

## BOOKS &amp; ARTS

## Bonds forged on the high seas

Shared experiences on global voyages linked Darwin and his fellow naturalists, explains **Alistair Sponsel**.

**Darwin's Armada: Four Voyages and the Battle for the Theory of Evolution**

by Iain McCalman

W. W. Norton/Simon & Schuster: 2009.  
432 pp. \$29.95/£20

Iain McCalman takes an unconventional tack among historians commemorating Charles Darwin's anniversary year. His aim is to show that the triumph of Darwinism in scientific and public debate following the publication of *On the Origin of Species* in 1859 was the result of a collective effort by a handful of career scientists from relatively unprivileged backgrounds. The bond between Darwin and the most important of these lieutenants — Joseph Hooker, Thomas Henry Huxley and Alfred Russel Wallace — was founded on their similar experiences as, in Darwin's words, "co-circumwanderers" of the southern oceans.

A cultural historian rather than a specialist in the history of science, McCalman is aware that the decision to take a long voyage was a conventional scientific career move in the early- and mid-nineteenth century. Finding passage to a remote portion of the globe was one of the few options available to young men of limited means who wished to devote their lives to the study of nature. Whereas the well-connected Darwin was offered a place on the *Beagle* unsolicited, the more common avenue for aspiring naturalists was to train as a physician and then to scrap for an appointment as a medical officer to a naval expedition.

It was in this manner that the 22-year-old Hooker joined James Clark Ross's Antarctic expedition as the surgeon's mate in 1839. Seven years later an equally callow Huxley embarked for a survey of the Great Barrier Reef as assistant surgeon on Captain Owen Stanley's *Rattlesnake*. These two at least had steady jobs and official dispensations to collect and study the plants and animals they found during their voyages. Wallace had to pursue science as an independent prospector, travelling to little-studied parts of Brazil and the Malay archipelago in search of desirable specimens that he could sell to collectors.

The years of sea-sickness, danger and tropical disease served all four men as an investment. As the unproven Hooker wrote when he was lobbying Captain Ross for a place on



J. W. CARMICHAEL/NATIONAL MARITIME MUSEUM

**Dangerous research:** Hooker's vessel *HMS Erebus* and its sister ship *HMS Terror* in the Antarctic.

the *Erebus*, just three years after the *Beagle* had returned Darwin to Britain, "what was Mr. D[arwin] before he went out? He, I daresay, knew his subject better than I do now, but did the world know him? The voyage with FitzRoy was the making of him."

This book's claim to novelty, and its main virtue, lies in McCalman's decision to juxtapose the periods in each of the protagonists' lives when they were travelling. Individually, Darwin, Hooker, Huxley and Wallace are already the best-studied anglophone naturalists of the nineteenth century. McCalman breaks no new ground in his research, relying on their published travel narratives and memoirs and on recent biographies, particularly those by Janet Browne, Jim Endersby, Adrian Desmond, James Moore and Ross Slotten. But by holding events in England at arm's length, McCalman forces us to notice the similarities of the men's intellectual and emotional experiences as well as of their physical privations. He thus sheds light on the depth of their mutual sympathies in later years.

McCalman brings the four voyagers' stories together in 1858 when Wallace, who was still in the field at Ternate in the Moluccan Islands (now part of Indonesia), sent Darwin a manuscript articulating a concept very similar to Darwin's as yet unpublished theory of evolu-

tion by natural selection. He dwells on Darwin's distressed reaction to this letter, and the quick decision by Hooker and the geologist Charles Lyell to have it read in Wallace's name at the Linnean Society alongside unpublished extracts that proved Darwin's priority. McCalman concludes that this move, though it was "dodgy", helped to bring attention to Wallace's work and provided him with credibility as a theorist and not a mere professional collector. This view of Wallace's rise in prestige feeds into the argument of the book's closing chapters.

To this point, McCalman has relied on the ready metaphor of the individual voyage to describe the personal development of each protagonist. Now he uses the image of a naval fleet to portray how Darwin's three junior colleagues coordinated efforts to support "their admiral's" reputation against enemies inside and outside the scientific community. McCalman wants us to see that their work on behalf of evolutionary theory was part of a larger campaign — by Huxley, Hooker and others such as the physicist John Tyndall — to wrest control of science from the traditional elite. They wanted to put scientific institutions into the hands of middle-class, secular-leaning professionals like themselves and in turn to increase the power of these institutions in Victorian society.

Getting a clear picture of how this post-1859 "battle for the theory of evolution" was fought



**Darwin200**

and won would require attention to many factors. But McCalman is less concerned with how the battle was waged than with why the participants on Darwin's side felt so strongly about their cause, and this is where he draws connections to the voyages to which he has devoted the bulk of the book.

