several issues, including the importance of reliable historical data on the populations in the affected region, and the observation that neither sea lions nor whales made attempts to avoid oiled areas, but that it was difficult to assess whether subsequent population declines could definitely be attributed to the spill.

The next ten chapters present data collected from observation and analysis of affected animals. Subjects range from behavioural studies — such as foraging strategies and prey-composition in sea otters and the impact of increased noise levels on killer whales — to the pathologies that developed as a result of oil contact. Information is also provided on the mechanisms by which sea mammals become oil-fouled, and on the rehabilitation criteria that were developed for reintroducing animals to the wild.

Throughout *Marine mammals and the Exxon Valdez*, the contributors convey a sense that, even after the extensive research and assessment that took place, the precise impact of the spill will never be known. Although the bodies of 1011 sea otters, 19 harbour seals, 12 Steller sea lions, and 37 cetaceans were recovered, it could not be determined what percentage of the death toll these animals represented. It was also difficult to assess whether some animals had actually been victims of the spill. In addition, harbour seal and Steller sea-lion populations in Prince William Sound were declining before the spill, making estimates even more difficult. However, while Frost and others (Chapter 6) estimated the total loss of harbour seals from seven haul-out sites to be 302 animals — a significant loss from an already dwindling population — Calkins and others (Chapter 7) suggest that the sea-lion population escaped any significant impacts.

Perhaps more significant than the reports of the impacts on specific populations are the findings of the pathology analyses, which provide a better understanding of the toxic effects of oil on sea-mammal tissues. For example, it was found that sea otters are vulnerable to death by inhaling fumes from evaporating oil, as well as from hypothermia when oil damages the insulating qualities of the fur. Behavioural changes in harbour seals — lethargy and a reluctance to swim away when approached — were found to relate to degenerative lesions in the brain (Chapter 17). At the same time, although understanding of some aspects of marine-mammal biology has taken great steps forward, many chapters underline the paucity of information about these animals, and stress the need for further research.

*Marine mammals and the Exxon Valdez* will prove to be an important book, not only for state and federal agencies developing contingency plans for the next oil spill, but for researchers interested in marine-mammal biology and populations. There are plentiful tables presenting original data, clear charts, and maps showing sightings and distributions. It is occasionally difficult to interpret the black-and-white photographs, but this is a minor complaint, and not one that detracts from the value of the text. In short, Loughlin's edited volume is a significant contribution to sea-mammal studies, and will be an invaluable source of information for specialists faced with containing or reducing oil-spill damage in the future. (E. Cruwys, Department of Zoology, University of Cambridge, New Museums Site, Cambridge CB2 1EJ.)

**THE ROSS OROGEN OF THE TRANSANTARCTIC MOUNTAINS.** Edmund Stump. 1995. Cambridge: Cambridge University Press. xv + 284 p, illustrated, hard cover. ISBN 0-521-43314-2. £60.00; US$99.95.

There have been a number of books written about the geology of Antarctica, most of them being proceedings volumes of symposia, or, in one case, a collection of chapters by specialists on various aspects of the geology of the continent. With a few exceptions, there are no volumes written by a single individual about the geology of the entire continent, an overview as it were. Most attempts at doing so have been the products of field geologists who have worked there, and have relied on multitudes of references by others to tie them together. A number of these syntheses have appeared as chapters in books or comprehensive articles in journals. As the evolution of geologic information from Antarctica has progessed, more has become known about a continent covered almost completely with ice (probably more than 99%). Thus, the availability of outcrops is rather sparse, and field geology introduces genuine challenges toward deciphering correlations between outcrops, to say nothing about simple survival in the field.

Here, in one book, is the result of numerous austral summer seasons in Antarctica by a leading geologist, one who paid his dues in the field, working in many parts of the Transantarctic Mountains in order to resolve the time period in the rocks when the 'basement' of the East Antarctic Shield experienced a major orogeny. It is thought now that this continental margin 'was created by the rifting and subsequent drift of Laurentia from Gondwanaland.' This revolutionary concept could not have come about without the adoption of plate tectonics theory, nor detailed field studies since the 1960s. This 'Ross orogen' commenced in the Neoproterozoic with passive margin sedimentation and progressed through a series of tectonic events that culminated in the Ross orogeny about 500 million years ago. Alex du Toit, the South African geologist who predicted the importance of Antarctica in the jigsaw fit of Gondwanaland when he published his book *Our wandering continents* in 1937, would be ecstatic with the fit of the Transantarctic Mountains into this regional pattern. In the 1930s there was very little known of the geology of Antarctica, and close to nothing about the interior.

Ed Stump has done a remarkable job of putting all this together into a coherent analysis of the Pacific margin of the shield. His work in Antarctica began 25 years ago, when he was a graduate student at Ohio State University, and in later summers as a leader of his own field projects. He is presently at Arizona State University.

