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Alwisia repens Photo: S. Lloyd

Tasmaniomyxa umbilicata – a new genus and species of myxomycete

Sarah Lloyd

When I started searching for slime moulds in the forest at Black Sugarloaf in 2010 I never envisaged that I would still be studying them in 2023, let alone finding new species. Identifying the specimens I found was extremely frustrating because they never quite matched published descriptions in northern hemisphere texts, which were the only ones available at the time. I had limited contact with researchers who could assist, and genetic sequencing of slime moulds was in its infancy. How things have changed in 13 years!

One of the first species I misidentified was described by Professor Dmytro Leontyev who named the species *Alwisia lloydiae* in a paper published 2014. The classification was based on morphology and basic sequencing with a comment in the paper '... further investigation, including study of additional genes ... are necessary to fully elucidate phylogenetic relationships (i.e. the sequence of evolutionary events) within *Alwisia*.'

Sequencing is rapidly changing our knowledge of many different taxonomic groups and is now used widely when describing new species. For instance, many fungal species are now known to be different to their northern hemisphere 'twins', and sequencing is showing that the same applies to many slime moulds.

One reason I had so much difficulty identifying species when I started my study was because many Australian species are new to science. Although I am getting a little blasé about finding new species, finding a new genus is pretty exciting, and it's great to finally have a name for this unusual slime mould.

Tasmaniomyxa umbilicata was one of the first species I observed in 2010. I misidentified it *Lamproderma* sp. because of the superficial resemblance to that genus and sent material to researchers, including several *Lamproderma* specialists, who did not recognise the unusual, indeed bizarre, combination of characteristics.

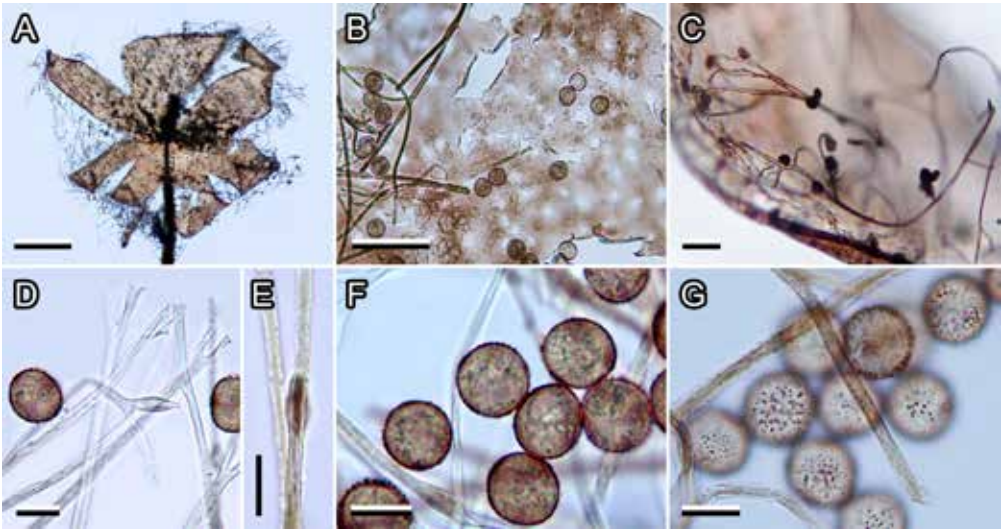
Having a species formally described and named requires collaboration with researchers with highly technical equipment and expertise. For instance, Scanning Electron Microscope (SEM) images of spores and other features have been a prerequisite when describing a new species for many years; more recently, genetic sequencing is becoming essential for differentiating similar looking species from different regions of the world.

Over the years, several potential type specimens (the specimen on which the description of a new species is based) of the mystery species were sent to a researcher in Spain, but they proved inadequate for microscopy because they had not properly matured. Meanwhile, the species was found in Victoria by fellow myxo enthusiast Peta McDonald who posted it on the slime mould Facebook page. It caught the attention of the aforementioned Dmytro Leontyev who recognised its peculiar combination of characteristics—the superficial resemblance to the family Lamprodermataceae, but other features more reminiscent of another family, the Didymiaceae.

