Mycological Research News[1]

This new feature in *Mycological Research* is introduced, and invitations to contribute to it are made. It introduces the contents of the issue, draws attention to exciting research published elsewhere, and will also include comments on papers previously published in *Mycological Research*.

This month *Mycological Research* includes papers which report a 20 million year old resinicolous ascomycete, contribute to the molecular biology and phylogeny of *Antrodiella*, *Serpula*, *Trichoderma*, *Typhula*, and *Uncinula*, marine ascomycetes, and conidial smut fungi. Magnesium tolerance, phosphatase activity in endomycorrhizal fungi, and *Tolypocladium* as an entomopathogen are also featured. One new genus and five species new to science are described. An obituary for G. C. Ainsworth is provided.

Recent research is reported on here which demonstrates that pyrenomycete fungi evolved earlier than previously documented, studies on tropical palms which suggest there may be even more fungi than we suspected, and a group of hitherto undetected ascomycetes with naked asci living inside discomycete apothecia has been discovered. Proposals to streamline aspects of botanical (including mycological) nomenclature have been thwarted at the XVI International Botanical Congress in St Louis.

INTRODUCTION

Mycological Research News is a new feature which will appear at the start of each issue of *Mycological Research*. It will introduce papers included in the issue, draw attention to research of wide interest published elsewhere, and also provide an opportunity for comments on papers published in previous issues of the journal.

The success of this venture will depend on the willingness of you and your colleagues to submit contributions for consideration for inclusion. If you have come across something which excites or irritates you in your reading, you now have an opportunity to share that. You also now have a mechanism of commenting on or providing supplemental evidence regarding papers already published in *Mycological Research*.

The topics covered in this inaugural issue reflect recent work which I have found of particular interest and are designed to indicate the style sought for future contributions. Inform and comment on equivalent recent advances in your area of mycology by preparing items in a similar style. In order to make the feature as topical as possible, the e-mail submission of proposed contributions is encouraged. Items other than those by the Executive Editor will provide the name and address of the author so that their source can be appropriately credited.

IN THIS ISSUE

Amongst papers included in this month's issue of *Mycological Research* is one reporting a 20 million year old resinicolous ascomycete referred to a genus existing today (*Chaenothecopsis*) and also commenting on the biology of resinicolous fungi (pp. 7–15).

Molecular biological studies included in this issue demonstrate that the *Halosphaeriales* are a subclade of the *Microascales* (pp. 35–43), help to resolve the relationships of the anamorphs of smut-like fungi (pp. 53–60), reassess the status of pathogenic *Typhula* species (pp. 16–22), throw additional light on the relationships of *Trichoderma* species (pp. 23–34), reassess the taxonomy of *Antrodiella* species in Europe (pp. 92–99), provide data on the infraspecific variation in *Uncinula necator* (pp. 44–52), and report a PCR diagnostic tool for the recognition of the dry rot fungus *Serpula lacrymans* (pp. 69–72).

Data on the variability of *Peronosclerospoa sorghi* in Africa are presented which show differential pathogenicity on different host plants (pp. 61–68). Magnesium ions are demonstrated to affect conidial formation in *Coniothyrium minitans* (pp. 73-76), and phosphatase activity in two endomycorrhizal *Glomus* species has been found to be mainly located in the hyphal

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walls and not exuded (pp. 81–86). *Tolypocladium cylindrosporum* has also been found to kill hibernating turnip moth larvae (pp. 87–91).

A new dematiaceous hyphomycete genus *Bulbocatenospora* forming chains of multicellular conidia is described from Venezuela (pp. 107–109), and new species are reported in *Acremonium* (pp. 77–80), *Antrodiella* (pp. 92–99), and *Haptoglossum* (pp. 100–106).

An obituary for G. C. Ainsworth (1905–1998) includes a list of his publications (pp. 110–116).

400 MILLION YEAR OLD FOSSIL PYRENOMYCETE DISCOVERED

Taylor, Hass & Kerp (1999) report on a fossil pyrenomycete discovered in Lower Devonian (400 Myr) Rhynie chert deposits in Aberdeenshire, Scotland. The fungus was growing just below the epidermis on the stems and rhizomes of *Asteroxylon*. *Asteroxylon* and other early land-plants in the same deposits are already well-known as the source of perhaps the first recorded VA-mycorrhizal fungi (Pirozynski & Dalpé 1989). The published photographs of this currently unnamed pyrenomycete clearly show sections of the perithecia, which have a two-layered wall, elongate asci with 16(-32) mainly 1-septate ascospores inside them, periphyses, and what appear to be true paraphyses.

