

University of Cape Town Research Report 2005

Faculty of Science Department of Botany

(Including the Bolus Herbarium and the Institute for Plant Conservation)

Head of Department: Associate Professor J.J. Midgley

Departmental Profile

Botany is a vibrant department, which strives towards the development of a centre of excellence for research and teaching of the ecology, evolution, physiological ecology and systematics of marine and terrestrial plants of southern Africa. The department includes two research units, the Bolus Herbarium and Leslie Hill Institute for Plant Conservation, and is also home to the Department of Environmental Affairs & Tourism Chief Directorate: Marine & Coastal Management. Research thrusts include plant population, community and reproductive ecology, systematics, floristics, biogeography and evolutionary biology of the unique Cape Floral Kingdom and its response to different land use practices, ecology and economics of marine and freshwater algae, the ecophysiology of plant responses to pollution and global change, the physiology of plant nitrogen-fixing symbioses and dendrochronology and palaeoecology. The Institute for Plant Conservation is actively researching the conservation status of and threats to the Cape Floristic Region and communicating these results to policy makers and the broader community, while the Bolus Herbarium is researching the taxonomy of and curating a specimen collection of over a third of a million southern African species. Staff are also active on Research Councils, policy-making forums and advisory committees.

Departmental Statistics

Permanent and long-term contract staff

Professors	4
Associate Professors	2
Senior Lecturers	1
Lecturers	2
Technical Support Staff	9
Administrative and Clerical Staff	3
TOTAL	21

Honorary staff

Honorary Professors	3
Honorary Research Associates	15
TOTAL	18

Students

Postdoctoral	2
Doctoral	28
Masters	34
Honours	8
Undergraduate	484
TOTAL	556

Research Fields and Staff

Permanent staff

Associate Professor Jeremy Midgley
Head of Department; plant ecology; evolutionary biology; forest ecosystem dynamics

Professor John J. Bolton
Phycology; marine and freshwater biology; mariculture

Professor William J. Bond
Plant ecology; evolutionary biology; conservation biology; fire and community dynamics

Dr Samson B. Chimphango
Physiology, nitrogen fixation

Associate Professor Mike D. Cramer
Physiology, ecophysiology, plant nutritionist

Dr Edmund February
Senior Lecturer; palaeoecology; ecophysiology

Professor Terry Hedderson
Plant systematics; bryology; molecular systematics; life history traits

Professor Timm M. Hoffman
Director of the Leslie Hill Institute for Plant Conservation: plant ecology; conservation biology; community ecology; biodiversity

Dr Anthony G. Verboom
Lecturer; plant systematics, ecophysiology, biogeography

Honorary Professors

Professor Richard Cowling
Plant ecology; conservation biology; community ecology; biodiversity

Professor Brian Huntley
Director of the SA National Biodiversity Institute; landscape ecology

Professor Peter Linder

Systematics; taxonomy; evolutionary biology

Honorary Research Associates

Dr R.J. Anderson
Phycology

Dr P.V. Bruyns
Systematics

Dr J.J. Donaldson
Ecology

Dr A. Ellis
Ecology

Mrs E. Esterhuysen
Taxonomy

Mr S.A. Hammer
Taxonomy

Dr J. Manning
Systematics & evolution

Dr G.F. Midgley
Ecophysiology

Dr E.J. Moll
Ecology

Dr C.F. Musil
Ecophysiology

Dr A.G. Rebelo
Ecology

Dr M. Rouget
Conservation planning

Dr G. Scott
Systematics

Prof W.D. Stock
Ecophysiology

Mr G. Williamson
Taxonomy

Contact Details

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Research Output

Articles in peer-reviewed journals

- Anderson, B. 2005. Adaptations to foliar absorption of faeces: A pathway in plant carnivory. *Annals of Botany*, 95: 757-761.
- Anderson, R.J., McKune, C., Bolton, J.J., DeClerck, O. and Tronchin, E.M. 2005. Patterns in subtidal seaweed communities on coral-dominated reefs at Sodwana Bay on the KwaZulu-Natal coast, South Africa. *African Journal of Marine Science*, 27(3): 529-537.
- Archibald, S., Bond, W.J., Stock, W.D. and Fairbanks, D.H.K. 2005. Shaping the landscape: Fire-grazer interactions in an African savanna. *Ecological Applications*, 15: 96-109.
- Balmford, A. and Bond, W.J. 2005. Trends in the state of nature and implications for human well-being. *Ecology Letters*, 8: 1218-1234.
- Bolus, A., Hoffman, M.T., Todd, S.W., Powell, E., Hendricks, H. and Clark, B. 2005. The distribution and population structure of *Aloe pillansii* in South Africa in relation to climate and elevation. *Transactions of the Royal Society of South Africa*, 59(2): 133-140.
- Bond, W.J. 2005. Large parts of the world are brown or black: A different view on the 'Green World' hypothesis. *Journal of Vegetation Science*, 16: 261-266.
- Bond, W.J. and Keeley, J.E. 2005. Fire as a global 'herbivore': The ecology and evolution of flammable ecosystems. *Trends in Ecology & Evolution*, 20(7): 387-394.
- Bond, W.J., Woodward, F.I. and Midgley, G.F. 2005. The global distribution of ecosystem in a world without fire. *New Phytologist*, 165: 525-538.
- Botha, M.S. and Stock, W.D. 2005. Stable isotope composition of faeces as an indicator of seasonal diet selection in wild herbivores in southern Africa. *South African Journal of Science*, 101: 371-372.
- Bruyns, P.V. 2005. New species in *Echidnopsis* and *Secamone* and new records of *Ceropegia* (*Apocynaceae*) from Socotra. *Edinburgh Journal of Botany*, 61(1): 7-19.
- Bruyns, P.V., Nowell, T.L. and Hedderson, T.A. 2005. A revision and phylogenetic analysis of *Stapeliopsis* (*Apocynaceae*). *Botanical Journal of the Linnean Society*, 148: 125-155.