Morphological and molecular data indicate that *Tasmaniomyxa* can be considered as a 'missing link' between basal (i.e. primitive) limeless Physarales and the evolutionarily younger lime-containing members of the group. However, neither morphological nor available phylogenetic data allowed for the genus to be assigned to a described family, so that may be new as well.

Another prerequisite when describing a new species is that it should be found at two separates locations at least 50 meters apart. This is to overcome the problem of the great variation within species caused by external conditions

One of the colour plates in our paper, showing the bright yellow plasmodium and development of young fruiting bodies (called 'blebs'); the changing colours as the fruiting bodies mature; photographs of mature fruiting bodies showing the petaloid dehiscence, columella and thick capillitium adhering to the inside of the peridium. For more details check: https://wordpress.com/post/sarahlloydmyxos.wordpress.com/3674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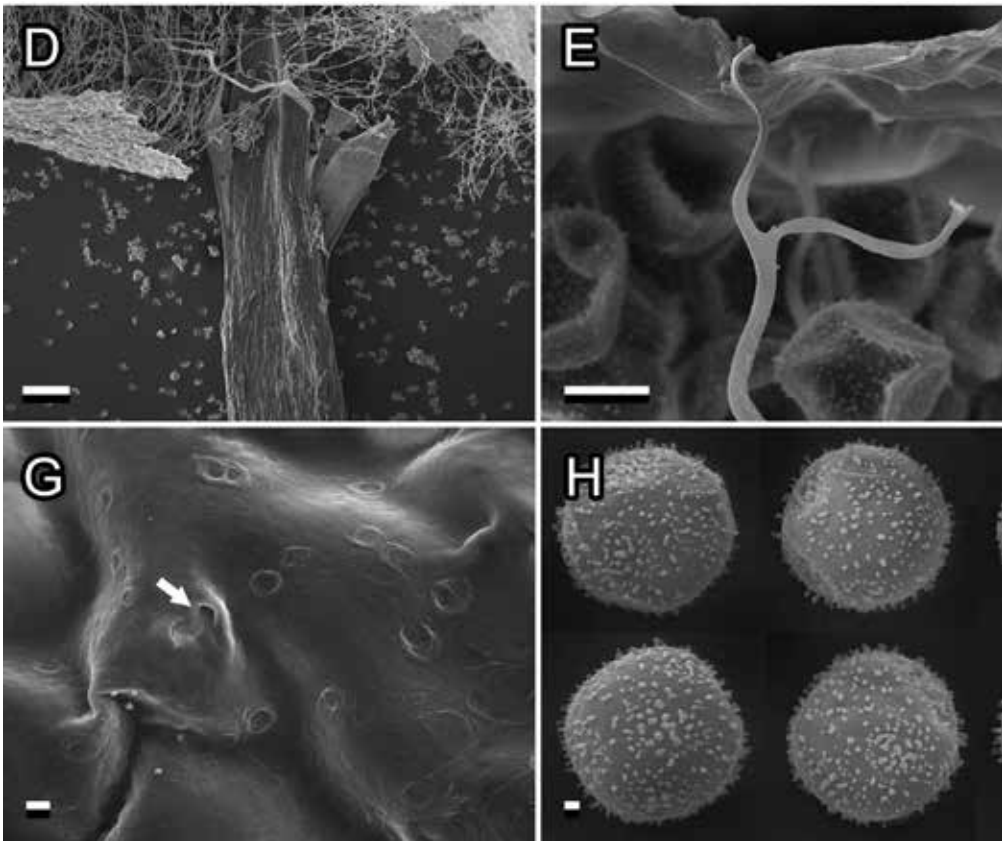
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(e.g. weather) while the fruiting bodies are developing, leading to features that could be mistaken as distinctive characteristics of the species, which has lead to the same species being assigned multiple names. This requirement was easily met by the numerous collections from different places at my study site (i.e. Swamp, Big tree track and Thismia Gully) and collections made over many years.

