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Slime Molds
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How an amateur got hooked—myxomycete research in Tasmania, Australia

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Abstract: The temperate forests of the world are known to be rich in myxomycetes. After 11 years of study and a collection representing approximately 120 species, it is clear that Tasmania's forests are no exception. Some of the common and distinctive species I collected were not possible to identify, in several cases because they were new to science. Via the internet, I had help and encouragement from Northern Hemisphere researchers. It is clear that there is a burgeoning interest in slime moulds on social media platforms, and that people equipped with even the most basic equipment can contribute to our knowledge of myxomycetes.

Keywords: Australia, citizen science, internet, social media, Tasmania

Introduction

In 2010 I started searching for myxomycetes (acellular slime molds) in the tall wet eucalypt forest that surrounds my house at Black Sugarloaf, Birralee, in central north Tasmania. I was particularly interested in the invertebrates feeding on plasmodia and developing fruiting bodies and started taking numerous photographs, mostly depicting various species of collembola (Fig. 1). Interestingly, while the fact that collembola forage on slime moulds is well known by many myxo researchers, especially those using moist chamber cultures (Ing 1997), it was unknown by many collembolon researchers (Dr. Penelope Greenslade, pers. comm. 2010). I was also photographing mature fruiting bodies in the field and attempting to identify the species from the images. However, it soon became clear that in most cases photographs of fruiting bodies were not enough for identification and that I needed to invest in microscopes and better camera equipment to capture the details in the tiny fruiting bodies as well as the microscopic features. I started to collect systematically after receiving a request to deposit specimens at the National Herbarium of Victoria (MEL) from senior mycologist, Dr. Tom May.

Figure 1. Collembola, including the large 10 mm long *Acanthanura* sp., feeding on developing fruiting body of *Dictydiaethalium plumbeum.*

Slime molds appear in every month in Tasmania depending on rainfall. The summer of 2021 was unusually wet and productive for slime molds, but the subsequent months have been uncharacteristically dry and the usual plethora of litter-dwelling species have not yet appeared. However, as I write this, small and large plasmodia of *Elaeomyxa reticulospora* (Fig. 2), one of the most common and reliable myxomycetes at my study site, are creeping through the accumulated leaf litter on a large eucalypt log known as "big tree" log. For the past few weeks I have been visiting the log during daily pre-dawn walks along my regular walking track. When illuminated by torch light, the yellow-green plasmodia are conspicuous on twigs, leaves, gumnuts and bark that have fallen from the 30 m high eucalypts (*Eucalyptus* spp.) and blackwoods (*Acacia melanoxylon*) that tower over the site; the plasmodia will be out of sight deep in the litter layer later in the day. I am confident to call *E. reticulospora* "common and reliable", because of all the slime moulds I find, this is one of the few species that appears every year and always in approximately the same place, although in greater or lesser amounts depending on rainfall. *E. reticulospora*, with its distinctive appearance, large reticulate spores and waxy globules on the capillitium (Fig. 3), I initially misidentified as *Lamproderma cribrarioides* based on a superficial resemblance to the illustration in *The Myxomycetes* (Martin and Alexopoulos 1969).

Figure 2. *Elaeomyxa reticulospora* is a 1.5 mm tall, litter-dwelling slime mold and one of the most common species at my study site in Northern Tasmania.

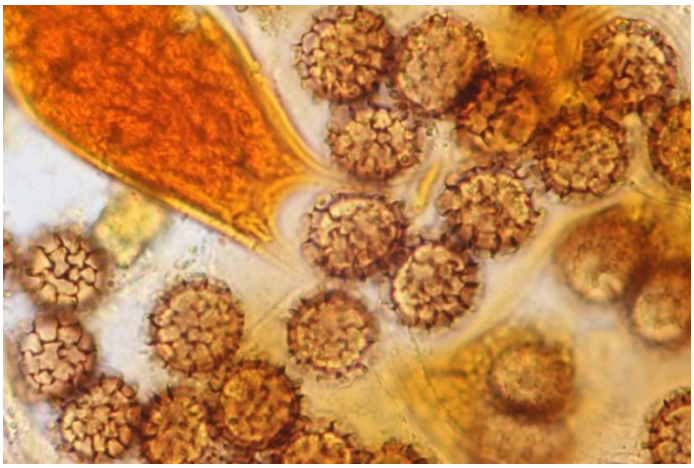

Figure 3. Spores (11-12 µm) and waxy swelling on the capillitium of *Elaeomyxa reticulospora*.

