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Field Mycology

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EDITORIAL

The inexorable spread of the aliens continues

In the previous issue of this magazine Alick Henrici brought us up to date with the current spread of *Amanita inopinata* in Britain and Europe (Henrici, 2022). But just three months later that information is already out of date. A recent posting by Yanna Drury on the Facebook pages of the Fungi Enthusiasts UK group relates that she and Andy Donegan collected this species in the suburbs of Hull, Yorkshire (Fig. 1). To my knowledge this is the furthest north it has been found (let us know if you have evidence of finds from further north).

From its first recorded site in W. Kent in 1981 it has continued to push north, west and east and it seems inevitable that it will continue to populate further regions of Britain. It will be interesting to see just how far north it will spread.

Fig. 1. *Amanita inopinata* showing its typical very dark grey cap and stem and somewhat pinkish white gills. Collected in the suburbs of Hull, Yorkshire. Photograph © Yanna Drury.

Perhaps more astonishing than the fairly slow spread of *Amanita inopinata* is the rapid expansion of *Favolaschia* in Britain. From its first appearance in Cornwall in 2012 (Ainsworth *et al.* 2015, where it is now a fairly common sight, it rapidly spread to Devon, then into Wales and recently over to Bristol and across to Co. Cork.

Now it has appeared at two sites in the New Forest, Hampshire and perhaps most surprising of all on Hampstead Heath, North London. It can surely be only a matter of time before it conquers England and we can expect this species to become a frequently recorded species on our annual fungal forays.

Popularly known as Orange Ping-Pong Bats, it has until recently been called *F. calocera* but following the publication of a recent phylogenetic study (Zhang *et al.*, 2021) it appears that the true *F. calocera* is confined to Madagascar and that the species spreading through Europe and widespread in Australasia should be called *F. claudopus*.

Fig. 2. Part of the collection of *Favolaschia claudopus* found in Hampstead Heath, north London. Photo © Piermario Maculan.

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Geoffrey Kibby

Fungal Portrait: 92

Mycetinis alliaceus

Geoffrey Kibby

Fig. 1. *Mycetinis alliaceus* in beech leaf litter, the Shere Estate, Surrey, October, 2022, showing their stiff, dark blackish brown minutely tomentose stems. Photograph © Mario Tortelli

The rather elegant, although drab *Mycetinis alliaceus* (Jacq.) Earle ex A.W. Wilson & Desjardin (Figs 1 & 2) is perhaps better known under its synonym *Marasmius alliaceus* . Despite its drabness it has a surprise in store: if you smell it (and you should smell all fungi you collect of which you are unsure) your nostrils will be assailed by the strong odour of garlic. There are a few other species of rather similar colour which also smell of garlic, e.g. *Gymnopus foetidus* (Fig. 3) and *G. brassicolens* (Fig. 4), but they are nowhere near as tall and usually grow in clusters on woody debris or fallen branches.

The genus *Mycetinis* Earle is an old one, created in 1909 with *M. alliaceus* as its type. This placement however was largely ignored, with most books in the last 50 years, following Fries who placed it in *Marasmius*. Recent DNA studies however (e.g. Oliveira *et al*., 2019) confirm its separation from *Marasmius* along with the other species in the section *Alliacei* (in Britain only the rare *M. scorodonius*).

Mycetinis alliaceus has rather large white spores which are amygdaliform in shape, 9.0–12 x 5.0–7.5 µm and its gill edges have cylindric cheilocystidia. The species is found exclusively in leaf litter of *Fagus* on calcareous soils but its distribution in Britain is rather interesting.

As pointed out in the British Checklist (Legon & Henrici, 2005) it is often referred to in older books as common and perhaps it was in those days but it certainly does not appear to be so today. Reports are widespread in England from

Yorkshire southwards but most are unsubstantiated with voucher material. The majority of recent records and collections have been from ancient woodlands in West Sussex. This collection was from the Shere estate in Surrey and the species is recorded from only one other site in Surrey at this time. It is hoped that this portrait will stimulate further discoveries of this species around the country, supported by photographs and voucher material.

Fig. 2. Another collection of *Mycetinis alliaceus* from the Shere Estate, backlit with the minute tomentose hairs on the stem showing as a white outline. Photo © Geoffrey Kibby.

Fig. 3. ***Gymnopus foetidus***
With a velvety-tomentose stem like *M. alliaceus* but with a reddish brown cap and growing in clusters on fallen wood. Spores 7.5–10 x 3.5–5 µm.

Fig. 4. ***Gymnopus brassicolens***
Very similar to *G. foetidus* above but with a smoother cap and a rather glossy, not tomentose stem. It also has much smaller spores 5.5–7.5 x 2.5–4.0 µm. Found on woody debris and fallen branches.

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Splashes of blood in the Isles of Scilly

Pauline Penna*

In October 2021 I and Tony Hardware, fellow members of the Cornwall Fungus Recording Group spent several days on the Isles of Scilly recording fungi. It was a concerted effort to increase the recorded mycota of these beautiful, temperate islands. Four of the islands were surveyed over a period of two weeks: St Mary's, St Martin's, St Agnes and Tresco.

Tresco is well known for its extensive, subtropical gardens. These are protected from the North and West by large shelter belts of Monterey cypress and pine with *Eucalyptus* and some native tree species.

While exploring one of these shelter belts a troop of blood-red, viscid, small mycenoid fungi was found scattered along the length of a fallen, moss-covered gorse branch (Fig. 1), quite a stunning and unexpected sight. Further individuals were found nearby, occurring on *Eucalyptus* bark fragments.

Fig. 1. *Cruentomycena viscidocruenta*. Fruiting along the length of a fallen branch of gorse. Photograph © Tony Hardware..

The limited literature we had been able to bring with us to the islands provided no assistance with identification. However, an online search for 'red *Mycena*' provided the answer. Petersen *et al.* (2008) had described a new genus, *Cruentomycena*, with the type species being *Mycena viscidocruenta*, described by Cleland from New South Wales, Australia, as a new name for his earlier but invalid *M. coccinea*. This excellent article gave the morphological detail which indicated a match with the Tresco specimens. *Cruent* translates as splashed with blood, aptly named!

Details of the Tresco collection:

Pileus

Mycenoid, 9–18 mm diameter, campanulate. Viscid, glistening when wet. Blood-red with darker red striations and centre which can be slightly rugulose. Cap edge paler and crenate when young. Blackening on drying. (Fig. 2)

Lamellae

Same colour as the cap, darkening on handling and with paler edges,. Adnate with a decurrent tooth. L = 24

Stipe

Cylindrical 9–20 x 1–1.5 mm, viscid, blood red.

Microscopy

Most tissues leaking red pigment in ammonia.

Pileal cells of two types.

Firstly thin walled, narrow, sinuous, with septa and clamps. These cells retain their pigmentation, 34–42 x 5 µm. Secondly, broader cells, thin-walled, with clamps and constricted septa. Up to 52 x 7–22 µm (Fig. 3).

Cheilocystidia variable. Some lageniform with constrictions and subcapitate apex 26–40 x 7.9–10 µm, some sphaeropeduculate (Fig. 4).

Basidia four spored , clavate 14–20 x 3.5–7.2 µm.

Spores narrowly dacryoid with one or two dark guttules. 6.8–10 x 2.6–3.6 µm (Fig. 5).

Pleurocystidia not seen.

Caulocystidia not examined.

Petersen *et al.* (2008) give details of the phylogeny and the justification for raising a new genus for this species. Sequencing by Moncalvo *et al.* (2002) puts it in a clade with two *Panellus* species and a *Resinomycena*. The sequenced material was from Tasmania. It has also been recorded in other locations in S.E. Australia and also in New Zealand.

A similar collection from the Eastern seaboard of Russia is virtually identical genetically but has smaller fruitbodies and spores, is not viscid and has a more marasmioid appearance. It is kept as a distinct species, *Cruentomycena kerdovayae*, named for the Kerdovayae National Park.

Prior to this record on Tresco a record was reported on social media from Northern Ireland. It would be most useful to compare these two records but we have been unable to track down the details of that collection. I am unaware of any other European collections.

Acknowledgements

Thanks must go to Tresco Estate management for allowing us to record and collect specimens and particularly to Tony Hardware for suggesting and then organising the whole event.

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Fig. 2. Close up of *Cruentomycena viscidocruenta*. Photo © Pauline Penna.

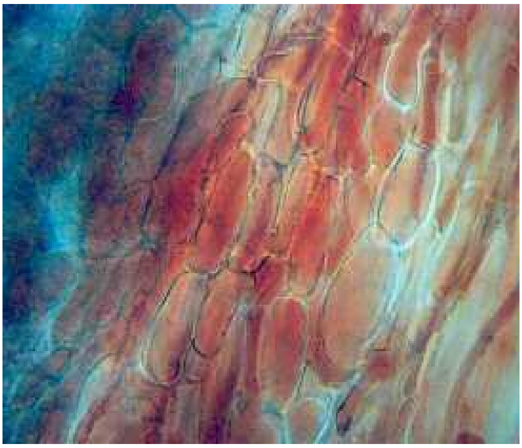

Fig. 3. *C. viscidocruenta* pileal cells. Photo © Pauline Penna.

Fig. 4. *C.viscidocruenta* cheilocystidium. Photo © Pauline Penna.

