Mycena dasypus rediscovered after 30 years

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This article started out with an entirely different ending planned and was originally entitled '*Mycena pinocchioides* – new to science'. In that form it had reached the stage of being laid out in Field Mycology format, sent to me for checking, also to Alick Henrici and Martyn Ainsworth for a final vetting prior to publication. That was as far as it got…

The story

In October 2017 when visiting Burnham Beeches, the Buckinghamshire Fungus Group explored an area known as The Mire. It was here amongst *Sphagnum* and damp mossy vegetation that I first found good numbers of a small fairly nondescript *Mycena*. Though field characters were unremarkable, at home I soon discovered that the cheilocystidia certainly were not! These were extremely elongated lageniform, swollen at the base but with a long, thin, almost cylindrical lanceolate narrow extension. Though I'd not seen the like of these cells within the genus previously, I hoped that this unusual character would lead to an easy determination. Not so. Nothing I could find in the literature I had available came close – I was none the wiser (Figs 1–5).

A couple of weeks later I attended an informal *Mycena* workshop in the Forest of Dean tutored by Thomas Læssøe, a recognised authority on the genus. I was able to collect fresh samples to show Thomas; however after examining them and checking through both volumes of the Robich (2003, 2016) monograph he also drew a blank. There being no material left worth retaining, it was not until October 2019 when the species reappeared in the same location that my research continued.

In the meantime I had acquired the excellent monograph authored by Aronsen and Læssøe (2016), and in autumn 2019 I decided to email them my latest photos together with the description and recently acquired sequence to ask for their opinion. They responded wondering if I could possibly have been mistaken in assuming that these remarkable cells on the gill edge were cystidia, suggesting that they might instead be the coarse hyphal ends of a parasitic fungus simulating cystidia. Their feeling was that this

Fig. 1. *Mycena dasypus*, Burnham Beeches, Buckinghamshire, October 2017. Photograph © Claudi Soler.

Fig. 2. *M. dasypus*, October 2019. Photograph © Penny Cullington.

Fig. 3. *M. dasypus*, close up of cap showing its sulcate surface. November 2020. Photograph © Penny Cullington.

Mycena, possibly from section *Polyadephia*, was close to the little known *M. dasypus* Maas Geest. & Læssøe, described from Surrey (1992) from similar habitat and also somewhat similar in appearance. Though the apparently scanty holotype material of this rare species held at RBG Kew reportedly had a fungal infection, they doubted if there'd been any attempt to sequence it as yet and that a comparison of the DNA of my Burnham Beeches *Mycena* and the Kew *M. dasypus* might well be a worthwhile exercise. As it turned out this was almost prophetic.

Whilst fully respecting A&L's knowledgeable view that the remarkable cells I was seeing were possibly not true cystidia, I remained convinced that they must be so. The fact that subsequent collections – every autumn from 2019 to 2022 – showed these possibly unique cystidia as a constant feature surely disproved their theory, moreover it seemed unlikely that Læssøe would not have spotted any such fungal contamination on his initial examination of the material in 2017. Two further matching sequences from my collections in 2019 and 2020 were obtained, kindly

prepared and analysed by Eric Janke with Brian Douglas and processed by Aberystwyth University supported by the BMS and City of London Corporation – owner/managers of Burnham Beeches. Neither matched anything on GenBank. The sequences placed the species on its own away from any other published *Mycena* sequence apart from a root associate from an Australian soil sample – not linked to any published species. At this stage no exploration had been made of the Kew material of *M. dasypus*: sequencing work at Kew was stretched to full capacity with a long waiting list limited to prioritised collections – the situation compounded at the time by Covid 19 lockdown issues. I doubted if a request for testing *M. dasypus* then would have met with approval.