On the intellectual level, each naturalist had his faith in the doctrine of special creation unsettled during his travels by the experience of seeing organisms in unexpected geographical distributions. Then there was the psychological link among those who had earned their knowledge through the alternating peril and drudgery of a long sea voyage. "We have had

a masonic bond," Huxley wrote to Hooker in 1888, "in both being well salted in early life." Finally, McCalman's book seems to suggest, we should view the decision of a young Hooker, Huxley or Wallace to undertake such a difficult voyage as the most telling symptom, not the cause, of his enduring devotion to science. ■

**Alistair Sponel** is a senior research assistant at the Darwin Correspondence Project, University of Cambridge, UK, and a postdoc in the Department of the History of Science at Harvard University, Cambridge, Massachusetts, USA.

See [www.nature.com/darwin/index.html](http://www.nature.com/darwin/index.html) for more on Darwin.

These reveal strange, recently discovered species such as the yeti crab, so named for its hairy legs and claws. The text, however, gets bogged down in lengthy and repetitive descriptions of the technologies used to conduct the studies, including tagging techniques and underwater exploration vehicles. Readers may be tempted to skip ahead, wanting to learn what has been found before reading how it was discovered.

Predicting what will live in future oceans is a challenge. Census studies suggest that the loss of exploited fish is coupled to wider shifts in the ecosystem balance, causing problems that will be exacerbated if current fisheries trends persist. Depleted shark populations in the northwest Atlantic, for instance, have led to an overabundance of the cownose ray, a key shark prey that, in turn, wiped out a scallop fishery. On a more positive note, a study based on a review of practices in Norway suggests that Maine lobster fishermen could reduce both the

number of traps they use and the length of their fishing season without reducing catch size. This would substantially decrease the number of critically endangered right whales in the North Atlantic killed by entanglement in lobster-fishing gear.

Fittingly, *World Ocean Census* begins and ends with spectacular photos of jellyfish, which are supremely suited to exploiting the niches created by overfishing. How humans respond to the trends revealed by the census will largely determine whether this 'jellification' of the ocean will continue, or if crippled marine populations may have a chance to recover. ■

**Mark Schroepe** is a writer based in Florida, USA. e-mail: [mark@markschroepe.com](mailto:mark@markschroepe.com)

See [www.nature.com/darwin/index.html](http://www.nature.com/darwin/index.html) for the whole biodiversity special.

## Log of life beneath the waves

### World Ocean Census: A Global Survey of Marine Life

by Darlene Trew Crist, Gail Scowcroft and James M. Harding Jr

Firefly Books: 2009. 256 pp. \$40, £30

Begun in 2000, the first global marine census is due to be completed next year. In anticipation of the official release of these results, a beautifully illustrated book highlights the findings to date of this massive project. *World Ocean Census* also hints at the studies that might stem from the millions of samples collected.

The Census of Marine Life aims to catalogue the oceans' inhabitants now, place them in a historic context and project what might be found in the oceans of the future. As of 2008, it involved some 2,000 scientists from 82 nations, and had US\$500 million of funding. A bold undertaking, it marks a "Herculean decade of exploration", explains oceanographer Sylvia Earle in her foreword to the book.

Science writer Darlene Trew Crist and educators James Harding and Gail Scowcroft emphasize that marine science is in an age of discovery. When the census started, only 250,000 species were known out of the millions estimated to live in the ocean. Researchers expect to find many thousands more, but will undoubtedly fall short of a complete accounting, given the size of the task. Just three recent expeditions to the Southern Ocean yielded some 700 likely new species, and one litre of seawater alone can host 20,000 different microbes.

Like the census, the book is organized by oceans past, present and future. Information dating back 500 years or more is gleaned from old whaling logs, scientific expedition records and even old restaurant menus that provide

snapshots of species exploitation. Although not always rigorously quantitative, such records can offer a baseline for conservation targets. Past levels of some exploited fish, such as cod, were surprisingly high. "It is virtually impossible to imagine

how much the oceans of the past teemed with life," census researchers have remarked.

Life nevertheless flourishes in today's oceans. The book is at its best when it offers glimpses of the astonishing array of sea creatures revealed by the survey, such as the deepest comb jellyfish ever recorded — found at 7,000 metres — which uses long filaments to anchor itself to the seafloor like a kite. Special sections tell of the widespread loss of bluefin-tuna stocks, the surprisingly long distances travelled by great white sharks and efforts to protect coral reefs.

The book is full of high-quality photographs.



Biodiversity



Recent discovery: *Kiwa hirsuta*, named after the goddess of shellfish, is better known as the yeti crab.

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