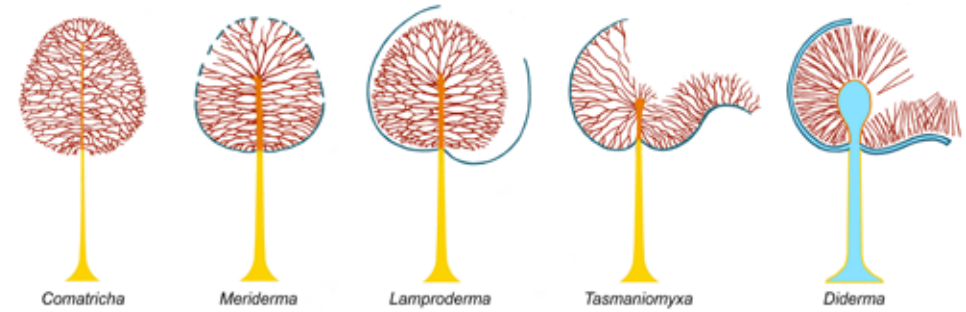
Additional observations on iNaturalist from Tasmania and Victoria also fulfilled this prerequisite. *T. umbilicatum* has a bright yellow plasmodium and 'blebs', the young fruiting bodies that arise from plasmodia. Although there are other slime moulds with yellow plasmodia, they are rarely as brightly coloured, they occupy different substrates and are therefore unlikely to be confused with the new species. The many observations on iNaturalist indicate that *T. umbilicata* is common in wet forests and rainforest in southeastern Australia, and its preferred substrate is well decayed logs and stumps. They also confirmed its phenology, i.e. the time of year it appears.

One record from New Zealand on the Hidden Forest website, helped us to decide on the name '*Tasmaniomyxa*': *Tasmania* alludes to its distribution surrounding the Tasman Sea; *myxa* to the fact that it is a myxomycete (www.hiddenforest.co.nz/slime/family/stemonitidaceae/stemo21.htm)

The paper describing this unusual species includes field photographs taken over the past 13 years of the developing fruiting bodies (p.3), micrographs of spores and other features using a compound microscope, scanning electron microscopy, (p. 4 top and bottom respectively) and extensive genetic sequencing. All this has revealed the mystery of this new genus in a paper that is considered "one of the most comprehensive descriptions of a new species of myxomycete" by one of the paper's co-authors, Dr Martin Schnittler. (The paper describing the new genus and species is available on my website at the link below.)

This is an example of international collaboration between a non institutional field naturalist in Tasmania and researchers in Ukraine, Spain and Germany. It is also an example of how observations on iNaturalist can add so much to our knowledge of a species—whether, plant, animal, fungus or myxomycete.

If you don't already do so, please upload your photographs to iNaturalist.



Above: Drawings of the structure of the fruiting bodies in five genera of dark-spored myxomycetes.
Page 4 Top: photos of peridium (outer cover of the spore mass), capillitium (threads within spore mass) and spores taken with a compound microscope. Photos: S. Lloyd. Bottom: Scanning electron micrographs of stalk, capillitium, peridium and spores. Photos: G. Moreno and D. Leontyev

https://wordpress.com/post/sarahlloydmyxos.wordpress.com/3674

The farmer and the flower: a fable

Bob Mesibov

Once upon a time, in a faraway kingdom, there lived a simple farmer who loved birds and butterflies and blossoms and all things natural.

One day the farmer found a strange and beautiful flower in a patch of scrub on his property. The farmer had never seen anything like it before. He took a photograph of the flower and sent it to the Professor of Botany at the University.

The Professor became excited when he saw the photograph. He wrote to the farmer and said that the flower was so rare, everybody had thought it was extinct. He asked the farmer to take very good care of the rare flower.

The Professor also wrote to the Government's Department of Nature Conservation. Officials in the Department were very happy about the farmer's discovery, because it gave them a chance to implement nature conservation policies and to target strategic conservation objectives.

The first thing the Department did was to direct one of its Flora Conservation Officers to visit the farmer's property and write a report. Unfortunately, there was no scope for such a visit in what remained of the financial year and, owing to cutbacks in travel allowances and the need for a reassessment of travel priorities, no visit was possible for another two years. In the third year, an Officer visited the farmer and confirmed the existence of the rare flower.