Looking at the type description of *M. dasypus* (no image of which existed) yes there appeared to be clear macro similarities between the two species (as indeed there are between many species in this genus) but there were to my mind significant differences. All collections of our Mire species had been found attached to *Sphagnum* whereas *M. dasypus* had been found on twigs/woody debris of *Pinus* and *Quercus*. Yes, both trees grow around the edge of the Mire but in my opinion not near enough to the vicinity of the fungus to be of influence. Then of course there was the issue of those remarkable cystidia mentioned above and not apparently present in *M. dasypus*, but there was an intriguing note below the description explaining how two specimens had apparently been 'invaded by a parasitic fungus whose coarse fungal ends, sticking out on all sides, simulating cheilocystidia and caulocystidia'. Maybe a warning light should have flashed in my mind at this point because this seemed to tally with A&L's initial suggestion that these cells were not cystidia as I thought. Something odd was clearly going on with this mushroom – the similarity between the shape of my cystidia and their observation of possible contamination surely had to be more than a coincidence? Nevertheless, bearing in mind that many species in this genus have very similar microcharacters to each other (and I was still and am still utterly convinced that these cells were and are indeed cystidia) I remained of the opinion that there was no reason why there should not be more than one species having such cystidia and the fact that the specific *Sphagnum* substrate differed from that described for *M. dasypus* for me was sufficient confirmation that this was indeed an undescribed *Mycena*.

So it was that in January 2023, whilst recognising that not all members of this genus had yet been sequenced, I set about preparing to publish with my chosen name, *Mycena pinocchioides*. (Pinocchio was a wooden puppet, the eponymous Disney film character created by the Italian Carlodi. Whenever Pinocchio told lies he found that his nose grew ever longer, the reference to his name being indicative of the remarkable elongated cystidia of this *Mycena* and not of his unfortunate dishonest trait!)

Description of the Burnham Beeches collection (not "M. pinocchioides" as it turns out but in fact *M. dasypus* now proven).

A rather small nondescript dull whitish *Mycena* found in *Sphagnum* in Burnham Beeches, Buckinghamshire, with amyloid spores and remarkably extended lanceolate cheilocystidia.

Cap 4–10 mm wide, broadly campanulate, sulcate, translucent-striate, glabrous, pale beige at centre with pinkish tinge then gradually dull white towards margin. **Gills** 12–18 reaching the stem, adnate, white, gill edge concolorous. **Stem** 20–80 x 1–2 mm, cylindrical, pruinose at the apex then gradually more glabrous below, white at the apex then gradually darker to grey-brown towards the base where attached to the substrate with white fibrils. **Smell** indistinct. **Taste** not known. **Sporeprint** white.

Basidia 4-spored. **Spores** (7-)8–9(-9.5) x 3–4.5 µm, Q av = 2.3-2.7, pip-shaped, amyloid (Fig. 5). **Cheilocystidia** 50–60(-70) x (9-)10(-11) µm, forming a sterile band, smooth, markedly lageniform, the wider lower section (often with pedicel below it) narrowing abruptly to an elongated to lanceolate extension, occasionally forking, 2 µm wide at the apex. (Occasionally a few secondary pyriform to spherical cystidia were found, 17.5 x 12.5 µm, with short scattered brush cells in top half, Fig. 4. arrowed in red, the 'normal' cheilos of a *Mycena*.) **Pleurocystidia** not seen. **Caulocystidia** present near the stem apex, similar to cheilocystidia.

Habitat gregarious amongst *Sphagnum* and general vegetation in The Mire. Autumn fruiting.

The fly in the ointment

On receiving the draft article to check, Martyn

Fig. 4. Cheilocystidia of *M. dasypus*. Note: the numerous small globules seem to be conidia from an infecting fungus. The real spores are arrowed. Note also the rounded brush-cell arrowed in red. October 2017. Photograph © Penny Cullington.

Fig. 5. Spores of *M. dasypus*. October 2019. Photograph © Penny Cullington.

Ainsworth noticed the tiny conidia-like spores which appeared to be plentiful together with the cystidia (see Fig. 4), these clearly different from the genuine *Mycena* spores seen in Fig. 5 (a few of which are also visible in Fig. 4). Here was possibly further evidence pointing to an infecting fungus and Martyn was rightly concerned that this needed further investigation. It now became critical to obtain a sequence from the Kew collections of *M. dasypus* as this would go some way to clarify the situation. Even if we were unable to resolve the issue over what was apparently infecting the gills or whether the elongated cells were genuine cystidia, it would at least reveal if the sequence from the Burnham Beeches *Mycena* was a match to that of *M. dasypus* or not.