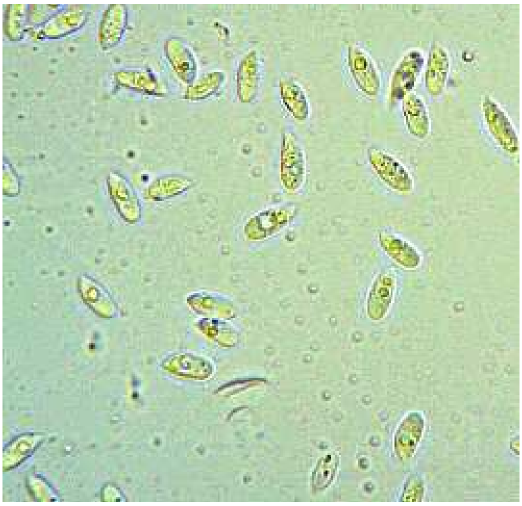

Fig. 5. *C. viscidocruenta* spores as viewed at x1000. Photo © Pauline Penna.

Mycenella trachyspora on roadside verges

Robert Skipper*

As is often the case during the autumn season, I found myself scanning the roadside verges in Surrey during my regular walk to the local shops. It is surprising what can be found in these otherwise disregarded grassy strips. On this occasion I noticed, what I assumed was a small white *Mycena* species growing amongst moss and grass at the base of a large horse chestnut tree (a further collection from under *Betula* is shown in Fig. 1). On our rather dry chalky soil small *Mycena* species growing at soil level are not particular common. So, on my return trip I collected a sample to try to key it out later in the day. My assumption of *Mycena* was immediately challenged by the present of distinct gill face and gill edge cystidia, these being untypically large and tapering to a sharply pointed tip (Fig. 2 above). Some of the gill edge cystidia showed evidence of a yellowish resin-like exudate at their base and the spores were also distinct in being quite small at approximately 5 x 4 µm, close to spherical with obvious nodular warts (Fig. 2 below).

The often-helpful fungal wheel diagrams used in Læssøe & Petersen's (2019) book *Fungi of Temperate Europe* put me on the right track, indicating that my warty spores are likely to belong to the genus *Mycenella*; not a genus I had previously encountered. Geoffrey Kibby's new book does indeed illustrate three species in this genus complete with cystidia and spores. Two of the species, *M. bryophila* and *M. lasiosperma*, are shown with warty spores but both have spore sizes that are rather too large and neither illustrate cystidia matching those on my sample. In the *Fungi of Temperate Europe*, a description of a fourth species, *M. trachyspora*, was provided and for this the spore size range quoted was about right. It did not refer directly to exudate on cystidia, but it did mention the gills showing fine red dots; unfortunately, this was a feature lacking in my sample.

The key to *Mycenella* in MycoKey 3.1 (Læssøe & Petersen, MycoKey.com). refers to the same four species and in its illustration of *M. trachyspora* it does give a clear indication of a deposit of some type over the cystidial surface, while the text refers to "cheilocystidia 45–70 µm long, ± fusiform to fusiform-mucronate, with conspicuous reddish brown resinous incrustations in exsiccate". This later phrase I assume must again be referring to red spots on the dried gills, so except for this last point the details in MycoKey are a good match with my sample. As a final check I dried my sample over a warm radiator for 2 days but on re-examination I could still find no evidence of red spots. MycoKey also refers to the fact that *M. trachyspora* is synonymous with *M. rubropuctata* and both these species are listed in the old Fungal Records Database of Britain and Ireland but with very few records given for either.

On my return to the original roadside location, I could find no additional material. A wider search in similar sites in the local roads did however find several possible suspects and subsequent examination found that seven of my collection were indeed the same species. In the field the pale matt grey cap with a slightly hairy stem

Fig. 1. *Mycenella trachyspora*, collected from under *Betula*. Photograph © Robert Skipper.

grading from white at the top to almost black at the base were the most useful field characters. The fact that the base was frequently rooting was also noted. The normal habitat appeared to be on the raised ground associated with tree roots and with a thin grassy cover. Horse Chestnut and Birch were the most favoured. I was relieved to find that on drying these samples, the majority did show orange-brown spots on the gill surfaces although the intensity of the colour and the number of spots varied widely (Fig. 3). The spots comprise aggregations of reddish orange resin-like material around the base of the cystidia. Re-examination of my original collection showed that it also had such aggregations but far fewer (mainly towards the gill edge) and composed of a much paler resin. It would appear that the presence of red spots after drying is not, on its own, a foolproof characteristic. However under the microscope traces of yellowish exudate could be seen on at least some of the cystidia on all the fresh material collected (Fig. 4) and this may be a more useful character.

Fig. 2. Above: cheilocystidia with sharp points and rather thick walls
Below: spores with warts. Photographed at x800. Photo © Robert Skipper.

I doubt that my local South Sutton streets are particularly unusual or the habitat obviously distinct, it seems more likely that this rather inconspicuous species may just be seriously under-recorded.

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Fig. 3. Gills showing variable amounts of reddish spots after drying; original sample above. Photo © Robert Skipper.

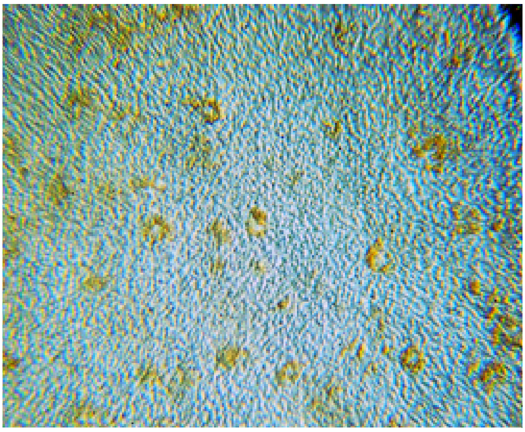

Fig. 4. Resin exudate on fresh gill surface. Photo © Robert Skipper

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Better late than never – the Leicestershire Fungi Study Group's Millennium Year Project

Geoffrey Hall*

In the year 2000, the LFSG embarked on a project to record the fungi in Martinshaw Wood near Groby in Leicestershire at regular intervals throughout the year. The records have been languishing in a box since the project was completed but provide an interesting study of a woodland in the English Midlands. This brief article is a summary of the project report that can be downloaded from the LFSG website, and which gives much more detail: (http://leicsfungi.chessck.co.uk/: Publications, Other Publications from the menu sidebar; the document is in pdf format, 2Mb).

The project had four aims:

1. To monitor fungus populations and activity at a single site.
2. To record changes in species and numbers of fruiting bodies over a full year to allow seasonal changes to be recorded.
3. To use well-defined and repeatable methods that could be used at sites elsewhere and allow comparisons to be made.
4. To allow members of the LFSG at all levels of expertise to contribute to a scientific study, and so is an early example of 'citizen science'.

To produce a complete catalogue of all the fungi in the whole wood over a year was beyond the resources and skills of the group. So, a transect method similar to that used by butterfly recorders was employed (Anon, 2022). It was defined in compartment 6 of the wood through a variety of habitats, and consisted of eleven sectors of 100 m. Fungi were recorded on sixteen occasions in each sector during 2000, by eight participants.

In total, 1156 records were made of 165 species, comprising 22 Ascomycetes, 138 Basidiomycetes, 1 Zygomycete and 4 Myxomycetes. Basidiomycetes represented 83.6% of all the species recorded and reflect both their visibility and the experience of the participants. Very few mildews and rusts, and only a few lichens were recorded, and are under-represented.

Occurrence records followed a typical J-shaped abundance curve i.e., a few species were common, but many were rare.

Fungi were allocated to one of five occurrence categories based on the number of sector records made for each one. Fifteen fungi were in the abundant (>30 sector records) or frequent (21–30 sector records) categories and are the most widespread fungi in the wood: *Crepidotus variabilis*, *Dacrymyces stillatus*, *Diatrype disciformis*, *Diatrypella quercina*, *Hemimycena lactea*, *Hypholoma fasciculare*, *Jackrogersella multiformis* (better known as *Hypoxylon multiforme*), *Laccaria laccata*, *Mycena galopus*, *Paralepista flaccida*, *Stereum hirsutum*, *Stereum ochraceoflavum*, *Trametes versicolor*, *Tricholomopsis rutilans*, and *Xylaria hypoxylon*.

Eleven species (6.7%) were recorded on 10–15 visits, but nine of these have persistent fruiting bodies, so are most likely to be seen in the wood irrespective of season. Sixty-one species (37.0%) were only found on one occasion.

Of the fifty species of generalist Basidiomycetes found in deciduous and mixed woodland in the British Isles listed by Rayner (1979), thirty were found in this part of the wood. None of the species recorded is listed in the *UK Red Data List of Threatened Fungi* (Evans *et al.*, 2006), and there is no Red Data List for fungi in Leicestershire and Rutland. It is dominated by species that have woody or decay-resistant fruiting bodies, such as brackets and crusts, that persist throughout the year on their host trees, and others that produce large and often colourful fruiting bodies and that are easily recognised in the field. Nevertheless, a good range of species was recorded, and it is considered to be a fairly typical example of a lowland wood on clay in the English Midlands.

The effects of management by the owners, The

Woodland Trust, and of climate change on fungi are yet to be understood properly for fungi in mixed woodland, but this study provides a useful baseline for future investigations. The obvious next step is to repeat the survey, but, as a group, we now lack the expertise of some former members.

The data from the project is available to anyone who may wish to undertake a more extensive analysis - please contact the author.