With the Officer's report in hand, the Department proceeded along its sequence of conservation management duties. It listed the rare flower on the Government's Official List of Threatened Plants, and it entered the name and location of the flower on the database of rare flora. A number of sophisticated studies were begun in the Department's Environmental Resources Section, which sought to relate the flower's location to rainfall, day length, soil type and other environmental parameters.

The Department also raised the issue of the rare flower at a meeting of the Interdepartmental Working Group on Threatened Species. The flower rose higher and higher on the agenda at successive Working Group meetings, but after a few years it was displaced by higher-priority species, and the Working Group never actually discussed the flower or what to do about it.

Earlier, however, the Department had applied to the Royal Court for money to conserve the flower under the King's Threatened Plants Rescue Program. Because the Program received many such applications, and because each one had to be carefully evaluated by a panel of experts, it was some time before the Department's application was processed. The result was favourable. The application was short-listed for funding, and after several more years the Department received a Royal grant. A Consultant was then hired to determine precisely what additional information was needed in order for the rare flower to be effectively conserved.

The Consultant worked quickly and prepared a detailed report, which spelled out exactly how much money would need to be spent on additional fieldwork and management studies. The Department referred the report to the Interdepartmental Working Group on Threatened Species and to the Royal Treasury Liaison Unit, which advised the King on how government resources could best be allocated given the various constraints on expenditure.

Ten years had passed since the farmer had made his discovery. In the meantime, the farmer had put a stock-proof fence around the rare flower, and a little colony of the plants had grown up and prospered. The farmer got a great deal of pleasure each spring when he

This orchid was photographed at a property in the northern midlands in 2008. It is possibly the critically endangered species *Caladenia anthracina*, although no one on iNaturalist is prepared to give it a 'research grade' identification. Whether or not it is still there after stock grazing in subsequent years in a covenanted area has not been confirmed. There seems to be no government funds for the policing of covenants, and whether or not the original conditions of covenants need to be revised.

saw the blossoms and smelled their perfume. The farmer believed he had done the whole kingdom a service when he put up the protective fence, so he wrote to the Department of Nature Conservation asking for $100, which was the cost of the fencing materials.

The Department replied with a long and polite letter. The officials explained that, while they would like to help the farmer cover his fencing costs, there were still some small, mainly administrative obstacles to spending Royal money on private land. Besides, nearly $100,000 had already been spent on the rare flower in Department Officers' time, data-processing, publicity, interdepartmental meetings, consultant fees etc, and there was nothing left in the budget for that particular item. The officials were sorry, but there was nothing the Department could do at the present time. However, the matter would certainly be raised at the appropriate meetings in the next financial year.

The letter concluded, "The Department greatly appreciates your efforts in helping the Government to conserve this priceless feature of our natural heritage."

This article was originally published in 1997 in the Australian Museum's now defunct magazine Nature Australia.

Editor: Bob's recent comment: "*I don't think much has changed in the conservation bureaucracy since 1997, but it would probably be harder today for the farmer to put up his stock-proof fence. He would probably need permission from the Department*"

This might ring true to those of us involved in saving Brushy Rivulet Reserve from the government's plan to build a high security prison. The adjoining landowner had attempted to build a stock-proof fence for many years to protect the reserve. He was told that it was a reserve and that he needed permission to do the work, at the same time that it was being proposed as a prison site! He eventually obtained permission when the government changed its mind.

Now we are trying to control the gorse at the Reserve—but that's another story about frustrating bureaucracy.

A case of mistaken identity

Tom Thekathyil

I began my foray into the bryophyte world with a copy of Meagher and Fuhrer's *A Field Guide to the Mosses and Allied Plants of Southern Australia*, unfortunately now out of print. It seemed not very difficult then to identify mosses and liverworts on the basis of a few characteristics. I have since changed my mind.

I collected a liverwort specimen that bore some resemblance to the *Lepidozia* genus from a swampy area exposed to full sun (Fig. A). Instead of the expected 4 lobes, the leaves had 8 lobes with all except the lowest made up of single cells. (these are the finger-like projections in Figs. C and D). There was only one species in the book (p. 218) that matched my specimen, *Telaranea mooreana* (now T*richolepidozia pulcherrima* var. *mooreana*).

