bioluminsecent fungi at the Natural History Museum. The full caption reads: “Mushroom magic: Juergen Freund lies on the ground for 90 minutes braving mosquitos and leeches to capture this image. On a summer's night Juergen searched the rainforest for bioluminescent ghost fungus. Scanning the darkness for the strange glow, faint to the naked eye, he was rewarded with this magical sight: clusters of ghost fungus seeming to climb the base of a dead tree. The bioluminescence of ghost fungus results from a chemical interaction between a compound known as luciferin and the luciferase enzyme in the presence of oxygen. The function of the glow remains a mystery to be solved.” Photo © James Scurry, With the permission of J. Freund.

Fig. 3. Scarlet Elf Cup, either *Sarcoscypha coccinea* or *S. austriaca*. My first ever fungal discovery on a visit to County Donegal in Ireland during my sabbatical. Photo © James Scurry.

Fig. 4. Hiking on the Ridgeway trail in Buckinghamshire; I still need to do some more research to identify this one. [Ed. this is *Fomitopsis betulina*, formerly *Piptoporus*]. Photo © James Scurry.

Fig. 5. A stunning find on a fallen log just around the corner from my house in Gunnersbury Park in west London, young *Cerioporus squamosus*. Photo © James Scurry.

decade ago, my hectic schedule had meant that I'd never taken the time to visit.

A few weeks after visiting Kew for the first time, I attended the British Mycological Society's 125th Conference at Cranfield University in Bedford, where I was introduced to a number of incredible mycologists and their work, which only deepened my curiosity about this fascinating and understudied field. I've even started taking my own photographs of fungi—admittedly nothing as remarkable as Juergen's image—but I've accepted the ghost fungi's call to me to partake in the mycological adventure (Figs 3–5).

The legendary author and mycologist Geoffrey Kibby helped me identify my first find while I was researching at the British Mycological Society's library at Kew Gardens.

At the bottom of Juergen Freund's photograph in the exhibition there is a caption that reads: "”The bioluminescence of ghost fungus results from a chemical interaction between a compound known as luciferin and the luciferase enzyme in the presence of oxygen. The function of the glow remains a mystery to be solved.”

I wasn't sure where the ghost fungi's mysterious glow was leading me, but I decided to email Juergen and ask him for permission to use his photograph on my blog. I wanted to tell him about the unlikely series of events that had ensued since I saw his picture, a pathway which eventually led me to beginning as a Visiting Researcher at Kew Gardens, home to over 1.25 million dried specimens of fungi, one of the largest, oldest and most scientifically important collections in the world. His photograph had quite literally led me back to the garden, to restore my mind and find my soul.

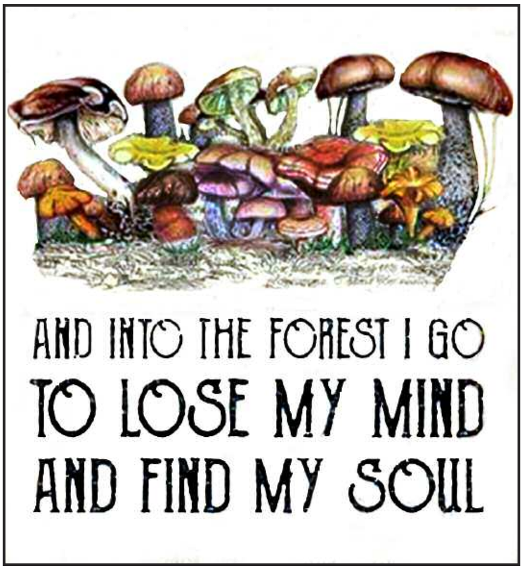

Fig. 6. The words on the sweater which meant so much to me at the beginning of my research.

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Notes and Records

Alick Henrici[1]

These notes were written shortly after Kew Gardens registered a temperatureof 40.1°C. A Kew spokesman on Radio 4 gave an all too accurate description of the Kew lawns as "looking totally non-green". The only agaric to have appeared in any numbers since late winter was *Leratiomyces ceres* struggling through on woodchip mulch, seemingly responding to conditions reminiscent of its native Australian haunts. I am now pinning my hopes on some observations made by Charles Aron, a long time observer of both fungi and weather. He notes (Aron, 2005) that several of the hot dry summers of recent years have been followed by well above average agaric fruiting when at last the rains arrived, but even then it was at least a further three weeks before they really got going.

I like to try and keep pace with the advances in fungal classification that have taken place throughout the forty odd years of my interest in mycology. In the last issue it was *Cortinarius*. Now I turn to a group of a mere six British species, all uncommon to rare, but all victims of recent substantial phylogenetic upheaval.

