Myxomycetes in Western Australia

Outline of tonight's presentation

- Classification of the Myxomycetes
- Life Cycle
- Structure of the fruiting body
- Distribution
- Habitats
- Preserving Specimens for study
- Slime mould studies in WA
- How to get involved

Image: Valérie Bruneau-Querey (Facebook)

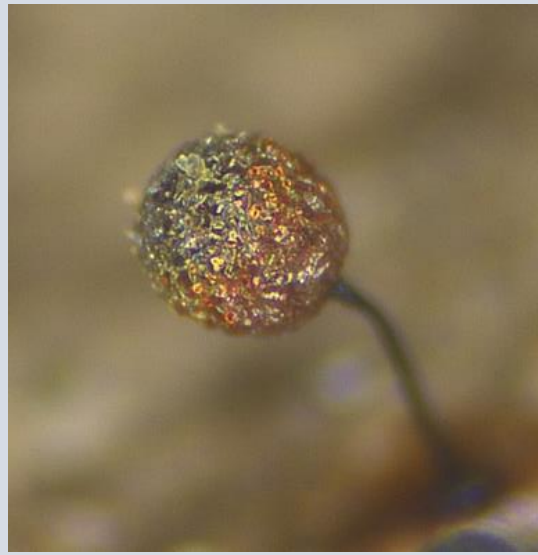
Classification of Myxomycetes

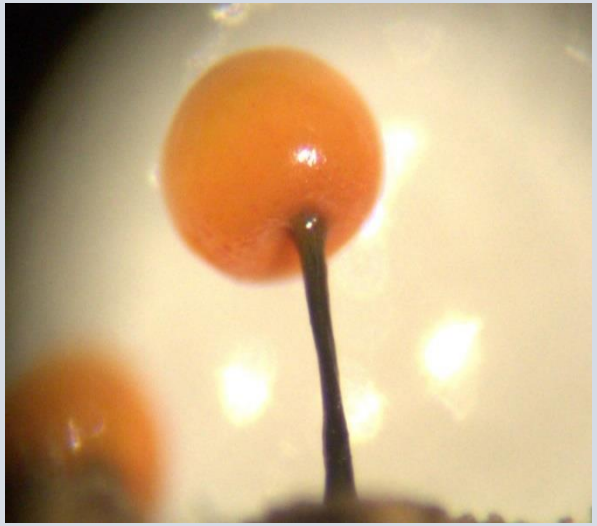
- The world is split into two kinds of organisms — **prokaryotes** and **eukaryotes** — the primary distinction is eukaryotic cells have a membrane-bound nucleus and prokaryotic cells do not.
- Plants, animals, fungi and slimemoulds (protists) are eukaryotes.
- Slime moulds are in the supergroup Amoebozoa.

Slime mould is an informal name for a number of unrelated organisms with similar stages of life. For example:

Dictyostelids (The Diversity of SM)

Ceratiomyxids (Tim Kelley, Facebook page))





Myxogastrids

Acrasids (The Diversity of Slime Moulds)

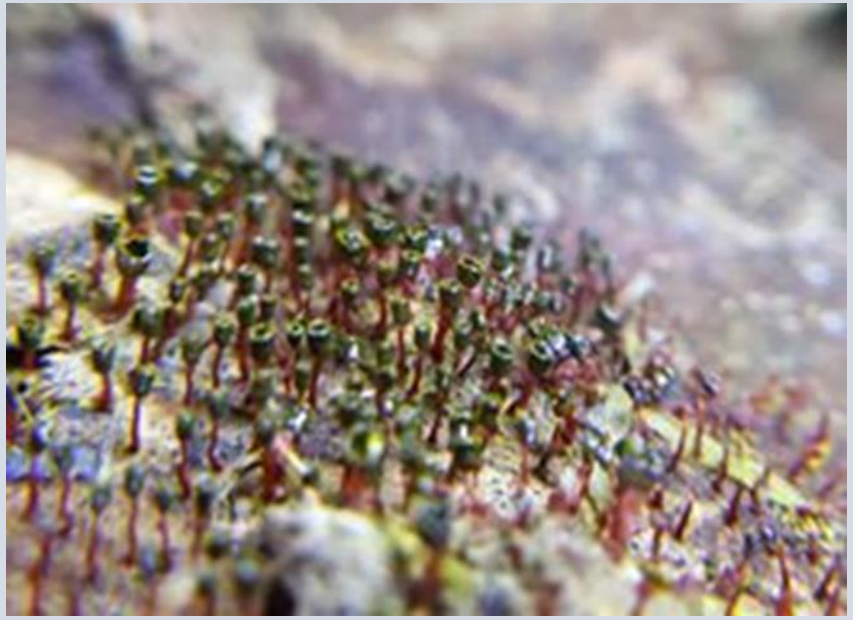
Myxomycetes were first thought to be fungi

- Primarily because they may resemble each other and both reproduce by spores.

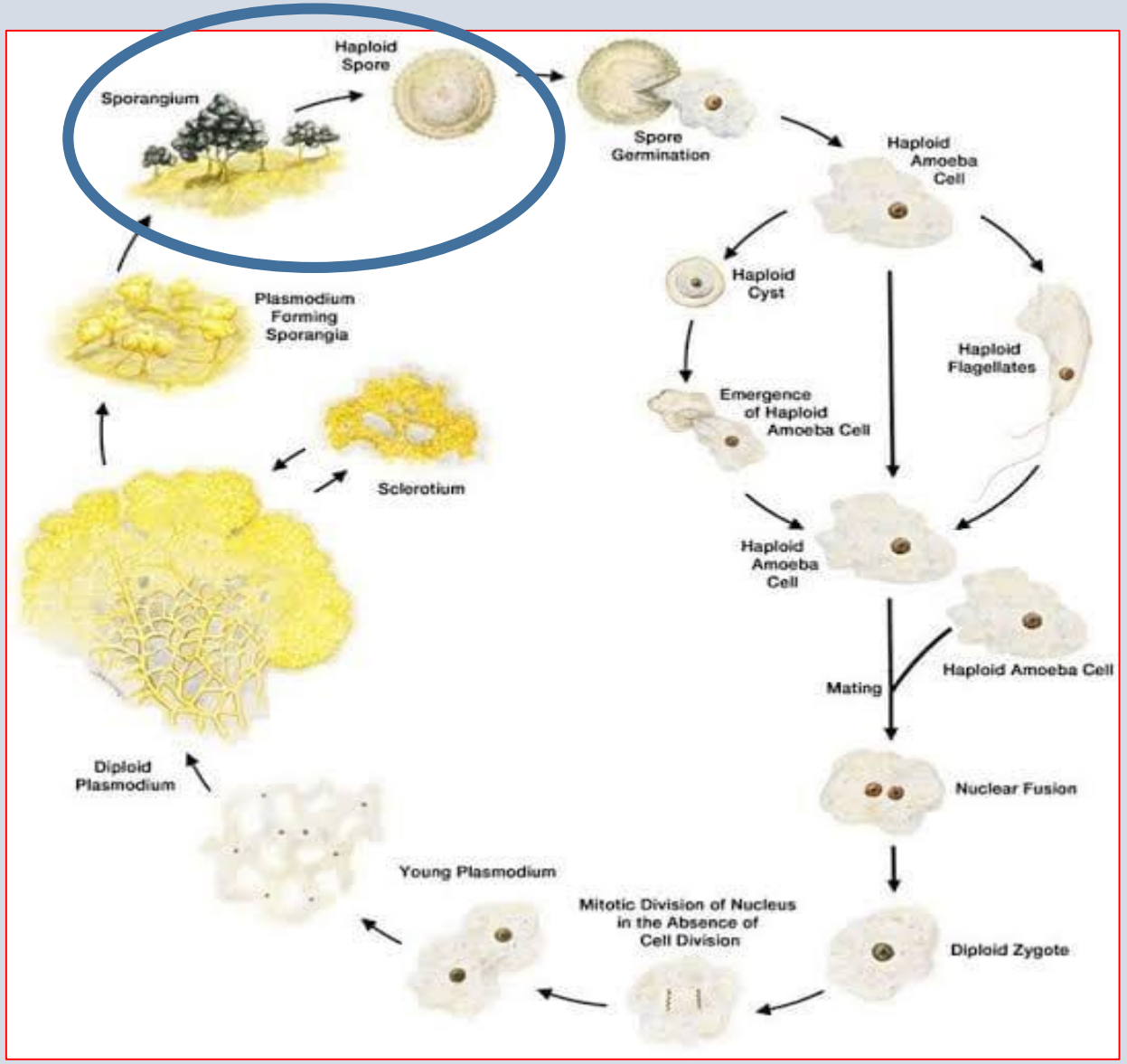
- However they differ in that slime moulds

- have a different cell structure
- play a different role in decomposition of organic material and
- Myxomycetes move!

