

# Book review

Edited by D. Jones

## THE BEAK OF THE FINCH: A Story of Evolution in Our Time by Jonathan Weiner

1995. Vintage, London. Pp. 332 + x, many line drawings, 1 diagram, 200 x 130 mm. \$19.95.

Thirteen species of finch live in the Galápagos Islands. Charles Darwin discovered the birds in 1835 during the voyage of the *Beagle*. Contrary to legend, at first Darwin did not think the finches were very important. He did not even think they were all finches but that some species were blackbirds, wrens and warblers. Subsequently John Gould examined Darwin's bird skins in London. He announced that he was particularly excited about 'a series of *Ground Finches*, so peculiar in form that he was reduced to regard them as constituting an entirely new group containing 14 species.' Much later, Darwin wrote 'It was evident that such facts as these could be explained on the supposition that species gradually become modified, and the subject haunted me.' In 1859 Darwin published his theory in *The Origin of Species*, and biology was transformed for ever.

Darwin marshalled an enormous mass of evidence to show that evolution by natural selection must have happened. Yet he never saw it happen, in the Galápagos or anywhere else. The theory still lacked proof when the *Origin of Species* was reprinted in 1964, more than 100 years after its original publication. This reprinting focused attention on the lack of observations or experiments that have been carried out on evolution in wild populations.

Today, more and more evolutionists are doing what Darwin thought impossible. Among the leaders in this field are Rosemary and Peter Grant from Princeton University. Jonathan Weiner's book tells the story of how the Grants have returned year after year to that most celebrated place in the study of evolution: the Galápagos. There they have studied Darwin's finches, the birds whose beaks inspired the first veiled hints of his theory. The Grants and their Finch Unit have caught, banded, watched and measured the finches, and they now understand the changes that are still shaping these icons of evolutionary research.

The Grants began their study in the Galápagos in 1973. They and their two daughters, Nicola and Thalia, aged eight and six, Australian graduate student Ian Abbott and his wife Lynette planned to stay on the islands for a single season. Their tools were simple: mistnets, box traps, numbered leg bands and colour bands, cal-

ipers and rulers, spring balance, binoculars, stop watch, notebook and pen.

The team members caught every finch they could, banded and colour-banded them, measured and weighed them. They also measured finch behaviour, to find that the finches were concentrating on about two dozen different sorts of seeds. They measured each type of seed and its hardness, then combined these into a sort of Struggle Index.

By the end of their first stay on the islands, the members of the Finch Unit thought they knew what the finches were eating and the size and shape of the beaks that the finches were eating them with. And most of the ground finches were eating the same seeds and fruit. This seemed to argue *against* Darwin's theory. Finches with long thin beaks and short fat parrot-beaks were eating identical foods. If different tools can do the same work, what is the point of small differences in size?

Before Peter Grant left the islands, the director of the Charles Darwin Research Station reminded him that the Grant team, like Darwin, had been there in the wet season. Yet the dry season might be the time to watch nature squeeze Darwin's finches.

The Grants came back a few months later. There had been four months of no rain. They recaptured many of the birds they had caught on their first trip. The finches had lost weight and the watchers could see why: the volume of finch food was down by 84% and only about half of their favourite kinds of food was left. In the wet season most of the seeds on the ground had been small and soft, averaging 0.5 on the Struggle Index. By the dry season the remaining seeds were big and tough, and the average was higher than 6.

*Geospiza magnirostris* has the biggest beak and the most powerful jaw muscles of any of the finches. It was now concentrating on the big, heavy seeds that almost none of the other finches could crack. Cactus finches were now taking advantage of their long, thin beaks and dining almost exclusively on cactus seeds. It was the same with all the ground finches. Now that they were reduced to tough foods, the birds' tool-kit beaks were determining what the birds ate.

In 1977 the worst drought in living memory hit the Galápagos. As the island of Daphne Major dried up the total mass of seeds went steadily down. The average size of the remaining seeds went steadily up. The total number of medium ground finches, *G. fortis*, fell with the food supply, from 1200 in March 1976 to 180 in December 1977. The birds that survived were the big bodied birds with the largest beaks. The average beak size

of *fortis* survivors was 0.5 mm greater than for birds before the drought. This variation had made the difference between life and death and the watchers had seen natural selection in action. It may have been the most intense episode of natural selection ever documented.

In January 1978 the drought broke. The surviving birds bred like crazy and the team watched and measured. They saw the increased body size of the survivors passed on to the next generation. The average *fortis* beak size in the new generation was 4-5% greater than that of the generation before the drought.

Darwin's process is in action among the Galápagos finches. Natural selection can lead to evolution in their flocks more swiftly than Darwin supposed possible. The finch watchers had to return to find out what would happen next.

It is a fascinating and inspiring tale. Weiner's success in interweaving historical fact, hard scientific detail and humorous anecdote into a story that reads like a good novel won him the 1995 Pulitzer Prize. He conveys the excitement and the drudgery of fieldwork. He describes how the painstaking analysis of myriads of measurements can lead to new insights into how the

world works. He succeeds in interweaving the thoughts of Darwin, now more than a century old, with insights from recent experiments and the latest technology to throw a new light on the story of evolution in our time.

The book is attractively illustrated by drawings from the works of Charles Darwin, and from the sketchbooks of Thalia Grant. It contains a single chart of the family tree of Darwin's finches but no other graphs or diagrams are used and this appears to be a deliberate choice. Weiner relies on words to convey ideas and he does it supremely well. I predict that this book will become a classic. At this price it is also a bargain.

## References

- Darwin, Charles R. 1964 (1859). *On the Origin of Species*. Ed. Ernst Mayr. Facsimile of 1st ed. Harvard University Press, Cambridge, Mass.

Belinda Dettmann  
Australian Bird and Bat Banding Scheme  
PO Box 8, Canberra, ACT 2601