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INTRODUCTION

Forensic methods in conservation research

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There are a growing number of high precision methodologies that are becoming ever more useful in the study of ecology and conservation of endangered species, often allowing critical insight. These techniques are often used to provide data that may be used as evidence in wildlife law enforcement, and this has led them to be considered as forensic methods. These include: molecular genetic fingerprinting; stable isotope, trace element and compound analysis; and veterinary pathology. We have examples of the full range of such techniques in this Theme Section.

Ogden et al. (2009) review the field of wildlife DNA forensics that has emerged from a synthesis of conservation genetics and forensic genetic practice to meet the increasing need for investigative tools in wildlife law enforcement. They describe the principal technologies and applications whilst focussing on the most common questions, and make recommendations as to how the field can progress further. Chapman et al. (2009) highlight how genetic stock identification of shark fins collected at the endpoints of the trade route offers a potentially useful approach for tracing the fins back to their stock of origin. Turning to plants, Ogden et al. (2008) describe the first stages in the development of a genetic assay for the identification of the tropical hardwood ramin *Gonystylus* spp., a CITES-listed genus subject to illegal international trade. Helping to inform rather than enforce conservation legislation, Andersen et al. (2009) utilise genetic methods to define the population sub-structure of the Atlantic walrus *Odobenus rosmarus rosmarus*, which is still exploited at variable levels across its range.

Additional methods using other chemical markers can also give insights into wildlife trade issues. Efforts to control the illegal international trade in parts and derivatives of the Asiatic black bear *Ursus thibetanus* are hampered by difficulties associated with the accurate identification of products. Peppin et al. (2008) outline how they have designed a simple immunoassay (LFIA) dipstick for bear serum albumin which works with serum, blood, skin and liquid bile. Espinoza et al. (2008) outline how spectroscopy can be used to differentiate between hair of elephants and giraffes that may be incorporated into curios.

Stable isotope analysis (SIA) has become a widespread tool in ecology (Inger & Bearhop 2008), allowing resolution of ecological and behavioural characteristics of animals, many of conservation relevance (Rubenstein & Hobson 2004). In an innovative paper, Gutowsky et al. (2009) integrate the analysis of museum skins of the marbled murrelet *Brachyramphus marmoratus* to construct reproductive success with SIA to assess diet quality. Their results suggest that the reproductive success of marbeled murrelets has declined over the past 150 yr and that reduction in diet quality may be partly responsible.

A number of roles for forensic veterinary pathology are highlighted. Colotelo et al. (2009) review the state-of-the-art technology in detection of anthropogenic injury on the skin of fish which has traditionally been limited to gross macroscopic examination. Taking an interdisciplinary perspective, Cooper et al. (2009) review some of the practicalities of dealing with wildlife crime scene investigations to help maximise the quality and quantity of evidence that may be gathered, particularly in challenging field situations. Finally, a longitudinal study of the causes of mortality in Mauritius pink pigeons *Columba mayeri* (Bunbury et al. 2008) elaborates the relative role of a range of mortality factors such as parasitism and introduced mammalian predators. It highlights the key, often under-described role, disease can play in ecology, especially in reduced populations.

It is clear that the technology underpinning forensics methods will continue to advance. As a journal, *Endangered Species Research* welcomes the possibility of dissemination of such further innovation in methods and techniques that will support the conservation of endangered species.

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