Mycological Research News[1]

This issue of *Mycological Research News* points out that *Micropeltopsis quinquinecladiopsis* belongs in *Lichenopeltella*, and features a record number of ascomycetes found on a single tree in Papua New Guinea, and the rules of fungal melanins.

This part of *Mycological Research* includes 14 papers. The first reports the transformation of the endophyte *Neotyphoidium lolii* with a green fluorescent protein gene. Molecular systematic studies clarify generic and species concepts in *Phaeoacremonium* and *Phaeomoniella*, reassess *Neofabraea* species, compare species of *Hypoxylon* and allied genera, clarify the identities of *Oidium* powdery mildews on tomato, and provide evidence for the reproductive mode in *Phellinus nigrolimitatus*.

The intracellular peptidases and proteinases of *Serpula lacrymans* have been investigated, and conidial discharge in *Erynia neoaphidis* examined.

Developmental studies are reported on apothecia of *Pyrenopeziza brassicae* and basidiomes in *Mycena stylobates*, and the germination of ascospores of *Monosporascus cannonballus* documented. The moss parasites *Eocronartium* and *Jola* have been studied in culture to elucidate their life-histories and revealed anamorphs.

Additional fungi have been found in the hypersaline Dead Sea, and seven new neotropical smut species are described.

The following new scientific names are introduced: *Aurantiosporium pallidum*, *Kuntzeomyces ruiziana*, *Moreaua bulbostylidis*, *Oidium neolycopersici*, *Phaeoacremonium mortoniae*, *Thecaphora amaranthicola*, *T. smallanthi* and *Tilletia boliviana* spp. nov.; and *Lichenopeltella quinquinecladiopsis* (syn. *Micropeltopsis quinquinecladiopsis*) comb. nov.

IN THIS ISSUE

Molecular papers in this issue include one on the transformation of the endophyte *Neotyphoidium lolii* with a green fluorescent protein gene (*gfp*) from a jellyfish which enables it to be visualized microscopically within host plant tissues (pp. 644–650). Molecular systematic studies using ITS and β-tubulin gene sequences support the separation of *Phaeoacremonium* and *Phaeomoniella* and clarify species concepts in this group of plant pathogens (pp. 651–657). The phylogenetic relationships of *Neofabraea* species, including those attacking apple trees, have been reassessed using ITS rDNA, mitochondrial rDNA, and β-tubulin gene sequences; four species are recognized, one so far undescribed, and geographical differences in current ranges were found (pp. 658–669). While species of *Hypoxylon* and allied genera are distinguished macro- and microscopically in the teleomorphic state, identification of sterile cultures and mycelium in plant tissues requires other methods; ITS rDNA sequences proved valuable in separating isolates of this group as well as confirming their current taxonomy (pp. 670–675). Molecular methods have also been used to clarify the confusing situation as to the identity of *Oidium* powdery mildews on tomato; two species are found to be present, one newly described with non-catenate conidia (*O. neolycopersici*) is the major pathogen, while *O. lycopersici* with catenate conidia is the causal agent of the disease in Australia (pp. 684–679).

Molecular markers have been used to provide evidence for the reproductive mode in *Phellinus nigrolimitatus*; different ITS types were found in the same isolate indicating outcrossing, but cultural pairings did not correlate well, suggesting that such experiments are not necessarily indicative of what occurs in nature (pp. 676–683). The intracellular peptidase and proteinase activities of another wood-rotting fungus, *Serpula lacrymans*, have been investigated and two peptidases and two proteinases discovered, the latter most active in starved mycelium (pp. 698–704).

The development of apothecia of *Pyrenopeziza brassicae* in culture and on oilseed rape debris is documented by scanning electron and light microscopy (pp. 705–714). Similar methods have been used to examine the development of basidiomes in *Mycena stylobates* in detail and reveal deficiencies in the terminology used for the trama of lamellae (pp. 723–733). The scanning electron microscope also shows that ascospores of *Monosporascus cannonballus* germinate on melon roots by forming several germ tubes arising from a single slit on each ascospore (pp. 745–748). Conidial discharge in *Erynia neoaphidis* examined on three different aphid species showed that conidia could be shot 2–11 mm at speeds of about 8 m s^{-1} (pp. 715–722).

The cytology, ultastructure and anamorphs of the moss parasites *Eocronartium muscicola* and three species of *Jola* have been studied in culture to elucidate their life-histories,

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Sporothrix-like anamorphs being reported for the first time in these genera (pp. 734–744).

