
Mycological Research News¹

This issue of *Mycological Research News* features: Corticioid basidiomycetes: unravelling the phylogeny of fungal cinderellas; Nomenclatural clarifications and new taxa in the *Glomeromycota*; and *Ascobolus immersus* spore-guns develop 3 atm pressure. An obituary of Richard W. G. Dennis is also included.

Ten research papers appear in this part. Molecular studies address basidiomycete phylogeny with new data from corticioid fungi; identify a new order of mycorrhizal heterobasidiomycetes; reassess *Plasmopara* and similar downy mildews; confirm the placement of a new sequestrate *Lactarius*; show additional *Geosmithia* species merit recognition; and identify a method of typing *Beauveria bassiana* strains. Critical studies reveal additional large-spored *Daldinia* species.

Root border cells produce stimulators of arbuscular mycorrhizal development, and ionizing radiation is shown to promote growth towards the radiation source.

The following new scientific names are introduced: *Diversisporales*, *Sebacinales* ords. nov.; *Diversisporaceae*, *Pacisporaceae* fams. nov.; *Diversispora*, *Protobremia* gens. nov.; *Daldinia dennisii*, *D. novaezelandiae*, *Geosmithia flava*, and *Lactarius angiocarpus* spp. nov.; *D. dennisii* var. *loculatooides*, *D. dennisii* var. *microspora* vars. nov.; *Diversispora spurcum* (syn. *Glomus spurcum*), *G. pallida* (syn. *Penicillium pallidum*), *Lactarius dolichocaulis* (syn. *Arcangeliella dolichocaulis*), and *P. sphaerosperma* (syn. *Plasmopara sphaerosperma*) combs. nov.

- Oberwinkler, F. (1977) Das neue System der Basidiomyceten. In *Beiträge zur Biologie der niederen Pflanzen* (W. Frey, H. Hurka & F. Oberwinkler, eds): 59–104. Gustav Fischer Verlag, Stuttgart.
- Parmasto, E. (1995) Corticioid fungi: a cladistic study of a paraphyletic group. *Canadian Journal of Botany* **73** (Suppl. 1): S843–S852.

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NOMENCLATURAL CLARIFICATIONS AND NEW TAXA IN THE *GLOMEROMYCOTA*

Pacispora (syn. *Gerdemannia*)

We recently published the new generic name *Gerdemannia*, along with the family *Gerdemanniaceae* in the order *Diversisporales*, in *Mycological Research* (Walker *et al.* 2004). Some weeks after we submitted our paper, Oehl & Sieverding (2004) sent one establishing the genus *Pacispora* to a different journal. Both publications describe the same clade of fungi and are based on the same type species *Glomus scintillans* S. L. Rose & Trappe 1980, but use different genus names.

Hard copy of the *Pacispora* paper was effectively published in early June 2004, while that with *Gerdemannia* was not distributed until 23 June 2004. The genus name *Pacispora* consequently has priority and must be used under Art. 11.3 of the *Code*. The authors of *Pacispora* were informed of our intentions, but chose not to disclose theirs to us until after they had their paper in press, by which time it was too late for us to make any changes in the printed version of our paper. *Gerdemannia* is consequently a homotypic later synonym of *Pacispora*. *Gerdemannia* is therefore an illegitimate name which must be rejected (Art. 52.1).

With respect to the species included in the genus, Oehl & Sieverding (2004) maintained *Pacispora scintillans* (the type species) and *P. dominikii* as separate species. However, the morphological and molecular data presented by Walker *et al.* (2004) show that the two names are synonyms, a conclusion which is shared by the original author of the name *Glomus dominikii* (Walker *et al.* 2004).

Pacisporaceae fam. nov. and *Gerdemanniaceae*

The family name *Gerdemanniaceae*, which we also introduced (Walker *et al.* 2004) remains validly published, but unfortunately is ruled as illegitimate because *Gerdemannia* is an illegitimate generic name (Art. 18.3). As Oehl & Sieverding (2004) did not introduce a new family name, it is necessary to do so here:

Pacisporaceae C. Walker, Blaszk., Schuessler & Schwarzott, fam. nov.

A familiis ceteris in *Glomeromycota* distincta combinatione sporae glomoideae, sporae tunicis internis flexibilibus, scutello germinationis, et sequentio DNA differenti. Sporocarpia ingnota. Mycorrhizas vesiculares-arbusculares formans.

Typus: Pacispora Oehl & Sieverd. 2004.

Diversispora gen. nov., *Diversisporaceae* fam. nov., and *Diversisporales* ord. nov.

The ordinal and family designations *Diversisporales* and *Diversisporaceae* were used in Schüßler, Schwarzott & Walker (2001) but not validly published at that time pending a more detailed treatment of the group which will be submitted for publication shortly. However, in view of our experience with *Gerdemannia*, we take this opportunity to validly publish these names and the new generic name *Diversispora* here. The *Diversisporales* comprises the families *Gigasporaceae*, *Acaulosporaceae*, *Diversisporaceae*, and *Pacisporaceae*.

Diversisporales C. Walker & Schuessler, ord. nov.

