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Unveiling the lizards of New Zealand

New Zealand Lizards, edited by David G. Chapple, 2016

Springer International Publishing, 375 pp. ISBN 978-3-319-41672-4

In this comprehensive and authoritative volume, David Chapple and co-authors have compiled a fascinating overview of the New Zealand lizards. Covering an impressive spectrum of topics, the book details aspects ranging from the discovery, taxonomy and evolutionary history of this lizard assemblage, to their ecology, conservation and focal areas for future research. As described in the initial chapter, the principal aim of the book was to synthesise current knowledge of the region's lizard biota, and, in so doing, highlight crucial knowledge gaps and key areas for future research. In this regard, I believe the book excels and will provide a notable point of reference for both current and future reptile researchers.

New Zealand lizards have long been underappreciated, both within the country and abroad, and overshadowed by interest in the tuatara (*Sphenodon punctatus*). While just under half of the proposed lizard species remain undescribed (45%; Chapple, chapter 1), the diversity appears to be particularly remarkable considering New Zealand's temperate setting. A proliferation of research on the region's lizard assemblage has enabled advances in biogeographical analyses and conservation priority assessments. While this research and expert knowledge form the backbone of the text, it is the author's critical assessments of the current research focus and recommendations for future directions that elevate this book above others in its class.

Following the chronology of New Zealand herpetological discoveries, the opening chapters detail the historical events and characters involved in unveiling the extant and extinct New Zealand lizards. The entire history of reptile discovery in New Zealand is meticulously laid out across its defining periods. The mystery surrounding one of the world's largest, and now extinct, geckos (*Hoplodactylus delcourti*) is also examined.

Is this the kawekawau of Maori folklore or a long-lost lizard from New Caledonia? If you are anything like me, this is not a section you will simply flick through. Concluding these sections the authors note how advances in ancient DNA technology and genomic DNA sequencing are set to revolutionise the fields of paleoherpetology and systematics. These, in turn, will open up exciting new avenues of research and, allied with increasing levels of spatial data from field surveys, pave the way for 'the golden age of New Zealand lizard biogeography' (Chapple and Hitchmough, chapter 5).

Studies of New Zealand lizard ecology, life-history traits and physiology have revealed the intriguing and often distinctive adaptations enabling them to diversify throughout this insular temperate environment. Specific adaptations to cold environments include the prevalence of viviparity (99% of taxa) and ability to retain fully developed embryos over winter (Cree and Hare, chapter 7). Research into lizard thermal tolerance has also revealed the potential beneficial side effects of warmer temperatures caused by climate change (Hare and Cree, chapter 9). Noteworthy areas for future research include the study of lizard parental care and the thermal dynamics between ambient and lizard-body temperatures under conditions of projected climate change. In order to equip reptile field researchers with the necessary tools to effectively sample New Zealand lizards, a chapter is dedicated to the most up-to-date collection methods and sampling techniques (Lettink and Hare, chapter 10). Useful hints are also provided for capturing and recording the more elusive arboreal species.

Outlining the challenges and threats facing New Zealand lizards is no trivial task, and the authors dedicate considerable attention to this subject. With 75% of the native taxa considered to be threatened (Towns et al., chapter 11), particular

attention is paid to invasive species as the principal agents of decline. Eradication of invasive mammals on satellite islands proved hugely successful in the natural recovery and reintroduction of native lizard populations (Towns et al., chapter 11). Recovery programs such as the installation of fenced mainland sanctuaries, however, has proved far less effective in mitigating declining lizard populations (Nelson et al., chapter 12). The authors cite social attitudes towards lizards as a challenge for future conservation and the need to assess variation in threat intensity at both the species and population levels (Nelson et al., chapter 12). The major diseases and disease agents of New Zealand lizards are also reviewed, with substantial knowledge gaps emphasising the need for further work in this area (Gartrell, chapter 8).

While the authors make note of the Linnaean shortfall within New Zealand lizards, whereby 45% of the proposed taxa remain undescribed, total species numbers are frequently cited including both formal and informal species. This aspect may be contentious for some readers. Despite this, a culmination of research and expert knowledge on the varied aspects of New Zealand lizard biology is brilliantly encapsulated in this book. It also stands an excellent model for those wishing to produce similarly detailed regional taxon-specific treatises. The fourteen chapters are

presented in a concise and scientific manner, and each chapter is supplemented with a reference list given as a useful guide for further reading. In a testament to the exhaustive research undertaken, the references often extend to several pages. Throughout the book, the authors continually emphasise the importance of publishing research, a sentiment that resonates across all facets of New Zealand lizard research.

Principally aimed at current and prospective researchers studying aspects of New Zealand's lizard biology, this book would provide a useful additional resource for university taught courses in fields such as ecology, evolution and conservation. While I would definitely recommend the book in its entirety, for those interested in specific research topics, each chapter is also conveniently offered in a standalone digital format.

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