Additional studies of fungi in the hypersaline Dead Sea (see Mycological Research News, *Mycological Research* **104**(2): 132–133, February 2000) yielded 476 isolates belonging to 38 species and bring the number known to 55; most were detected in the winter and near the outlets of less saline springs (pp. 749–756). Rust and smut fungi are often thought of as relatively scarce in the tropics, but here seven new neotropical species are described, some representing small genera or with unusual morphological developmental features (pp. 757–767).

MICROPELTOPSIS QUINQUECLADIOPSIS BELONGS IN *LICHENOPELTELLA*[2]

In describing *Micropeltopsis quinquecladiopsis* from submerged twigs in a stream in Thailand, Jones *et al*. (1999) compared the new fungus with five species previously recognized in the genus and two other trichothyriaceous fungi. However, *Micropeltopsis* Vain. 1921 has been shown to be a synonym of *Lichenopeltella* Höhnel 1919 by Santesson (1989, *in* Eriksson & Hawksworth 1991). Species of the genus are known from often dead leaves and stems of plants (Spooner & Kirk 1990), but *Lichenopeltella* may be primarily lichenicolous. A key to 26 lichenicolous species was provided in Aptroot *et al*. (1997); two of those species have since been validated (Molitor & Diederich 1997, Santesson 1998) and an additional species described (Earland-Bennett & Hawksworth 1999). Spooner & Kirk (1990) provided a key to the 10 British species then known (as *Micropeltopsis*) of which three were on lichens and seven on plants. No overall monograph of *Lichenopeltella*, as it is now understood, has been prepared. However, *M. quinquecladiopsis* has the ascomatal structure, asci, and appendaged ascospores characteristic of *Lichenopeltella*, but differs from the 27 lichenicolous species and those treated by Spooner & Kirk (1990) in other features and so is transferred to that genus here.

Lichenopeltella quinquecladiopsis (E. B. G. Jones, Sivichai & Hywel-Jones) E. B. G. Jones & D. Hawksw., **comb. nov.**

Basionym: *Micropeltopsis quinquecladiopsis* E. B. G. Jones, Sivichai & Hywel-Jones, *in* Jones *et al*., *Mycol. Res*. **103**: 729 (1999).

L. quinquecladiopsis belongs to the group of species within the genus that lacks ostiolar setae. The relatively large ascomata recall those of the lichenicolous *L. heterodermiae*, but that species has 4- and not 8-spored and also larger asci, and ascospores of twice the length and breadth with only one pair of appendages. The number of appendages is suggestive of *L. coppinsii* (Earland-Bennett & Hawksworth 1999), which has smaller ascomata, larger asci, and longer ascospores.

While the aquatic habitat of *L. quinquecladiopsis* might at first appear unusual for the genus, we note that two of the lichenicolous species occur on aquatic lichens (*L. hydrophila ined*. and *L. thelidii*; Molitor & Diederich 1997).

L. quinquecladiopsis is the only species of the genus in which the development of the appendages has been studied ultrastructurally. This has shown features of the appendages that may well be useful when describing new species of the *Microthyriaceae* and indeed any future monograph of this group should aim to include such detail.

Aptroot, A., Diederich, P., Sérusiaux, E. & Sipman, H. J. M. (1997) Lichens and lichenicolous fungi from New Guinea. *Bibliotheca Lichenologica* **64**: 1–220.

Earland-Bennett, P. M. & Hawksworth, D. L. (1999) *Lichenopeltella coppinsii*, a new species on *Verrucaria muralis* from the British Isles. *Lichenologist* **31**: 575–578.

Eriksson, O. E. & Hawksworth, D. L. (1991) Notes on ascomycete systematics – Nos 969–1127. *Systema Ascomycetum* **9**: 1–38.

Jones, E. B. G., Wong, S. W., Sivichai, S., Au, D. W. T. & Hywel-Jones, N. L. (1999) Lignicolous freshwater *Ascomycota* from Thailand: *Micropeltopsis quinquecladiopsis* sp. nov.. *Mycological Research* **103**: 729–735.

Molitor, F. & Diederich, P. (1997) Les pyrénolichens aquatiques du Luxembourg et leur champignons lichénicoles. *Bulletin de la Société Naturalistes du Luxembourg* **98**: 69–92.

Santesson, R. (1989) Parasymbiotic fungi on the lichen-forming basidiomycete *Omphalina foliacea*. *Nordic Journal of Botany* **9**: 97–99.

Santesson, R. (1998) Fungi lichenicoli exsiccati. Fasc. 11 & 12 (Nos 251–300). *Thunbergia* **28**: 1–19.

Spooner, B. M. & Kirk, P. M. (1990) Observations on some genera of *Trichothyriaceae*. *Mycological Research* **94**: 223–230.