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The use of human senses in the identification of mushrooms part 2: touch

Jonathan Cazabonne*

Touch: A Matter of Receptors and Movements

"*The sensibility of the individual to the world adjacent to his body by use of his body*", Gibson, 1966

After observing a mushroom of interest through your sense of vision and the appropriate use of colours, the next reflex is to collect it and appreciate the shape, texture, and size of the different morpho-elements that make up the fruitbody. Our ability to distinguish different shapes and textures when handling mushrooms is allowed by numerous cutaneous mechanoreceptors situated in the skin's layers, especially at the tip of the fingers (Roudaut *et al.*, 2012). Tactile perception is an assemblage of complex neural mechanisms (Johnson, 2001) permitting the detection of both innocuous and noxious mechanical stimuli. This physical sensibility is surprisingly important for the identification of mushrooms.

In our everyday life and particularly in the field, our sense of vision and touch are continuously interacting with each other (Klatzky & Lederman, 2003). We are often able to associate the mechanical feeling of a particular surface just by seeing it, such as with the glutinous cap surface of *Gomphidius glutinosus*. This bounding link is the memory, which allows us to partner the look of a texture with the sense of touching it (Lacey *et al.*, 2007). Thanks to haptic (= touch) memory or perception, we can rapidly and accurately identify three-dimensional objects (e.g., mushrooms) only by touch (Zhang, 2019).

Haptic perception is frequently described as a way to see with our hands. However, caution must be taken when identifying a mushroom based solely on the use of vision, as touching makes it possible to confirm or perceive new characters useful for identification that vision hasn't been able to catch.

Touching is particularly efficient when it is used in an active way. Haptic perception consists of active exploration of the handled object thus being associated with our hand movements over the mushroom. It can be via moving our fingers over the outer surface of the mushroom or by holding it entirely in our hands. In field mycology, touch is mainly involved in the perception of shape, size, and texture patterns. In this paper, I use the term texture patterns as described by Lederman (1982) — for example, roughness, smoothness, hardness, stickiness, slipperiness, oiliness, coarseness, or graininess — with the caveat that hardness is more about pressure resistance than texture perception. Even if this may seem obvious, I'd like to emphasise that touch is exclusively used in the perception of macroscopic characters and not microscopic characters.

• Static touch-induced taxonomic criteria

First and foremost, the use of our hands allows us to feel the consistency of the mushroom. This is a way to guess the 'fragility' of the specimen. When we feel a typical *Agaricales* in our hands, we may guess a filamentous texture and consistency since the fruiting body is nothing but a set of mycelial filaments (or hyphae) so agglomerated that we can see them with the naked eye. In the case of the genera *Russula* and *Lactarius* s.l. however, the fruitbody is made up of a series of inflated hyphal cells that easily break apart from each other. As a result, the macroscopic impression is that the stem breaks like chalk, unlike other mushrooms that are filamentous. Also, the gills of *Russula* spp. will usually break into several pieces when brushed by a finger. The generally stiff stem of *Marasmius* s.l. compared to *Mycena* s.l. can be cited as another example of differences in texture. The vocabulary associated with touch is still quite debatable, with definitions varying greatly from one mycologist to another.

Josserand (1983) rightly points out how certain meanings can be misleading in the descriptions by certain authors. However, such semantic subtleties are still important to take into account, such as the differentiation between firmness and hardness, or the fact that consistency (perceptible by touch) should not be confused with appearance (mainly perceived by vision). For instance, *Auricularia auricula-judae* has an elastic consistency, rather firm and tough, but still flexible; whereas a typical polypore will have the consistency of wood, firm and hard (not pliable) while the flesh of *Russula* spp. and *Lactarius* spp. will be firm but brittle. The branched *Calocera viscosa* has a gelatinous appearance and is rather elastic, which differentiates it from other branched or coralliform mushrooms. The nature of the gills might be determined by touch, i.e., whether they are 'true' or "false". *Hygrophoropsis aurantiaca*, the false chanterelle, has real gills while *Cantharellus cibarius*, the golden chanterelle, has false gills. The latter—basically gill-like mushroom folds—are much tougher to the touch and look more like elongated ridges than gills attached to the cap.

Our hands allow us to perceive the shape (thus the size) and weight of the handled mushroom. For texture, one can tell by touching the cap's surface whether it is viscous, while one can sometimes also tell this solely by looking at the presence of plant debris that has been 'glued' to the cap. On the other hand and against all odds, knowing the mushroom's weight can be surprisingly informative. Weighing and pressing might allow one to guess, without having to open the specimen, the presence of porosity or cavities. A classic example comes from *Suillus cavipes* that shows a distinct hollow stipe. This characteristic is also found, more or less pronounced, in species belonging to *Gyroporus* (e.g., *G. castaneus*) or *Craterellus*. This "technique" should be used with caution however since these cavities can fill with water and distort the interpretation (e.g., *Lactarius trivialis*, see description in Eyssartier & Roux, 2017). The passage of mycophagous insects and slugs through the mushroom may also create unexpected holes. *Pleurotus eryngii* for example is known to be frequently attacked by larvae. It is therefore recommended to always open the stem to check for cavities and biological activities, allowing additionally to distinguish between entirely (e.g., *Russula delica*, deeply hollow) or partially (e.g., *Gyroporus cyanescens*, unconnected holes) hollowed mushrooms.

Similar to the use of vision and colours, these characters are so important for field identification that many species are named after them, i.e. *Mucidula mucida* (Fig. 1) where both parts of its name refer to its slimy or mucous-like texture. Notwithstanding, these characters are often insufficient if they are only considered from a static perspective. Dynamic changes may be complementary and often decisive in the field.

Dynamic touch-induced taxonomic criteria

Even when normally air or drying-induced (see Cazabonne, 2021), colour changing throughout the whole mushroom can be enhanced by the

Fig. 1. *Mucidula mucida* has an extremely glutinous cap surface when fresh. Photograph © Mario Tortelli.

touch. One of the best-known examples is *Ganoderma applanatum*, often referred to as the artist's bracket. The passage of our fingers on the pores leaves a marked brownish stain and has therefore been used by artists as a medium to create pictures. The mechanism behind this phenomenon is similar to the one when you cut or injure an apple and leave it in the open air. This is an oxidation phenomenon involving phenolic compounds (or tannins). These compounds have a certain colour in the living fungal cell but when they are touched, cell content is released, and the phenolic compound will change colour by reacting with air. For *G. cyanescens*, the oxidation process involves gyrocyanin (Besl *et al.*, 1973), a pigment that turns blue in contact with air. In other boletes, blueing or reddening is more likely to be linked with the oxidation of variegatic or xerocomic acids (Gill & Steglich, 1987).

The function of these phenomena induced by touch is quite unknown, but they probably have an antioxidant role in catching oxygen. If oxygen enters the cell it can create free radicals that can further damage the cells (Dalton, 1995). *Boletales* s.l. are well-known to react quite spectacularly to touch (e.g., browning pores of *Suillus grevillei*; darkening squamules of *Leccinum albostipitatum* and blueing pores of *Gyrodon lividus*, *Buchwaldoboletus hemichrysus* or *Suillellus luridus* (Fig. 2)).

Not all boletes show changing colours, such as pores of some *Butyriboletus* spp. or *Hemileccinum* spp. and boletes are not the only fungal groups with such features. *Russula* spp. also have changing colours from blackening directly (e.g., *Russula albonigra*) to reddening (e.g., *Russula acrifolia*). Whether we are dealing with the cap, hymenium, or stipe, they can all potentially show a wide spectrum of colours when they encounter our hands.

The change in pigmentation occurs with different intensities. *Gyroporus cyanescens* has intense and immediate changing colours (cyanescent blue) which earned it its binomial name. The gills of *Russula luteotacta* however, turn yellow strongly but very slowly when bruised, whereas a morphologically similar species, *Russula persicina*, shows quicker but only slightly yellowing gills, thus the changing of colour can be of various speeds. Hyphae situated on the cap's surface of *Agaricus brunneolus* turn slowly yellow when touched. In contrast, *Cyanoboletus pulverulentus* turns dark blue very quickly.

These changes may vary in different parts of the fruitbody. When touched, *Agaricus augustus* has both a quickly yellowing pileus but a slowly yellowing stipe. The act of touching doesn't necessarily lead to one unique colour change. One

Fig. 2. *Suillellus luridus* showing the characteristic blueing of all its parts when bruised. Photograph © Geoffrey Kibby.

species can have a succession of different colours over time. Even if we combine all these taxonomic criteria, inter-specific variations can be subtle such as between the tubes of *Lanmaoa fragrans* (turning brown-blue) and *Cyanoboletus pulverulentus* (dark-blue). Specimens of the same species are likely to show a range of colour changes, like *Daedaleopsis* spp. with pores turning pink, red or reddish brown after touching (Fig. 3). Then, the colour change does not occur all the time, and clearly different colours may occur on two different specimens of the same species or genus. *Rigidoporus* species sometimes turn red or black when touched, but not always.