The Internet

The internet overcame my isolation in Tasmania and meant I could communicate with researchers. Soon after my study began, I received a CD published by the late David Mitchell. It was a compilation of hundreds of papers on ecology and taxonomy, over 2000 thumbnail images, the beautiful Emoto plates and Dr. Martin Schnittler's 2001 thesis (Schnittler 2001). Many of these resources were useful and informative but it was a comment in Schnittler's manuscript concerning the lack of detail about myxomycete substrata in various reports that set me on the right track in this regard. Some of my very early collections lack these details but I soon realised the value of such information, especially if my study were to continue indefinitely.

Mitchell and I started communicating by email and I sent him over 20 collections of "mystery" species. The *Lamproderma* species he was unable to identify eventually reached Dr. Gabriel Moreno via Marianne Meyer. Dr. Moreno identified *Lamproderma echinulatum* and the aforementioned *Elaeomyxa reticulospora*—previously *Lamproderma reticulosporum* (Moreno et al. 2008)—and sent me colour plates of both species showing fruiting body, capillitial attachment to columella, and images of spores taken with compound and scanning electron microscopes. Seeing these plates was another valuable lesson and I began to make colour plates of all my collections. Interestingly, Moreno's study of *E. reticulospora* described it as muscicolous, tropical and "apparently very rare" with the plasmodium of an unknown color. My observations indicate it is a common, litter-dwelling species in Tasmania, with a greenish-yellow plasmodium. The third *Lamproderma* sent to Moreno, *L.* "*umbilicatum*" (Fig. 3), is another distinctive and apparently common species with a brown peridium that I misidentified as *L. acyrionema*. It is yet to be described.

There were several other unidentified slime molds in the batch I sent to Mitchell. One very distinctive species had appeared on a large eucalypt stump not far from the house when I started photographing slime molds in 2010, and it appeared again in August 2011 on a bryophyte-covered log on big tree track. I collected the specimen and attempted to identify it using *Myxomycetes, A Handbook of Slime Molds* (Stephenson and Stempen 1994), *Les Myxomycétes* (Poulain et al. 2011), and *The Myxomycetes* (Martin and Alexopoulos 1969). Somewhat unusually it seemed quite easy to identify because as well as its relatively long, sometimes coalescing stalks, it has brush-like capillitia arising from the peridium. However, the only species to display these characteristics was *Tubifera bombarda*, a species known only from the tropics. As Tasmania is in the temperate zone, it seemed an unlikely extension of its distribution. I wrote an article for the Fungimap newsletter (Lloyd 2013) and was contacted soon thereafter

by Dr. Steve Stephenson who had collected a similar-looking species in New South Wales. At the time Senior Fulbright Scholar Dmitry Leontyev was working in Stephenson's laboratory at the University of Arkansas on the family Reticulariaceae (Branan 2013), especially *T. bombarda* (now *Alwisia bombarda*). Based on my photos of the fruiting bodies, they were almost certain my specimen was not *T. bombarda* but a species new to science. They accessed collections from the National Herbarium of Victoria (MEL) and my personal collection and, based on morphology and DNA sequencing, confirmed that it was a novel taxon they named *Alwisia lloydiae* (Fig. 4) (Leontyev et al. 2014). It was these experiences that made me realise just how much I could contribute to myxo research. My interest was further piqued after reading a subsequent paper by Leontyev (Leontyev 2016) whose research suggested that based on morphology and genetics, *A. lloydiae* is close to the ancestral stock of members of the Reticulariaceae family and that the Australian continent and Tasmania are "well-known refuges of relict biota."

