Identification of genetic diversity for lizard conservation

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1. Introduction

Until recently, the herpetofaunal diversity of the West Coast has remained relatively unexplored. Preliminary protein investigations of West Coast skink material indicated that unrecognised species might be present in the area. To clarify questions relating to the skink species present on the West Coast, a joint DOC/Victoria University study of lizards in the West Coast Conservancy Area has recently been completed.

As part of this study, we undertook a taxonomic survey of *Oligosoma* skinks in the West Coast region, using allozyme (protein) variation as the primary data source. Analyses of allozymes are useful because they can identify reproductively isolated populations where they occur together, even if colour and morphology conceal this diversity, and they have previously allowed significant cryptic diversity to be revealed within New Zealand reptiles (for example, Daugherty et al. 1990a; 1990b; 1994; Hitchmough 1997).

The allozyme data revealed the existence of three undescribed taxa, which we have labelled: *O.* "Big Bay", *O.* "Grey Valley" and *O.* "Open Bay Islands". *O.* "Open Bay Islands" remains undescribed due to a lack of collected material from this species. The other two species are being formally described in a paper to be submitted to the *New Zealand Journal of Zoology*.

Discovery of new species of lizards is nothing new. The number of lizard species recognised in New Zealand has increased significantly in the last 45 years. In 1955, McCann recognised 28 species of lizards here in 1994, 59 species were recognised (Daugherty et al., 1994), and by 1999, that number has increased further to over 60 described species, with more than ten other species still undescribed.

This increase has occurred clue to the finds of observant field workers and members of the public who continue to discover animals in "out of the way" places, and to the application of new genetic techniques to investigate geographic variation. Species newly discovered in the last 20 years include obvious new species such as *Hoplodactylus rakiuriae* (Thomas 1981) and *O. longipes* (Patterson, 1997), and cryptic species that are highly similar in morphology, such as *O. maccanni* and *O. inconspicuum* (Patterson & Daugherty 1990).

2. Issues for lizard conservation in New Zealand

The Department of Conservation was established under the Conservation Act 1987 to manage and conserve New Zealand's natural and historic resources. In 1992, New Zealand became a party to the United Nations Convention on

Biological Diversity (1992). Article 7 of that convention states that the parties shall "identify components of biological diversity important for its conservation...". The Convention recognises that effective conservation is not possible without knowledge of what is to be conserved, i.e., a species inventory. To fulfil New Zealand's obligations under the Convention and its goal under the Conservation Act, the Department has to rely on accurate taxonomies for the species it manages.

The West Coast discoveries in our study follow other discoveries of lizards in the last ten years in the South and Stewart Islands (Patterson 1997; Patterson & Daugherty 1990, 1994) and it is important that DOC continues to advocate for stable taxonomy in New Zealand.

DOC staff are sometimes reluctant to send specimens to labs for genetic analysis because the animals may have to be killed to obtain study material. We believe that accurate taxonomic knowledge benefits conservation so greatly that the sacrifice of a few individuals is justified. The morphological sampling methods of the past required far larger numbers of individual animals to be killed. Today's methods require far fewer sacrifices, but produce accurate results with far-reaching effects for conservation of the species. There is little likelihood of damage to local populations, far less, for example, than the ecological consequences of building a house, an activity whose conservation costs are rarely acknowledged.

Examination of the genetics of common widespread species often reveals a large degree of variation not evident in morphology. The outcome may be that a single widespread species is revealed to be part of a complex of localised and restricted species (for example, *O. notosaurus* in tile *O. nigriplantare* complex [Patterson & Daugherty 1990; Daugherty et al. 1990b] and various species thought to be within *H. maculates* [Hitchmough 1997]). Working with such cryptic species can present practical problems for conservation workers. Distinguishing between species in the field may be difficult or even impossible.

The discovery of new species also challenges conservation managers. The number of rare species requiring management often increases due to the identification of cryptic species, e.g. tuatara (Daugherty et al. 1990b), *Leiopelma* frogs (Bell et al. 1998). This may place increased financial demands on limited resources, and force choices to be made about what species should be actively managed, and what should be left alone. The Department of Conservation's priority ranking system for conservation action (Molloy & Davis 1994) includes taxonomic distinctiveness as one of the five factors to assess threatened species priorities. It is therefore especially important that taxonomic information is readily available.

However, other factors required under the Molloy & Davis criteria include species status (number of populations, geographic distribution, etc.) and vulnerability (habitat/diet specificity, behavioural specialisations, etc.). We need to know ecological details for each species to be able to accurately determine conservation priority. Naming new species should thus be seen as the beginning and not the end of the research.

Knowledge of the natural history of herpetofauna in New Zealand is limited, even for species such as the chevron skink *(Oligosoma homolonotum),* which is recognised as a priority species for conservation. The ecology of native frogs is better known than that of lizards, mainly due to the long-term commitment of researchers such as Ben Bell, who has monitored populations over a period of about 25 years, and is now able to observe declining numbers. There are no studies of lizards in mainland New Zealand to provide a similar baseline. Dave Towns' lizard studies in the Mercury Islands group are probably the best long-term studies of New Zealand lizards at present.

To conserve New Zealand's biodiversity effectively, the Department of Conservation relies on good taxonomic knowledge, followed by good natural history. Without the former, there is a risk that unrecognised diversity will be lost. Studies which have illustrated this point include work on some of New Zealand's highest profile species, such as kiwi (Baker et al. 1995), tuatara (Daugherty et al. 1990a), and the orange-fronted parakeet (Wee Ming Boon, VUW, unpubl.).

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