

end result was that Loncarevic asked the young Wadhams to take part in the *Hudson-70* expedition. It seemed that no one wanted to stay aboard for the entire trip, around both of the American continents, and Loncarevic needed a junior person aboard to keep records and make sure there was some continuity in measurements. Should he accept the post, Wadhams would be forced to endure the voyage the whole route, as it travelled the oceans and visited Rio de Janeiro, Buenos Aires, Antarctica, Tahiti, and other locales that others might spend their whole lives only dreaming about. The result was not only a scientifically interesting voyage, but also it was the start of a strong scientific career for Wadhams, and an eye-opening personal journey.

Those interested in the history of oceanography should approach this account with caution. It is organised logically, following the route of the ship itself, and its chapter titles helpfully call to mind the location in question. But this is where the logical coherence ends. Although Wadhams is full of humour, and his tale is often colourful, there is not much binding the narrative together. The title, *The great ocean of truth*, has little bearing on the expedition itself, but is a reference to a quote from Isaac Newton, who had written that 'the great ocean of truth lay all undiscovered before me.' Wadhams does not dwell on particular scientific questions, or on any particular issues at all. Most of the book is a highly detailed account of the comings and goings of young Wadhams, with fleeting reference to the scientific work being done by others on board. Although readers will learn a little about echo sounders and the importance of the Antarctic Convergence, they will have to find these nuggets hidden in passages that describe anything and everything, whether it is going to a bank to exchange money or visiting a house of ill repute with the lads. It is obvious that Wadhams either has a memory like a steel trap, or he kept an extraordinarily detailed diary. Despite the benefit of some critical distance, his descriptions of the people he met are very much from the perspective of an impressionable young man.

Perhaps understandably, the early chapters tend to be heavy on descriptions of tourist attractions and local people, particularly in the quest for female companionship, as the expedition traveled in South America and stopped in Brazil, Argentina, Chile, and Peru. But also we have Wadhams providing fascinating descriptions of the Chilean fjords, and the strange oceanographic phenomena that accompany them. To one who knows nothing of fjords (including this reviewer), it is useful to encounter the weird sloshing of water through the eyes of young Wadhams, and to experience their puzzling dynamics vicariously. It is equally helpful to have them explained by the mature Wadhams.

Since the great expanse between Peru and Vancouver was interrupted only by a brief interlude in Tahiti, Wadhams devotes more attention here to the scientific work. At first they headed southwest to reach once again the cold and turbulent Antarctic. The crew hauled out the magnetometer, gravimeters, and expendable bathythermographs, and put the echo sounder into full use again. The gravimeters would help scientists, led

by William von Arx, to discern a somewhat clearer picture of the shape of the earth itself in the Pacific. Of all the scientists who worked on *Hudson*, Wadhams writes, Von Arx 'alone possessed all the characteristics of nobility,' and appreciated to his shipmates as one who had an extraordinary breadth of knowledge in science and culture (page 241). His work was in part designed to help calibrate a new mode of earth observation: satellite oceanography. This was in the era when dreams of a devoted oceanographic satellite overstepped the reality. Seasat, which was to draw from *Hudson's* work, was delayed until 1978, and even then it failed a few months after launch. The *Hudson's* gravimetric work would not really become crucial for satellite oceanography until the 1990s. But the *Hudson* made other notable measurements with the echo sounder: in an area previously thought to be fairly uniform, it measured a mountain (Hudson Peak) and a trough (Hudson Deep).

In a chapter called 'A geophysical interlude,' Wadhams provides more of a taste of the scientific import of the voyage. By 1970 the theory of plate tectonics, having passed from its previous incarnations of continental drift and seafloor spreading, had only recently been proposed in a comprehensive way, as a system of crustal blocks interacting on the surface of a sphere. Three of these blocks, or plates, joined together off the west coast of Canada (Juan de Fuca, American, and Pacific plates), making it a particularly interesting site for taking measurement of gravity, magnetism, seismic refraction and reflection, and heat flow. The seismic work helped to determine how the crust moved in relation to the mantle below. The heat flow measurements were abnormally high, and several years later scientists determined that the *Hudson* must have been moving over some active hydrothermal vents.

