



BOOK REVIEW

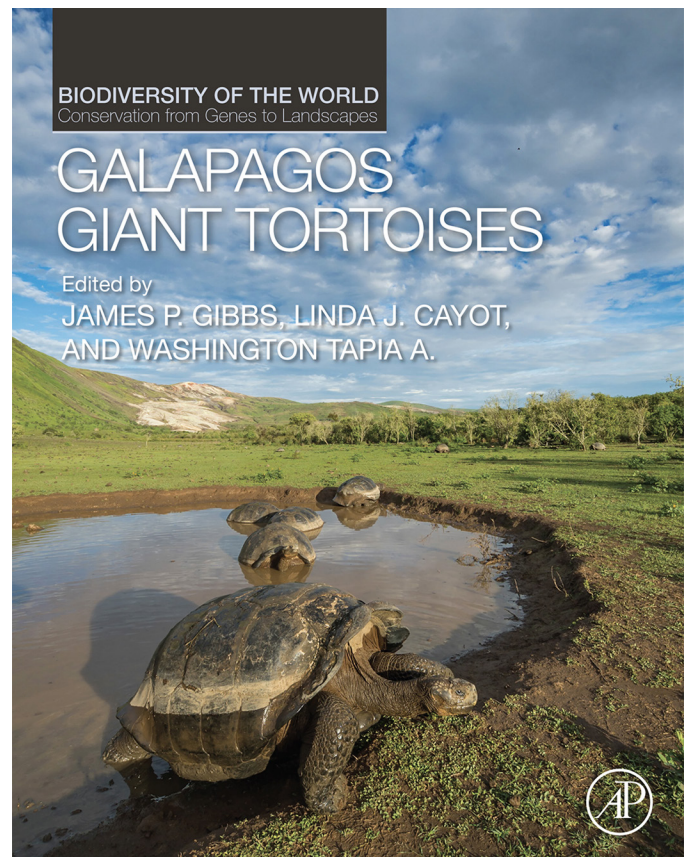
Galápagos Tortoises: A Challenging History and a Way Forward

Galapagos Giant Tortoises. 2021. James Gibbs, Linda Cayot, and Washington Tapia A. (eds.). Academic Press, London, UK. xvii + [1] + 518 pp. ISBN 9780128175545 (hardcover). ISBN 9780128175552 (ebook). \$102 (hardcover or ebook), \$120 (bundled).

When Charles Darwin set off from Plymouth Sound on 27 December 1831, chelonians were probably not the first thing on his mind. One of the most memorable places he visited while on the *Beagle* under the command of Vice-Admiral Robert FitzRoy was the Galápagos Islands. Although he wrote quite a bit about the tortoises he saw (Darwin 1839), noting how those on different islands differed in shell shape and in other ways, the finches that were named after the great naturalist and brought to modern popular attention by Lack (1947), Grant and Grant (2014), and others garnered the most modern-day attention. Nonetheless, the islands’ giant tortoises have inspired many books for children and adults — Amazon currently lists 161. At the top of their list (doubtlessly placed there by a proprietary algorithm) is the recent book reviewed herein, an up-to-date synthesis of a copious literature. Its six sections and 25 topical and island-specific chapters cover a wide range of subjects. Encouragingly, of the 39 contributing authors, eight listed Ecuador as their home. Each chapter begins with a short “chapter outline,” which lists subheadings, the pages on which they begin — a nice navigation aid — and its own list of references; in the electronic version we reviewed, many of these came with hyperlinks to source material. The book ends with an index to terms and scientific names. Individuals contributing to tortoise research and conservation are given credit throughout the text, but the inclusion of photos of locals associated with onsite efforts was a nice touch, as non-authors working behind the scenes are not always recognized.

The book offers a nice balance of academic-style text and tables with boxed insets containing related case-studies or personal recollections of researchers. *Overview*, the first section of the book, opens with an account of the 16th-Century Panamanian Bishop, Fray de Berlanga, in which he breathlessly described “...tortoises so great, that they could carry a man on top...” (cited in chapter 1). The rest of the chapter describes the geographic setting, provides a brief summary of

the entire book, and ends on a high note by giving examples of success in invasive species removal, habitat restoration, and captive-rearing programs for the islands’ tortoises. Chapter 2 is chronological, beginning with the emergence of life on Earth, through the evolutionary history of turtles, the emergence and decline of large land forms, and the arguments for conservation and restoration. To sailors of the 17th, 18th, and 19th centuries, the giant land tortoises of the Galápagos, Mascarene, and other islands were mostly known as food. They were “extraordinary large and fat, and so sweet, that no pullet eats more pleasantly” said William Dampier; their “flesh is very wholesome, and tastes something like mutton” agreed François Leguat (Chambers 2004). Whalers and sailors on other ships, including the *Beagle*, decimated populations for food supplies, since they could keep the large beasts alive for long periods in those pre-refrigeration days. Eleven of the



fourteen species went extinct, yet somehow the giant tortoises persisted, both on the islands and in people's imaginations.