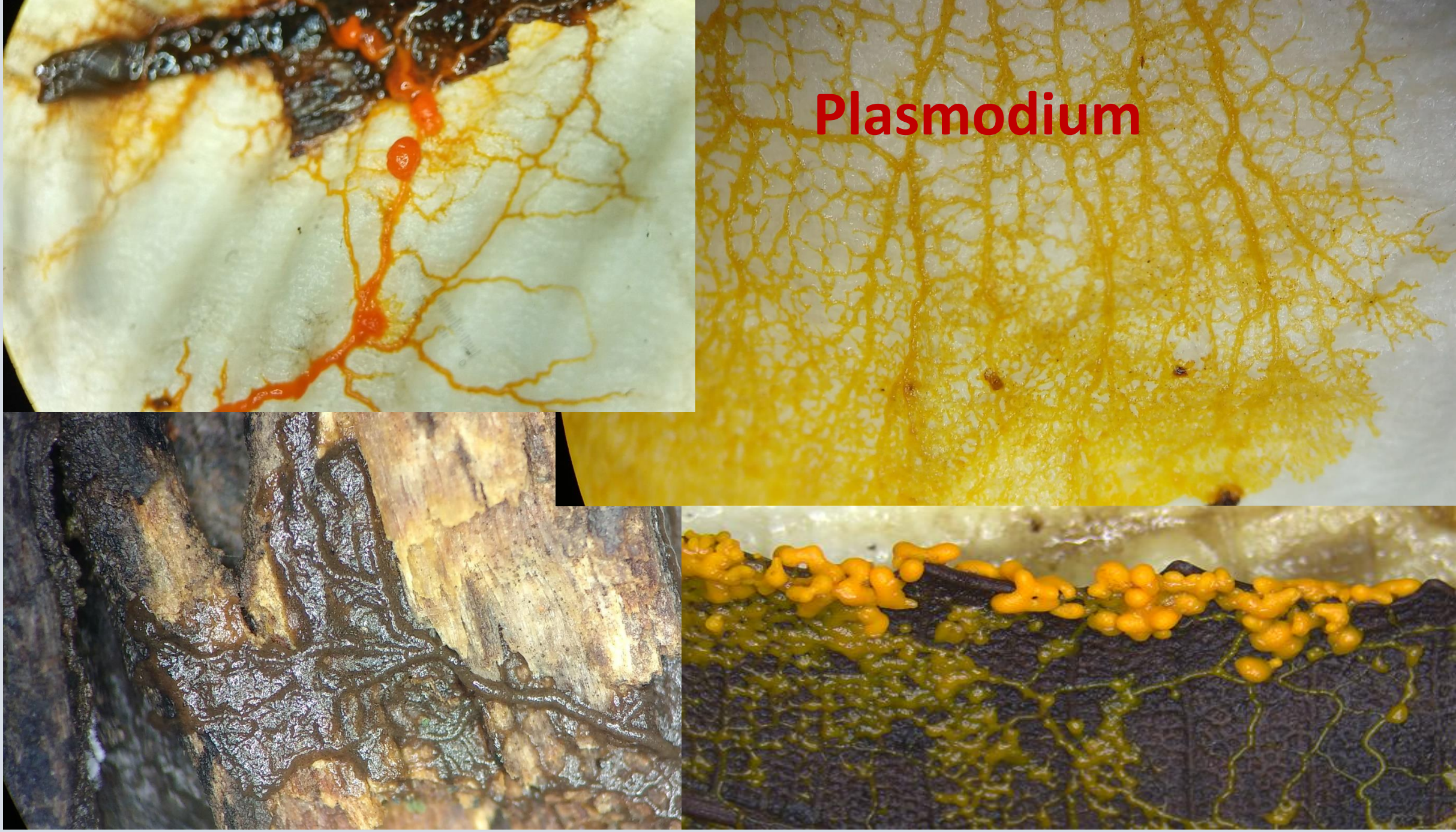
Image: Joseph Andracchio (Facebook)



Life Cycle of a Slime Mould



https://www.carolina.com/teacher-resources/Interactive/think-single-celled-organisms-are-simple-think-again-the-slime-mold-physarum-polycephalum-a-single-celled-organism-for-student-investigations/tr41405.tr


Plasmodium

Types of fruiting bodies

- Sporocarp
- Aethalium
- Pseudoaethalium
- Plasmodiocarp

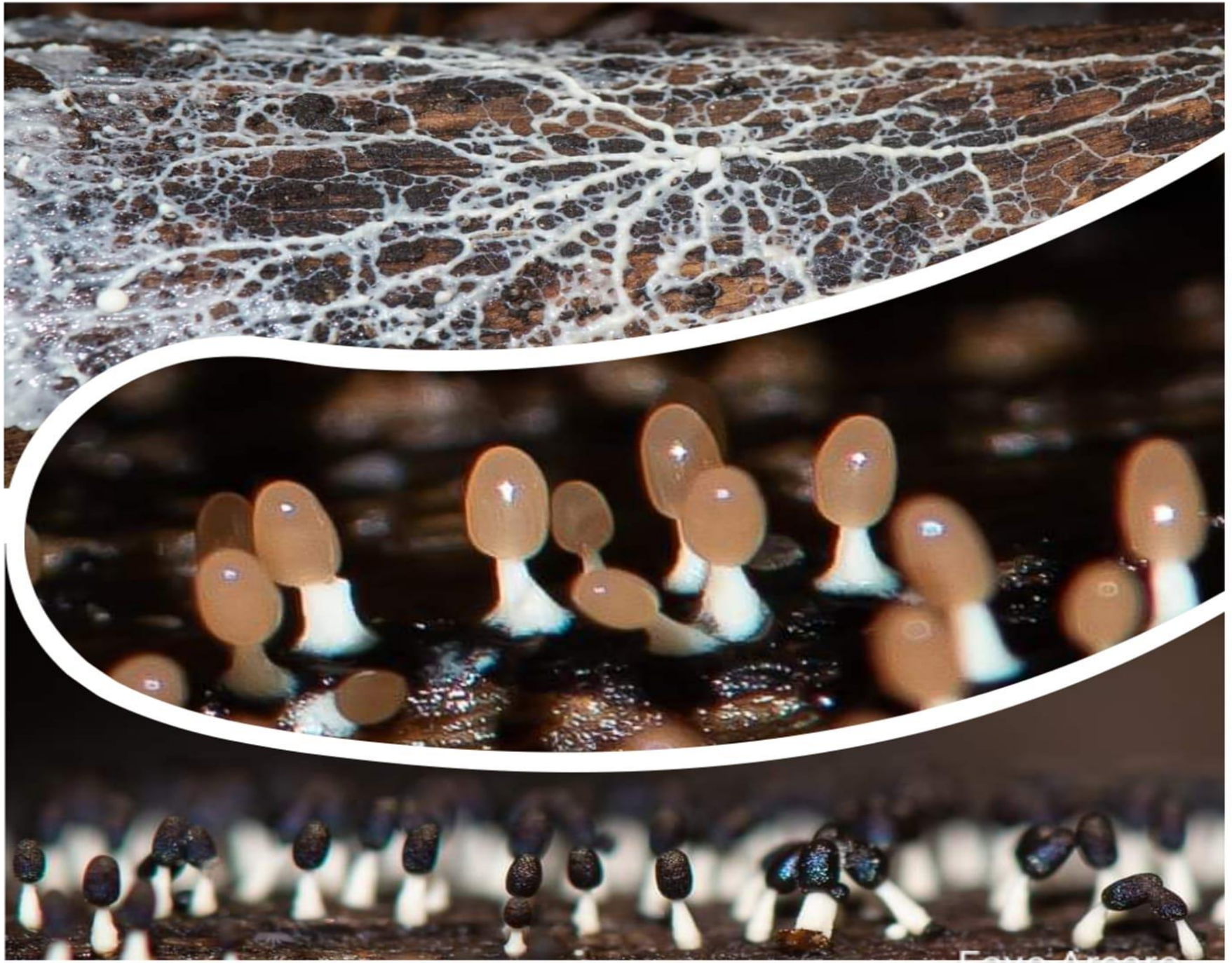


Image:
Faye Acaro

Structure of the fruiting body

Fruiting body (or **sporophore**) – spore-forming structure in slime molds.