The voyage turned out wonderfully for Wadhams. Aside from tasting life at sea, he got to know von Arx a little, and learned to appreciate wide-ranging ideas, rather than what Wadhams considers the narrow specialisations of today's oceanographers. Wadhams sees the *Hudson-70* expedition as the last of the great oceanographic voyages, part of a dead tradition that began with the *Challenger* in 1872. That may be, though Wadhams was probably one of a select view who saw it that way, since he was there for the duration. Scientists were able to fly in and climb aboard for discrete legs of the voyage.

As a memoir, *The great ocean of truth* is a fun jaunt through the past, and it helps to put human faces on the story of a scientific cruise. As history, its contextualisation is understandably anecdotal. Some may find it jarring to read Wadhams conflating Alfred Wegener's 1910s theory of continental drift with the 1960s ideas of seafloor spreading, which have very different conceptual bases. As a record of the voyage itself, it succeeds admirably in taking in some of the science, and some snapshots of the western hemisphere's ports-of-call, seen from the perspective of a ship full of men doing science and having the time of their lives. (Jacob Darwin Hamblin, Oregon State University, Department of History, 306 Milam Hall, Corvallis, OR 97331-5104, USA)

INNOCENTS IN THE DRY VALLEYS: AN ACCOUNT OF THE VICTORIA UNIVERSITY OF WELLINGTON ANTARCTIC EXPEDITION, 1958–1959. Colin Bull. 2009. Wellington: Victoria University Press. 267 p, illustrated, soft cover. ISBN 978-0-86473-594-2. NZ\$50.

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The dry valleys of Victoria Land are one of the best known and strangest places in Antarctica. They were discovered, but not explored, by the *Discovery* expedition in 1903. Although surrounded by glaciers, the valleys have remained ice free for

thousands of years. In Wright Valley, the central of the three valleys, the longest river in Antarctica, the Onyx, flows inland to Lake Vanda. The lake reaches temperatures of 25°C, despite being ice covered. The only vegetation is algae and lichens, including endolithic species, and bizarre mummified seals, some hundreds of years old, lie kilometres inland. The geology is unusual and complex, and the valleys are the nearest place on Earth to conditions found on Mars. From the late 1960s the dry valleys have been the subject of a huge amount of scientific research. This was not the case in the summer of 1958–1959.

In that year, Colin Bull, a lecturer in physics, and three companions, Peter Webb and Barrie McKelvey, both 3rd year geology students, and Dick Barwick, a biology lecturer, mounted a two month expedition to Wright Valley, then unnamed and unvisited. It was an adventure with plenty of geographical and scientific research, a lot of hard going and hard work in harsh conditions and plenty of fun. This was at a time when it was still possible to go to Antarctica and easily carry out fruitful research on a shoestring. It could not happen nowadays.

Bull had participated in the Birmingham University Expedition to Spitsbergen in 1951 and then the British North Greenland Expedition, 1952–1954. He was invited to join the Commonwealth Trans-Antarctic Expedition but had just become engaged. So he went to New Zealand as a senior physics lecturer at Victoria University of Wellington. While listening to Webb and McKelvey talking about their recent visit to Antarctica, he realised that it might be possible to make a short visit himself. He had seen aerial photos of the dry valleys and chose the unnamed valley as his venue. Barwick, who had also worked in Antarctica, completed the team. They enlisted the enthusiastic support of Bob Clark, the Professor of Geology, and set about raising funds and gathering equipment. A novel approach was to place £1 from the Lord Mayor's donation on a horse in the Derby. It won at 40 to 1. And an anorak, a veteran of the Trans-Antarctic Expedition, was retrieved from the rubbish dump at Scott Base and made serviceable. The expedition cost less than \$1000 but this is somewhat misleading. Travel to McMurdo Sound and flights out to the Wright Valley were free of charge.

