An eye to the future

SIEGLINDE RODE

Above *A Southern Ground-Hornbill fitted with a solar-powered satellite transmitter.*

The past 50 years have seen significant changes to the ways in which science is conducted. In 1960, when the Fitztitute was founded, ornithology centred around field observation, the study of museum skins, ringing programmes and some basic laboratory experiments. The structure of DNA had been discovered only seven years previously, the first wildlife satellite-tracking project was still nine years from being implemented, micro-processors were more than a decade away, and the first commercially available GPS unit was more than three decades distant.

The technological toolkit available to scientists has grown exponentially since the 1980s and we are now able to gather data at rates that our ornithological predecessors could only dream of. In addition to increasingly powerful computers, three fields have witnessed the greatest advances: tracking the movements of individual birds, the remote sensing of physiology, and the use of genetic tools to address questions ranging from behavioural ecology to unravelling the Tree of Life.

Interest in the movement patterns of birds dates back to at least the days of Aristotle, and knowledge of these patterns is crucial to understanding how bird populations function. Fifty years ago, the primary means of tracking bird movements was ringing. Unfortunately, few ringed birds are ever seen again, and rings don't tell us what a bird did or where it went between the time of ringing and its recovery. Today, provided the birds are large enough to carry the tracking devices, we can follow their movements to a resolution of metres. We can learn about the travelling speed, habitat use and foraging behaviour of birds thousands of kilometres away. We can also record the dives of birds below the water's surface or use changes in air pressure to see how high they fly, thus tracking their movements in three dimensions. Fitztitute researchers have adopted these new technologies in studies ranging from identifying the key foraging areas for seabirds to dispersal among waterfowl and harriers. With increasingly fine-scale resolution, even birds with relatively small ranges can be accurately tracked; for example, we study how ground-hornbill groups use complex savanna habitat mosaics. As this technology becomes progressively more miniaturised, the opportunities for new uses multiply.

For physiologists, data that previously could be collected only under laboratory conditions can now be gathered in the field. By implanting tiny sensors into birds, scientists can measure variables such as body temperature and heart rate in free-ranging individuals. The data can be logged for periods of more than a year or transmitted to a mobile receiving station for shorter periods.

The information the sensors provide is of vital importance in studies into the effects of climate change and we are now using this technology in the deserts of southern Africa. As the ambient temperature rises, so birds must lose heat. One of the simplest ways they can do this is by panting, but this carries the concomitant danger of lethal dehydration. Some birds opt to enter hyperthermia, allowing their body temperatures to rise. By knowing which species follow a particular strategy, we hope to predict which will be the first to be affected by climate change.

Since Watson and Crick described DNA in 1953, the science of genetics has mushroomed. Access to the 'blueprint' of birds from a drop of blood has opened a magician's box of opportunities. We can infer the ancestry of species: who is related to whom and even when they first evolved. At the Fitztitute, we have traced how the distributions of African birds have changed over time. Understanding what happened during past climatic upheavals should strengthen our ability to predict how different species will respond to ongoing climate change. We can also gain insights into how species form by using markers to track the speciation process. At the other end of the temporal spectrum, we can test how birds interact as individuals. Using their DNA, we can check paternity and test whether successful males have greater genetic diversity.

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In collaboration with national and international partners, the Fitztitute has been successful in exploiting new technologies as they arise. Indeed, a former student from the Institute, Rory Wilson, was instrumental in developing some of the techniques for logging bird behaviours and movements, initially working on penguins, but now on virtually any animal that moves. It is clear, however, that the technological revolution is far from over. We need to stay at the forefront of these developments to improve our understanding of birds and ultimately to enhance their conservation. □

If you would like to be part of our 50th Anniversary celebrations and our bursary and research fund-raising drives, please contact the Institute's Director, Prof. Phil Hockey, Percy FitzPatrick Institute, University of Cape Town, Rondebosch, South Africa 7701. E-mail ***phil.hockey@uct.ac.za***, fax +27 (0)21 650 3295, tel. +27 (0)21 650 3290/1 or visit ***www.fitzpatrick.uct.ac.za***

Little Bittern

PETER RYAN

GORDON SPRIGG SCHOLARSHIPS IN ORNITHOLOGY AT THE UNIVERSITY OF CAPE TOWN

GORDON SPRIGG SCHOLARSHIPS are available to allow students to pursue postgraduate degrees in Ornithology (MSc or PhD) at UCT.

ELIGIBILITY

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APPLICATION PROCEDURE

Applications must be made in writing to:
The Director
Percy FitzPatrick Institute of African Ornithology
University of Cape Town
Private Bag X3, Rondebosch 7701

Applications must include a full Curriculum Vitae, incorporating a publication list, certified academic transcripts and the names and contact details of three referees. A copy of the research proposal, a letter of support from the University of Cape Town research supervisor and a detailed statement of financial need must also be submitted. Scholarships will be awarded for one or two years.

CLOSING DATE FOR APPLICATIONS:
31 MARCH 2011