A ordo ceteris in *Glomeromycota* distincta sequentio DNA differenti. Fungi hypogaei vel in parte epigaei; formant endomycorrhizas arbusculares in radicibus cum plantis vivis. Vesiculae efformatae vel absentes. Cellulae auxiliares efformatae vel absentes. Sporae glomoideae vel gigasporoideae vel acaulosporoideae.

Typus: Diversisporaceae C. Walker & Schuessler 2004.

Fungi hypogeous or partly epigeous, forming arbuscular mycorrhizas, with or without vesicles, with or without hypogeous auxiliary cells. Forming either complex spores produced within a sporiferous saccule (acaulosporoid spores), complex spores developing from a bulbous base on the sporiferous hypha (gigasporoid spores), or glomoid spores. Differing from other orders in the *Glomeromycota* by the possession of specific SSU rRNA gene sequence signatures, for example GGGTTTH and TYACCGGRAGGTRT corresponding to homologous positions 234 and 1495, respectively, of the *S. cerevisiae* SSU rRNA sequence J01353.

Diversisporaceae C. Walker & Schuessler, fam. nov.

A familiis ceteris in *Diversisporales* distincta combinatione sporae glomoideae, scutello germinationis absens, et sequentio DNA differenti.

Typus: Diversispora C. Walker & A. Schuessler 2004.

Differs from other families in the *Diversisporales* in the possession of glomoid spores, germination not accompanied by formation of a germination shield, and having specific SSU rRNA gene sequence signatures, for example GGCTCATTYGRRTYTS, ACYCATTRYCAGGCTTAAT, and TTGGCATTAGYCA,

corresponding to homologous positions 487, 648, and 1389, respectively, of the *S. cerevisiae* SSU rRNA sequence J01353.

Diversispora C. Walker & Schuessler, **gen. nov.**

Etym.: Referring to the diverse nature of the spores found within the order to which the genus lends its name.

A generibus ceteris in *Glomeromycota* distincta combinatione sporae glomoideae, sporae tunicis internis flexibilibus, elemento tunicae internae in solutione Melzeri non colorans, scutello germinationis absens, et sequentio DNA differenti.

Typus: *Glomus spurcum* C. M. Pfeiff., C. Walker & Bloss 1996.

Differs from other genera in the *Glomeromycota* in possessing glomoid spores with a spore wall structure consisting of a thin outer wall, a laminated structural wall, and a flexible inner wall not reacting with Melzer's reagent, germination not preceded by formation of a germination shield, and specific SSU rRNA gene sequence signatures, for example CYCATTRGYCAG-GCTTAATTGTC, TATTGGCATTAGYCA, and CTTTGGATTRGGGTTTAGGGRTC, corresponding

to homologous positions 649, 1387, and 1673, respectively, of the *S. cerevisiae* SSU rRNA sequence J01353.

Diversispora spurcum (C. M. Pfeiff., C. Walker & Bloss) C. Walker & Schuessler, **comb. nov.**

Glomus spurcum C. M. Pfeiffer, C. Walker & Bloss, *Mycotaxon* **14**: 374 (1996).

Oehl, F. & Sieverding, E. (2004) *Pacispora*, a new vesicular arbuscular mycorrhizal fungal genus in the *Glomeromycetes*. *Journal of Applied Botany – Angewandte Botanik* **78**: 72–82.

Schüßler, A., Schwarzott, D. & Walker, C. (2001) A new fungal phylum, the *Glomeromycota*: evolution and phylogeny. *Mycological Research* **105**: 1413–1421.

Walker, C., Blaszkowski, J., Schwarzott, D. & Schüßler, A. (2004) *Gerdemannia* gen. nov., a genus separated from *Glomus*, and *Gerdemanniaceae* fam. nov., a new family in the *Glomeromycota*. *Mycological Research* **108**: 707–718.

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ASCOBOLUS IMMERSUS SPORE-GUNS DEVELOP 3 ATM PRESSURE

The concept of forcible discharge of asci is familiar to all mycologists, but just how great are the pressures developed within individual asci? Fischer *et al.* (2004) measured the turgor pressure within asci of *Ascobolus immersus* using a microprobe and determining the pressure needed to indent the ascus wall with a miniature strain gauge. The turgor developed ranged from 23–89 μN (or MPa), with a mean of a staggering 0.31 $\mu\text{N} \mu\text{m}^{-2}$, equivalent to about 3 atm. While the results are in general consistent with earlier research conducted by Buller and Ingold, their earlier calculations were based on data from derived observations. This is the first time microprobes have been used for direct measurements, and the results are consequently incontestable. Interestingly, the force needed to propel the ascospore mass in this species to distances observed

in practice was calculated as 0.2 MPa, the difference being ascribed to loss of pressure as the ascospores pass through the ascus apex. A mathematical model constructed from the data indicates that the ascospores discharge at 0.32 m s^{-1} , accelerating 'at thousands of g ', comparable to ballistospore discharge but way ahead of acceleration recorded in other organisms such as the frog hopper. Analysis of the ascus sap suggests that glycerol was the major osmolyte involved in the development of ascus turgor pressure, accounting for 0.1 MPa of the osmotic pressure found.

Fischer, M., Cox, J., Davis, D. J., Wagner, A., Taylor, R., Huerta, A. J. & Money, N. P. (2004) New information on the mechanism of forcible ascospore discharge from *Ascobolus immersus*. *Fungal Genetics and Biology* **41**: 698–707.