The sequencing of *M. dasypus* collections

The collections were moved to the head of the sequencing queue, the work kindly undertaken by Alona Biketova: the first, (the holotype 1991, Esher Common) consisting of very scant material, the second (the paratype 1991, Epping Forest) consisting of a decapitated stem only, and a third collection (1992, Kew Gardens) which had been identified by Thomas Læssøe. There was a problem. At Alona's first attempt the 1991 collections both failed and the 1992 collection yielded a sequence quite different from that of our *Mycena* but inexplicably matched that of a *Melanotus* / *Deconica*! The mystery deepened!

Martyn then investigated the three collections together with all attached notes etc., concluding that the third collection was "a normal amyloid-spored *Mycena* and not a brown-spored agaric",

that all three collections appeared to be conspecific, and furthermore he discovered mention of some differing opinions over the cystidia prior to the protologue being finally written up – it was clear that Læssøe and Maas Geesteranus favoured the fungal contamination theory, this backed up by the relegation of *M. dasypus* in Læssøe's joint monograph to one of a series of notes on species too poorly known to justify inclusion in the main text, despite the fact that he co-authored the species.

Meantime Alona together with colleague Frances Pitsillides attempted further sequencing using a different method. Two failed yet again but surprisingly a short sequence was at last derived from the headless paratype which proved a 99% match to Janke's sequence of our *Mycena* sp., now held at Kew. Bingo! At last here was proof positive that *Mycena dasypus* had been rediscovered after a thirty year lapse though I will admit that I was sad to see the final nail banged home into poor Pinocchio's coffin.

This story – something of a mycological 'cold case' – is not quite concluded: DNA testing is still ongoing on the three original collections in an attempt to tie up all loose ends, and there remains the mystery of those conidia present in the gill squash of many of my microphotos. I suspect argument over the cystidia will rattle on but I remain convinced that they are the genuine article, remarkable though they be. At least now we have a fuller picture of this intriguing little *Mycena* – one that is apparently unmistakeable when the gill edge and stem are examined and hopefully will now be recognised in more areas (though it is not mentioned in any key). It is so plentiful when it fruits at Burnham Beeches that it's hard to believe it can be that rare, and we now know a bit more about the variety of habitat and substrate in which it might occur.

The moral of the tale

If there be one it is surely that one shouldn't count one's chickens before they hatch. Even more apposite: 'The show isn't over till the fat lady sings!' This particular fat lady was about to sing the praises of *Mycena pinocchioides* from the rooftops and was only just prevented in the nick of time!

Thanks

Many people have played their part in this story and I'm grateful to all of them: Claudi Soler took the first photo in The Mire in 2017 (though he can't recall doing so!). Thomas Læssøe examined the first collection and later together with Arne Aronsen gave valued help and advice. Eric Janke, supported by Brian Douglas, has now prepared three of my collections for sequencing by Aberystwyth University, in turn supported by BMS funding. City of London Corporation and the Burnham Beeches team have supported throughout. Derek Schafer has examined a collection in support of my theory concerning the cystidia. Geoffrey Kibby also examined a collection and has supported in various editing and mycological roles. Finally Martyn Ainsworth together with Alona Biketova and Frances Pitsillides have given expertise and time as well as shown remarkable patience and perseverance. Without their contribution this species might possibly have remained in obscurity.

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References

Aronsen, A. & Læssøe, T. (2016). The genus *Mycena* s.l. *Fungi of Northern Europe* Vol. 5.

Maas Geesteranus, R.A. & Læssøe, T. (1992). *Mycena dasypus*, a new member of Section *Polyadelphia*. *Persoonia* 15 (1): 101–103.

Robich, G. (2003 & 2016). *Mycena d'Europa*. Vols. 1 & 2. A.M.B..

Editorial footnote

As this issue was about to go to press Martyn Ainsworth at Kew informed us that a collection by Alick Henrici of a mysterious agaric has now been sequenced and is yet another specimen of *Mycena dasypus*.

It was found by Alick in Kew, growing on buried roots under *Pinus peuce* in November 2020. He at first thought it was a *Mycena*, then changed his mind and suspected it was instead a *Marasmiellus*. His first guess however was correct and he even noted that it had "unusually long cheilocystidia and a hairy stem". The specific epithet *dasypus* means hairy foot and is also derived from a Greek word for a hare.