Figure 3. *Lamproderma* "*umbilicatum*" is a common 2 mm tall species that appears most years at Black Sugarloaf on logs, stumps and associated litter.

Figure 4. *Alwisia lloydiae* (2.5-5 mm tall) forms extensive colonies on well-decayed, bryophyte-covered logs.

Social media

Social media and the ubiquity of cell phones, some with excellent quality macro lenses, have no doubt contributed to the increasing interest in slime molds since 2014. For instance, the Slime Mold Facebook Identification Page (Bendlin 2014) was started in December 2014 by Leah Bendlin who envisaged that "nerd friends from Instagram" would join. By 2017 it had over 10,000 members and more than 24,000 members by 2021. Of these, several are associated with academia, a small percentage regularly include microscopy, and many are excellent photographers. However, most are novices who were possibly redirected to the Facebook page from mushroom groups after encountering something "weird". (L. Bendlin, pers. comm., 2 June 2021).

There has also been burgeoning interest on Instagram since 2017, when I was convinced that this visual medium is ideal for informing a wide audience about such photogenic organisms. The Instagram algorithm influences and promotes particularly colourful species so the eye-catching stages of *Stemonitis* (Fig. 5), *Badhamia utricularis*, or iridescent blue *Lamproderma* can receive thousands of "likes". Many people, after seeing these unusual and very beautiful forms for the first time, are fascinated to learn more, and some quickly become obsessive in their desire to find a slime mold for themselves. More serious nature and wildlife photographers relish the challenge of capturing the fine details of myxomycete fruiting bodies with macro and extreme macro equipment. Unfortunately, these posts on Facebook (of which I am not a user) and Instagram (where I am a user with over 30,000 followers, Lloyd 2021b) are in a sense transitory in that there is no way of keeping track of interesting or unusual observations.

Figure 5. Young *Stemonitis* can get thousands of "likes" on Instagram.

More usefully, iNaturalist and similar scientific platforms allow researchers to track observations. I have been interested to see the range extensions of species for which Black Sugarloaf is the type locality. For instance, there was an observation of *A. lloydiae* on 12 March 2021 near Cairns in far North Queensland. This extended the range by about 3700 km from the wet forests in the south-eastern Australian states of Tasmania, Victoria and New South Wales where it had hitherto been recorded, and is the first record of this species from Australia's wet tropics (iNaturalist 2021a). *Tubifera vanderheuliae* was known from only two locations—one in Tasmania and one in New South Wales—when it was first described (Lloyd et al. 2019). It has since been found at another location in New South Wales, near Melbourne in Victoria, and at Margaret River in Western Australia, which is another considerable range

extension of about 2889 km (iNaturalist 2021b). Range extensions of such ephemeral organisms would be almost impossible and prohibitively expensive if it were not for citizen scientists, especially in such a large, relatively sparsely populated country as Australia.

Identification of slime moulds on iNaturalist is mostly limited to those species with distinctive fruiting bodies that can be easily identified from photographs. For example, *Elaeomyxa cerifera* (iNaturalist 2021c) and *Lycogala conicum* (iNaturalist 2021d) which are not included in *Myxomycetes of New Zealand* (Stephenson 2003), were recorded there for the first time on 8 June 2014 and 7 November 2020 respectively. The undescribed *Lamproderma* "*umbilicatum*" is a very distinctive bright yellow species when it first appears and the seven records on iNaturalist suggest that it is widespread in wet forests in south eastern Australia.

Discussion

The study of myxomycetes has reached an interesting stage. On one hand, sophisticated equipment such as scanning electron microscopes and the knowledge and resources needed for DNA extraction, amplification and sequencing, increasingly puts research out of the realm of amateurs. On the other hand, just about anyone can be a "citizen scientist" and contribute to our knowledge of myxomycetes if they have a camera and upload their observations on platforms such as iNaturalist. Their observations can be important in extending the range of species, and should be used to update country species lists.