Sporocarp – a fruiting body formed from a plasmodium. It consists of spores and auxiliary acellular structures (stalk, peridium, capillitium, columella, etc.). A large plasmodium usually splits into several (sometimes tens to hundreds) fragments, each forming one sporocarp.

Sporotheca – spore-bearing portion of the fruiting body. It consists of a spore mass, covered by a peridium, and may contain auxiliary structures (capillitium, columella, etc.).

Capillitium – a system of solid or hollow threads, interspersed within the spore mass inside the sporotheca. It serves to facilitate and regulate the spore dispersal.

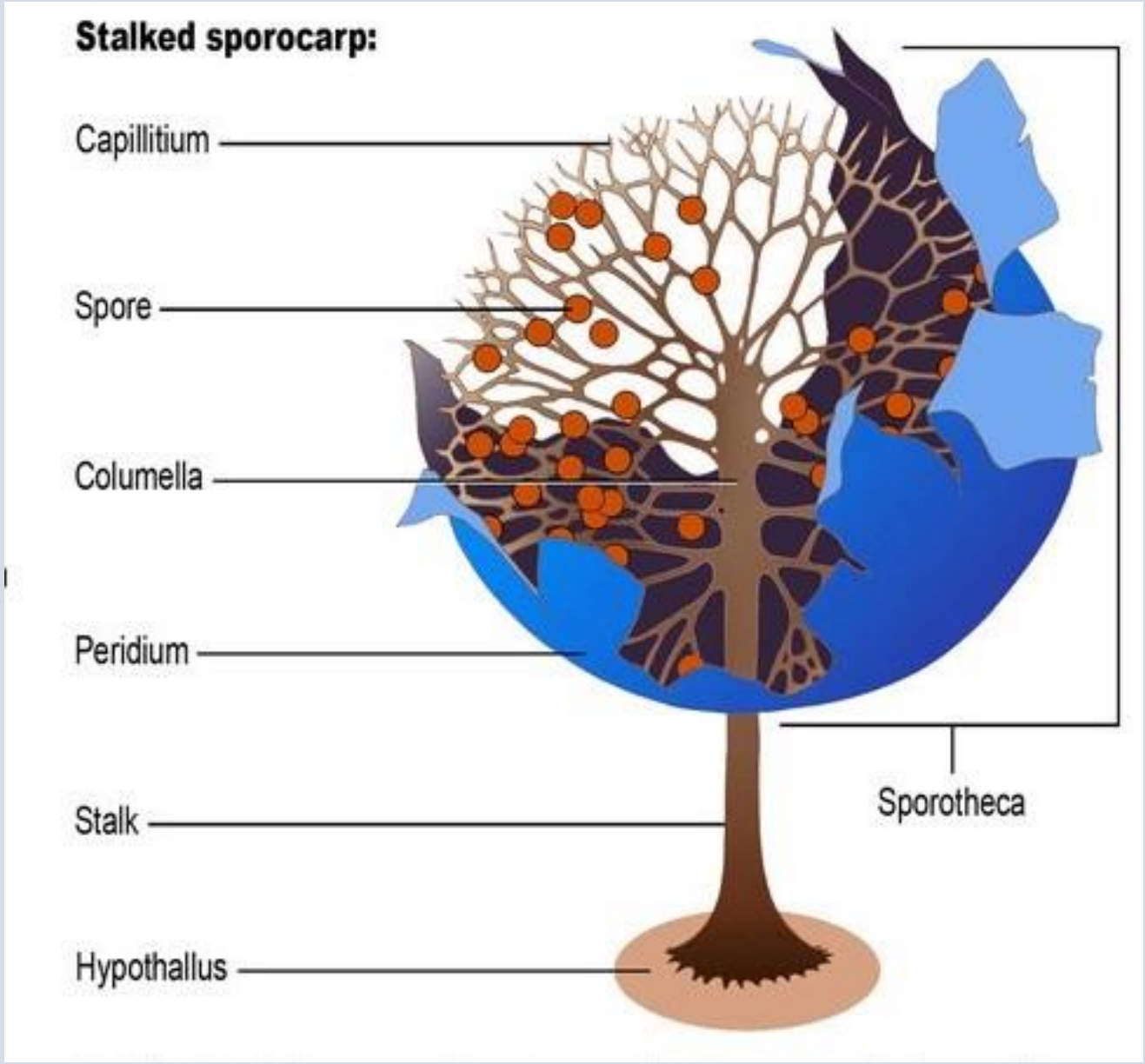
Spore – microscopic reproductive unit formed in the fruiting body.

Columella – continuation of the stalk inside the sporotheca.

Peridium – fugacious or persistent covering that surrounds the sporotheca.

Stalk – a structure that elevates the spore-bearing portion of the fruiting body above the substrate.

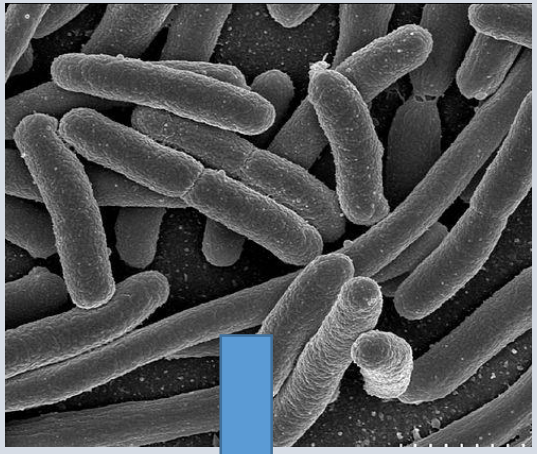
Hypothallus – a structure which serves to attach the fruiting body to the substrate.



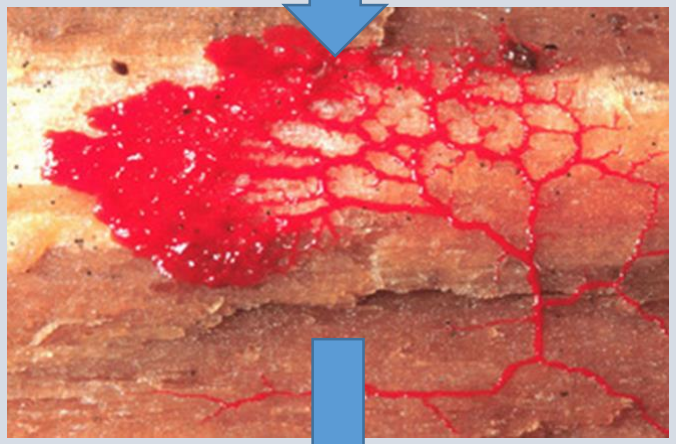
https://www.researchgate.net/figure/Illustrated-glossary-for-morphological-traits-of-myxomycetes-and-related-taxa_fig1_332029233

Function in the ecosystem

- Haploid amoeba and diploid plasmodium moves across the substrate feeding on microfungi and bacteria.
- Which themselves feed on the substrate as nutrient recyclers or decomposers
- The slime mould plasmodium and fruiting bodies are then in turn predated on by small insects such as springtails, beetles, ants and molluscs such as slugs.

