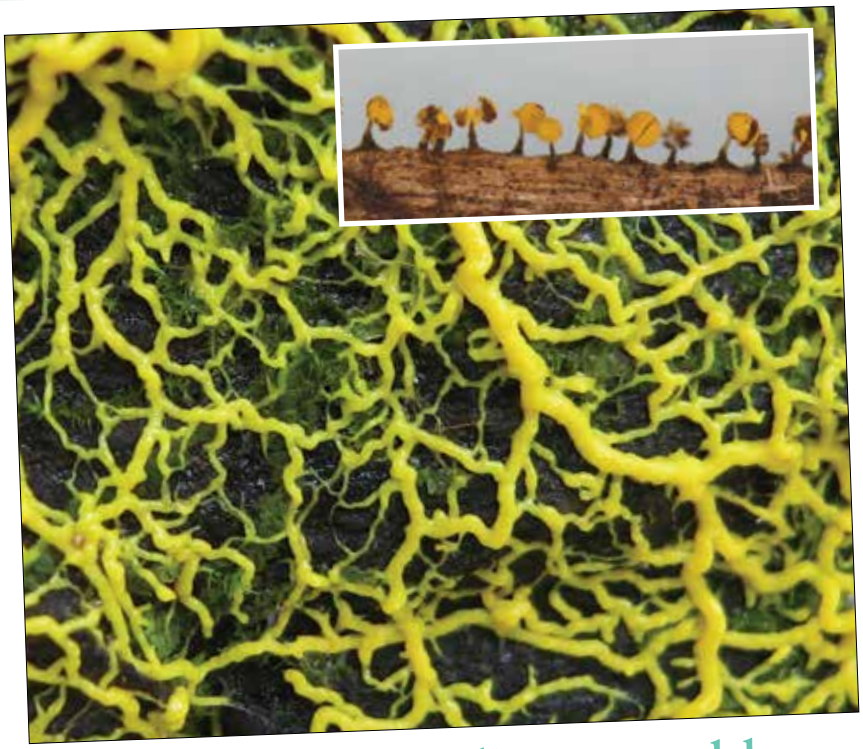

A passion for slime moulds

Drawing up a list of things that might potentially ignite passion, it is hard to imagine that 'slime moulds' might make the cut, let alone rise to the top. They must surely have been lumbered with the most unappealing of names for a taxonomic group. One wonders about those who coined the name. Surely 'mould' was bad enough, but add 'slime' to it and you might as well have named a disease. But to those who appreciate them, slime moulds are a fascinating and attractive group.

More formally called Myxogastria or Myxomycetes, slime moulds were once thought to be fungi as both groups reproduce by spores. However, unlike true fungi, slime moulds do not play a direct part in the decomposition of organic material, and their cell walls do not include chitin, a component of all fungal walls. Slime moulds also move, and are predators, consuming bacteria, fungal hyphae and other smaller organisms by phagocytosis, a process in which the prey item is engulfed by the slime mould by encasing it within the cell membrane. Molecular evidence has convincingly placed them as a monophyletic taxon in the phylum Amoebozoa and they are regarded as part of the informal group known as protists. There are approximately 1000 species of slime mould.

Slime moulds occur almost everywhere, and are one of the major components of protist soil biodiversity. Some have even been found in aquatic habitats, where they primarily live underwater, only emerging to reproduce. They commonly occur in forests, growing on the bark of living trees, fallen logs, dead leaves and other organic litter.

The life cycle of slime moulds is quite complex. For the greater part, the 'plasmodial' slime moulds exist as a plasmodium, which is essentially a large, single cell that contains millions of nuclei. This phase can have the viscous, slimy consistency that prompted the name, but many species are not at all slimy. The plasmodium is often small and inconspicuous; some can be transparent, but others are very brightly coloured and striking, even iridescent. In some species the plasmodium can be large, greater than a square metre, and the largest weigh in at around 20 kilograms. In contrast, the 'cellular' slime moulds exist as individual, uninucleate cells that can congregate as a 'pseudoplasmodium' before becoming reproductive. They do so by leaving a chemical trail as they move, at the breakneck speed of about one millimetre per hour, which attracts other cells to follow and congregate.

Given the right conditions, the plasmodium will produce fruiting bodies, which is where the slime moulds bear the strongest resemblance to fungi. Slime moulds produce four types of fruiting bodies, which contain a few to numerous spores (depending on their size) that can survive in a dormant state for up to 75 years. Meiosis occurs in the spores, which germinate to produce either flagellated or amoeboid cells. These act as gametes, eventually fusing to form a zygote that ultimately grows back into the feeding plasmodium stage.

Slime moulds are not random in their movements. They are sensitive to chemical stimulants and light, moving towards or away depending on the stimulant. They tend to avoid salt and strong light, and bitter chemicals such as caffeine and quinine. In an interesting set of experiments, scientists have shown that slime moulds can be habituated to such chemicals, and that this tolerance is retained and can even be passed on to other slime moulds. Habituation is regarded as the simplest form of learning; rather than adapting, the slime moulds are able to ignore the stimulus if it is proved irrelevant. Slime moulds are even capable of solving a maze, by finding the shortest route to a food source. There seems to be no end to the amazing feats that these seemingly primitive organisms can perform.

Above Slime mould plasmodium.
Inset Stalked fruiting bodies of *Physarum viride*.
Photos – Peter Davison