

## Science after a century at Rhodes University

THE SMALL UNIVERSITY OF RHODES (6142 students), in the rural city of Grahamstown, was established in 1904 as a result of a £50 000 grant from the Rhodes Trust in Oxford. It grew out of St Andrew's College, which provided the first four professors and 41 students. The first paper from Rhodes in the *South African Journal of Science* (then called the *Report of the South African Association for the Advancement of Science*) was by Selmar Schonland, one of the university's founding fathers. Entitled: 'Biological and ethnological observations on a trip to the N.E. Kalahari', it appeared in 1904. The following pages provide a glimpse into the growth and achievements of various departments in the faculties of Science and Pharmacy and associated institutes a century after the university was born.

Brown and his colleagues document the hundred-year history of the Department of Chemistry, which currently conducts research in the fields of electrochemistry, photochemistry, organic and inorganic synthesis, thermal analysis and marine natural products. It has emerging strengths in medicinal chemistry with research on the development of novel light-sensitive systems for treating cancer and for characterizing and synthesizing bio-active natural products from indigenous marine algae and invertebrates. Tebello Nyokong (winner of the 2004 Shoprite Checkers/SABC 2 Women of the Year Award in the Science and Technology category) is researching cancer diagnosis and treatment, and the work of organic chemists Kaye and Davies-Coleman features in this issue.

The Physics Department has for many years worked in the area of radio astronomy and is playing a leadership role in the national Square Kilometre Array bid. The department also collaborates with the Hartebeesthoek Radio Astronomy Observatory and other radio astronomy institutes worldwide. Apart from star-gazing, results from research 'closer to our home planet' appear in the pages that follow. Haggard reports on electron precipitation effects over the South Atlantic Anomaly region; McKinnell and Poole report on research findings concerning the ionosphere over southern Africa, which is part of a long-established interest; Chithambo presents results in the area of the thermoluminescence processes in quartz. These papers reflect the department's work in experimental and computational aspects of aeronomy, radio astronomy, electronics and materials science.

The Department of Geology, established in 1905, was the fifth department at Rhodes. It has a focus on economic and exploration geology. Three aspects of its research appear in this issue. Jacob *et al.* and Marsh describe features of the Grahamstown area, while

Prevec *et al.* move further afield.

Collectively, the life sciences form the greatest research component of the university, and the biological and environmental sciences have a strong tradition. The diverse interests in the Department of Zoology & Entomology are reflected in the range of papers included here. McQuaid and Froneman report on the progress of nearly two decades of research by the Southern Ocean Group. Hepburn and Radloff from the departments of Zoology & Entomology and Statistics, respectively, are long-term collaborators on bees. In this issue they present results from a morphometric analysis of honeybee populations, on which Hepburn is a world authority. Craig and Hulley report on eye coloration in passerine birds, and Villet *et al.* use DNA-based techniques to address evolutionary and biogeographical relationships in the African cicada genus, *Platypleura*.

The Botany Department has a long and respected history, and well-known plant scientists have passed through its historical buildings, as elucidated by Lubke and Brink in this issue. The department in 2004 offers a multidisciplinary approach to researching plant life. Barker *et al.* have used DNA sequencing to solve a long-standing taxonomic problem of generic delimitation and taxonomic boundaries in Africa's yellowwood trees, Botha *et al.* report on their latest findings of plant structure at the ultramicroscopic level, and Peter *et al.* examine the pollination biology of a poorly studied group of plants commonly known as 'vygies' that are endemic to the Eastern Cape.

The Department of Ichthyology & Fisheries Science, the only one of its kind at a South African university, specializes in research into the management of fish and other resources, fish population dynamics and aquaculture. This research directly influences fisheries in southern and East Africa. Oosthuizen and her colleagues write here on octopus genetics and management, while Rutaisire *et al.* on a cichlid species in Lake Victoria offer a more theoretical approach.

The papers by Palmer *et al.* and Hughes on fresh water toxicology and hydrological modelling reflect the interests of the Institute of Water Research, and are complemented by the work on sustainable environments and their communities in the Department of Environmental Science (established in 1998). Two articles in this issue report on the economic benefits of southern Africa's natural resources to the rural poor.

Within the Department of Biochemistry, Microbiology and Biotechnology, the biotechnologists have successfully filed patents and developed viable industrial processes. Representing the theoretical side, three papers in this issue are from the laboratory of Greg Blatch. One is on heat shock proteins

from the coelacanth and the second is on the monitoring of protein-protein interactions. The third, on molecular chaperones, represents basic work that won Blatch the prestigious Wellcome Trust International Senior Research Fellowship — the first time this award has gone to a university without a medical school. A fourth paper, on mycorrhizal interactions and dynamics by Hawley and Dames, unites the work of microbiologists and botanists.

Research on the human condition is represented by contributions of special relevance to South Africa from the Faculty of Pharmacy and the Department of Human Kinetics and Ergonomics. Dowse and Ehlers report on alternative methods of conveying medicine instructions to the poorly literate or illiterate by means of pictograms, and Scott and Christie use ergonomic methods to investigate the energy expenditure of manual labourers.

This centenary suite of papers reflects wide-ranging scientific research at Rhodes, much of it concerning the people, flora, fauna and environment of southern Africa. Nevertheless, many researchers take part in a growing number of international collaborations, and research is increasingly multidisciplinary. This results partly from the growth of widely applicable techniques and technologies, and partly from the increasing scope and complexity of research questions.

The development of improved methods of gene targeting, amplification and subsequent DNA sequencing, for instance, has led to the merging of work from seemingly diverse disciplines, such as biochemistry, botany, zoology, physiology, anatomy and information technology. DNA sequencing at Rhodes produces data for researchers in several departments, most notably Nigel Barker's molecular ecology and systematics group in the Department of Botany, which collaborates in research projects on the genetic diversity of marine organisms (such as mussels and crustaceans), insects and plants. The results are of interest to ecologists and are also used in conservation and its strategic management.

Another example reflects concern for the environment. Over the last three years, for instance, researchers at the university, at the South African Institute for Aquatic Biodiversity (formerly the J.L.B. Smith Institute of Ichthyology) and government departments have created the elaborate African Coelacanth Ecosystem Programme to investigate the biology and oceanography of the western Indian Ocean.

While cutting edge research at South African universities is delicately poised, Rhodes continues to commit itself to fostering excellent research. This special edition of the *South African Journal of Science* represents a snapshot of our science in progress.

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Additional information on each department can be found on the university web site, [http://www.ru.ac.za/academic/degrees/department\\_list](http://www.ru.ac.za/academic/degrees/department_list)