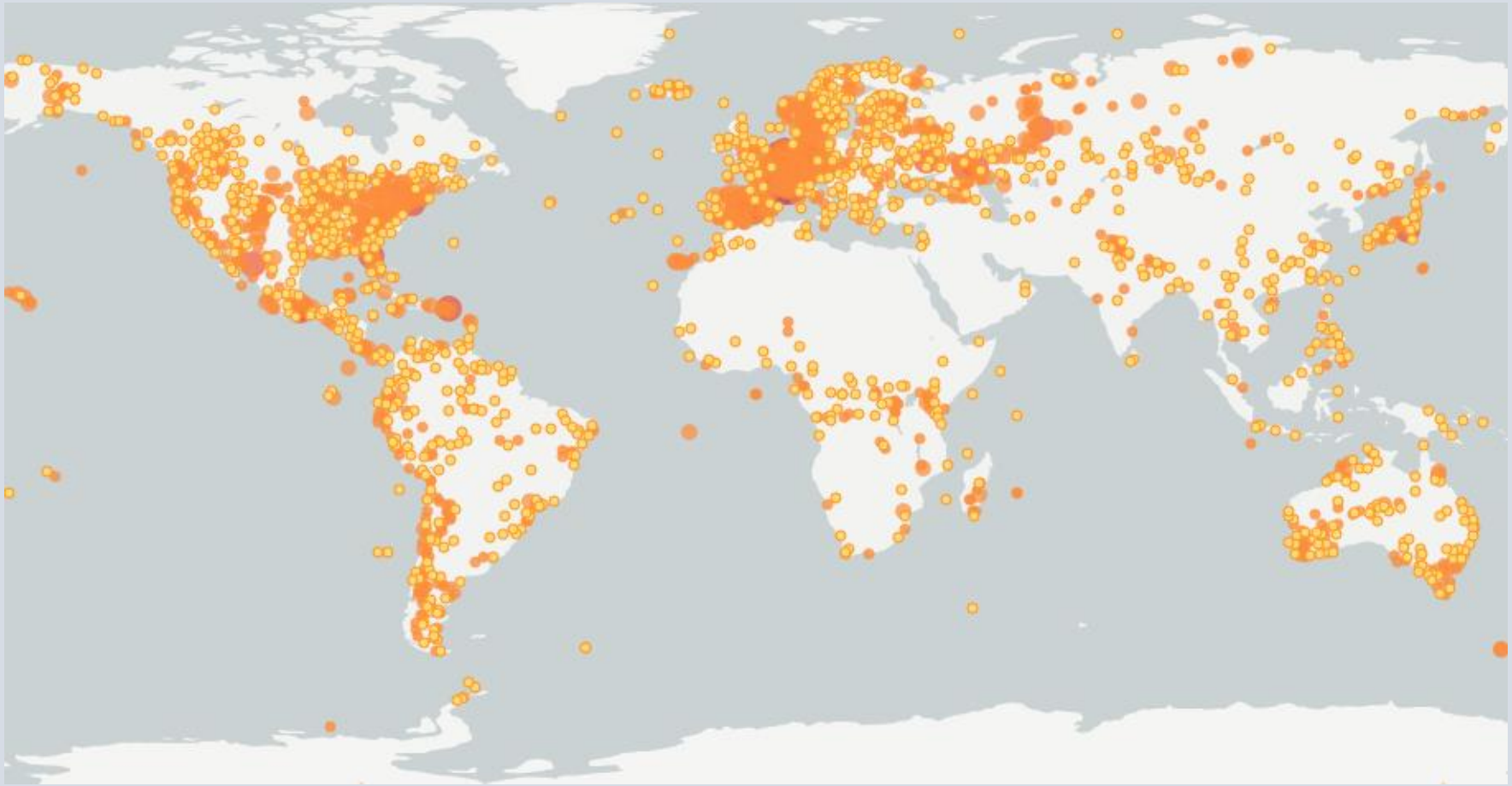


https://commons.wikimedia.org/w/index.php?curid=104228



The Eumycetozoan Project.

General Pattern of Distribution



GBIF Secretariat (2017). Myxomycetes. GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei [accessed via GBIF.org on 7 July 2021].

Myxomycete habitats

Long evolutionary history – found in virtually every terrestrial habitat. A few are aquatic.

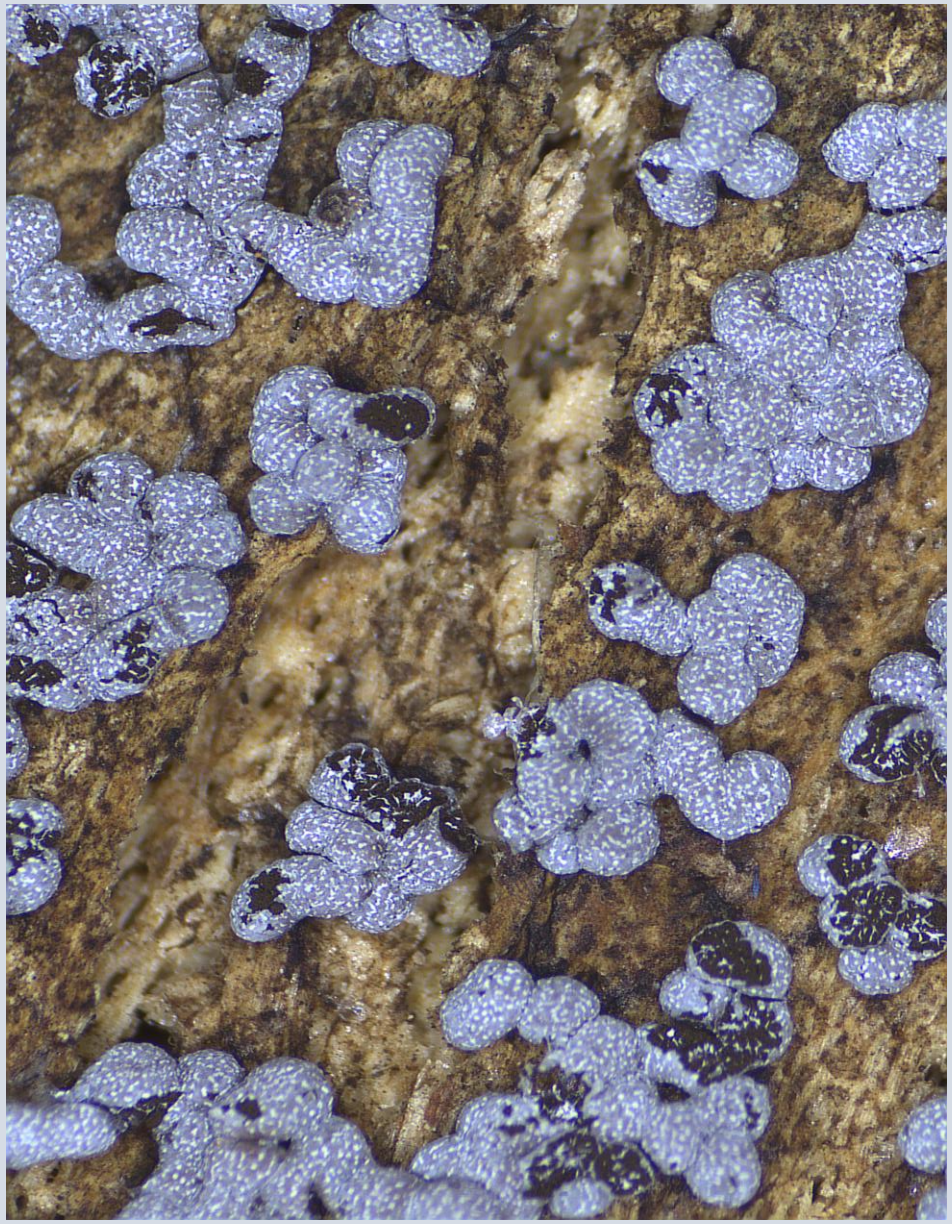
Under favourable conditions slime moulds can be quite common.

Temperature and moisture are the main limiters.

With increasing plant species richness in the environment there is a corresponding increasing in diversity of slime moulds.

Many species have a cosmopolitan distribution, although some occur only in quite specific habitats.

Soil, ground leaf litter, wood, e.g. rotting logs, aerial leaf litter, lianas, flowers of large trees.



