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Book Reviews

Author: Lounibos, L. Philip

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KAY, BRIAN H. AND RICHARD C. RUSSELL [EDS.] 2013. Mosquito Eradication. The Story of Killing *Campto*, CSIRO Publishing, Collingwood, VIC. Australia. xxii + 256 pp., paperback. ISBN 9781486300570, $69.95 (AU).

This multi-authored volume chronicles stages and strategic planning of a remarkable achievement, the unprecedented eradication of an invasive salt marsh mosquito pest and potential disease vector. The book is a collaboration between Australian experts, including the editors, who are doyens of mosquito biology and control Down Under, and New Zealand scientists, government workers, and response teams whose timely engagement was responsible for the eventual purging of the Australian southern salt marsh mosquito *Aedes camptorhynchus* from their country. The cooperation between these neighbors is appropriate and not unexpected, given their shared concerns about invasive species and 'biosecurity', plus the fact that the unwanted *Campto* was inadvertently introduced into NZ from Australia.

This book has been attractively produced, with a vivid cover that features a beautiful macro image of an adult female *Campto* by the Aussie mosquito photographer Stephen Doggett. As the catchy title might suggest, stiff scientific prose is avoided in the 13 chapters, which range in coverage from the importance of government support and legislation (Chapter 3) to coming to grips with the surprisingly large and unexpected infestation of *Campto* in Kaipara Harbor north of Auckland (Chapter 8). Several of the chapters that describe building in-house capacity for mosquito control and eradication are peppered with reproduced newspaper clippings and posed photos of ground and aerial mosquito control teams, adding to the local flavor of the book.

The rarity of successful eradication of an invasive mosquito species invites comparisons between the present book and Soper & Wilson (1943), which described the elimination of the African malaria vector *Anopheles gambiae* (s.l.) more than seventy years earlier from northeastern Brazil. Indeed, both books, one edited and the other by two American authors, are approximately of the same size and length, although the newer opus is visually more appealing. The timelines between first detections of establishment of the exotic mosquito invaders and final eradication were similar, 10-12 years in both NZ and Brazil, the prolongations attributable to 'silent spreads' of both invasive species beyond the borders of original infestations. Both books describe the build-up of in-country expertise to deal with their invasions, leading to Brazil's Malaria Service of the Northeast and NZ's National Saltmarsh Mosquito Surveillance Programme. Both campaigns deployed targeted larviciding, primarily using the toxic Paris green in Brazil and the juvenile hormone analog S-methoprene in NZ, to achieve their ends.

Although *A. camptorhynchus* is recognized as an important epidemic vector of Ross River virus (RRV) in southern Australia, and this fact was hammered home in NZ for public support of 'Killing *Campto*', RRV was never detected during the establishment of this invasive species in NZ. By contrast, the presence of *A. gambiae* (s.l.) transformed malaria from endemic to virulently epidemic in NE Brazil (Soper & Wilson 1943). As salt marsh occurs throughout much of NZ's extensive coastline, radical differences in habitats occupied by the Brazilian and Kiwi invasive mosquito species favored a simpler path to eradication of *A. gambiae* (s.l.), whose aquatic immature stages were restricted to a narrow range of freshwater habitats that persisted during the extended dry season of NE Brazil. A palpable difference between Kay and Russell (2013) and Soper and Wilson (1943) is one of attitude. The final chapters of these books show that the Kiwis and Aussies are humble and grateful for the planning and cooperation that led to eradication and guardedly optimistic that future biological threats could be similarly managed. By contrast, the hubris of eradication of *A. gambiae* (s.l.) from Brazil led to grander and unrealistic plans for eliminations of other mosquito species, such as the subsequent, failed campaign to eradicate the yellow fever vector *Aedes aegypti* from the Americas.

The intended audience for the current volume is somewhat unclear, despite the book's prefatory claim of "providing 'lessons' for others who may face similar challenges". As few countries would be likely to sink NZ $70 million into eradication of a pest which might, or might not, transmit an arbovirus that may cause polyarthritis, but not mortality, this book is probably most important to Kiwis and Aussies for its historical accounts of important events by those who participated on the front lines. Others who may find chapters of interest include mosquito control professionals, especially those whose major pests develop in salt marshes, such as in coastal New Jersey and Florida. These public servants or private contractors will especially appreciate the penultimate chapter on "Communications and cultural issues", which emphasizes media efforts to ensure public support for targeted insecticiding.

There is less in this volume for invasion biologists, in part because the modes of entry and dispersal of *Campto* in NZ are unknown. Molecular sleuthing with maternal population genetic markers, described in Chapter 7, was consistent with a single-entry hypothesis but did not help resolve the routes or methods of extensive dispersal within NZ, which required 11 disjunct eradication efforts, most at salt marshes on North Island. Al-

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though there is a section in the book's first chapter about NZ's historical problems from human introductions of invasive species, there is scant mention of the weak biotic resistance because of NZ's depauperate indigenous fauna and flora in general and, in particular, its vulnerability to salt marsh colonization by an invasive mosquito because of the absence of a native culicid occupying that habitat.

Was 'Killing *Campto*' worth the effort and expense to Kiwis? In the minds of the editors and contributors to this book, surely there is no doubt. Recent modeling suggests that the potential for RRV emergence in NZ, in the absence of a major vector such as *A. camptorhynchus*, is low (Tompkins & Slaney 2014). This book thoroughly describes what was entailed to achieve and maintain that sense of security.

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L. Philip Lounibos
Florida Medical Entomology Laboratory
University of Florida – IFAS
Vero Beach FL 32962
E-mail: Lounibos@ufl.edu

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