Chimphango, S.B., Musil, C.F. and Dakora, F.D. 2004. Impact of increased ultraviolet-B radiation stress due to stratospheric ozone depletion on N₂ fixation in traditional African commercial legumes. *South African Journal of Botany*, 70(5): 790-796.

Chimphango, S.B., Musil, C.F. and Dakora, F.D. 2004. Responses to ultraviolet-B radiation by purely symbiotic and NO₃-fed nodulated tree and shrub legumes indigenous to southern Africa. *Tree Physiology*, 24: 181-192.

Codron, J., Codron, D.M., Lee-Thorp, J.A., Sponheimer, M., Bond, W.J., DeRuiter, D.J. and Grant, R. 2005. Taxonomic, anatomical, and spatio-temporal variations in the stable carbon and nitrogen isotopic compositions of plants from an African savanna. *Journal of Archaeological Science*, 32: 1757-1772.

Craine, J.M., Lee, W.G.L., Bond, W.J., Williams, R.J. and Johnson, L.C. 2005. Environmental constraints on a global relationship among leaf and root traits of grasses. *Ecology*, 86(1): 12-19.

Fox, S.C., Hoffman, M.T. and Hoare, D. 2005. The phenological pattern of vegetation in Namaqualand, South Africa and its climatic correlates using NOAA-AVHRR NDVI Data. *South African Geographical Journal*, 87(2): 85-94.

Hahn, B.D., Richardson, F.D., Hoffman, M.T., Roberts, R., Todd, S.W. and Carrick, P.J. 2005. A simulation model of long-term climate, livestock and vegetation interactions on communal rangelands in the semi-arid succulent Karoo, Namaqualand, South Africa. *Ecological Modelling*, 183: 211-230.

Hattas, D., Stock, W.D., Mabusela, W.T. and Green, I.R. 2005. Phytochemical changes in leaves of subtropical grasses and fynbos shrubs at elevated atmospheric CO₂ concentrations. *Global and Planetary Change*, 47: 181-192.

Hawkins, H.-J., Wolf, G. and Stock, W.D. 2005. Cluster roots of *Leucadendron laeolium* (Proteaceae) and *Lupinus albus* (Fabaceae) take up glycine intact: An adaptive strategy to low mineral nitrogen in soils? *Annals of Botany*, 96: 1275-1282.

Hemborg, A.M. and Bond, W.J. 2005. Different rewards in female and male flowers can explain the evolution of sexual dimorphism in plants. *Biological Journal of the Linnean Society*, 85: 97-109.

Hendricks, H., Bond, W.J., Midgley, J.J. and Novellie, P.A. 2005. Plant species richness and composition along livestock grazing intensity gradients in a Namaqualand (South Africa) protected area. *Plant Ecology*, 176: 19-33.

Hendricks, H., Clark, B., Bond, W.J., Midgley, J.J. and Novellie, P.A. 2005. Movement response patterns of livestock to rainfall variability in the Richtersveld National Park. *African Journal of Range and Forage Science*, 22(2): 117-125.

Iyer, R., Bolton, J.J. and Coyne, V.E. 2005. Gracilarioid species (Gracilariaceae, Rhodophyta) in southern Africa, with a description of *Gracilariopsis funicularis* sp. nov. *African Journal of Marine Science*, 27(1): 97-105.

Iyer, R., Tronchin, E.M., Bolton, J.J. and Coyne, V.E. 2005. Molecular systematics of the Gracilariaceae (Gracilariales, Rhodophyta) with emphasis on southern Africa. *Journal of Phycology*, 41(3): 672-684.

Knott, M.G., Mkwanzani, H., Arendse, C.E., Hendricks, D.T., Bolton, J.J. and Beukes, D.R. 2005. Plocoralides A-C, polyhalogenated monoterpenes from the marine alga *Plocamium corallorhiza*. *Phytochemistry*, 66: 1108-1112.

Midgley, J.J. 2005. Why don't leaf-eating animals prevent the formation of vegetation? Relative vs. absolute dietary requirements. *New Phytologist*, 168: 271-273.