After two weeks at McMurdo and Scott bases, the four men were deposited in the Wright Valley. They spent 52 days exploring this valley. Their main base was close to Lake Vanda (named after one of Bull's Greenland dogs to alliterate with nearby Lakes Vida and Vashka named after two of Scott's dogs) and they traversed Bull Pass to reach the McKelvey and Barwick Valleys to reveal some of the secrets of this amazing place. It was hard work, climbing mountains to survey the surrounding country, carrying or dragging huge loads of equipment over difficult terrain and suffering drift sand.

Surveying was a major part of the programme, together with geology and biology. The geology proved complicated and hard to interpret. The biology was limited, thieving skuas and some obscure and virtually microscopic life forms. *Innocents in the dry valleys* is an account of the expedition rather than a description of the field programmes and the results they obtained. That the programmes were successful is shown by the list of 17 scientific papers derived from the seven week, four man expedition. From this expedition sprang a series of 50 annual expeditions from Victoria University of Wellington and the dry valleys are now the most intensively studied area of the Antarctic continent, with over 2000 scientific papers published.

I would have liked to have seen a summary of the expedition's scientific results followed by a brief *resumé* of 50 years' subsequent research in the valleys to put their pioneering efforts into perspective, although Bull considered this to be impracticable. However, he mentions finding fossils of the mollusc *Pecten* (scallop) far inland. The team were divided on their origin but we do not hear the definitive conclusion. Barwick, the biologist, was interested in the mummified crabeater seals (together with a few Weddell seals and some Adélie penguins) also found many kilometres inland. What were they doing there? 'Odd bit of weathering', thought Bull, tossing away a piece of sandstone with a dark line, thereby missing 'yet another important discovery'. A decade later this was found to be caused by endolithic bacteria. They narrowly missed taking the bottom temperature of ice-covered Lake Vanda, discovered a year or so later to be so amazingly hot.

Before Bull's visit nearly every expedition to Antarctica had been a national expedition, like Scott's or a large private expedition, like Shackleton's. The Kohl-Larsen and Carse expeditions to South Georgia are more like Bull's, especially in the way that they were able to overcome the major problem of reaching their destinations by cadding lifts.

Bull dedicates the book to his 'uncomplaining, contubernial accomplices'. A note helpfully explains that 'contubernial' means sharing the same tent. Although now retired, he has written the book with the same enthusiasm and humour that made the expedition such a success. It reminds me of Thomas Bagshawe's *Two men in the Antarctic*, in which two young men mitigate the rigours of life in unpleasant conditions through their sense of humour. It harks back to a time when working in Antarctica could still be an adventure and the simplest observations could reveal something new to science.

All in all, *Innocents in the dry valleys* is a very enjoyable 'read' and makes a change from accounts of yet another ski jaunt to the South Pole. It is enhanced by maps, a glossary, an explanation of place-names and a detailed index. (Robert Burton, 63 Common Lane, Hemingford Abbots, Huntingdon PE28 9AW.)

WHALES' BONES OF GERMANY, AUSTRIA, CZECH REPUBLIC AND SWITZERLAND. Nicholas Redman. 2009. Teddington: Redman Publishing. 205 p. illustrated, hard cover. ISBN 978-095458002-5. Available only from the author. Enquiries to nick.redman@hotmail.com. £35.
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This is the second volume of a series which will eventually cover the whole of Europe as well as the USA and Australasia

and maintains the high standard of the author's *Whales' bones of the British Isles* (Redman 2004) as regards both the depth of research and quality of production.

The documentation of whale remains in Germany extends so much further back in time than anywhere else and the earliest reference revealed by the author concerns whale bones hung from the fortifications of the Baltic port of Lubeck in 1336. Then in 1365, following the stranding of a whale at Damerow (island of Usedom), the Duke of Pomerania sent the jaws and some of the ribs to be hung in churches at Wittenberg., Brandenburg, Stralsund and Stettin, an act which emphasises