I check observations on iNaturalist almost daily and have learnt a huge amount by identifying species that I am unlikely to encounter in Tasmania. I also endeavour to inform people about slime molds though iNaturalist, and my website (Lloyd 2021a) and Instagram accounts (Lloyd 2021b). I am still adding to my species list after finding the appropriately-named *Cribraria minutissima* earlier in 2021. Best of all, I look forward to my early morning walks through the forest to see what – if anything – has appeared overnight. The winter rain has finally started falling, and the plasmodium of *Badhamia utricularis* that has been feeding on the pink resupinate fungus *Gloeoporus taxicola* has started forming fruiting bodies (Fig. 6).

Figure 6. *Badhamia utricularis* fruiting bodies forming on a leaning dead understory tree.

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References

Bendlin L [Internet]. 2014. The Slime Mold Identification & Appreciation @ Facebook; [accessed on 6 June 2021]. Available from: https://www.facebook.com/groups/SlimeMold/

Branan C [Internet]. 2013. Fulbright Scholar from Ukraine studying slime moulds; [accessed on 14 June 2021]. Available from: https://news.uark.edu/articles/22993/fulbright-scholar-from-ukraine-studying-slime-molds

Ing B. 1994. The phytosociology of myxomycetes, Tansley review No. 62. New Phytol. 126: 175-201.

iNaturalist [Internet]. 2021a. *Alwisia lloydiae* observation; [accessed on 10 June 2021]. Available from: www.inaturalist.org/observations/71098998

iNaturalist [Internet]. 2021b. *Tubifera vanderheuliae* observation; [accessed on 10 June 2021]. Available from: https://www.inaturalist.org/observations/55689865

iNaturalist [Internet]. 2021c. *Elaeomyxa cerifera* observation; [accessed on 13 June 2021]. Available from: https://www.inaturalist.org/observations/1004258

iNaturalist [Internet]. 2021d. *Lycogala conicum* observation; [accessed on 13 June 2021]. Available https://www.inaturalist.org/observations/64469006

Leontyev DV, Stephenson SL, Schnittler M. 2014. A new species of *Alwisia* (Myxomycetes) from New South Wales and Tasmania. Mycologia. 106(6): 1212-1219.

Leontyev D. 2016. The evolution of sporophore in Reticulariaceae (Myxomycetes). Ukr Bot J. l(73): 178-184.

Lloyd SJ. 2013. *Tubifera bombarda* – a tropical species in Tasmania? Fungimap Newsl. 48: 11.

Lloyd SJ [Internet]. 2021a. Sarah Lloyd's website; [accessed on 10 June 2021]. Available from: https://sarahlloydmyxos.wordpress.com/

Lloyd SJ [Internet]. 2021b. sarah.lloyd.tasmania @ Instagram; [accessed on 10 June 2021]. Available from: https://www.instagram.com/sarah.lloyd.tasmania/?hl=en

Lloyd SJ, Leontyev D, Dagamac N. 2019 Three new species of *Tubifera* from Tasmania and New South Wales. Phytotaxa. 414 (5): 240-252.

Martin GW, Alexopoulos CJ. 1969 The Myxomycetes. University of Iowa Press, Iowa. 560 pp.

Moreno G Singer H, Stephenson SL. 2008. A study on *Lamproderma australiensis* and *L. reticulosporum* Bol Soc Micol Madrid. 32: 113-120.

Poulain M, Meyer M, Bozonnet J. 2011. Les Myxomycètes. Federation mycologique et botanique Dauphine-Savoie Le Prieure, Sevrier. 1112 pp.

Schnittler M. 2001 Ecology and biogeography of myxomycetes. Doctoral dissertation, Freidrich-Schiller-Universität Jena. 309 pp.

Stephenson SL, Stempen H. 1994 Myxomycetes: a Handbook of Slime Molds. Timber Press, Oregon.

Stephenson SL. 2003 Myxomycetes of New Zealand. Fungi of New Zealand Volume 3, Wellington.