Biases and limitations

The environment or substrate on which the fungus is found developing can greatly influence our perception of many touch-related taxonomic criteria. Firstly, some of these characters may disappear according to the weather. In their North American Boletes book, Bessette *et al.* (2000) noticed that caps that are initially viscid or glutinous when fresh can become shiny and dry to the touch in dry weather. Similarly, in a humid climate or during a rainy day, a normally dry cap can become greasy to the touch. This kind of situation can make identification by touch difficult, notably in genera where you can find both naturally viscous and dry caps, such as *Suillus* or *Cortinarius* spp. Indeed, the dryness of a specimen (which can be predicted by our sense of vision and touch) can influence the colour-changing reactions. Pores of *Strobilomyces strobilaceus* turn red only when touching fresh specimens. This type of character may change completely when dried.

Touching, ageing, and drying may lead to the same final colours, such as the darkening phenomena happening on *Ischnoderma* spp. after touching or by ageing, but this is not a general rule. Pores of *Daedaleopsis* spp. usually turn from white-grey to brown when ageing, but the same pores can shift to pink/red when touched. The hymenium of *Trametes gallica* can turn white or brown by both touching or ageing. The pores of *Meripilus giganteus* can go black with touch or while ageing. In addition, the related intensity and speed may also vary with the age and dryness of the specimen.

Conclusion

I have discussed how touch can directly enable fungal diagnosis. Touching a specimen reveals taxonomic criteria that can be perceived by other senses, such as by vision for colour changes or even odours by rubbing gills. If you want to physically 'feel' a mushroom, you must be

Fig. 3. *Daedaleopsis confragosa* whose pores bruise from pink to reddish brown when handled. Photograph © Geoffrey Kibby.

dynamic. You can’t tell if it’s smooth or rough by just putting your fingers down; allowing you only to perceive the local relief and pressure resistance. Whether you are looking for direct or indirect taxonomic criteria, you must systematically touch the specimens you encounter. I know that many people are afraid to handle species that are known to be toxic or even deadly. To date, no species of mushroom, in Europe at least, has been proven to be naturally toxic or lethal to the touch (Starwood, 2021).

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Demystifying Hebeloma

https://hebeloma.org/ is live! Its launch was recently announced in IMA Fungus (Bartlett *et al*. (2022) 13:18). This dynamic website is underpinned by a database of almost 10,000 *Hebeloma* collections that have been amassed over the past twenty plus years covering over 135 species worldwide, and includes almost all type collections. The website provides a direct public ‘view’ into the database. The website provides full species descriptions, information on every *Hebeloma* name ever published, tools for species comparisons, species parameters, species geography and habitats as well as an AI machine learning based species identifier. Most importantly it is all, even the species identifier, automatically updated as new information becomes available.

Most database collections have been identified to species level using both molecular and morphological data in addition to locality, host and habitat information. Almost all collections have an associated ITS sequence and often sequences from several distinct genetic markers. The morphological descriptions have been parameterised and micro-morphological characters are available for about a third of the collections.

This analytic tool, alongside phylogenetic analysis, has enabled a better understanding of a genus that has hitherto been described as ‘difficult’. This work may be considered as a proof of concept that a structured and methodical approach to morphology can advance species recognition even in difficult groups.

Peter Bartlett, Henry Beker, Ursula Eberhardt

Dead wood saves the day

Andy Overall[1]

During the spring and summer of 2022 I and other field mycologists were witnessing the hottest, driest weather that the UK has ever seen. Temperatures rose above 40º C at Heathrow and in Kew Gardens and water bans were put in place across many parts of the country.

I had started the second phase of my Bushy Park fungi survey during April, which was to carry on through to August 2022. These extreme, dry conditions did not bode well. The survey had a good start in the spring, with *Entoloma clypeatum* and possibly also *Entoloma saepium* (I am hoping to have this sequenced) with *Rosaceae* and *Prunus* respectively, but as we moved into the summer months things began to get tougher.

This recalled a similar period back in 2003 when similar conditions prompted me to write an article for FM on Hampstead Heath, entitled *All is not lost in a dry year on Hampstead Heath* (Overall, 2004). The focus of the article was the many fungi appearing on dead wood during such dry conditions. My attention during this survey therefore was concentrated on dead wood specialists. Thankfully, Bushy has a an excellent dead wood management programme, with fallen and standing dead trees scattered about the park.

One particular area of note is tucked into woodland just east of the Woodland Gardens in compartment 39b. A wide track, lined on the east by *Carpinus betulus*, has a number of large woodchip heaps, which during Phase 1 of the survey produced some excellent fungi (Overall, 2022). Immediately behind the heaps is an area where poplar and ash trees have been allowed to rot down, fall or stand in situ. This has created a fabulous habitat for wood rotting fungi such as *Pluteus*, *Volvariella*, *Fomes*, *Ceriporia* and *Aurantiporus* among others.

Fig. 1. A very impressive fruiting of *Laetiporus sulphureus* on a willow. Photograph © Andy Overall.

Fig. 2. *Leucocoprinus cepistipes*, a thermophilic species found on the large piles of woodchips. Photograph © Andy Overall.

However, as good as this area was I couldn't spend all of my time there, I had to take a look at the rest of the park. In doing so and with dead wood in mind, I could not believe the number of times that I saw *Laetiporus sulphureus*, either on fallen dead wood or on a variety of live standing trees. One particular willow had the most impressive fruiting I've ever seen, appearing not unlike a big bunch of bananas. (Fig. 1)

Another fairly frequent fruiter was *Cyclocybe aegerita* on poplar stumps in the Pheasantry, this had fruited no less then three times in consecutive months April & May.

My subsequent visits to the park all began in the Woodland Gardens, slowly making my way to the woodchip heaps, which, during each visit, provided new and special surprises. Among the large fruitings of *Coprinopsis lagopus*, Hares Foot, were small groups of the heat-loving *Leucocoprinus cepistipes*, which is more often seen in greenhouses (Fig. 2).

Another, larger ink cap had fruited in a larger cluster, matured and dried in situ without completely deteriorating. I was able to get some photographs and a decent collection. This appeared to be the very rare *Coprinopsis strossmayeri*, only known in Britain from two sites (Figs 3 & 4).

Among the more mulchy edges of the woodchip heaps an *Agaricus* species had been appearing over the past few visits. I took photographs and finally made a good collection (Fig. 5). My initial thoughts were that this might be *Agaricus subrufescens*, a rare species which I'd seen a couple of times before, once at Queens Wood NW London, back in the early 2000's and then later at Wimbledon Common. The other option would be the far more common *Agaricus bisporus*. Examination under the microscope revealed 4-spored basidia thus ruling out *A. bisporus*.

To have a more precise determination I knew I had to have the *Agaricus* DNA sequenced. So I arranged for this, together with the suspected *Coprinopsis strossmayeri* (probably a species complex so labelled as 'agg.') and *Leucocoprinus cepistipes*, to be sent to David Harries for DNA extraction which would then be sent onto Aberystwyth University for sequencing. Luckily, all three returned good sequences and all three confirmed my determinations.

Fig. 3. *Coprinopsis strossmayeri* agg., a rare species, known so far from only two previous British sites but perhaps spreading. Photograph © Andy Overall.

Fig. 4. *Coprinopsis strossmayeri* agg., younger specimens showing the characteristic coarse scales on the caps. Photograph © Andy Overall.

Details of the illustrated collections

Coprinopsis strossmayeri (Schulzer) Redhead, Vilgalys & Moncalvo (agg.)
Cap 50–110 mm, conical, bell shaped, cream to black, covered in white velar patches.
Gills crowded, cream to black.
Stem 80–130 x 8–10 mm, fragile. Connected to mass of reddish rhizomorphs.
Smell strong, fungoid.
Spores 8.7 x 4.9µm (Average from 10 measured spores), oblong, with distinct germ pore.

Velar cells distinctly diverticulate.
Fruiting from large woodchip pile.

This is a rare species that was only recently recorded as new to Britain, from Warwickshire (Douglas *et al.*, 2000). A further record from Aberdeenshire, Scotland, was added during 2021. This is a large species, similar in size to *Coprinopsis atramentarius*, inhabiting woodchip mulch and similar deadwood habitats, fruiting in large clusters from a mass of reddish rhizomorphs. It has long lasting velar patches on the cap and a strong, fungoid-like odour.

Leucocoprinus cepistipes (Sowerby) Pat.
Cap 20–50 mm, white, granular, scaly, tubular, convex.
Gills white, fairly well spaced.
Stem white, scaly, smooth, base bulbous.
Ring ascending with darker edge.
Flesh white-cream, bruising brown.
Spores 8.6 x 6.4 µm average from 11 measured spores, variable, subglobose to ellipsoid, thick-walled with small germ pore.
Cheilocystidia clavate with long, often bifurcate ends.

An occasional yet widespread species, with around 60 records on the FRDBI since the 1800's. A species that thrives in heated environments such as greenhouses or from the heat generated from within large woodchip piles.

Agaricus subrufescens Peck
Cap 50–120mm, hemispherical, convex, flat, whitish with small scales.
Gills pinkish grey to brown, free.
Stem 50–150 x 10–15mm, cylindrical, base swollen with white mycelial cord.
Flesh white, minimal bruising reddish, odour sweet, almond-like.
Spores ellipsoid, 6–7.5 x 4–5µm
Fruiting on the edge of large woodchip pile in more mulch-like conditions.

A rarely recorded species with less than 20 records on the FRDBI dating from 1997. All of these records are concentrated in Surrey or Middlesex.

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Fig. 5. *Agaricus subrufescens*, a rare and probably invasive species favouring deep woodchip piles. Photograph © Andy Overall.

