

## **CHARLES DARWIN IN AUSTRALIA: HIS ZOOLOGICAL OBSERVATIONS<sup>1</sup>**

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### **SUMMARY**

Early in 1836, Charles Darwin spent two months in Australia as part of his round-the-world voyage on HMS *Beagle*. During this time he visited Sydney, travelled on horseback to Bathurst, visited Hobart and called in to King George Sound. In musing in his diary on the “strange character of the Animals of this country as compared to the rest of the World”, for the first time he writes down questions that have begun to puzzle him, e.g. has there been two creators? His extensive zoological collections and observations in Australia formed part of the wealth of information he collected over several decades from throughout the world — information that led, in 1859, to the publication of ideas that still, 150 years later, underpin our understanding of life on earth.

### **INTRODUCTION**

In December 1831, the Royal Navy’s HMS *Beagle* left England on its second surveying voyage. On board was a young man called Charles Darwin. During the voyage, he took every opportunity to examine the geological formations and the myriad forms of plants and animals, both living and fossil, in the different parts of the world visited by the *Beagle*. The many observations made by Darwin during the voyage led him to question conventional wisdom on the origin of species, and sowed the seeds for his thinking about evolution. Combining his *Beagle* observations with masses of information collected after his return to England, Darwin gradually developed an idea as to how evolution could have occurred, and in 1859 he published his revolutionary book, “On the Origin of Species by Means of Natural Selection”. By providing Darwin with the initial impetus for the development of his far-reaching ideas, the *Beagle*’s voyage has become an important event in world history.

During this voyage, the *Beagle* visited Australia between January and March 1836, giving Darwin an opportunity to examine and explore the infant colony. He was very active and observant during his visit, he collected numerous specimens of animals and rocks, and he made a number of observations that played a role in the development of his ideas on evolution.

This paper briefly reviews the most interesting zoological aspects of Darwin’s visit to Australia.

### **THE ANT-LION EPISODE**

The *Beagle*’s first Australian port of call was Sydney, where it stayed for 18 days. As was his custom whenever the *Beagle* stayed in a port for any length of time, Darwin took an inland excursion, in this case to Bathurst. He “hired a man & two horses” and followed more-or-less the present line of the Great Western Highway, over-nighting at Emu Ferry, Wentworth Falls, Blackheath, and at Wallerawang (then a sheep station, whose homestead was located near the Cox’s River). As he records in his diary, “In the dusk of the evening, I took a stroll along a chain of ponds (which in this dry country represents the course of a river) & had the good fortune to see several of the famous Platypus” which reminded him of the northern hemisphere water vole.

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<sup>1</sup> This paper is abridged from “Charles Darwin in Australia” (Anniversary edn) by F.W. and J.M. Nicholas (Cambridge University Press, Melbourne, 2008). Quotations are from Darwin’s *Beagle* diary.

## *Animal Genetics*

Earlier in the day, he had seen a kangaroo rat, occupying a similar ecological niche (with similar behaviour) to the northern hemisphere rabbit. On this and previous days, he had seen “plenty of Crows, like our jack daws, & another bird, something like the magpie.” Earlier that same evening, he had observed the “conical pitfall of a Lion-Ant”, noticing that it is similar to, but not the same as, northern hemisphere species. Not surprisingly, all these sightings caused him to reflect “on the strange character of the Animals of this country as compared to the rest of the World.”

So it was that in the space of just a few hours in the middle of January 1836, on an isolated property in inland Australia, the 26-year-old Darwin had been confronted with three clear illustrations of the fact that similar environments in completely different parts of the world seemed to be inhabited by animals having similar adaptations, but obviously belonging to different species. In the two most striking cases, the similarly adapted animals belonged to different genera, families, orders and subclasses as well. To modern biologists, this phenomenon is called convergent evolution, and is seen as providing evidence of the power of natural selection as an adaptive force. To Darwin, it was a puzzle: “A Disbeliever in everything beyond his own reason, might exclaim, “Surely two distinct Creators must have been [at] work”. In relation to the ant-lion pits, he asks, “Would any two workmen ever hit on so beautiful, so simple & yet so artificial a contrivance? I cannot think so.— The one hand has worked over the whole world.—”

These words, written in his diary on board the *Beagle* in the last week of January 1836, when Darwin had returned to Sydney, represent one of the earliest times he raises the issue of the origin of species in writing. The last sentence in the quotation above is tantalisingly ambiguous. Given that Darwin was writing the diary at least partly for the benefit of his friends and family back in England, many of whom still probably hoped that he would enter the Anglican ministry, this ambiguity may have been intentional. If by the ‘one hand’ Darwin means a single universal natural phenomenon, then this is one of the earliest glimpses we have, if not the earliest glimpse, of the theory that he was to use much later to explain the mechanism of evolution. It is quite possible, however, to interpret the ‘one hand’ as referring to God the creator who ‘hit on’ the one ‘artificial . . . contrivance’ and used it on a slightly different scale in the two different hemispheres of the world. In writing for a very mixed audience, Darwin chose words that would offend no one.