A decade later I came across another liverwort growing in shade (Fig. B) that had similar leaf characteristics (Fig. D shows only 6 lobes but this is within the range). This was a much greener plant and it seemed reasonable to conclude that this was a phenotype which had developed extra chloroplasts to compensate for low ambient light.

Another 2 years passed by and I collected a third, similar-looking liverwort growing in the shade but this one was pale, not the darker form expected. A closer look under the microscope showed that the lobes were sharply bent towards the shoot tip. After browsing through the liverwort key on the utas website, which included brief descriptions, this had to be *Psiloclada clandestina*, as was the first specimen collected but wrongly identified at the time. It is an apparently rare species in Australia, that Meagher and Fuhrer had not included in their book.

This was not to be the end of the story. Authoritative sources e.g. Schuster (1992) and Engel & Glenny (2008) report *P. clandestina* as lacking oil bodies. These are membrane bound structures containing oil found in most liverworts, and are useful for identification. (Fig. E shows 8 bodies within a cell.) Either my identification was wrong or the experts were. A couple of days after collecting the specimen when it had partially dried I decided to take another look at the oil bodies and discovered that the membranes containing the oil had ruptured and spilled the contents. This is not unknown, and in fact Schuster had mentioned this in his paper but he attributed this to the heat generated by the microscope lamp. Dried specimens of *P. psiloclada* which bryologists usually study would be devoid of oil bodies but these are certainly present in freshly collected material.

Conclusion

Although some liverworts are not difficult to identify based on a few characteristics, many require microscopic examination and more specialised texts to determine species.

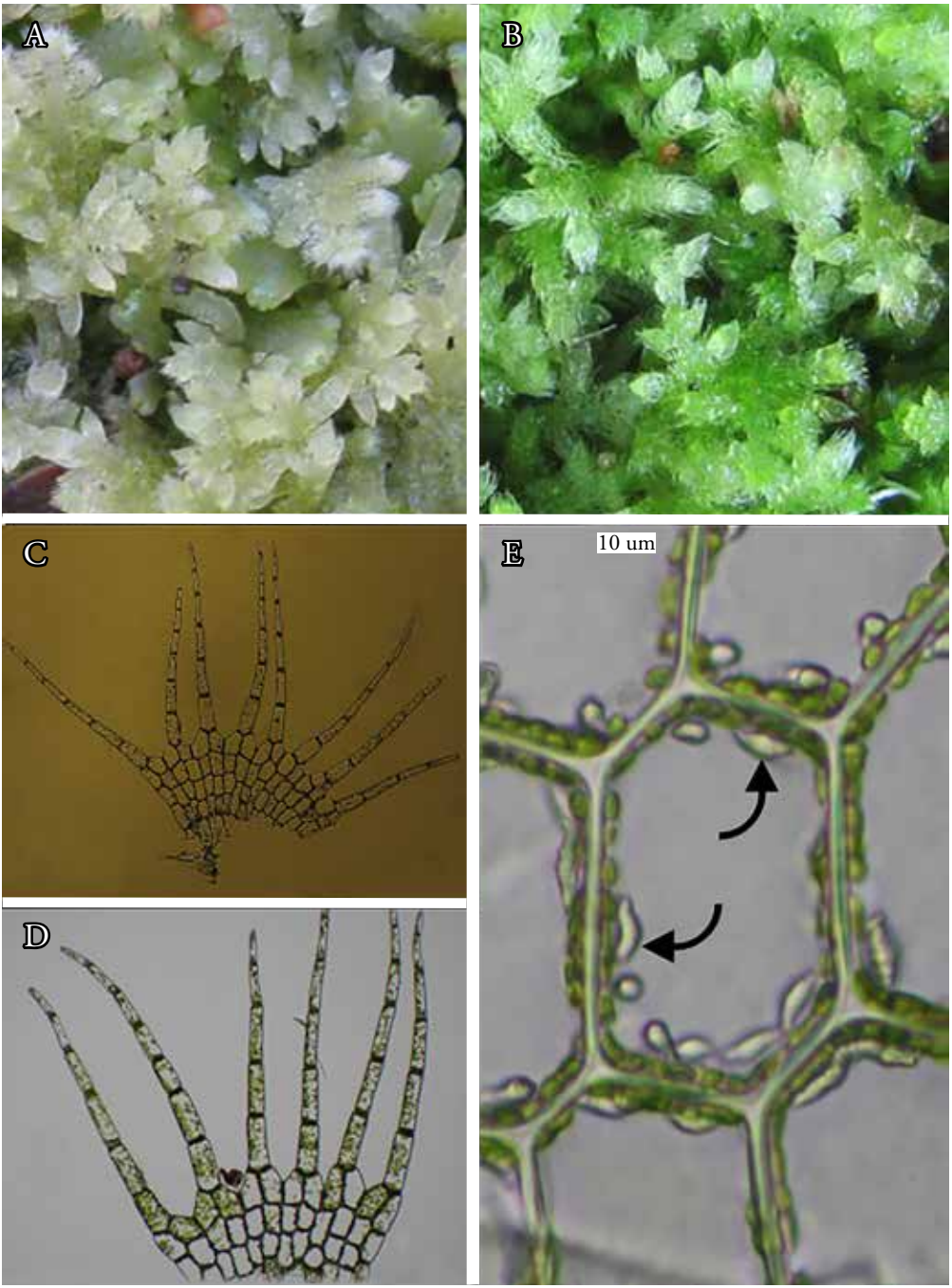
References:

Engel JJ, Glenny D (2008). *A Flora of the Liverworts and Hornworts of New Zealand:* Volume 1, Missouri Botanical Gardens Press, St. Louis.

Meagher D, Fuhrer B (2003). *A Field Guide to the Mosses and Allied Plants of Southern Australia*, Flora of Australia Supplementary Series, Number 20 - Australian Biological Resources Study/The Field Naturalists Club of Victoria.

Schuster RM (1992). The oil-bodies of the hepaticae. 1. Introduction. *Journal of the Hattori Botanical Laboratory. 72: 151-162.*

https://www.utas.edu.au/dicotkey/dicotkey/Lworts/gen_key/liv_genkey.htm



A: *Psiloclada clandestina* B: *Telaranea mooreana* C: Leaf of *P. clandestina*
D: Leaf of *T. mooreana* E: leaf cells of *P. clandestina* with arrows indicating oil bodies within the cell.

The importance of genetic sequencing and iNaturalist

Sarah Lloyd

In March 2023 three myxomycete researchers from Europe, Dr Martin Schnittler (Germany), Dr Dmytro Leontyev (Germany, ex Ukraine) and Dr Stacey Kochergina (Germany ex Russia) visited Australia. They attended a fungi foray at Dorrigo in New South Wales, before visiting Tasmania with local researchers, Karina Knight from Western Australia and Peta MacDonald from Victoria.

After the extremely enthusiastic response to the unfamiliar plants in the forest at Black Sugarloaf from botany professor Martin Schnittler, I introduced them to 'Big Tree Track' a familiar name given it is the type locality of 4 species they had described, with the new genus *Tasmaniomyxa umbilicata* and two (possibly three) *Lamproderma* in the process of being studied.

One of my first questions to Dmytro was about some spores I had sent him months earlier that I thought were from another undescribed *Alwisia*. Surprisingly, based on genetic sequencing, he told me it was *Alwisia repens,* despite my specimen having erect, not creeping stalks (*repens*—Latin for creeping—was used as the specific epithet). Had it not been for sequencing, which helped to identify my material as the already described species, my specimen might have been described as a different taxon. (See front cover photo)

This lead to a discussion about species that are wrongly named because the type specimen was either atypical or poorly preserved. I thought no more about it until Dmytro asked me to collaborate on a paper to emend the description because he was aware of photographs on my website that showed hitherto unknown features of the species.

My series of images of the developing fruiting bodies were important additions to the paper and iNaturalist once again proved extremely useful as observers in New South Wales had also photographed this distinctive species, with images showing the colour changes as it developed.

For some reason, the first time I found *A. repens* I didn't make a collection for long term storage, but took just enough material for microscopic examination. My micrographs revealed unexplained geometric structures in the peridium (membrane surrounding the spore mass) (Fig. A), and amber coloured circles in the spore mass (Fig. B).