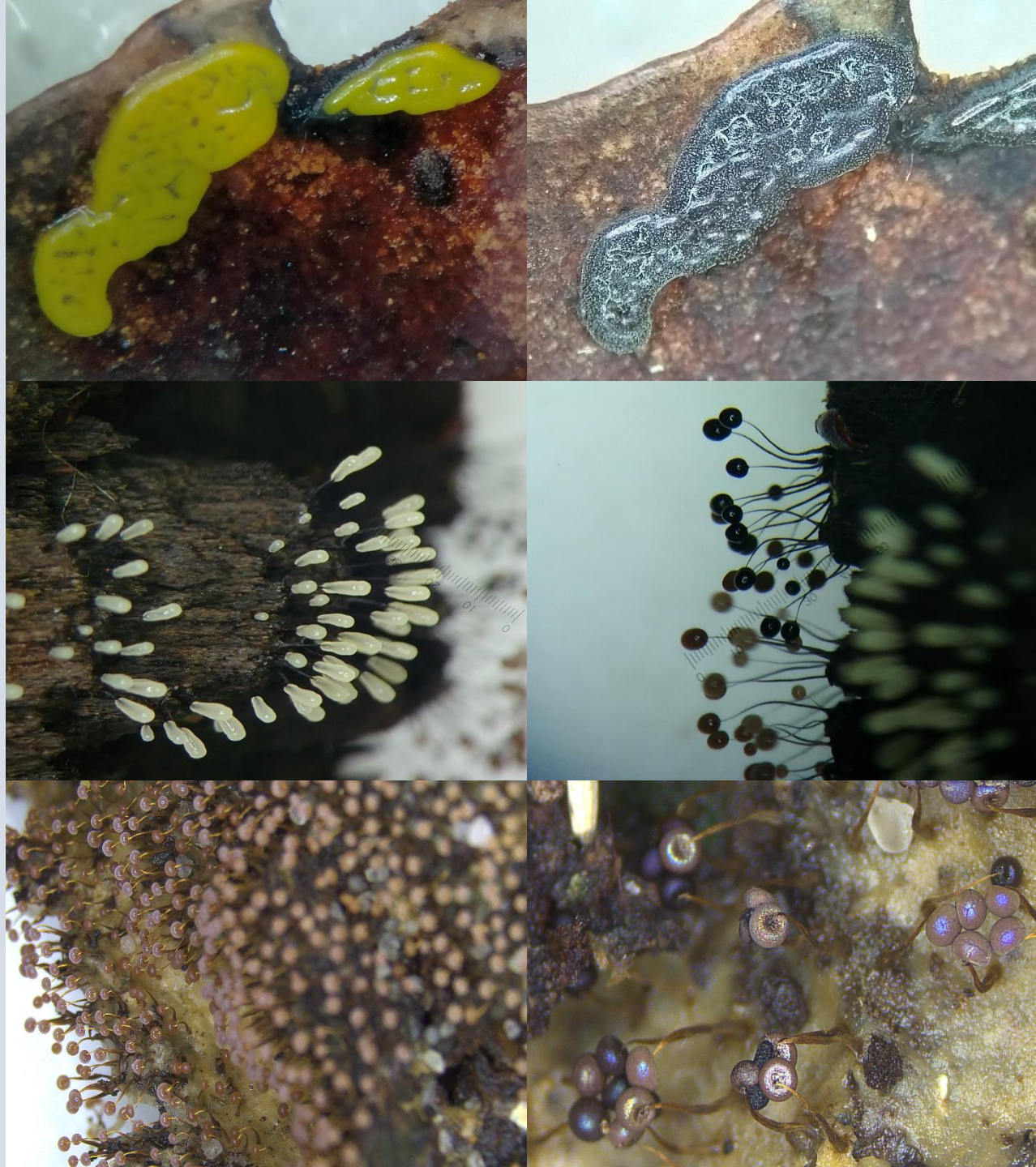
Habitat types

- Temperate
- Tropical
- Grassland
- Snow melt
- Desert/arid regions

Image: Edvin Johannsen

Unusual microhabitats

- Bark of live trees
- Dung of herbivorous animals
- Bryophytes
- Succulents

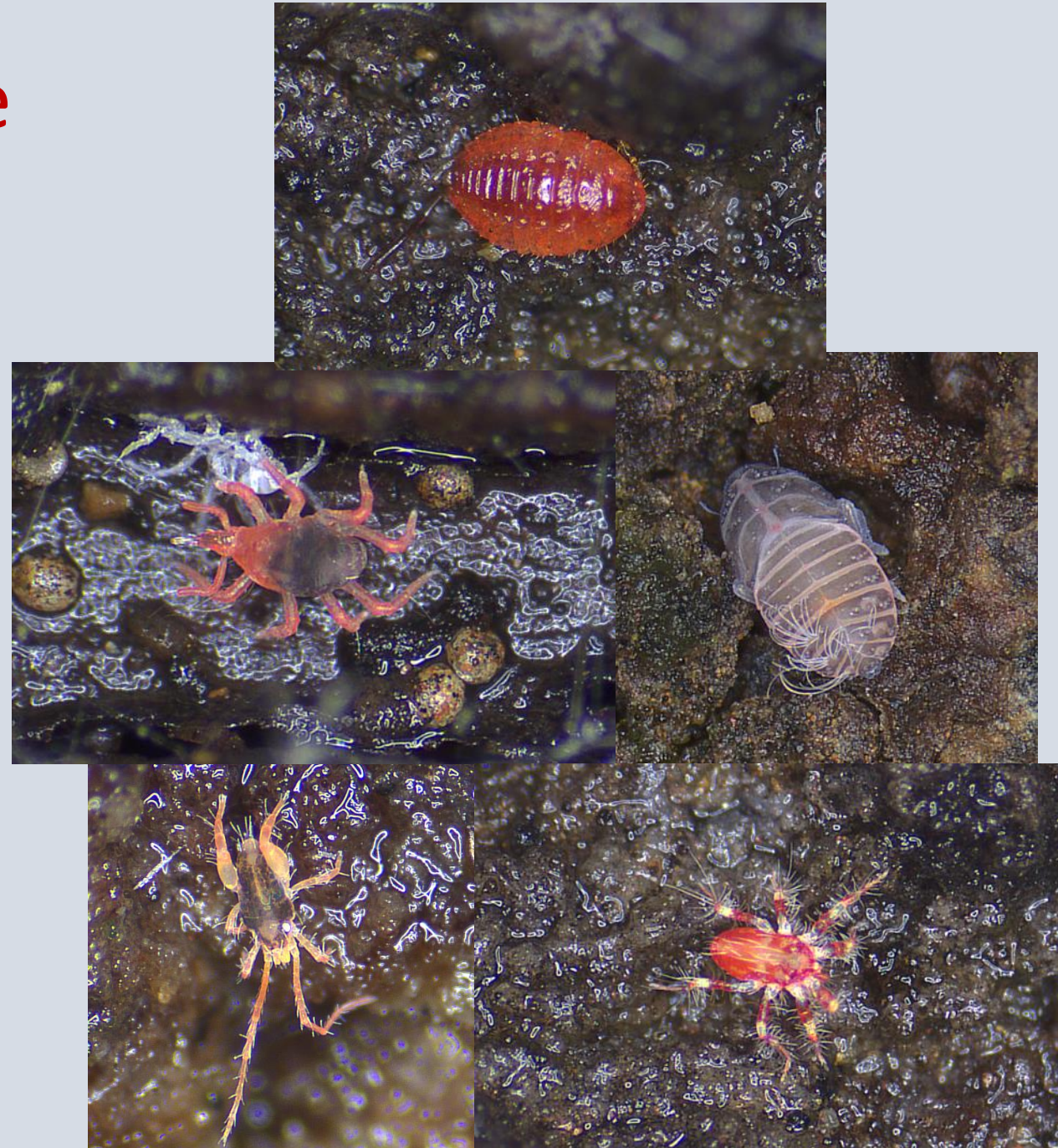


Moist chamber

- Supplements field collections.
- Best method to locate minute species.
- Arid areas my favourite, moist chamber the best method of finding slime moulds in this environment.
- Pick up any piece of organic matter, it’s likely to grow slime mould in moist chamber.