Exciting finds on a Scottish adventure

Mario Tortelli*, Geoffrey Kibby*, & Claudi Soler*

In September of 2022 the authors, along with Antony Burnham, Peter Rönsch and Peter Smith, rented a house for two weeks in Nethy Bridge, Strathspey, Scotland, with our primary intention to record fungi in the surrounding woodlands, many of which are under threat from development.

This area, situated on the edge of the Cairngorms National Park, is extremely rich in fungi and has been studied by many mycologists over the years, perhaps most famously by Peter Orton who taught at Rannoch School, Perthshire and described several new species from Scotland as well as publishing a very useful tabulation of all the agarics and boletes that he had found to be characteristic of Highland pine and birch woodlands (Orton, 1986). More recently Liz Holden, who has lived in the area for many years has conducted extensive surveys there.

So, there is a good existing knowledge of many of the species to be found there, but like any large wooded area the list is never complete; the more often you visit the more species you will continue to add. Peter Orton expressed this best in his 1986 paper: "*So it is rarely possible to go out during the agaric season without finding something that does not seem to be described or cannot immediately be assigned a name. Filling in all the gaps takes a long time and I suspect the process will go on for some time yet. Another problem is that some species appear to fruit only occasionally, so that they may be present in a given area all the time, but unless the right person happens to be in the right place at the right time they will remain undetected.*"

Also some genera are notoriously difficult, e.g. *Cortinarius* and *Russula* usually require specialist knowledge to identify.

Fig. 1. *Cortinarius bataillei*, in deep beds of *Polytrichum* moss. Lettoch Road Wood, Strathspey, September 2022. Photograph © Mario Tortelli.

We had visited the area previously and had the good fortune to meet local naturalists Gus and Tricia Jones who live just a few metres up from the house where we stayed. They were incredibly helpful in showing us potential sites, letting us know of interesting fungi they had seen, and finally, by helping us to obtain a grant from the Badenoch and Strathspey Conservation Group to have important finds sequenced so as to confirm our determinations.

Our visit followed the longest and driest summer that most of Britain, including Scotland, had experienced. But there had been some heavy rain just prior to our visit so some fungi were starting to come through, although many woodlands were still fairly unproductive.

Cortinarius

Because of the dry conditions we started to concentrate our efforts on boggy areas and we had some very good results by doing so. One of our objectives was to continue to expand the list of *Cortinarius* species found there, having added several new species to the British list in the previous year. An exciting find was a large group of the rare *Cortinarius bataillei* (Fig. 1), a member of the subgenus *Dermocybe* and best distinguished in the field by the pinkish orange colour of the lower stem combined with the deep orange gills.

Russula

The genus *Russula* is of particular interest to two of us (GK & MT) and on a visit to Beachen Woods, Grantown-on-Spey, we were thrilled to find one species not familiar to us at all and another which we recognised as rare. Both were found along the edges of a disused railway line that bisects the woodland and which is edged predominantly with *Betula* and *Populus tremula*.

The first collection was a bright yellow-orange with ochre gills and a taste which started mild but soon became unpleasantly acrid (Fig. 2). The collection was sent for sequencing to Alvalab in Spain (www.alvalab.es) and was a 99.5% match on GenBank to vouchers of *R. aurantioflammans* Ruots., Sarnari & Vauras, a species described from Finland and with which it agreed in all aspects morphologically. This is the first record from the British Isles.

The second collection was found with aspen and was of a large greyish green *Russula*; clearly a member of the subsection *Griseinae* that contains such familiar species as *R. parazurea*, *R. grisea* and *R. ionochlora*. Unlike those species however, that have white or pale cream spores, its spore deposit was a dark ochre, IIIb on the Romagnesi scale of spore colours (Romagnesi, 1985). This dark spore colour along with the tree host immediately pointed to the rare *R. medullata* Romagnesi (Fig. 3) and subsequent sequencing was a 100% match to numerous sequences on GenBank. This species has been recorded a couple of times before in Scotland.

Inocybe is a large and difficult genus to identify, and becoming more so with every passing day. In the last three years over 80 new species have been described from Europe, a number of which have already been recorded from Britain. During our stay we collected two samples, the first from the Dell Road, Nethy Bridge and the second from Culbin Sands, both under *Pinus* and *Betula* and clearly the same species. They had tawny yellow caps, an elegant white stem with a moderately large, marginate bulb and warty spores (Figs 4 & 5).

Attempts to key them out were not very successful; clearly something in the *I. mixtilis* group but a recent revision (Esteve-Raventos *et al.*, 2018) had described several new species, so a specimen was included in our batch of collections for sequencing. The sequence returned as a 99.82% match to that of the type of the newly described *Inocybe occulta* Esteve-Rav., Bandini, B. Oertel & G. Moreno, with all morphological and habitat characters also agreeing, so another addition to the British list.

Down the mouse hole - two rare fungi

Another person we were privileged to meet up with was Stewart Taylor, a local tooth fungus expert who has written articles on the Scottish species for Field Mycology and who, on our previous visit, had shown us a number of interesting sites for hydnoid fungi. On this trip he offered to show us some newly found sites in Nethy Bridge for the rare *Hydnellum gracilipes* (Fig. 6). This is small and very difficult to find, its preferred habitat being small holes in banks, usually under a covering of heather. With all of us searching we soon uncovered not just the sites that Stewart already knew of but new sites also.

Some of the holes appeared as if made by small rodents and while pushing aside the

Fig. 2. *Russula aurantioflammans*, collected under *Betula* and *Populus tremula* in Beachen Woods, Grantown-on-Spey, Scotland, August 2022. Photograph © Geoffrey Kibby.

Fig. 3. *Russula medullata*, a large and rare species associated with *Populus tremula* and distinguished from other British members of subsection *Griseinae* by its dark ochre spore deposit. Beachen Woods, Grantown-on-Spey, Scotland, August 2022. Photograph © Geoffrey Kibby.

Fig. 4. *Inocybe occulta*, a recently described species now recorded from Nethy Bridge and Culbin Sands in Scotland. Photograph © Geoffrey Kibby.

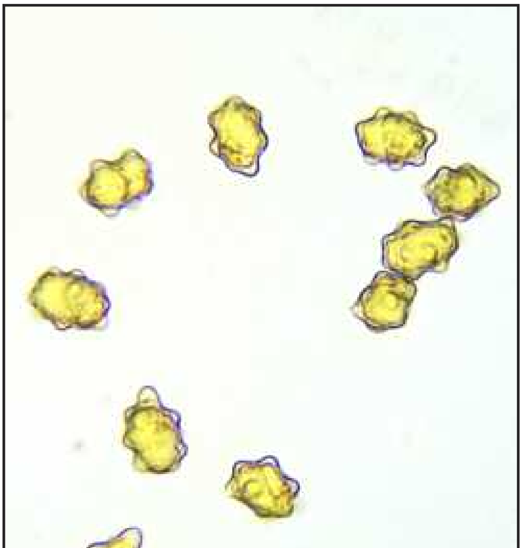

Fig. 5. Nodulose spores of *Inocybe occulta*. Photograph © Geoffrey Kibby,

heather to photograph the *Hydnellum* we were surprised to find a second, different fungus. This was a small, bright yellow fan- or funnel-shaped species unknown to most of us present. Stewart however knew it immediately. It was the very rare *Stereopsis vitellina* (Figs 7 & 8). This intriguing species was first recorded in Britain in 1909 from Boat of Garten, Abernethy Forest, Scotland, not far at all from where we were in Nethy Bridge and only refound nearly 100 years later in 1999 by Peter Orton in company with Stewart, very close to the spot where our photographs were taken.

Stereopsis vitellina is one of just two species recorded in Britain assigned to this genus, the other being *S. hiscens*. Like *Hydnellum gracilipes* it seems to like growing in small holes in banks and we could not help wondering if perhaps there was some association between the two species as in each case where we saw the *Hydnellum* the *Stereopsis* was also present. It will be interesting to see in years to come if this co-occurrence is a regular feature of the two species. It is also intriguing to speculate on how the spores of these fungi are dispersed as there

Fig. 6. The rare *Hydnellum gracilipes* inside a deep hole underneath a bank of heather. Unlike other *Hydnellum* species it can often be entirely bracket-like without an obvious stem. Photograph © Geoffrey Kibby.

Fig. 7. *Stereopsis vitellina* (left) growing alongside *Hydnellum gracilipes* (right) in the same hole on a heather-covered bank in Nethy Bridge. Photograph © Geoffrey Kibby.

Fig. 8. A particularly fine group of *Stereopsis vitellina*, growing alongside *Hydnellum gracilipes* (at left, arrowed). Photograph © Stewart Taylor.

can be little to no air movement inside these enclosed holes. Perhaps small mammals or invertebrates play a part in their dispersal.

Stereopsis vitellina appears to be centred around the Abernethy area, having been recorded from 54 locations there, mostly by Stewart Taylor with a few earlier records by Peter Orton. Of course this may just reflect the presence of mycologists who know where to look! Perhaps searches elsewhere in Scotland in suitable habitats might reveal further populations.