The British stipitate stereoid fungi

The species formerly grouped together under this description are characterised by a relatively tough context, a smooth hymenium and smooth hyaline spores (thus *Stereum* like), but with a stipe, or at least a basal rosette. Despite the stipe, they get treated in standard texts on corticioid fungi. Most were originally described in *Thelephora*, though *Thelephorales* as now understood all have ornamented spores. This is a widespread growth form in the tropics but one largely absent in northern Europe.

Derek Reid published an influential *Monograph of the Stipitate Stereoid Fungi* in 1965, arising out of his Ph D thesis. He examined over 200 type collections and recognised 60 species, ten of them newly described, assigning them to nine genera in the *Stereales*, mostly in a new family *Podoscyphaceae*. He preceded these placements with the time-honoured observation "At the present time the taxonomy of the Basidiomycetes is in a state of flux". Forty years later, in the published British checklist (2005), there are four such species: *Podoscypha multizonata, Cotylidia pannosa*, *C. undulata* and *Stereopsis vitellina*, all assigned as by Reid to *Podoscyphaceae* in the *Stereales*. Incidentally, all are excellently illustrated in FTE (*Fungi of Temperate Europe)*. A fifth, *Stereopsis hiscens*, was added in Update 6 to the checklist. The confirmation of a sixth species, *Stereopsis reidii*, identified thus far on morphological grounds alone, is currently on hold until this species is represented by a good reference DNA sequence in a publicly accessible database and the appropriate comparisons can be made..

The DNA revolution has now torn up all these family and order placements, as made clear in Sjökvist *et al.* (2012), entitled "*Stipitate stereoid fungi have evolved multiple times*". *Podoscypha* is now in *Polyporales* and *Cotylidia* in *Hymenochaetales*. The true *Stereopsis* (type *S. radicans* described by Berkeley from S. America, Surinam) is now type of a new order *Stereopsidales*, fairly basal in the *Agaricomycetes* (Sjökvist *et al.*, 2015). *S. vitellina* and *S. reidii*? both require placement in other genera, possibly also *S. hiscens*. Further notes follow on all these species.

Podoscypha multizonata

This has its world stronghold in southern Britain where it is widespread, being local in France and rare in the rest of Europe. It was written up in FM by Overall & Mottram (2006) and again by me in 2013 after it was found in Kew under an Ash tree, a previously unrecorded host. It still fruits there annually. It prefers oak or beech but appears not to be mycorrhizal and several other hosts are known. DNA has shown it to be closely related to the poroid *Abortiporus biennis* which tends to grow in similar looking rosettes. It was at one time confused with *Cotylidia pannosa* (e.g. by Berkeley) but unlike that species it has skeletal hyphae, abundant gloeocystidia and longer spores.

Cotylidia pannosa

A fairly rare species described by Sowerby. I gave it a Fungal Portrait in FM9(4) 2008 under the doubting heading '*Cotylidia pannosa* sensu auct.'.

I was puzzled by the discrepancy between the collection I illustrated with bright pink tinges and the lack of any mention of pink in Reid (1965), though he had studied numerous British collections, including fresh material. I speculated that I was illustrating a distinct taxon recently introduced. This idea was shown to be untenable next year when Jo Weightman (2009) reproduced a painting of a clearly pink-tinged collection made by Dr Henry Bull in 1872. I still cling to the idea there may be a second closely related species lacking all trace of pink. Fries in the *Systema* listed both *Thelephora pannosa* and a subsidiary taxon *T. pannosa* β *pallida*, previously described by Persoon as *Thelephora pallida*, now considered a synonym. These days it seems that if enough collections of almost any species are DNA'd a species complex is revealed. So I live in hope.

Cotylidia undulata

A few collections held at Kew have been assigned to this species in the past from as far apart as Cornwall and Angus (though see below under *Stereopsis reidii* for the fate of the Cornish one). There is an up-to-date treatment of *Cotylidia* in Larsson & Ryvarden 2021 where it is described as associated with mosses on dry soils. Its distribution is given as "Rare, reported from Italy, Central Europe and the Nordic countries". Records from Britain seem to have gone unnoticed or disbelieved. See Fig. 1 for a possible North American collection.

Stereopsis vitellina

"Unlikely to be confused with any other European basidiomycete" (FTE), the only somewhat similar species macroscopically being the ascomycete *Spathularia flavida*. For a description see *Corticiaceae of North Europe* Vol. 7. Described by Plowright from Abernethy Forest, Inverness in 1901, and found there again in 1999 with no other British records in the intervening years. Several more records have been made recently in the same area. Sjökvist et al. (2012) found that this belongs somewhere in the *Atheliales*, the only stipitate and pileate species so far known in that order, hitherto confined to typically corticioid species. It is certainly no *Stereopsis*, but appears to be still awaiting placement in a new genus or family, since none is apparent in the outline classification in Larsson & Ryvarden 2021.