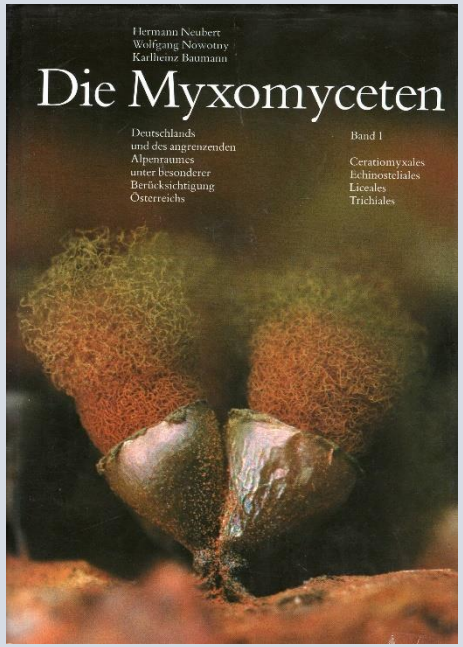
Moist chamber technique

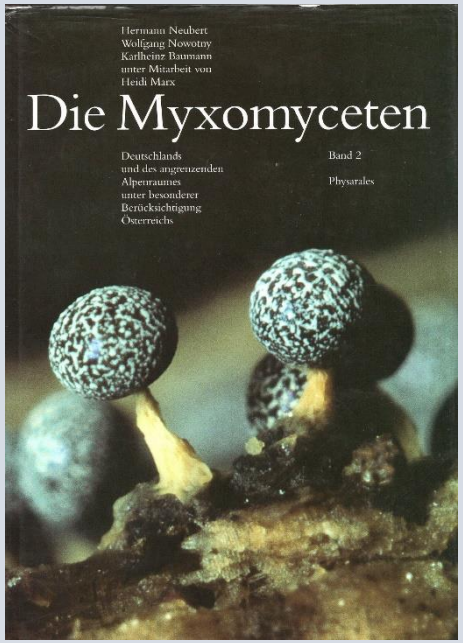
- Place substrate cut side down on paper towel in a lidded container.
- Submerge for 24 hours in deionised water.
- Take off excess water.
- Close the lid.
- Watch and be amazed.
- Harvest as you would a specimen from the field.
- Dry slowly on the kitchen bench!
- Limits – tends to only grow the minute slime moulds because not enough substrate to feed upon.

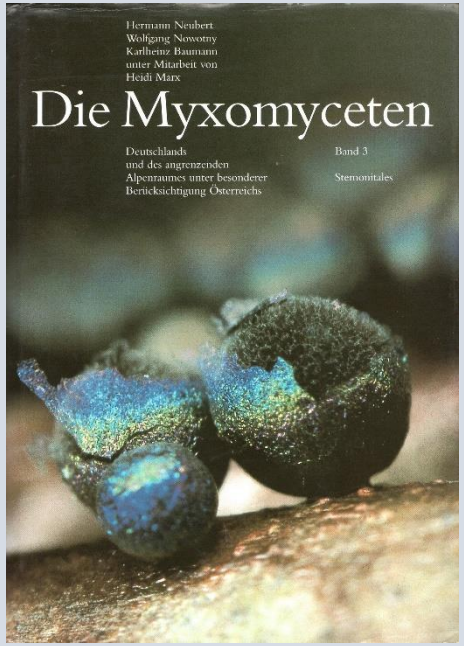


Preserving /Identifying specimens

- Air dry, this allows the specimen to dry slowly and provide enough time to finish development.
- Once dried, using archival glue, attach to an archival mounting board.
- Freeze to kill insects.
- A collecting licence may be required.
- Provide collecting information.
- Identification resources limited, there isn't a complete key, rely on reference books, and some of the best books are in other languages.
- Microscopes necessary to identify, particularly to study the spores.



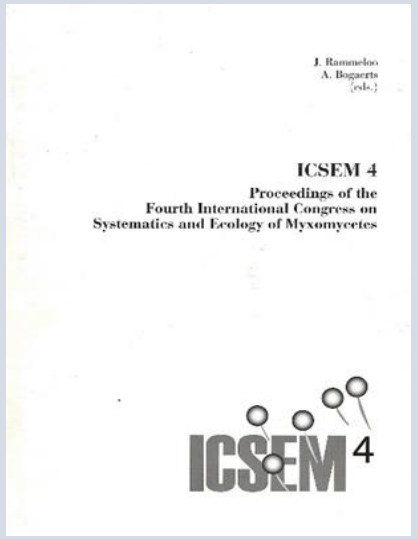


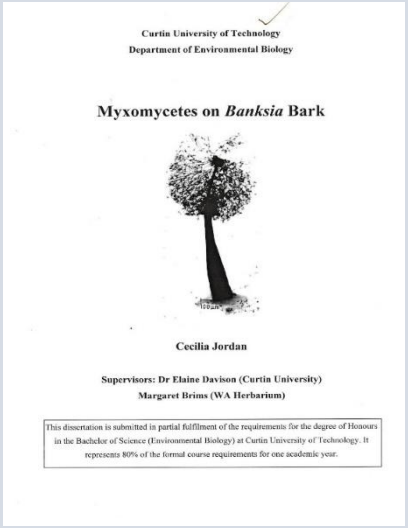


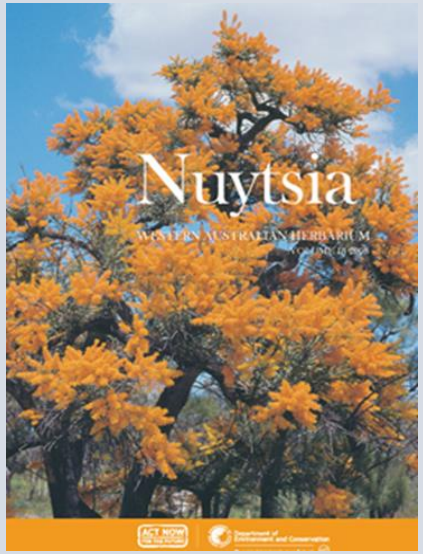
Slime Mould Studies in WA
Margaret Brims 1996-2007

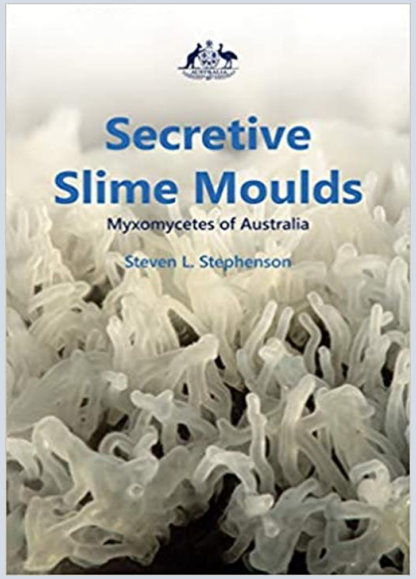
- Pre 1996: very sketchy interest in Myxomycetes in WA or Australia.
- 1996: Margaret's interest in Myxomycetes was sparked by finding a bright red blob on some moss.
- 1997 – 1999: Margaret started to hunt for specimens in the field. Alex was very supportive of her endeavours
- 2000-2007: Margaret's most productive period. She sparked interest in those around her including myself.

- 2004: Margaret attended ICSEM 4 in Brussels in 2004.
- 2004: Co-supervised an Honours student with Elaine Davison, Curtin Uni.
- 2010: Census of slime moulds in WA published. Due to Margaret's influence the number of species known in WA increased from 21 to 142, the number of specimens in the Herbarium collection from less than 100 specimens to 630. Currently there are 194 species and 1485 specimens lodged in the herbarium.
- Margaret contributed 393 specimens to the Herbarium.
- 2012: Trichia brimsiorum: Stephenson named a slime mould after Margaret and Alex's contribution to his work.