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A RECORD NUMBER OF ASCOMYCETES ON ONE TREE

A single individual tree of the genus *Elaeocarpus* at 2100 m in the Owen Stanley mountain range north of Port Moresby in Papua New Guinea has been claimed to have the largest number of ascomycetes ever reported on a single tree (Aptroot 2001). The tree was 25 m tall and had a trunk of 50 cm diam. It grew in an undisturbed area of forest and blew down in a storm two days before it was examined. The whole tree surface, branches and twigs were examined with a hand lens and over 500 collections made. On examination the material was found to represent a staggering 200 species of ascomycetes, 173 of them lichenized. Only above-ground parts of the tree were examined, and endophytes and saprobes were not cultured. Aptroot suggests that studies of the endophytic fungi might have yielded a further 50–100

[2] *Mycological Research News* welcomes comments on, or items on matters arising from, papers already published in *Mycological Research* for consideration for this section of the journal.

species, giving a probable total of 250–300 ascomycete species for this single tree.

Many of the species appeared to be undescribed, including two genera new to science, named *Leptocucurthis* and *Lirellodisca*.

Allowances for mycorrhizal and rhizosphere fungi, and also fungi other than ascomycetes present, might be expected to add, conservatively, a further 50–100 species. This suggests that the actual total mycobiota of this single modestly sized tree could be as many as 300–400 species.

While comparable studies on other single trees are needed to demonstrate whether or not this *Elaeocarpus* tree is representative of others in the site, this investigation demonstrates the richness of tropical forests for fungi, the need to study parts of trees not normally accessible, and the painstaking hand-lens work necessary to detect the full range of species present.

Aptroot, A. (2001) Lichenized and saprobic fungal biodiversity of a single *Elaeocarpus* tree in Papua New Guinea, with the report of 200 species of ascomycetes associated with one tree. *Fungal Diversity* **6**: 1–11.

PATHOGENIC AND ECOLOGICAL ROLES OF FUNGAL MELANINS

The melanin pigments in the cell walls of spores and vegetative structures of numerous fungi will be familiar to many mycologists, but their roles may not. Now Butler *et al*. (2001) have drawn attention to their functions in a most readable review. These chemically complex black polymers are insoluble even in boiling water, hot mineral acids and organic solvents, although some may be degraded by strong alkalis and they can be bleached with hydrogen peroxide — an asset to microscopists studying otherwise opaque melanized structures. Their resistance frustrates precise chemical analyses, and they have been described as blacker than black as they can absorb not only visible wavelengths of light but also gamma rays, X-rays, infrared, and ultraviolet taking these energies into their molecular structures. It is perhaps no coincidence that fungi with melanins predominate in the damaged Chernobyl reactor (Zhadanova *et al*. 2000).

Where they appear greenish black or dark brown, this is due to complexes formed with proteins and other compounds.

Melanins confer protection against physical and biological stresses, can exclude toxic compounds, aid the absorption of required minerals, and also prevent the loss of water and metabolites from the cells. They are particularly important in lichen fungi, where fungal melanins help protect the algal partner from temperature extremes and damaging radiation. In the case of plant pathogens, they can be crucial to securing entry into host cells as it is the melanized walls of appressoria that enable huge turgor pressures to be developed in penetration pegs (Brzezina 2000); appressoria treated with the melanin synthesis inhibitor tricyclazole cannot penetrate leaves in the same way as untreated ones. Root pathogens are frequently melanized on root surfaces and also inside roots themselves but the significance of this remains unclear. The role of melanins in promoting longevity and resistance to chemical attack in resting structures such as sclerotia is, however, evident; boiling in aqua regia (a concentrated hydrochloric and nitric acid mix) can have little apparent effect. In fungi causing mycoses in humans, melanins can hinder response of the immune system and frustrate the action of some drugs; it is probably far from coincidence that so many fungi causing mycoses are melanized.

It is clear from Butler *et al*.'s masterly review that fungal melanins merit a higher profile than they often receive in both pathology and ecology.

Brzezina, A. (2000) Punching appressoria. *Mycological Research* **104**: 131–132.
Butler, M. J., Day, A. W., Henson, J. M. & Money, N. P. (2001) Pathogenic properties of fungal melanins. *Mycologia* **93**: 1–8.
Zhadanova, N. N., Zakharchenko, V. A., Vember, V. V. & Nakonechnaya, L. T. (2000) Fungi from Chernobyl: mycobiota of the inner regions of the containment structures of the damaged nuclear reactor. *Mycological Research* **104**: 1421–1426.