For further information on this species and why it is not really a *Stereopsis* see Henrici, 2022)

Psilocybe

On a visit to School Wood, Nethy Bridge a large number of a handsome *Psilocybe* species (Fig. 9) were found by MT in company with Gus Jones. It was growing in a troop on fallen woody debris in *Sphagnum* moss. Its spores were ellipsoid, 9.4–10.2 x 5.4–5.8 µm and it had numerous lageniform cheilocystidia with long, narrow ends. In *Funga Nordica* (Vesterholt, 2012) this keys directly to *P. medullosa* with which it is a very good match morphologically. Sequencing however did not produce a particularly good match so for the moment we refer to it as *P.* aff *medullosa.*

Amanita

A number of specimens were observed under birch of a rather attractive *Amanita* in the section *Vaginatae*. They slightly resembled the familiar *A, fulva* but the cap colour was a duller, more milky coffee to hazel-brown (Fig. 10). The stem was concolorous while the large volva was strikingly white and unstained, unlike *A. fulva* where the volva is usually spotted rust-red. The edges of the gills were faintly edged with brown. Our provisional identification as *A. betulae* was confirmed when sequenced with a 99.82% match with several vouchers of this species. It appears to be a rather uncommon species in Britain, although widely distributed, particularly in more northerly and western areas in our experience.

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Fig. 9. *Psilocybe* aff. *medullosa*. A rather large species with caps up to 2.5 cm across, found in troops in *Sphagnum* on fallen woody debris. School Wood, Nethy Bridge, August 2022. Photograph © Mario Tortelli.

Fig. 10. *Amanita betulae* with its very white volva contrasting with the hazel-brown stem and cap. Photograph © Geoffrey Kibby.

Fungi on a living and then dead elm

Graham Mattock[1]

For many years a standing dead elm by the fence of St. Cross Hospital, Winchester had supported magnificent growths of the common Dryad's Saddle, *Polyporus squamosus* (Fig. 1). In 2020 the tree was removed for health and safety issues, it being by the side of a well-used footpath. Fortunately the timber was not removed from the site, with the cut logs being placed some one hundred yards distant along a field boundary.

In 2021 inspection of the rotting wood pile showed only limited signs of fungal activity. During a return visit in late autumn 2022 I was pleasantly surprised by the number of fungal species now present. There were impressive growths of the Veiled Oyster, *Pleurotus dryinus* (Fig. 2) and the Flame Shield, *Pluteus aurantiorugosus* (Fig. 3). The *Pluteus* has special significance because after searching several databases this sighting would appear to be a new Hampshire county record for *P. aurantiorugosus*.

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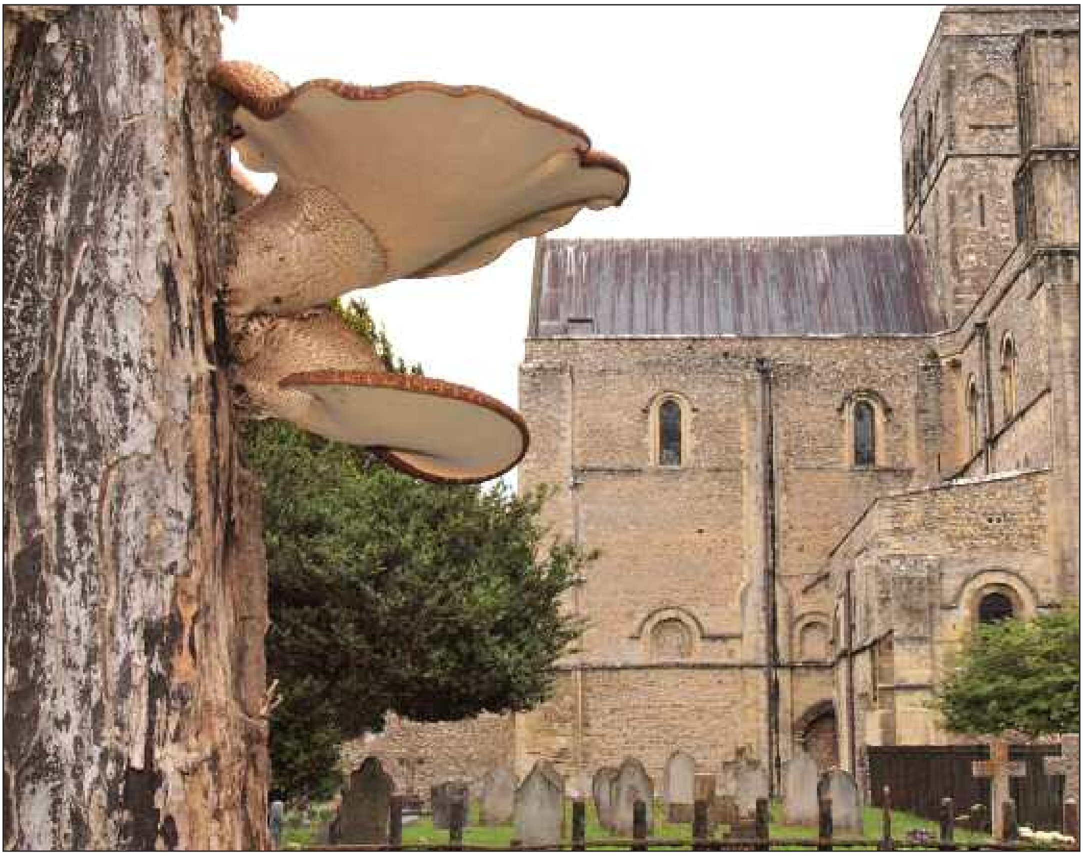

Fig. 1. Large specimens of *Polyporus squamosus*, Dryad's Saddle fruiting on a standing elm tree which has since been cut down. Photograph © Graham Mattock.

Fig. 2. Specimens of *Pleurotus dryinus*, the Veiled Oyster with typical greyish brown caps showing the remains of the white veil around the edges and which characterise the species. Photograph © Graham Mattock.

Fig. 3. *Pluteus aurantiorugosus*, Flame Shield has a particular liking for dead elm logs although it will also grow on other tree species. Photograph © Graham Mattock.

Wormwood Scrubs: an unexpected mycological treasure trove

Geoffrey Kibby[1]

Wormwood Scrubs is perhaps most famous for the eponymous prison nearby but the actual site is a large (76.8 hectares), municipal grassland in the borough of Hammersmith & Fulham in West London, edged with mixed deciduous woodland and with a few 'islands' of trees at its centre.

A preliminary survey of the area was requested by Netty Ribeaux who works for the RSPB and *i*dverde who are both managing the site and recording the wildlife of the area. In attendance at the survey were two other staff members, Freya Prince and Kate McVay, plus three mycologists, Alick Henrici, Geoffrey Kibby and Mario Tortelli. Despite initial doubts by the mycologists about the potential mycological value of the area a surprising number of very interesting species were found.

Crepidotus cinnabarinus Fig. 1

This striking species is quite unmistakable and is quite likely an 'alien' invader of these shores. In Britain it was first recorded in Hertfordshire in 1995 but has since been found in a number of English counties as far north as Warwickshire and with previous records in both South and North London. Its finding caused great excitement as it was a species the mycologists present had all wanted to see ever since its discovery. The caps were quite small, just 1–2 cm across and at first I thought we had found the similarly coloured and also invasive *Favolaschia claudopus* (better known as *F. calocera ss. auct.*).

Apart from the beautiful bright orange and very hairy cap surface it has the additional feature of its gills being edged with dark red, reflecting the presence of numerous coloured cheilocystidia.

Fig. 1. *Crepidotus cinnabarinus*, certainly the easiest to identify and most striking species in its genus to be found in Britain. Note the red gill edges on the upturned specimen at left. Photograph © Mario Toretelli.

Fig. 2. *Laccaria macrocystidiata* showing the darkening of their stems. Inset: a single cheilocystidium over 100 µm in length. Photograph © Geoffrey Kibby.

Laccaria macrocystidiata Fig. 2
A troop of a large *Laccaria* was found and the first idea was that it might be *L. proxima* but they lacked the coarsely fibrous stems and rather scaly cap surface of that species as well as not having a strong raphanoid odour. Later microscopic examination confirmed that it was not that species as the spores were perfectly round (they are ellipsoid in *L. proxima*). Most striking were the entirely sterile gill margins which instead were lined with extraordinary numbers of very large and flexuose cheilocystidia (Fig. 3). These large cystidia, up to 100 µm in length or even longer, are a feature of *L. macrocystidiata*, a species that was added to the British list in 2019. Also in agreement with that species was the tendency for the stems to darken considerably, a feature pointed out in the recent study of the species by Dovana *et al.*, 2021.

Fig. 3. Sterile gill edge of *L. macrocystidiata* with prominent cheilocystidia . Photograph © Geoffrey Kibby.

Fig. 4. *Mycena olida*, a small but attractive species frequent at the base of standing trees. Photograph © Mario Tortelli.

It is possible that this species might be quite widespread in Britain but is easily overlooked or mistaken for *L. proxima* unless microscopic examination is made.

Mycena olida Fig. 4

This is not a particularly uncommon species although it is often overlooked because of its small size. It is a mainly found growing at the base of deciduous trees, either on the root buttresses or on the lowest part of often mossy trunks. It is white with just a hint of greyish brown at the cap centre and translucently striate when wet, As with most *Mycena* species microscopic examination of spores and gill cystidia is required to confirm species identification. In this case the cheilocystidia are smooth and lageniform-ventricose.

Despite the specific epithet *olida*, which means having an unpleasant smell it is often, or even usually, odourless. It is one of a number of small to tiny species to be found on the trunks of living trees.