Stereopsis hiscens

For Reid this occurs in moist tropical or subtropical regions throughout the world (see Fig. 2). David Harries has found it in Wales, confirmed by Martyn Ainsworth (Harries, 2012). An attached note by Martyn adds that an earlier Welsh collection, made in 2007, was found to be conspecific, rather than the first Welsh record of *Podoscypha multizonata* as claimed at the time. These are thought to be the first European records of this species. Larsson & Ryvarden (2021) consider the genus *Stereopsis* sensu stricto is not present in Europe. So either news of these

Fig. 1. A putative collection of *Cotylidia undulata* from western North America, 2011. Photograph by Caspar S ex Wikimedia Commons.

collections didn't reach them or they consider this to be yet another species needing a new genus.

Stereopsis reidii?

A very distinctive pure white species was found late in 2017 in the Ainsdale Sand Dunes Reserve in Lancashire and later refound at the same site. It was reported by Tony Carter as a 'Reader's Find' in Field Mycology (FM20(1): 30, 2019). Martyn Ainsworth determined these collections after microscopic examination and comparison with the published protologue. *S. reidii* had been described from a single Italian collection. It is included in Bernicchia & Gorjón 2010, together with a photo looking plausibly intermediate between the two included by Carter. His material has been DNA'd, but no authentic *S. riedii* sequence is available for comparison.

Since then a collection of an unknown species made in South Devon in October 2019 has been sequenced at Kew and found to be a good match. As a follow up a Cornish collection already in Kew filed as *Cotylidia* cf. *undulata* made in November 2000 has also been sequenced and found to provide a further match. These sequences would suggest a closer relationship of the British collections to *Cotylidia* than to *Stereopsis*, although the absence of cystidia is certainly not in accordance with the current morphological definition of the former genus. Further sampling and analysis is required to establish their true affinities and to help with the taxonomic decision-making. Currently this is looking like a choice between modification of the definition of *Cotylidia* or creation of a new genus.

It was these developments around a third rare British possible *Stereopsis* that inspired me to put these notes together, leaving no room for further thoughts in this issue on any other random topics.

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Fig. 2. A collection identified as *Stereopsis hiscens* from Maunganui Bluff, New Zealand, 2018. Photo by Peter de Lange ex Wikimedia Commons.

Book reviews

The Fungi of North East Wales

Bruce Ing
302 pp. A4, paperback.
University of Chester Press, 2020
ISBN 978-1-910481-12-7. Price £19.19

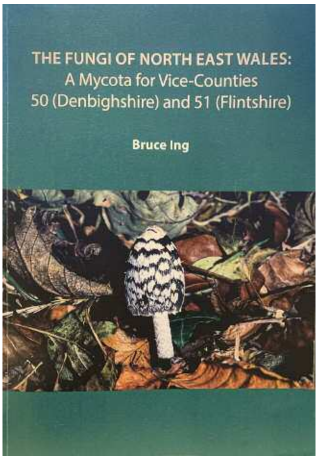
Whether described as a fungus flora or a mycota or a funga (a term recently advocated) this is a rare beast. Following the meticulous Fungus Flora of Warwickshire edited by Malcolm Clark (1980) many such have been contemplated but few have reached book form, none indeed with so much detail per species. The main British ones, in date order, have been: Bramley 1985 for Yorkshire, Dennis 1986 for the Hebrides, Dennis 1995 for South East England, Dickson & Leonard 1996 for the New Forest and Aron 2005 for North West Wales. Species totals, when cited at all, were around 2500 for Warwicks, 3000 for the Hebrides and 4000 for the South East. There has also been Ellis & Ellis 1988, a mere pamphlet, but concisely listing 3762 species from Suffolk, the high total benefiting from the authors' unrivalled knowledge of microfungi.

Reasons for the lack of such books are not hard to find. The task is manifestly impossible. Not even Dr Dennis knew enough to cope with such an undertaking unaided. In all cases the preface acknowledges assistance from 30 or more colleagues. It needs an author with exceptional tenacity to see the whole thing through to a conclusion, knowing all along that the finished product will be only a first stab at the actual diversity waiting to be uncovered.

This book covers the two vice-counties of Denbigh (VC50) and Flint (VC51), listing around 2000 species from each, 2500 in all. The area complements Aron's coverage of VCs 48, 49 and 52. Preliminary matter gives a background to the physical environment, summary descriptions of 24 important sites, notes on previous recording and an impressive bibliography. Each species gets at least the following details: current name and author citation, English name; habitat/distribution in NE Wales; frequency in Britain as a whole (on a five point scale); presence by 10 km squares and in which of the 24 notable sites; total recorded sites in the area; year of first record; presence in which of Aron's three VCs. Thus all in all a good impression of how well it is known in the region.

