Desiccation tolerance in the fern *Mohria caffrorum* is seasonally regulated

J.M. Farrant
Department of Molecular and Cell Biology, University of Cape Town, Private Bag X3, Rondebosch 7701, South Africa

Vegetative tissues of resurrection plants are desiccation tolerant (DT), drying to 5% water content and recovering full metabolism on rehydration. Mechanisms of DT vary among the orders; bryophytes suffer damage during drying but repair it on rehydration whereas in angiosperms extensive protection is accumulated so that little repair is required. Little is known about mechanisms of DT in pteridophytes and the present study was undertaken to characterize them in the resurrection fern *Mohria caffrorum*. Plants were collected from Table Mountain, Western Cape, during dry and rainy seasons. Ultrastructural, biochemical and physiological data were collected during plant drying and rehydration. Plants collected in the dry season were DT and those collected in the rainy season were DS, a phenomenon reported here for the first time. Tolerant fronds acquired protection mechanisms during drying that are mostly similar to those reported for angiosperms. These included 1) frond curling and presence of abaxial scales that masked chlorophyll and minimized free radical injury; 2) increased anti-oxidant capacity that was maintained in dry tissues; 3) mechanical stabilization of vacuoles in the dry state; 4) *de novo* production of heat stable (potential LEA-like) proteins; 5) accumulation of protective carbohydrates (sucrose, raffinose family oligosaccharides and cyclitols).

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Pollination of an alien hummingbird-pollinated plant (*Nicotiana glauca*) by hovering sunbirds (*Nectarinia famosa*): Effects on each others distribution

S. Geerts, A. Pauw
Department of Botany and Zoology, University of Stellenbosch, Private Bag X1, Matieland 7602, South Africa

★ Awarded the Van Staden Prize for best oral presentation by a MSc student

Alien plants often engage in mutualistic interactions with local species, and these interactions can affect the distribution and abundance of both parties. In this study we explore the interaction between the alien invasive tree tobacco (*Nicotiana glauca*) and the community of indigenous nectar feeding birds in the Namaqualand Region of South Africa. *N. glauca* is native to South America where it is pollinated by hummingbirds. Hummingbirds typically hover while feeding and in this respect differ from African nectarivorous birds which typically perch while feeding. *N. glauca* is adapted for pollination by hovering birds by having flowers that face outward and by displaying its flowers on the tips of the branches. Nevertheless, we find that *N. glauca* in South Africa is visited primarily by native Malachite sunbirds (*Nectarinia famosa*). Malachites adapt to *N. glauca* through a behavioural change to hover-feeding. They feed legitimately from the flowers and transfer pollen between plants. *N. glauca*, in turn, greatly increases the local abundance of Malachites compared with uninvaded areas. Additionally, we report on the results of breeding system experiments aimed at determining effect of sunbird pollination on seed set and outcrossing rate, and contribute morphometric data to a global analysis of variability in floral traits in relation to pollination mode.

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New perspectives in coastal dune ecology

M.E. Gilbert6, N.W. Pammenter6, B.S. Ripley6
6Department of Botany, Rhodes University, Grahamstown 6140, South Africa
7School of Biological and Conservation Sciences, Howard College Campus, University of KwaZulu-Natal, Durban 4041, South Africa

An unforeseen perspective in dune plant ecology is that the shape of a dune may determine which type of growth geometry is optimal for plants exposed to partial burial. From theoretical and experimental evidence it seems clear that some plant species, on some dune surfaces, are able to optimise growth geometry in such a manner that these plants no longer grow vertically. This is in accordance with the principle that in order to grow the least in response to partial burial, growth must be at right angles to the (non-flat) dune surface. Three common dune species were surveyed. These species displayed a range of responses to burial: 1) optimal growth on steep dunes (*Arctotheca populifolia*), 2) optimal growth on north-facing dunes due to heliotropism (*Scaevola plumieri*), and 3) vertical growth (*Ipomoea pes-caprae*). The ability of these species to respond optimally to burial also corresponded well to the steepness of the dunes formed by each species. Thus, the species that formed steep dunes were also able to benefit via shorter growth than species that formed shallow dunes. This new idea has broad implications for the ecology of dune plants.

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Lessespian migration of cardinalfishes (Teleostei, Apogonidae)

O. Gor6, D. Golani6
6South African Institute for Aquatic Biodiversity, Grahamstown, South Africa
7Department of Evolution, Systematics and Ecology, Hebrew University, Jerusalem, Israel

Invasion of the Mediterranean Sea by Red Sea organisms commenced in 1869 with the opening of the Suez Canal. This phenomenon, known as Lessepsian migration, has significantly altered the biodiversity of the eastern Mediterranean and shows no signs of ceasing. At present 67 species have migrated successfully, including three species of the family Apogonidae. The first species, Apogon pharaonis Bellotti, was reported from the coast of Israel in 1947. The other two, Apogon quetetti Gilchrist and Apogon smithi Kotthaus, were discovered in 2006 and 2007, respectively. Considering that cardinalfishes are mouth brooders with a relatively short pelagic larval stage, they are unlikely pioneers.

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A phylogeny of Porellaceae (Marchantiophyta) based on nuclear and chloroplast DNA sequences

S.R. Gradstein, J. Hentschel, H. Schneider, J. Heinrichs
Institute of Plant Sciences, Department of Systematic Botany, Untere Karspüle 2, 37073 Göttingen, Germany

The family Porellaceae (Marchantiophyta) include the widespread genus *Porella* (50–60 species) and the monospecific eastern Asiatic genera *Ascidiota* and *Mavricaria*. Maximum parsimony, maximum likelihood and Bayesian analysis of sequences of three molecular markers (rbcL, trnL-trnF region, trnTS region) of 96 accessions resulted in similar topologies supporting the generic status of *Ascidiota* and *Porella*. *Mavricaria*, however, is nested in *Porella* and does not deserve generic status. Relationships among species of the genus *Porella* are generally well resolved and many terminal nodes achieve good statistical support; basal relationships in the genus, however, are at best moderately supported. Multiple accessions of single species are usually placed in monophyletic lineages. The Macaronesian species of *Porella* are closely related to Asian and North American species but *P. obtusata* and *P. canariensis*, both in Macaronesia, cannot be separated on the basis of our molecular data. The molecular topologies also indicate various range extensions, e.g. of the Asian *P. gracilima* to North America and of the Neotropical *P. swartzi* to South Africa. Accessions of the common *P. platypulla* split into a European and a North American clade with one accession from North America embedded in the European samples. The current infrageneric classification of *Porella*, finally, is not supported by the molecular data and needs reconsideration.

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