Trichia brimsiorum

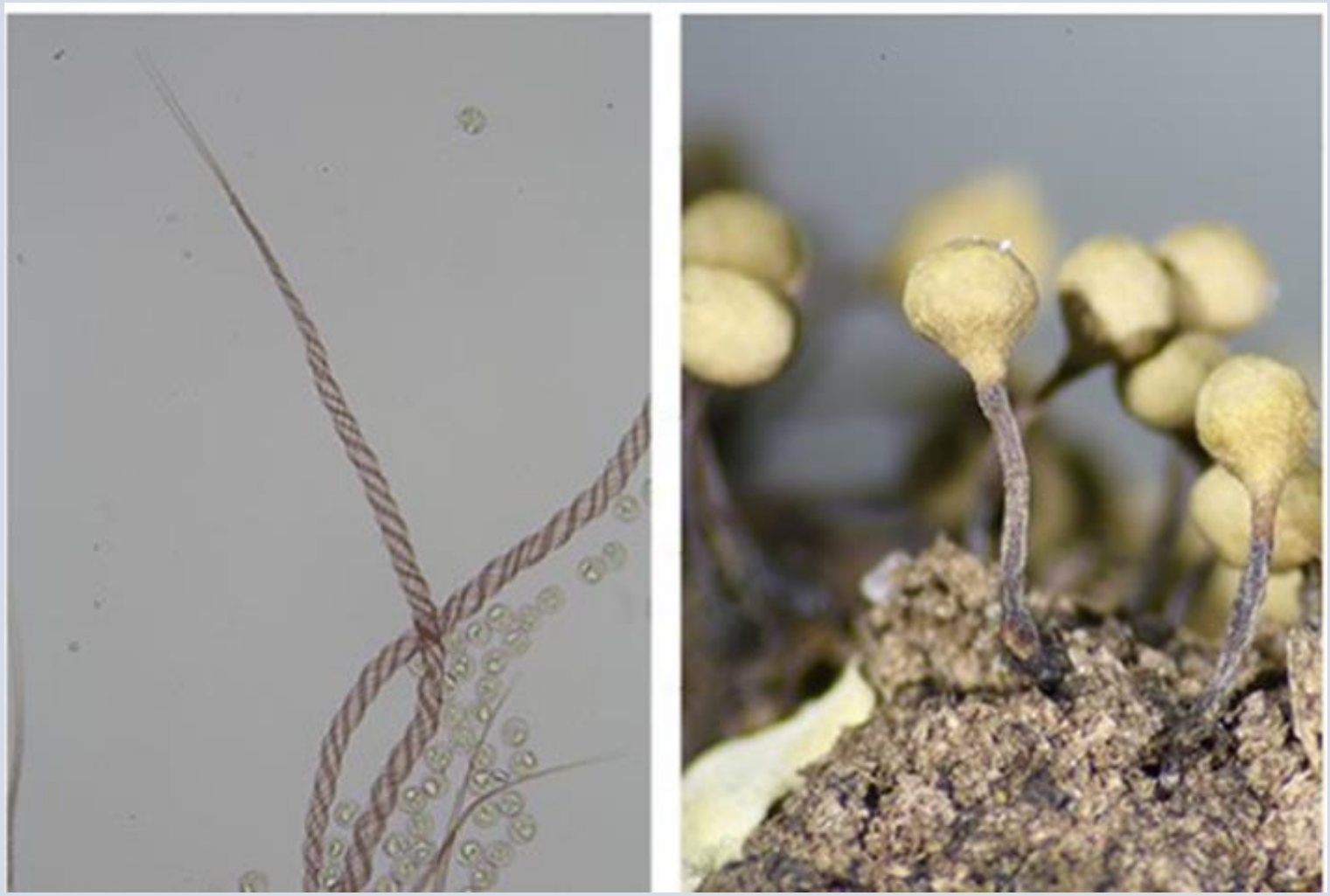


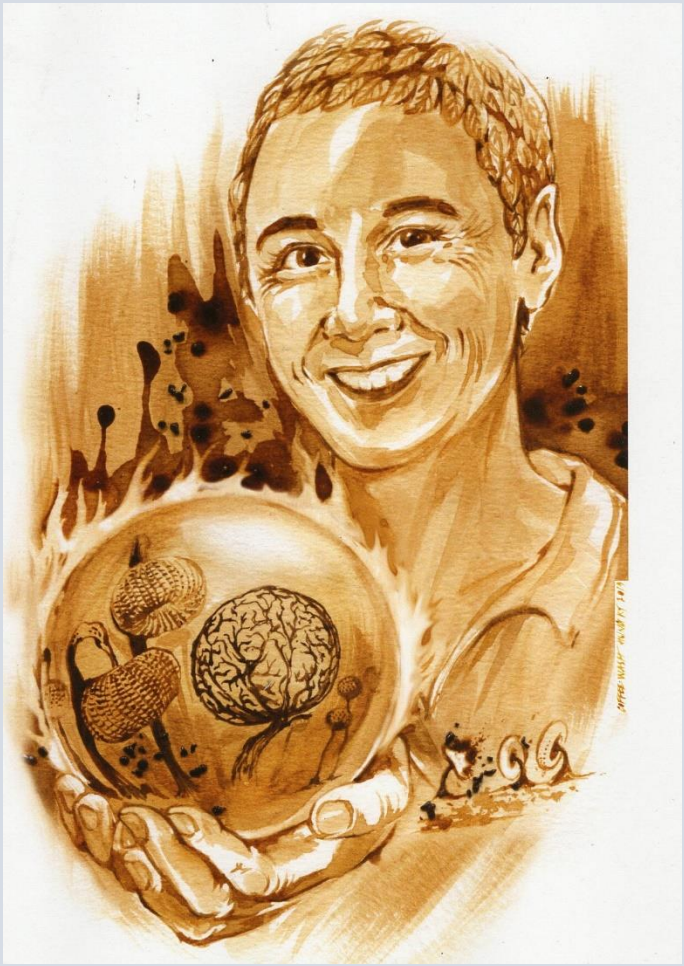
Image:
Sarah Lloyd

Slime Mould Studies in WA
Elaine and Peter Davison 2005 – 2015 +

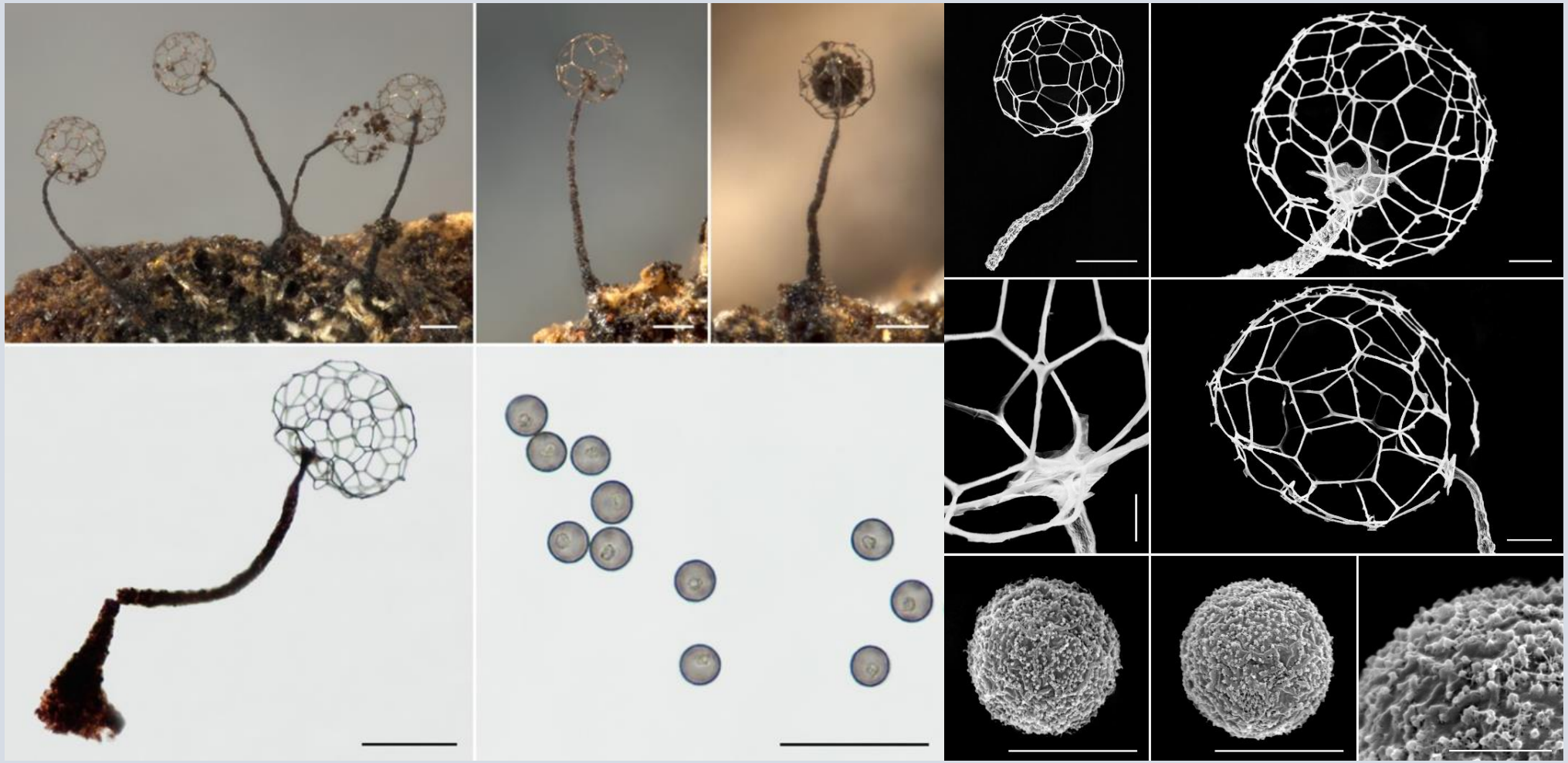
- 2005-2015: Elaine and Peter Davison became active in Slime Mould research due to Margaret's influence.
- They've contributed nearly 400 specimens to the Herbarium.
- 2013: Licea xanthospora: the Davison's along with the Barrett's described a new species of slime mould found only in WA
- 2016: I started my slime mould journey, with the assistance of Elaine and Peter Davison who mentored me in identification.