Section 2, *History of Human-Tortoise Interactions*, contains chapters 3–6, which cover human-tortoise interactions (chapter 3); relentless exploitation by humans, primarily whalers, sailors, and buccaneers, in the years 1535–1959 (chapter 4); Darwin and his evolutionary take-aways from the Galápagos (chapter 5); and early scientific inquiry (chapter 6). When describing Darwin's expeditions and thought process, chapter 5 details the struggles he faced when formulating his evolutionary theory rather than painting the figurehead with broad, glorying brushstrokes — reminding us that Darwin, too, was merely human. By the time of the California Academy of Sciences Expedition (1905–6), concern about the need to protect the islands and conserve the tortoises had emerged. Invasive species, whether competing herbivores like goats or predators such as dogs, were having major negative impacts on what the sailors and settlers left behind (recounted in chapters 3 and 6). Several collections for zoos and museums followed, providing much insight into tortoise taxonomy and enabling foundational research on tortoise behavior and morphology. Today, of course, *in-situ* protection and husbandry dominate conservation practice in the Galápagos, something that would have been impossible until relatively recently.

Section 3 contains chapters on general biology, including phylogeny (chapter 7), morphology (chapter 8), reproduction (chapter 9), thermoregulation (chapter 10, which includes a detailed and highly technical appendix), diet, behavior, and activity patterns (chapter 11, with a detailed appendix listing plants found in the diet), population biology (chapter 12), movement ecology (chapter 13), habitats (chapter 14), ecological role (chapter 15), and effects of climate change (chapter 16), which, as its author points out, “is unlike any previous threat” and might have belonged in the following section.

Sections 4 and 5 focus on conservation, recounting recent history decade by decade, starting with a broad overview of multi-level conservation efforts in the 1960s (chapter 17), then covering health (chapter 18) (which might have been better placed in section 3), the impacts of invasive species (chapter 19), current population status on the various islands (chapter 20), and restoration case studies from several islands (chapters 21–24). Avoiding genetic bottlenecks and reducing human interference and invasive species are common threads. Reviewing these efforts throughout the years provides a model to follow and identifies errors to avoid for successful worldwide conservation and management practices. Finally, the single chapter comprising section 6 provides a brief summary and attempts to forecast future trends. It includes a summative figure that depicts the chronology of Galápagos tortoise populations, including the devastation during the eras of discovery and exploitation, and projects a

healthy annual population growth, concluding optimistically: “Although the future is full of uncertainty, given a changing climate, the ever-present threat of new invasive species and especially introduction of new tortoise diseases, and intensifying pressures from animal traffickers, the habitat base for Galápagos giant tortoises remains extensive and largely secure ... future generations of visitors may witness, throughout the Archipelago, scenes similar to that recorded in 1833 by Commodore John Dowes.”

Unfortunately, poaching for the illegal pet trade continues, including theft from the tortoise breeding centers (chapter 1, with additional details in chapter 17). As we wrote this review, the media reported that 185 baby Galápagos tortoises were seized by Customs officials in Ecuador, although no arrests were made (Anonymous 2021). So, good news and many advances in management are compromised by ongoing problems. For example, as chapter 16 points out, “large body size and longevity do not provide an inexhaustible buffer to all climate variation.” The chapter notes that “a serious threat may be posed to the viability of future tortoise eggs during incubation,” and recent work suggested that endemic island species may be facing particularly great risks from climate change, whereas invasive species may benefit from it (Manes et al. 2021). The optimism engendered by the success of efforts to date is certainly appealing, but it might be premature or at least overstated.

On the whole, this book does an excellent job of covering the history, biology, and conservation of these iconic chelonians. It reviews past work and is current enough to include novel research. The publisher lists the target audience as “Conservationists, researchers, and students in wildlife conservation, conservation biology, herpetology, captive breeding, habitat management, and invasive species control worldwide; visitors to the Galápagos Islands.” We believe that much of this book (especially the appendices) will be too detailed and technical for many students and definitely for most visitors to the islands. Also, at over 500 pages and with a cost greater than \$100, it is not likely to appeal to most tourists. Instead, we suggest its target is more appropriately limited to professionals seeking to understand how Galápagos tortoises arrived at their present situation, what we are doing to address the problems, and the challenges that lie ahead.

Literature Cited

- Anonymous. 2021. Galápagos tortoises: 185 babies seized from smugglers. *BBC*, 29 March 2021. <<https://www.bbc.com/news/world-latin-america-56564326>>.
- Chambers, P. 2004. *A Sheltered Life: The Unexpected History of the Giant Tortoise*. John Murray, London, UK.
- Darwin, C. 1839. *Narrative of the Surveying Voyages of His Majesty's Ships Adventure and Beagle, Between the Years 1826 and 1836, Describing Their Examination of the Southern Shores of South America, and the Beagle's Circumnavigation of the Globe. Volume III. Journal and Remarks. 1832–1836*. Henry Colburn, London, UK.
- Grant, P.R. and B.R. Grant. 2014. *40 Years of Evolution: Darwin's Finches on*

- Daphne Major Island*. Princeton University Press, Princeton, New Jersey, USA.
- Lack, D. 1947. *Darwin's Finches: An Essay on the General Biological Theory of Evolution*. Cambridge University Press, Cambridge, England.
- Manes, S., M.J. Costello, H. Beckett, A. Debnath, E. Devenish-Nelson, K.-A. Grey, R. Jenkins, T.M. Khan, W. Kiessling, C. Krause, S.S. Maharaj, G.F. Midgley, J. Price, G. Talukdar, and M.M. Vale. 2021. Endemism increases species' climate change risk in areas of global biodiversity importance. *Biological*

Conservation 257: 109070. <https://doi.org/10.1016/j.biocon.2021.109070>.

Charles Jacobi, Kristin L. Kabat, and Gad Perry
Department of Natural Resource Management,
Texas Tech University