Cheimonophyllum candidissimum Fig. 5

This species is one of several very small, white, crepidotoid fungi that occur on rotten wood, the commonest being *Clitopilus hobsonii*, which is indeed what this collection was thought to be when found. However, when examined later by Alick Henrici he was very surprised to find that it was instead the much rarer species, *Cheimonophyllum candidissimum*. Its specific epithet means ‘very white’, which is a fitting name for this beautiful snow-white species.

Alick was particularly pleased to identify this as he had, as he later said, been looking for it for over 30 years! It has almost globose white spores 5–6 µm across (unlike its lookalike *Clitopilus hobsonii* which has ellipsoid and ridged pinkish spores) and branching, coralloid cheilocystidia.

Although it is possibly overlooked because of its diminutive size of just 5–15 mm across it is certainly uncommon based upon Alick’s extensive collecting experience. As related in Alick’s regular column (Henrici, 2016) there are eleven sites listed in FRDBI but just two collections in the Kew fungarium. Most records occur from the more northern parts of Britain, West Sussex being its most southerly record to date, so its presence here in West London is notable.

The actual collection was sadly notpho-

Fig. 5. *Cheimonophyllum candidissimum,* a diminutive species found on rotten logs. Photograph © Michael Loizides.

tographed on the day but we are grateful to Michael Loizides for permission to re-use a photo of his that appeared in an earlier edition of Field Mycology (12(2): 50).

Pappia fissilis Fig. 6
As with so many other fungi the taxonomy of polypores is changing all the time. This uncommon, large species (up to 20 cm wide) is better known as either *Aurantiporus fissilis* or *Tyromyces fissilis*, depending on the literature consulted. The latest phylogenetic work on the subject has placed it as the type species of the new genus *Pappia*.

It has been recorded on a very wide range of hosts, mainly deciduous trees but also more

Fig. 6. *Pappia* (= *Aurantiporus*) *fissilis* is a very uncommon, large, rather soft polypore which has been placed in a number of genera over the years. Photograph © Geoffrey Kibby.

rarely on conifers and is described by Ryvarden & Melo (2014) as generally a rare species and this is certainly my experience in Britain where I have seen it just once or twice.

The white fruitbody may be tinted slightly pinkish as seen here and it spores are broadly ellipsoid to almost subglobose, 4–5 x 3–4 µm. It also has globose, thick-walled chlamydospores 4–10 µm across.

Peziza flavida Fig. 7

This rather brightly coloured species was found in some numbers on two of the several large heaps of compost and woodchips maintained on site. Their yellowish colour reminded me of very similar collections found at Kew on some of the mulched beds, both in the gardens and in some of the glasshouses.

Discussion with Brian Spooner, the cup fungus expert and former Head of Mycology at Kew confirmed that these were indeed the same species: *Peziza flavida*. This is a rather poorly known species originally described by W. Phillips in 1887 from Moccas Park in Herefordshire as *Peziza micropus* var. *flavida*.

Its ascospores are 16.0–20.5 x 8.0–10.0 µm and its asci stain blue at the tip in Melzer's reagent.

1. Editorial address

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Fig. 7. Peziza flavida, growing in some numbers on woody compost

Notes and Records

Alick Henrici[1]

Despite repeated pleas from the editor, I have once again finalised this column only at the last minute. But at least this allows me to comment on my foraying in southern England in this year's November, at the end of a season when the weather has been as topsy-turvy as the country's finances.

An odd November

Much of my foraying is done in sites that I have been visiting at all times of year over twenty years or more. This November three sites have all been producing surprises. In Perivale Wood in Middlesex the surprise was a negative. *Clitocybe nebularis* in many past years has fruited there in large rings in huge numbers. This year there were just four fruitbodies, possibly members of a single failed ring. By contrast *Lepista flaccida* (for some *Paralepista flaccida*, for yet others *Clitocybe inversa*) was growing throughout the wood in dense rings in unprecedented numbers. What was so wrong for the one and so right for the other??

In Kew Gardens there were both positives and negatives. Good material appeared in November of a large, pale, cystidiate *Laccaria* growing in luxurious clumps under hornbeam which does not seem to fit the usual *L. laccata* and awaits sequencing to see if it fits some other known species. The negative was the apparent total failure to fruit of the entire Kew waxcap community (up to ten species in November in good years) with the three common *Clavulinopsis* species that usually accompany them equally absent, despite plenty of mild wet weather. Things like this will be familiar to any regular forayer, but they still require explanation. As another instance, in the very productive November visit to Wormwood Scrubs described elsewhere in this issue nobody saw a single ectomycorrhizal fruitbody (no *Russula*, no *Cortinarius*, no *Inocybe*, etc, etc.).

All those new Russulas

There is a *Russula* new to Britain in this issue and there was another in the first issue this year and two others last year. How long can this go on? I've done some historical research. George Massee (1895) recognised 61 British species (and maintained that 51 of them occurred in Kew Gardens!). 50+ years later Pearson (1948) recognised 66 species and 13 varieties. The 'New Check List' (Dennis *et al.* 1960) had 87 species, but only one variety (now the green colour form of *R. sardonia*). This reflected Orton's view of varieties as unproductive fence-sitting. By contrast Rayner (1985) in the last edition of his *Russula* keys included 115 species and 12 varieties (many of these treated briefly and sceptically). The printed CBIB checklist (Legon & Henrici, 2005) had 140 species, a few included only 'with reservations'. This rather surprisingly dropped to 139 in Kibby (2017). Many further species had been added in the intervening years but evidently almost equal numbers had been synonymised or reappraised (I haven't checked the details). Since then six more have been added, giving a total of 145 species, and thus an increase of 79 species in 74 years since Pearson's account.

DNA studies have recently led to an enormous increase in the numbers of European *Inocybe* species. I dread to think what will happen if *Russula* receives a similar level of attention. Even without it the supply of new British *Russula* species seems unlikely to give out for some years yet.

All these new genera

In his editorial in the last issue Geoffrey Kibby mentioned the printed CBIB checklist of 2005 as 'an essential reference work', a view which I, being one of its joint authors, of course agree with whole-heartedly. It is however only essential in some respects but very out of date in others, see below. In particular, many genera are now in use that weren't then considered distinct or hadn't even been published by 2005. In a similar spirit to the *Russula* exercise above, I add some quantitative details on numbers of new genera, confined here to agarics (loosely defined). I have written often enough in the past about the explosion of boletoid genera.

Since CBIB was published there have been ten online updates (https://fungi.myspecies.info/content/checklists), between them introducing around 50 further genera to the British list. The splitting of *Coprinus*, recognised in UD1 (2006), of *Collybia* in UD5 (2011) and of *Clitocybe* and *Hygrocybe* in UD7 (2016) together accounted for around a third of these. Only three are in response to new British finds, the rest all responding to taxonomic changes largely driven by DNA evidence. The three exceptions are *Allopsalliota*, *Favolaschia* and *Callistosporium*, the first two of these to accommodate species that are clearly recent arrivals in Britain.

Two other sources currently invite us to adopt futher new genera: Geoffrey Kibby's books and *Fungi of Temperate Europe* (FTE). Kibby adds 11 more genera in his Vol.2 and another 12 in Vol.3. None of those in Vol.2 are used in *Funga Nordica*, (Knudsen & Vesterholt, 2012) but all are also accepted in FTE (without any mutual consultation!). Most concern single fairly rarely recorded species, but the following are certainly noteworthy: the common *Volvariella gloiocephala* moved to *Volvopluteus* (Fig. 1), the ringless *Armillaria tabescens* to *Desarmillaria* (Fig. 2) and all the inamyloid *Mycena* species to *Atheniella* or *Phloeomana*. Three of the 'new' genera in Kibby Vol.3 are not in fact particularly new, being already accepted in *Funga Nordica*: *Flammula* for two species of *Pholiota*, *Phaeonematoloma* for *Hypholoma myosotis* and *Deconica* for *Melanotus* and most of *Psilocybe*. The rest, with one exception, are once again in line with FTE. The exception, which nobody else seems to find necessary, is the transfer of *Hypholoma udum* to *Bogbodia* (so named because its bodies occur in bogs!).

Fig. 1. *Volvopluteus gloiocephala* was, until relatively recently, better known as a species of *Volvariella*. Photograph © Geoffrey Kibby.

Pros and cons of CBIB and its updates

The printed CBIB is very out of date in many respects. Even when published its assignment of genera to families was less than 'state of the art', because the state of the art was then, as always, in an unsatisfactory state of flux. Since its publication there has been almost no updating of details such as recommended illustrations, known hosts or known distribution. It remains very useful for the things that don't go out of date such as location of the type description and most of the synonymy; also for giving a general impression of frequency. Of particular value is the list of excluded species. If you want to know if a name has ever been used in Britain you can look for it in the index, and if you find it there it will lead you to how it has been used, rightly or wrongly or with no supporting evidence or even that it is now considered a *nomen dubium*, nobody knows what it means.

The updates, nominally by Martyn Ainsworth and myself, in practice almost entirely by Martyn, have done much to keep things up to date with major additions and changes. They are good on new British species and the evidence that supports them. Increasingly this has been limited to collections backed by DNA evidence. But from UD6 (2015) onwards there has been relatively little logging of name changes to known British species, whether from taxonomic or nomenclatural reasons. Several major revisions have been incorporated, notably of *Hygrocybe* s.l. in UD7, *Hebeloma* in UD8 and parts of *Cortinarius* in UD8, 9 and 10. (Two major revisions of long standing have never been reflected in these updates:

1. The split of *Pholiotina* from *Conocybe*, accepted in *Funga Nordica* and monographed by Hausknecht (2009). Around 20 British species affected.
2. Restriction of *Psilocybe* to the few species containing psilocybin and move of all the rest plus the genus *Melanotus* to *Deconica* (as in *Funga Nordica* Edn.2 (2012).