## **ZOOLOGICAL COLLECTIONS IN AUSTRALIA**

The *Beagle* called in at Hobart and King George Sound (Albany) on its way home. At both places, as well as at Sydney, Darwin and/or his servant Syms Covington collected many natural history specimens.

**Sydney.** In Sydney, they collected an oyster, a mud whelk, several air breathers, a sand snail, and a trochid or top shell, plus a crab, a snake and various frogs and lizards (all of which had been described previously). The sole mammal amongst the Sydney specimens, a mouse, turned out to be previously undescribed. Initially called *Mus gouldii* when named by George Waterhouse in 1837, it was later renamed *Pseudomys gouldii*. Unfortunately, it is now extinct. Darwin and Covington between them also captured ninety-seven different insect species representing five orders in the environs of Sydney. Forty-two were previously unknown. Included among these new species were a leaf beetle (*Idiocephala darwini*), a seed bug (*Ontiscus darwini*), a gasteruptiid wasp (*Foenus darwini*) and a bee (*Halictus darwiniellus*) that were each named after Darwin. The remaining novel insects comprised six leaf beetles (Chrysomelidae), four stink bugs (Pentatomidae), a seed bug (Lygaeidae), an assassin bug (Reduviidae), a water boatman (Corixidae), a leafhopper (Cicadellidae), a cicada (Cicadidae), a flatid planthopper (Flatidae), a froghopper or spittlebug (Cercopidae), three parasitic wasps (Chalcididae), an encyrtid (Encyrtidae), five eucaritids (Eucharitidae), a eulophid (Eulophidae), four seed chalcids (Eurytomidae), five Lamprotatidae, and one torymid (Torymidae).

**Hobart.** Here Darwin observed at close quarters a blotched blue-tongued lizard, *Tiliqua nigrolutea*, and what turned out to be a venomous snake, either a tiger snake (*Notechis ater*) or a copperhead (*Austrelaps superba*), which he thought was harmless.

What would have happened to the history of biological science if the young Charles Darwin had died of a snake bite in Hobart in 1836?

Also collected were shells, including rock barnacles, mesodesma (a bivalve), a whelk, an amber shell, and some bulimoid land shells, periwinkles, top shells, and air breathers. He also collected some free-living flatworms or planaria (later named *Planaria tasmaniana*) which he kept alive on the *Beagle* for the next eight weeks, collecting information on their reaction to light and their amazing regenerative powers. Among the Hobart collection, there were also at least 119 species of insects, 63 of which were previously unknown. Included among these new species were dung beetles, leaf beetles, ladybird beetles, weevils, ptinid beetles and parasitic wasps, together with a new water scavenger beetle, a new spider beetle and a new bee. Of particular interest was one species of dung beetle that had adapted from kangaroo dung to cattle dung in only 33 years.

**King George Sound.** One of the most important finds in the environs of Albany was another previously unknown species of native Australian rodent: the bush rat, *Rattus fuscipes*. This animal is unusual in that it is not a marsupial, but it is a native of Australia. The species inhabits a narrow coastal strip in the south-western corner of Western Australia and much of the eastern seaboard of Australia. Another interesting find was a southern frog, *Crinia georgiana*. Ten species of fish were collected, two of which were new to science: the Longhead Flathead (*Leviprora inops*), and the Common Jack Mackerel (*Trachurus declivis*). Also collected were an air-breathing limpet, a nerite, a littorinid, a periwinkle, a physa from a freshwater lake (Lake Seppings), several bulimoid land snails including two species from Bald Head, and some barnacles. The insect haul comprised at least sixty-six species, including forty-eight that were previously unknown. Six of the new species were subsequently named after their discoverer: two planthoppers (*Haplodelphax darwini* and *Alleloplasis darwini*), a predaceous diving beetle (*Hydroporus darwini*), a small-headed fly (*Ogcodes darwini*; later renamed *Ogcodes basalis*), a seed bug (*Ontiscus darwini*) and a parasitic wasp (*Anipo darwini*; later renamed *Ipoella darwini*).

## CONCLUSION

There was no Eureka moment during Darwin's visit to Australia. Instead, what he saw in Australia, and his subsequent continual gathering of information from Australia, contributed to the wealth of evidence he assembled from around the world showing that (a) species have evolved and (b) evolution can be explained by a combination of natural selection, correlated responses to selection, and chance events, all operating on the vast store of heritable variation that exists in nature.

## ACKNOWLEDGMENTS

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