stressed birds

DIONNE MILES

The stress caused to birds by mist-netting is the focus of a PhD study at the University of Pretoria.

Stress is a fundamental part of the lives of birds and other animals. In physiological terms, stress is a response – mediated by hormones – that prioritises short-term survival over longer-term considerations such as immune function and reproduction. The response evolved to increase the likelihood that animals can handle short-term threats. However, just as in humans, stress can become a serious problem when demanding environments result in sustained, chronic activation of these physiological pathways. Continuous immune suppression leads to elevated susceptibility to disease and the disruption of reproductive cycles results in severely reduced breeding success.

The links between stress, immune function and reproduction mean that some significant challenges to the conservation of threatened species arise directly from elevated stress levels. For this reason, quantifying stress in animals through analyses of stress hormones represents one of the most important research tools in the field of conservation physiology. The past two decades have seen a burgeoning number of studies examining anxiety caused by human disturbance, in contexts as diverse as Hoatzin chicks in nests visited by ecotourists in the Amazon and wolves and elk in parts of Yellowstone National Park in the USA where recreational snowmobiles are used.

The most straightforward way to measure stress is to obtain a blood sample and analyse the concentration of relevant hormones in the blood. However, since the process of capture and blood sampling is itself highly stressful for the animal, non-intrusive measurements are almost always preferable. For this reason, in recent years considerable effort has been invested in developing ways to measure stress hormones non-invasively.

One technique is to use animals' faeces, since these contain molecules whose concentrations mirror the levels of stress hormones in the animals that produced them. In the Yellowstone study, for instance, researchers collected wolf and elk droppings that they subsequently used to evaluate stress levels. The past two decades have seen stress-focused studies of the 'scoop-the-poop' variety emerge as a viable alternative to blood sampling. The technique can also be useful for behavioural research and indeed is probably the only feasible way to quantify stress levels in long-term study populations habituated to the presence of human observers.

Two University of Pretoria students working with Fitztitute Centre of Excellence team member Andrew McKechnie are currently conducting non-invasive measurements of stress hormones in local birds. Emma Jepsen's BSc Honours research involves validating this method for Southern Pied Babblers. The species was selected for this project because of the long-term behavioural study on it by Mandy Ridley and her research team near Vanzylsrus in the Northern Cape; being able to monitor stress without interacting with the babblers will provide novel insights into their complex social lives.

Celiwe Ngcamphalala's PhD research includes non-invasive measurements in several species, but also tackles two other important questions. The first concerns the extent to which species differ in the magnitude of stress caused by capture in mist-nets. Her preliminary results reveal wide variation among species. For instance, whereas stress hormone levels in Karoo Thrushes and Southern Masked Weavers triple following capture, Speckled Mousebirds show a much larger, sevenfold increase. This kind of information has obvious value from an animal welfare standpoint and Celiwe's work will reveal which groups are more susceptible to stress and hence should be prioritised by researchers and ringers in terms of removal from nets and rapid processing.

The second question involves the role of stress physiology in avian responses to extremely hot weather. Severe heat waves are becoming increasingly frequent, but it remains unclear what role stress physiology plays in determining birds' responses to excessive heat and how it affects the likelihood of them being negatively affected. This aspect of Celiwe's research fits neatly into the Hot Birds Research Project, a study of arid-zone birds and climate change involving the Fitztitute, the University of Pretoria and the recently established South African Research Chair in Conservation Physiology at the National Zoological Garden in Pretoria.

For more information, contact
The Director, FitzPatrick
Institute of African Ornithology,
University of Cape Town,
Rondebosch, South Africa 7701.
E-mail *fitz@uct.ac.za*,
tel. +27 (0)21 650 3291 or
visit *www.fitzpatrick.uct.ac.za*