Recent phylogenetic concepts are followed, resulting for instance in hyphos and coelos all listed under their known or suspected teleomorph genera. Species are listed alphabetically within their genus as expected, but also genera alphabetically within their family, families within suborder etc.. This is all very logical, but has its drawbacks. Species can be hard to locate: apparently absent taxa may in fact be listed under recent nomenclatural changes. Thanks, it would seem, to some impatience from the publishers, there is no index. By the time you read this, I am assured that an index to species (including widely used synonyms) will be available on request from the author. His address is: Tigh na Faoileige, 1 Rhue, Ullapool, IV26 2TJ.

Alick Henrici



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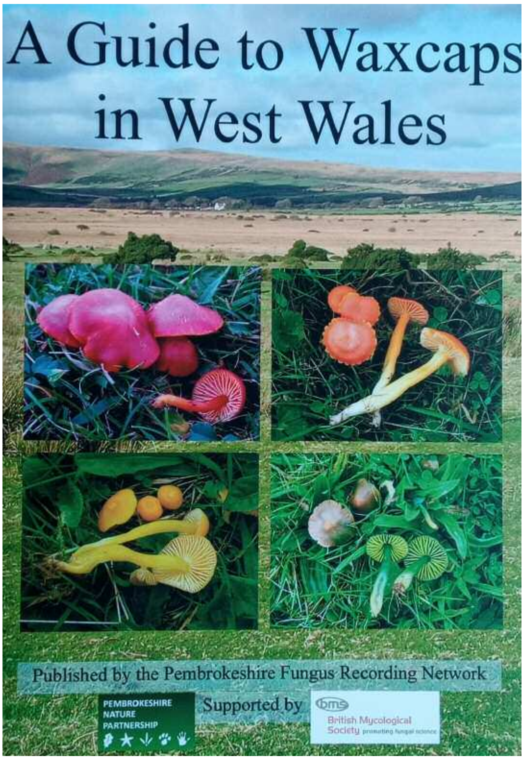
A Guide to Waxcaps in West Wales

David Harries
Pembrokeshire Fungus Recording Network, 2022
Half A4 size, 40 full colour pages
£30 for 20 copies, from djh.somerton@gmail.com

The motives behind this admirable booklet are set out in two sentences in its introduction: "Published to encourage people to identify and report waxcap finds and to help raise awareness of the conservation needs of waxcap-grassland fungi. Although waxcaps receive good coverage in several popular field guides, it is intended that this booklet should be light and compact enough to take into the field, and sufficiently inexpensive that it can easily be replaced if lost or damaged". It especially targets novice mycologists who have become waxcap enthusiasts. The ultra-low price (bulk orders only!) is thanks to financial support from the Pembrokeshire Nature Partnership, the British Mycological Society and, I suspect, from the author himself.

The 49 species covered include almost all those known in Britain (the rest mainly confined to Scotland), keyed informally on colour and texture. The last four pages add a brief overview of the other main fungal groups found alongside waxcaps. Each species gets excellent photos, short notes on field characteristics and a frequency indicator. My only quibble is that some species with very few confirmed British records are considered 'infrequent'. This is certainly preferable to 'rare', unjustifiable in the current state of knowledge. But 'rarely recorded' would be nearer the mark and might help to ward off over-optimistic identifications.



Gliophorus laetus (Hygrocybe laeta) **Heath waxcap**

Cap small to medium, flattened-convex, greenish-orange, slimy. Gills greyish-white with a **translucent margin** (best seen using a hand lens). Stem greenish-yellow, slimy. Specimens are unusually firm when crushed and have a **characteristic smell said to resemble burnt rubber**. Occasional in heaths and amongst moss in wet areas on acid soil.

Gliophorus psittacinus (Hygrocybe psittacina) **Parrot waxcap**

Cap small to medium, hemispherical sometimes umbonate, very slimy. Colour variable, usually green, yellow-green, yellow or purplish-pink. Gills rather broad but narrowly attached to the stem, sometimes with a tooth. **Stem shades of yellow or green but always with a trace of green near the top**, slimy. Widely recorded in unfertilised grassland.

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Ongoing DNA studies have revolutionised waxcap taxonomy. They were all in *Hygrocybe* in the 2005 checklist. Names here are spread over six genera in accordance with modern orthodoxy. The downside of DNA is that several species have been shown to encompass complexes of virtually indistinguishable 'microspecies' scarcely differing except in their DNA. The further field work this booklet aims to promote isn't going to remove this inconvenient truth. But if it achieves the distribution it deserves, it will surely boost our understanding of British waxcaps, a group possibly as well represented in Britain as anywhere in Europe.

Alick Henrici

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