

PROBLEM

Some mould fungi live on submerged decaying dicot leaves and produce non-motile spores (conidia) underwater. These fungi (aquatic hypomycetes) have been extensively studied in Europe and America but little is known about them in Western Australia. Once you have discovered a source of these fungi you might look at their seasonal abundance and their occurrence on different kinds of leaves.

Alternatively, you might compare their abundance in different sorts of habitats – fast flowing streams with tree lined banks (eucalypts and native plants or introduced willows etc.) swampy areas with some water flow (plants like Typha-bullrush and Juncus-rush), or stagnant ponds.

INFORMATION

1. Aquatic hypomycetes are expected to be most abundant in fast flowing streams with tree lined banks at cooler times of the year. They can be distinguished from terrestrial fungi which have spherical or ovoid shaped spores, because they produce conidia of a distinctive shape – large, several cells, commonly with four or more radiating arms. Some are long and worm-like. Students in cool southern areas of W.A. are more likely to be successful in finding these fungi.
2. Partly decayed, almost skeletonised leaves can be collected, washed free from mud and debris and placed in distilled water in a Petri dish in the lab., in a cool place (preferably below 20° C) in light. In 1-7 days hyphae grow out from the petiole and veins and spores are produced underwater.
3. Spores can be trapped in large numbers in the bubbles of foam that form at the bottom of rapids, waterfalls, etc. Spoon foam into a clean jar and when it breaks down into a few mL of liquid, fix immediately by adding an equal volume of F.A.A. (5 mL glacial acetic acid, 90 mL 70% alcohol, 5 mL 40% formaldehyde). The surface scum that forms behind barriers of twigs and leaves may also be a spore trap.
4. Another way of collecting spores is to filter a known volume of river water ½ -1 litre collecting the spores on a millipore filter (8 µm pore size). To do this in the field use a bike pump on the outlet arm of the filter flask. Dry filter and add a few drops of 0.1% cotton blue in lactic acid to kill the spores. Back in the lab. place filter in a glass Petri dish, flood with 0.1% cotton blue in lactic acid and heat to 50-60 C for 45-55 mins to make it go clear. Cut in two and mount on a slide. Add a coverslip and scan several fields under low power. (Cotton blue can also be called Methyl Blue or Aniline blue-water soluble). A Gurr or BDH product, it is available from Selby's, 21 Glassford Road, Kewdale. W.A.
5. Species can be indicated by drawings of spore shape. It is difficult to name them as even if you obtain the book by Ingold you can't be sure the W.A. ones will be included.
6. Another group of fungi called aero-aquatic hypomycetes may be encountered. These grow on decaying leaves in more anaerobic conditions. Place rotting leaves on wet filter paper in a Petri dish (do not submerge them) in cool lighted conditions. Spores may be produced on the leaf surface. They are tightly coiled and float rather than being underwater. Again identify your findings by drawings of spores – naming is difficult being based on accurate measurements of spore size, coil and cell number, and characteristics in pure culture.

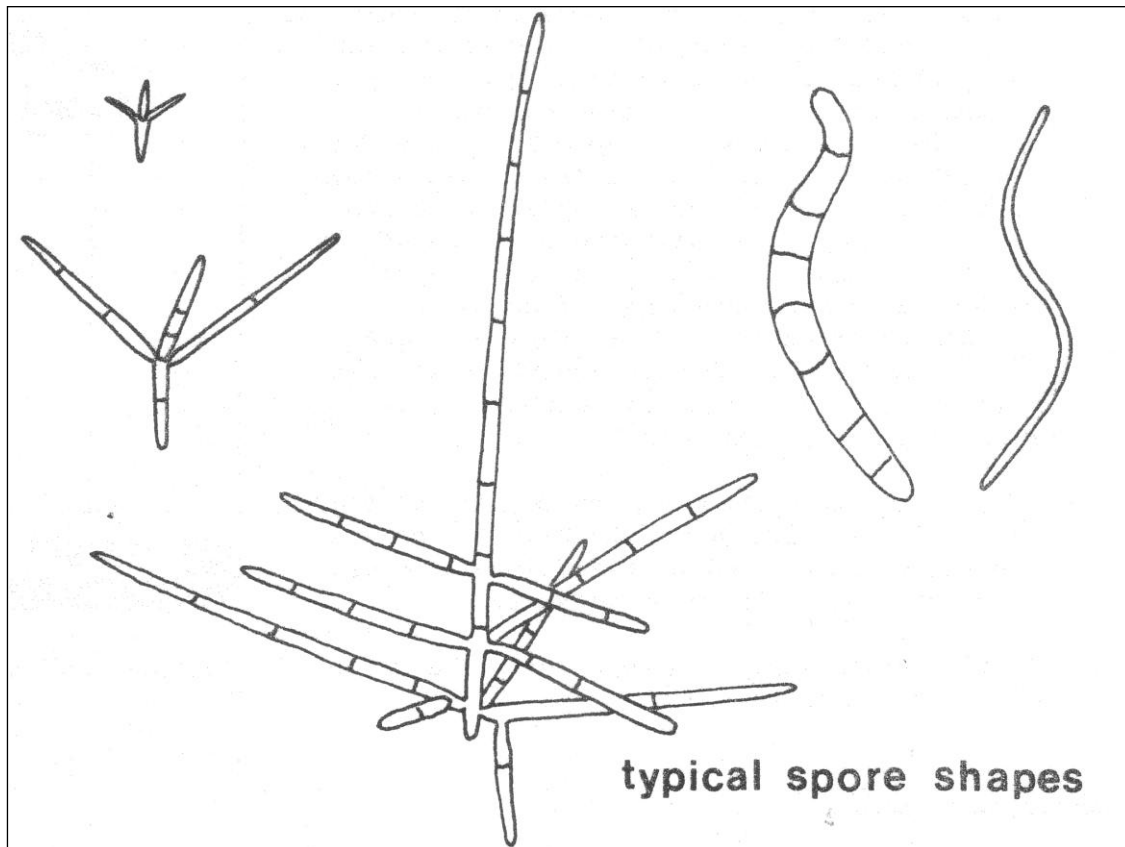
DESIGN OF EXPERIMENT

1. How will you figure out from which plants your decaying messy leaves came?
2. How will you distinguish aquatic hypomycete conidia from conidia of terrestrial fungi, moss and fern spores, pollen etc.?
3. Is it possible to determine spore concentration in water by collecting foam or do you need running water for this?

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4. If you count spore numbers how will you back calculate to the volume of river water originally sampled?
5. Of what functional significance is the branched structure of the conidia?
6. How are you going to tell the difference between the fungi and other organisms present such as blue green algae, protozoa diatoms etc.?



REFERENCES

Hudson, H. (1972). *Fungal Saprophytism* (Edward Arnold : London) (Studies in Biology No. 32).

Ingold, C.T. (1975). *An Illustrated Guide to Aquatic and Water Borne Hypomycetes (Fungi Imperfecti) with Notes on their Biology*. Freshwater Biological Association Scientific Publication No. 30 (1). Available from the Supply Dept., The Ferry House, Ambleside, Cumbria LA220LP, U.K.