The Transantarctic Mountains literally span the entire continent, for about 3500 km, from the Pacific margin to the Atlantic. Peaks rise to more than 4000 m, not necessarily high by comparison to other major mountain systems on Earth, but imposing when viewed from sea level. They are the boundary between what is known as East and West Antarctica, East being mainly in east longitudes and West in west longitudes. Geologically, East Antarctica is composed mainly of a Precambrian shield area, with overlying sedimentary and other rocks. The vast East Antarctic ice sheet covers it to as much as nearly 4800 m thickness, and most of its bedrock lies above sea level. The Transantarctic Mountains also form the boundary between the East and West Antarctic ice sheets along much of their length, except for a section between the Horlick Mountains and the Patuxent Range, where the two ice sheets are joined. Elsewhere, the Transantarctic Mountains form a barrier, as it were, of the East Antarctic ice sheet, allowing drainage through glacial valleys that exit into the Ross Ice Shelf or the Ross Sea north of 78°. One of the more famous of these glaciers (or 'ice steams') is the Beardmore, discovered by Ernest Shackleton in his 1907–1909 expedition and found to be the route from the Ross Ice Shelf to the polar plateau and on to the geographic South Pole. Although Shackleton did not quite reach the South Pole, he showed the way for Robert Falcon Scott's successful attempt. Collection of geological specimens on Scott's expedition is also part of the background information given here.

These bits of exploration history provide the background for each of six chapters in the book, in which regional areas are discussed geologically. A short introductory chapter precedes them. They correspond to the four areas in which the author has conducted fieldwork (northern Victoria Land, southern Victoria Land, central Transantarctic Mountains, and Queen Maud and Horlick mountains), plus the only two areas that he has not visited — Thiel Mountains and Pensacola Mountains. Captain James Clark Ross was the first to see any part of the Transantarctic Mountains, in January 1840, when he sailed into the Ross Sea and made landfall on offshore islands. Ross sailed about as far south as a ship can go in the world, McMurdo Sound, and discovered Ross Island with its smoking volcano, Mount Erebus, and the Ross Ice Shelf and its barrier (a 'barrier' to further progress south). Rocks were collected and eventually described in publications. It is this kind of exploration history that adds greatly to the geologic descriptions that follow in each chapter. A review of the 26-page bibliography includes these historical references, plus the majority that signify the importance of the period beginning with the International Geophysical Year of 1957–1958 and the following decades. The final chapter is a synthesis of the Ross orogen itself. The book ends with a helpful index.

The Transantarctic Mountains can be best described as a rift shoulder whose boundary follows the front of the range along the Ross embayment. As indicated by fission-track analysis, the main phase of uplift of the range began around 50 Ma, but there are earlier indications at about 80 and 110 Ma. The present-day elongation of the range is parallel to structural features in its basement formed about half a billion years earlier. This basement is the Ross orogen. Its temporal and spatial boundary is a Mid-Paleozoic erosion surface, called by some authors the Kukri peneplain, that is overlain by the Beacon Supergroup. The latter contains rocks of Devonian to Triassic age, which include glacial deposits, coal beds with associated fossil plants, and fossil remains of reptiles. Discovery of these vertebrate bones in 1967, and large collections made in 1969, provided convincing evidence of the former land connections between Antarctica and other southern-hemisphere land masses in Gondwana time.

The book includes numerous maps and black-and-white photographs, aiding greatly in illustrating the geology and structure. The short 'Epilogue' consists of a parable about a monk and a traveller with a pebble that came from a place high up in the mountains where the ice never melts. It is worth reading and pondering about.

This book is of interest not only to geologists who have worked in Antarctica, but also has relevance to worldwide mountain systems by comparison. It would be valuable reading for graduate-level assignments, for example. I highly recommend the book, and commend the author for his efforts in providing a useful addition to the geology of Antarctica. (John Splettstoesser, 235 Camden Street #32, Rockland, Maine 04841, USA.)

**A WEALTH OF THOUGHT: FRANZ BOAS ON NATIVE AMERICAN ART.** Aldona Jonaitis (Editor). 1995. Seattle and London: University of Washington Press; Vancouver and Toronto: Douglas and McIntyre. xiv + 365 p, illustrated, soft cover. ISBN 0-295-97384-6.

An intellectual revolutionary, Franz Boas challenged the legacy of social evolutionism that had come to dominate anthropological theory in the late nineteenth and early twentieth centuries. His many writings on race and culture, for example, argued against what he saw as an implicit racism promoted by the kind of evolutionary theory that placed human societies along a historic continuum from 'primitive' to 'modern,' from 'lower' to 'higher.' In this collection of Boas' writings on native American art, Aldona Jonaitis argues for a reassessment of his work in light of contemporary debates about cultural representation of the 'Other.' As Jonaitis makes clear in her preface and introduction, Boas, while dealing with 'primitive art,' nonetheless refused to see it as a less than perfect or inferior form of 'high art,' stressing instead its egalitarian nature (including pointing out the importance of female artistic creativity) and demonstrating how it was embedded in other aspects of cultural life.

Jonaitis provides an excellent introduction to Boas' theories of 'primitive' art, setting their development against prevalent evolutionist approaches, and concludes the collection with a succinct and considered essay on the Boasian legacy for the study of the art of the northwest coast of America, arguing that Boas laid the foundations for every subsequent study and analysis. The value of this volume