Midgley, J.J., Balfour, D.A. and Kerley, G.I. 2005. Why do elephants damage savanna trees? *South African Journal of Science*, 101: 213-215.

Richardson, F.D., Hahn, B.D. and Hoffman, M.T. 2005. On the dynamics of grazing systems in the semi-arid succulent Karoo: The relevance of equilibrium and non-equilibrium concepts to the sustainability of semi-arid pastoral systems. *Ecological Modelling*, 187(4): 491-512.

Sankaran, S., Hanan, N.P., Scholes, R.J., Ratnam, J., Augustine, D.J., Cade, B.S., Gignoux, J., Higgins, S.I. and Le Roux, X., Ludwig, F., Ardo, J., Banyikwa, F., Bronn, A., Bucini, G., Caylor, K.K., Coughenour, M.B., Diouf, A., Ekaya, W., Feral, C.J., February, E.C., Frost, P.G.H., Hiernaux, P., Hrabar, H., Metzger, K.L., Prins, H.H.T., Ringrose, S., Sea, W., Tews, J., Worden, J. and Zambatis, N. 2005. Determinants of woody cover in African savannas. *Nature*, 438: 846-849.

Schurr, F.M., Bond, W.J., Midgley, G.F. and Higgins, S.I. 2005. A mechanistic model for secondary seed dispersal by wind and its experimental validation. *Journal of Ecology*, 93: 1017-1028.

Simmons, R.E., Du Plessis, M.A. and Hedderson, T.A. 2005. Seeing the woodhoopoe for the trees: Should we abandon Namibia's Violet Woodhoopoe as a species? *IBIS*, 147(1): 222-224.

Springfield, E.P., Eagles, P.K.F. and Scott, G. 2005. Quality assessment of South African herbal medicines by means of HPLC fingerprinting. *Journal of Ethnopharmacology*, 101: 75-83.

Stock, W.D., Ludwig, L., Morrow, C., Midgley, G.F., Wand, S.J.E., Allsopp, N. and Bell, T.L. 2005. Long-term effects of elevated atmospheric CO₂ on species composition and productivity of a southern African C₄ dominated grassland in the vicinity of a CO₂ exhalation. *Plant Ecology*, 178: 211-224.

Tanner, E.V.J., Teo, V.K., Coomes, D.A. and Midgley, J.J. 2005. Pair-wise competition-trials amongst seedlings of ten dipterocarp species; the role of initial height, growth rate and leaf attributes. *Journal of Tropical Ecology*, 21(3): 317-328.

Walters, M., Milton, S.J., Somers, M.J. and Midgley, J.J. 2005. Post-dispersal fate of *Acacia* seeds in an African savanna. *South African Journal of Wildlife Research*, 35(2): 191-199.

Non peer-reviewed published conference proceedings

Richardson, F.D., Hahn, B.D. and Hoffman, M.T. 2005. Understanding factors that influence the sustainability and productivity of pastoral systems in the communal areas of Namaqualand: The role of simulation models. In N. Allsopp and M.T. Hoffman (eds), Proceedings of the Namaqualand Colloquium: Towards Sustainable Land Use in Namaqualand, Springbok, 24-26 May 2005, 25. [CD-ROM].

Theses and dissertations passed for higher degrees

Balfour, D.A. 2005. Acacia demography, fire and elephants in a South African savanna: 1-184. PhD.

Evans, A.G. 2005. An investigation into the ecology and biogeography of subtidal seaweed communities of KwaZulu-Natal: 1-98. MSc.

Krook, K. 2005. The effect of grassland shifts on the avifauna of a South African savanna: 1-97. MSc.

Kruger, L.M. 2005. The ecology of resprouting in South African forests, savannas and fynbos: 1-142. PhD.

Leitao, D.D. 2005. Effects of commercial kelp extract and plant growth regulators on growth of *Gracilaria gracilis* in culture: 1-160. MSc.

McGrath, K.M. 2005. Reconstructing South African afro-montane forest history with bryophyte phylogeography: 1-58. MSc.

O'Farrell, P.J. 2005. Ecosystem goods and services in a semi-arid landscape: An examination of the relationship between ecological processes, land use strategies and biodiversity conservation: 1-191. PhD.

Rowe, S. 2005. Speciation and phylogeography: Coalescent-based models applied to the Cape plant genus *Pauridia*: 1-95. MSc.

Van Alphen-Stahl, J.D. 2005. Molecular systematics and phylogeography of the Helmeted Guineafowl (*Numida meleagris*): 1-78. MSc.

Waldram, M. 2005. The ecological effects of grazing by the White Rhino (*Ceratotherium simum simum*) at a landscape scale: 1-112. MSc.

Unrefereed journal articles

Duncan, A., Hoffman, M.T. and Rohde, R. 2005. Is the flagship of the Richtersveld sinking? *Veld & Flora*, 91(4): 180-181.

Scott, G. 2005. A remarkable Zimbabwean botanical artist and ethno-botanist. *Veld & Flora*, 91(4): 196-199.