Image:
Peter Davison

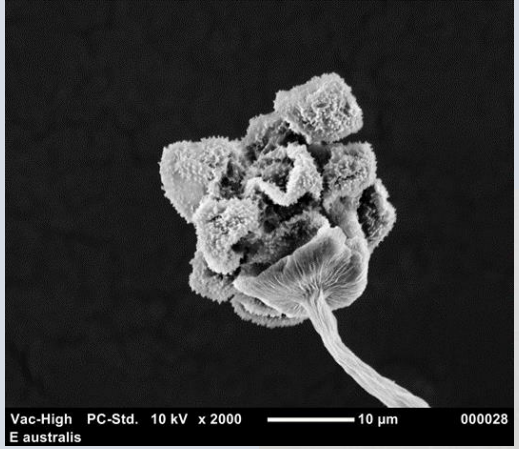
Slime Mould Studies in WA
Karina Knight 2016 +

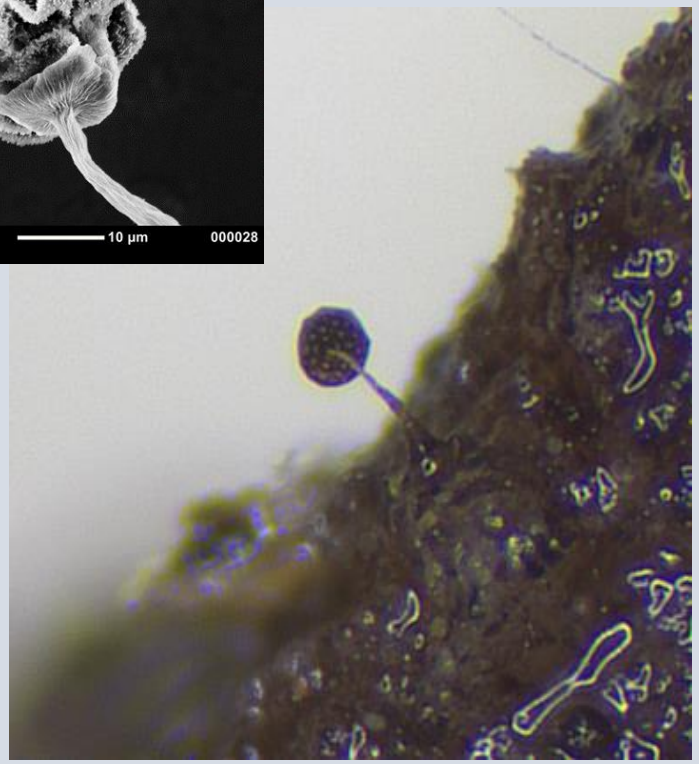


Clastoderma confusum K.J.Knight & Lado



Current Activities



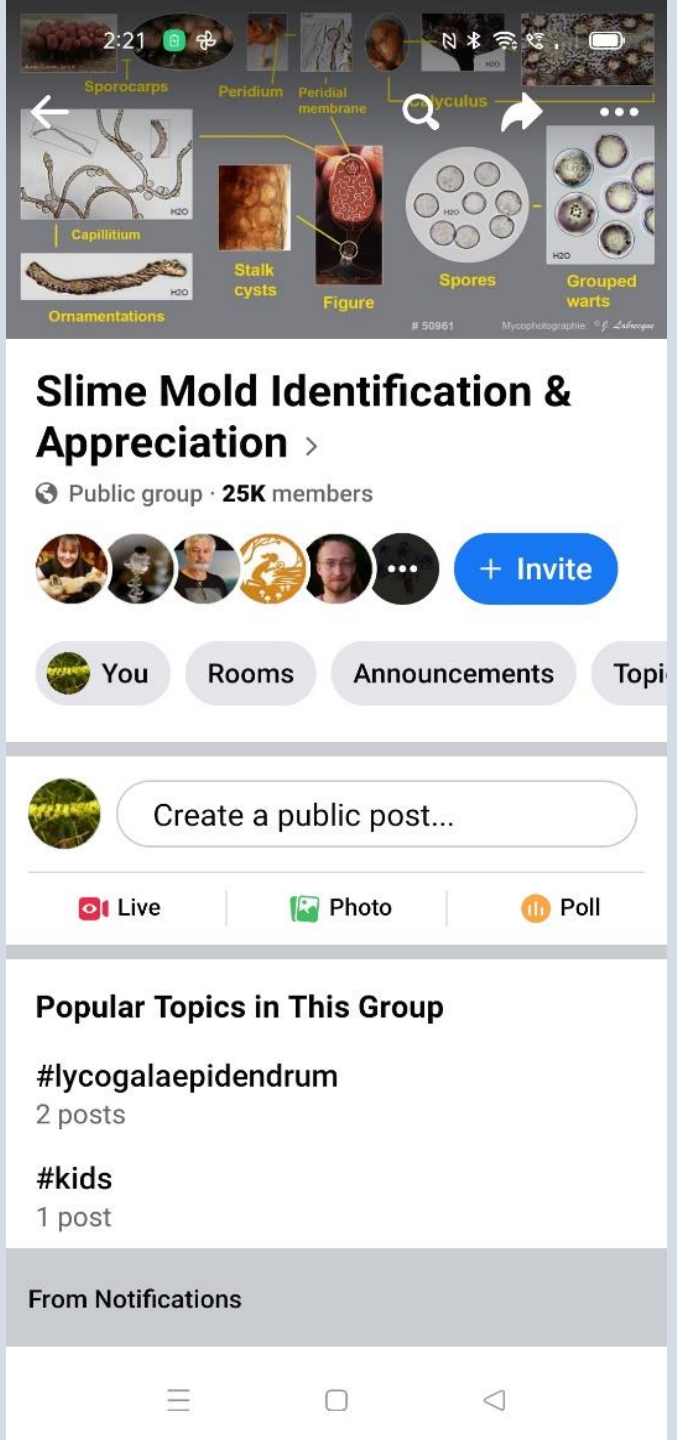


- Curating the herbarium collection.
- Field collecting.
- Focus on moist chamber with substrates collected from arid regions.
- Followed by areas where slime moulds are poorly documented.
- The specimens are added to the Herbarium collection, new names for WA added to the census.
- Currently describing another new species with a few more up my sleeve.

Perichaena sp. nov.

How to get involved

- Eyes down toward the ground.
- Collect.
- Facebook – Slime Mould Identification and Appreciation Page.
- Message me via Messenger.
- Email: karina.knight62@gmail.com
- Drop specimens at the Herbarium, contact me first.



Presentation resources/references

- WA Herbarium.
- The Eumycetozoan Project (*http://slimemold.uark.edu/).*
- GBIF (https://www.gbif.org/).
- FloraBase – WA Herbarium (*https://florabase.dpaw.wa.gov.au/*).
- Nomenmyx – online nomenclatural system of Eumycetozoa (*nomen.eumycetozoa.com*).
- Myxotropic (Project) (https://www.myxotropic.org/home/).
- Wikipedia – https://en.wikipedia.org/wiki/Myxomycetes.
- The diversity of Slime Moulds (http://coo.fieldofscience.com/2008/09/diversity-of-slime-moulds.html).
- Secretive Slime Moulds (Stephenson).
- Myxomycetes (Stephenson and Stempen).
- Facebook: Slime Mould Appreciation and Identification page and its contributors.
- All images were taken by myself unless otherwise attributed.