These fossils provide the oldest evidence of this major lineage of ascomycetes by about 250 Myr. They also indicate that caution is warranted in accepting molecular clock date estimates. For example, molecular clock dating has suggested that the major split between *Ascomycota* and *Basidiomycota* occurred around 400 Myr, and that the ascohymenial pyrenomycetes arose around 200 Myr ago in the Triassic (Berbee & Taylor 1994) – not around 400 Myr as is clear from this new fossil evidence.

The discovery of such fossils indicates that other exciting finds, and surprises, may still await the intrepid and persistent palaeomycologist. It also demonstrates the need for molecular systematists and palaeomycologists to work more closely together than has hitherto been the case.

Berbee, M. L. & Taylor, J. W. (1994) 18S ribosomal DNA sequence data and dating, classifying, and ranking the fungi. In *Ascomycete Systematics: Problems and perspectives in the nineties* (D. L. Hawksworth, ed.): 213–223. [NATO Advanced Science Institutes Series A, Vol. 269.] Plenum Press, New York.

Pirozynski, K. A. & Dalpé, Y. (1989) Geological history of the *Glomaceae* with particular reference to mycorrhizal symbiosis. *Symbiosis* **7**: 1–36.

Taylor, J. W., Hass, H. & Kerp, H. (1999) The oldest fossil ascomycetes. *Nature* **399**: 648.

HOW MANY FUNGI ARE THERE?

Although Hawksworth's (1991) estimate of 1.5 million fungi on Earth has come to be widely accepted and quoted, estimates both upwards and downwards appear. A key issue is the actual numbers of fungi obligately occurring on particular plant species in the tropics. New research in the tropics is a key to a more objective assessment of the situation.

Studies coming out of active mycological laboratories in Hong Kong and Thailand are of especial interest in this connection. Fröhlich & Hyde (1999) compared the fungi on six different palms in Australia and Brunei Darussalam (Borneo). They found 242 taxa amongst 2672 isolates and collections. However, the palms in Australia supported on average 54.7 species, and those from Brunei Darussalam 111.3 taxa each. They consider their results to indicate that 33:1 is a more accurate figure for the number of fungi associated with particular palm species than the overall 5.7:1 suggested by Hawksworth's data.

But can a five-fold increase in Hawksworth's figure be contemplated? Especially when there are also some downward revisions suggested by other data sets – for example Aptroot (1997)'s based primarily on his experience of certain pyrenomycete groups, which suggested that there might only be 5K ascomycetes world-wide. He recognized that this was 'obviously too low'. However, May (2000) continues to insist the fungal figures are too high, and settles on 500K, still a significant increase on the estimated 72K species now known.

Studies on some additional data sets, including those in some major databases and species on well-studied hosts (notably *Eucalyptus* spp., *Lantana camara*, *Pinus sylvestris* and *Urtica dioica*), give a mean of 31 fungi per plant species (Hawksworth 1998).

However, Hawksworth (1998) stuck with a mean of 5.3 for fungi overall as divergences between groups must be high. More data are needed to add precision to our estimates, and the topic looks like running at both extremes for some years to come – especially with so little critical work being undertaken on tropical microfungi.

Aptroot, A. (1997) Species diversity in tropical rainforest ascomycetes; lichenized versus non-lichenized; foliicolous versus corticolous. *Acta Amazonica* **21**: 37–44.

Fröhlich, J. & Hyde, K. D. (1999) Biodiversity of palm fungi in the tropics: are global fungal diversity estimates realistic? *Biodiversity and Conservation* **8**: 977–1004.

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Hawksworth, D. L. (1991) The fungal dimension of biodiversity: magnitude, significance, and conservation. *Mycological Research* **95**: 641–655.

Hawksworth, D. L. (1998) The consequences of plant extinctions for their dependent biotas: an overlooked aspect of conservation science. In *Rare, Threatened and Endangered Floras of Asia and the Pacific Rim* (C.-I. Peng & P. P. Lowry, eds): 1–15. [Academia Sinica Monograph No. 16.] Academia Sinica, Taipei.

May, R. M. (2000) The dimensions of life on Earth. In *Nature and Human Society: the quest for a sustainable world* (P. H. Raven & T. Williams, eds): 22–37. National Academy Press, Washington DC.

APOTHECIA WITH TWO KINDS OF ASCI REVEAL AN OVERLOOKED GROUP OF FUNGICOLOUS FUNGI

One of the most fascinating aspects of mycology is the discovery of hitherto quite unexpected fungi. In a remarkable paper, Baral (1999) has discovered a group of ascomycetes with naked asci living inside the apothecia of discomycetes. The first hint as to their presence was the finding of asci which did and did not react with iodine solutions in the same hymenium. The asci were mixed amongst the paraphyses and asci of the host with no hint of a separate ascoma.