Fig. 2. *Desarmillaria tabescens*, one of two ringless species (the other is *D. ectypa)* transferred from the familiar genus *Armillaria*. Photograph © Geoffrey Kibby.

These are just two outstanding examples of the problem that currently far too many fungi don't have a single universally accepted latin name. Names used have a strong tendency to reflect the age of the user. I have no answer to such thorny problems as the collating of site records made by different people over many years.

An update on stipitate stereoid fungi

Further to my coverage of the three British genera in my column in the last issue, I was delighted to see the photos in this one of the rare and extremely localised *Stereopsis vitellina*. I have also since become aware that Ryvarden (2020) has published world synopses of all three of the species discussed, acknowledged to be "previously excellently treated taxonomically in Reid's (1965) monumental book", now considered "rather difficult to find and rather expensive". The pale form of *Cotylidia pannosa* that I suggested might be distinct remains for now a synonym. *Stereopsis hiscens* is widespread and very variable. The New Zealand material illustrating my article may be correct, but the 'putative' *Cotylidia undulata* from N. America is certainly not the European species.

Addendum on *Amanita inopinata*

I am happy to note from the editorial in this issue that the spread of this spectacular species continues, and also wish to rectify an omission from my article on this species in the last issue. I failed to mention a wide-ranging account by Courtecuisse & Moreau (2004) that followed the first find in France. They were the first to discuss the relevance of *A. inopinata* to the ecological concept of an invasive species, a topic I ascribed to a later, essentially repeated treatment by Fraiture & Di Giangregario.

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New Books

Snippets of Mycological History

Heino Lepp, 2021
PDF free to download – see below

Under this disarmingly modest title Heino Lepp has constructed a sequence of 17 scrupulously researched and beautifully illustrated essays on aspects of the early history of mycology, adding up to a major work of scholarship. He has kindly presented the BMS Library with a hard copy version of the entire set contained in two large A4 volumes. The essays themselves occupy 406 pp. and are accompanied by a further 284 pp. volume with the Appendices, Notes and Index. The PDF version is available to all subscribers to Field Mycology on application to the editor at FieldMycologyJournal@britmycolsoc.info, with the proviso that for copyright reasons neither volume is placed on any website.

The 'snippets' enlarge on selected topics covered in Ainsworth (1976), acknowledged as "the standard work on mycological history". The author, an honorary fellow of the Australian National Botanic Gardens, has made great use of the world's academic websites (74 of them cited!), allowing him to present the reader with beautiful colour reproductions of much of his rare source material. This makes the whole work a delight to browse through, despite the obscurity of much of the subject matter. For instance one lengthy snippet is a defence of Sterbeeck's *Theatrum fungorum* of 1675, the first book wholly devoted to fungi. Sterbeeck has been widely criticised for having insufficently acknowledged his debt to an earlier work by Clusius in 1601. This worried Lepp.

The emphasis is largely on the early history of mycology. Only the last four snippets reach even the 19th century, the last being a nicely illustrated overview of popular fungus books of the Victorian era. The major theme is the development of an understanding of the nature and diversity of fungi from classical times onwards. Lepp reckons the key development over this period came from the work of Michaeli (1679–1737), the first to study fungi with a microscope. If, for instance, you feel a need to know who first saw spores in tetrads or who coined the term `basidium', the answers are all here.

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Alick Henrici

The Incestuous Sex Life of Budding Yeast resolved to DNA level

Ken Adams
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Remarkably some yeasts can change sex by literally using rigid cranes to move sex genes wrapped round them to locations tens of thousands of base pairs apart. This is a detective story! 30 years in the deciphering!

Around 400 million years ago a multicellular cup-fungus ancestor of our Bread and Beer fermenting Budding Yeasts set out on a backward path, dismantling its complexity, to become a unicell again, scrapping excess DNA (just 12,000,000 base pairs left) between its mere 6,275 genes on 16 chromosomes, indeed also scrapping non-essential genes to get down to this number, and became a specialist, exploiting the nectar and sugary fruits of the recently evolved higher plants. It reduced its cell cycle time to the minute range, dividing as fast as it could to produce lots of new single-celled individuals - and fermenting the sugars to CO2 and alcohol to pickle any competitors.

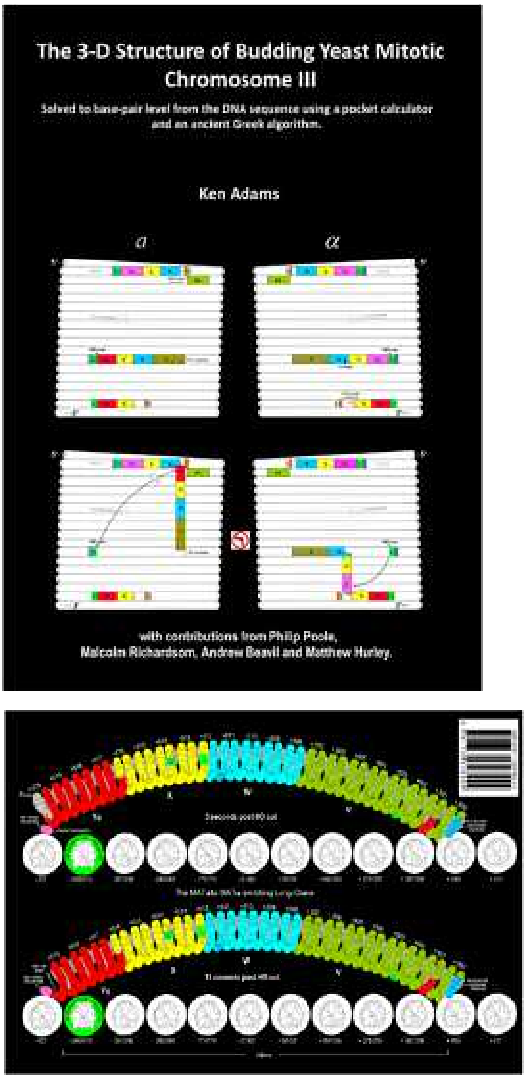
It must think it's in heaven when we dunk it in a bread mix or the brewers' sugary wort! However, in retaining sexual reproduction to exchange any useful genes its pals might have acquired since their generational divergence, out in the wild it often comes unstuck. Although it doesn't have a male sex that seeks out the female, like other fungi it has two genetically equivalent mating types conventionally called α and a, one cell of each having to coalesce and combine their nuclei in order to undergo meiosis and form thick-walled spores. Conveniently, *Drosophila* fruit flies avidly collect and deposit the spores on new sugary substrates they themselves have found to exploit. However, when a fruit fly only introduces one spore to a new source of food the budding yeast population will only be of one mating type - and when the fruit or flower rots away, no matter how many thin-walled cells in its population - it's doomed if it can't form thick walled survival spores. Although the α and a mating types are coded by back-up copies of genes that both cell types possess, normally a cell is stuck with a working copy of just one set. Never-the-less numerous strains of the 1,500 or so species of known budding yeasts have found several ways out of the impasse by some of their cells changing mating type by managing to hack their way in to copy the alternative back-up so they can incestuously conjugate with one of their daughters - 'hooray I can now form thick-walled spores to get me out of here'.

Now in the case of our original rotten-fig-fermenting Budding Yeast strain S288C that labs around the world use to study yeast genes, the two back-up copies are respectively 185,000 and 82,000 DNA base pairs (bp) away on either side of the active copy, but— fortunately—they are on the same chromosome. Number III out of the 16 available. Why fortunately? Well, way back in 1992 chromosome III was the first of any higher organism chromosome to have its DNA base sequence of 316,320bp determined - and yours truly began to wonder how on earth the active copy got together with the back-up of opposite mating type in order to copy it and change mating type. The downstream end of the active copy is cut leaving a single stranded 4bp ticket at the end and I knew that the answer to the puzzle must involve a single-stranded matching ticket somewhere in the back-up copy sequence and that a rigid crane must swing across to bring them together. I had the answer in outline by 1993, but a lecturing career got in the way and despite dotting the i's and crossing the t's a bit at a time over the years, it wasn't until Covid isolation and a kick in the butt from a renal carcinoma in 2022 made me work on it flat out with my colleague Phil Poole. Deducing where the two ends of the crane were in the sequence had an even greater reward - the open sesame to deducing the coiled-coil 3-D ultrastructure of the entire chromosome to base pair level and the realization that one mating type is on a left-handed and the other on a right-handed version of the same chromosome.

This will probably be the first and last chromosome 3-D ultra-structure to be worked out by a human brain to base pair level, no doubt an A.I. algorithm will eventually crack many others - but we probably won't ever know how it did it. So this could become a collector's classic !

I have had a limited edition of only 500 copies printed of the well illustrated 360 page, A4 account of the detective story and its resultant detailed structure.

Ken Adams



The 3-D Structure of Budding Yeast Mitotic Chromosome III

Solved to base-pair level from the DNA sequence using a pocket calculator and an ancient Greek algorithm.

Ken Adams

with contributions from Philip Poole, Malcolm Richardsom, Andrew Beavil and Matthew Hurley.

Two illustrations from the book.

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