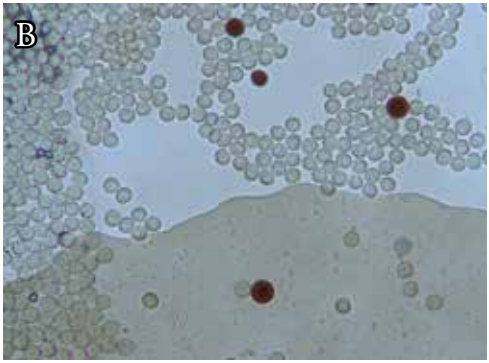
We noted these features in the paper, and also checked numerous photographs of *Alwisia* species posted on iNaturalist and the slime mould Facebook page. These helped to conclude that the dark spots within the developing fruiting bodies (Fig. C), help to distinguish *A. repens* from *A. lloydiae* (Fig. D), which lacks these structires.

We also noted that dehiscence (splitting to release spores) is through preformed polygonal or circular platelets (Figs. E & F), and the curious structures I had photographed were vestigial (i.e. non functional) capillitium (Fig. A).

Genetic sequencing and photographic equipment has improved markedly since the species was described in 2014. The photos on iNaturalist and Facebook provided additional information and the experience emphasises the importance of examining more than one collection when describing new species.

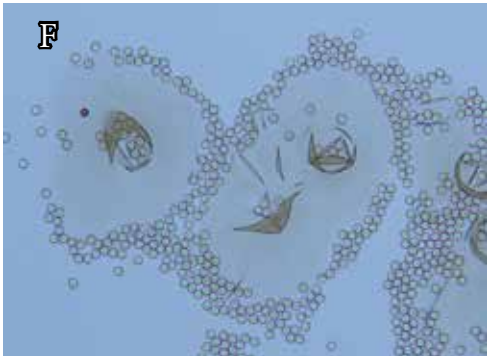
Like *Tasmaniomyxa umbilicata, Alwisia* is an ancient taxon. Thus far, *A. lloydiae* has only been found in Australia with the apparently rarer *A. repens* also found in New Zealand.

https://wordpress.com/post/sarahlloydmyxos.wordpress.com/3268



A. The geometric structures are vestigial (non functional) capillitium, processes not noted in the original description of the species. B: amber coloured circles amongst the spore mass are believed to be oil droplets.

C: Dark structures within the developing fruiting bodies help to distinguish young *A. repens* from young *A. lloydiae* (D). Photos Mary McConnell and S. Lloyd.



E: the polygonal to circular dehiscence observed in *A. repens* is rare in myxomycetes and has not been observed previously in the Reticulariales. F: photograph of polygonal platelets taken with compound microscope at 400 x magnification.

Walks and other events

All walks are scheduled for the first Sunday of the month unless otherwise stated. Meeting time is usually 10am. There are more details in the e-news.

Bring food, water, clothes for all weather, hand lens, binoculars, note book & curiosity.

December 3rd 2023 Tasmanian Arboretum, 46 Old Tramway Road, Eugenana. Leader: Philip Milner. Ph: 03 64923201 An opportunity to explore the less well-known corners of the arboretum with Philip Milner who has been establishing the relatively new Australian section with the help of a small group of dedicated volunteers.

January 7th 2024: Dooley Track/Wilmot River. Leader: Mary McConnell. Ph: 0409 900 476

This is part of a loop walk that runs both sides of the Wilmot River. The first part of the walk is along a very quiet road that provides access to 3 houses but then becomes a lovely track along the winding Wilmot River. There are several small shelters along the way, and most of the walk is shaded which will be ideal for a January walk. We can walk as far as we want and then turn back. Meet at the Alma Bridge where there is quite a large parking area on the left side of the road just before the bridge. Drive to Forth and then take the C132 which runs along the east side of the Forth River towards Wilmot. The Alma Bridge is approximately 12 km/10 minutes from Forth. The December eNews may have a map. There are no public toilets at Alma Bridge or on the walk, so take advantage of those in Forth.

February 11th 2024 Westmoreland Falls, near Mole Creek.

The Tawny Frogmouth is a master of disguise. On a warm rainy afternoon at Black Sugarloaf I heard the distinctive repetitive 'oom oom' of a Tawny Frogmouth and eventually tracked down the source.