Microscopic studies established that two organisms were present and that the invaders could be placed in *Helicogonium*, a genus first introduced in 1942 by W. L. White for an ascomycete growing in the fruits of *Stereales*. Eighteen species are accepted by Baral, 15 described as new to science from discomycete apothecia.

The ascospores vary in shape from worm-like to arcuate or ellipsoid, and in most cases produce conidia within the asci. In some cases a *Coryne*-like anamorph is formed.

Helicogonium has been referred to the *Saccharomycetales* or *Endomycetales* in recent systems of ascomycete classification because of the lack of ascomata. Baral, refers them to *Leotiales*, suggesting that they might have evolved from *Gelatinopsis* by repression of the formation of an exciple. Species of *Gelatinopsis* occur in apothecia of both lichenized and non-lichenized discomycetes.

The biological relationship of the organisms merits further study; in many cases there is little evident harm, but in some ascus production by the host can be partly suppressed. In the case of *Crocicreas gemnisporus*, this suppression led to the description of a 'new species' based on the apothecia of the host and the asci of the invader.

Baral, H.-O. (1999) A monograph of *Helicogonium* (= *Myriogonium*, *Leotiales*), a group of non-ascocarpous intrahymenial mycoparasites. *Nova Hedwigia* **69**: 1–71.

PROPOSALS TO STREAMLINE BOTANICAL (INCLUDING MYCOLOGICAL) NOMENCLATURE THWARTED

The Nomenclature Section of the XVI International Botanical Congress, met in St Louis, Missouri, on 26–30 July 1999. The rules regulating botanical nomenclature are also used for fungi; i.e. for nomenclatural purposes fungi are treated as plants. This meeting had before it proposals to increase the stability of names through granting specially protected status to lists of names in current use, and also to require the registration of newly proposed names as a criterion for their validity.

The proposal to protect lists of names in current use had achieved a 55% vote in favour at the XV Congress in Tokyo in 1993 (Greuter, McNeill & Barrie 1994); a 60% vote was required for approval. However, this same set of proposals was overwhelmingly defeated in St Louis. The concept of registration had already been approved at the Tokyo Congress and was scheduled to come into operation from 1 January 2000 subject to approval of details of how that should operate. The officers of the International Association for Plant Taxonomy (IAPT) had been charged by the Tokyo Congress with preparing detailed proposals; these had been published prior to the St Louis Congress and a trial system has been operating since January 1998. However, these proposals were withdrawn in view of the evident hostility of many in the Section meeting to the ideas, and all references to registration in the Code were deleted. Even the establishment of a Special Committee to investigate how the impact of old forgotten names on those now used might be limited was rejected (41% in favour). Interestingly, a proposal to establish a Committee to look into issues concerning effective publication, was approved. A Committee with a rather similar remit established by the XIV Congress in Berlin in 1987 led to the proposals for registration as a way of overcoming the same problems! Nomenclature clearly moves very slowly, and not always progressively. The concept of mandatory registration of new names was first aired by two eminent mycologists back in the 1950s (Ainsworth & Cifferi 1955).

Most proposals relating to increased harmonization between the five different Codes of nomenclature which relate to different kinds of organisms were also rejected. Amongst those which passed were ones designed to avoid confusion with virus names, a recommendation to botanists to avoid generic names already used in bacteriology or zoology for different organisms, and the establishment of Special Committee to continue to look at liaison between the Codes.

On the mycological front, it was, however, pleasing to see increased precision and detail approved in relation to both the

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use of cultures preserved in metabolically inactive states as name-bearing types, and the sanctioning of names.

A synopsis of the proposals considered by the St Louis Congress is provided by Greuter & Hawksworth (1999), and a summary of the decisions on all 215 published proposals, together with those made from the floor, is given by Greuter & Barrie (1999). As all proposals, unless expressly date-limited, are effective and retroactive on ratification by the Congress, fungal taxonomists should familiarise themselves with them now and not await the printed version of the St Louis Code in mid-2000.

Those concerned with progressing towards a more streamlined nomenclature in the botanical sciences will have to prepare well for the XVII Congress in Vienna in 2005.

Ainsworth, G. C. & Ciferri, R. (1955) Mycological taxonomic literature and publication. *Taxon* **4**: 3–6.

Barrie, F. R. & Greuter, W. (1999) Preliminary mail vote and report of Congress action on nomenclatural proposals. *Taxon* **48**: 771–784.

Greuter, W. & Hawksworth, D. L. (1999) Synopsis of proposals on botanical nomenclature – St Louis 1999. A review of the proposals concerning the International Code of Botanical Nomenclature submitted to the XVI International Botanical Congress. *Taxon* **48**: 69–128.

Greuter, W., McNeill, J. & Barrie, F. R. (1994) Report on botanical nomenclature – Yokohama 1993. *Englera* **14**: 1–265.

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