

Towering infernos?

Jonathan Fink

Mountains of Fire: The Nature of Volcanoes. By Robert W. Decker and Barbara B. Decker. Cambridge University Press: 1991. Pp. 198. £30, \$39.95 (hbk); £10.95, \$15.95 (pbk).

VOLCANOES receive some of the world's worst publicity. Journalists and geologists focus on lurid details of each new disaster; the former to sell newspapers, the latter to attract funding for hazard assessments. Yet, as Robert and Barbara Decker convincingly point out, the study of volcanoes extends far beyond the tallying of deadly statistics. In this comprehensive and enjoyable book, we learn to view these dynamic "fire mountains" as instruments for bringing about climate change, mineral wealth, agricultural renewal and even biological evolution. At the same time, the dangers of eruptions are thoroughly documented and explained.

The past two decades have witnessed a blossoming of understanding about volcanic processes owing mainly to long-term monitoring of Kilauea and Mauna Loa in Hawaii, Mount St Helens in Washington State and Mount Etna in Italy. Other important advances have come from the study of spacecraft images of Mars, the outer planet satellites and Venus, as well as from observations of the mid-ocean ridges. The Deckers have been involved with many of these findings, he as scientist-in-charge at the United States Geological Survey's Hawaiian and Cascades Volcano Observatories, and she as the coauthor of numerous books and articles that covered these events. Their experience is reflected in the breadth and timeliness of the topics they deal with in this book.

The reader is drawn into each chapter by an eyewitness account of a significant eruption or volcanological discovery. These anecdotes include familiar descriptions of the destruction of Pompeii in AD 79 and the explosion of Mount St Helens in 1980. Less well known but equally exciting are the first glimpses of active volcanism on Jupiter's moon Io, as viewed by NASA scientists at the Jet Propulsion Laboratory in 1979, and the bizarre menagerie of creatures surrounding 'black smoker' hot springs on the East Pacific Rise, seen through the windows of a small research submarine in 1977. Vivid narrations also convey the tragic shortsightedness of politicians and bureaucrats, which greatly increased the fatalities associated with the two deadliest eruptions this century, those of

Mont Pelée in 1902 and Nevado del Ruiz in 1985.

A considerable challenge for any popular book about geology is to translate the spatial and temporal scales of the Earth's dimensions and history into the reader's frame of reference. The Deckers are uncommonly effective at using analogies to make these connections. Continents drift apart about as fast as fingernails grow, and the Washington Monument could fit easily inside the Mount St Helens lava dome. Every page is richly embellished by such images.

Simple maps, cartoons and cross-sectional diagrams help the authors to minimize technical jargon. Sixteen pages of colour plates strikingly portray many common eruption phenomena. Black-and-white photographs, liberally scattered throughout the book, are less consistent in quality. Many appear to have been made from colour slides, leading to low contrast and rather poor focus.

Shifting populations

John Brookfield

Molecular Genetic Ecology: In Focus. By A. Rus Hoelzel and Gabriel A. Dover. Oxford University Press: 1992. Pp. 100. £6.50, \$14.95 (pbk).

I HAD hoped that I would be able to recommend this book, not least because of the increasingly large community of ecologists who are starting to use molecular genetic techniques to investigate population structure. These workers require a short text that will tell them what they need to know about molecular and population genetics. But I do not think this book is adequate for their needs.

The areas dealt with include the structure of eukaryotic genomes and the techniques for their study. There is a summary of theories of molecular evolution, the statistical interpretation of genetic surveys and some examples of the uses of molecular techniques to study animal populations. The sections on molecular biology and the final glossary are quite good, although permeated by confusing references to molecular drive. The authors seem unclear about the extent to which they think inheritance of DNA is biased. They consistently warn that drive processes may be spreading sequences through populations, yet simultaneously advocate analytical approaches that implicitly assume that substitutions in evolution are neutral, such as the estimation of mutation rates from substitution rates.

The authors deal in some detail, considering the book's length, with evolu-

Nonetheless, the broad range of features that they show adds another important dimension to the text.

One of the ironies of volcanic research is that although our ability to predict eruptions continues to increase, the number of casualties does not appreciably decline. This is largely the result of growing populations around tropical volcanoes, drawn to soils enriched by the breakdown of ash and lavas. But many deaths, including nearly all of the 25,000 in Armero, Colombia, could have been avoided with simple precautions if civic leaders had grasped the dangers. *Mountains of Fire* will go a long way towards educating these people. It can also help those of us who hear about these disasters in the news to appreciate more fully their causes and consequences. □

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tionary theory and population genetics, and consider the statistical interpretation of molecular data. These sections are the weakest parts, and contain many errors. Two examples will suffice. In describing how one arrives at Nei's distance, D , the authors say that a "simple measure of genetic similarity (I) is multiplied by the natural logarithm (\ln) to give a parameter that is 0.0 for genotypes that are completely dissimilar." Later, after a description of the variances of heterozygosity between and within loci, they add the qualification "[these] variance measures are affected by . . . dominance. Dominance will tend to increase the variance, although the effect is small unless the frequency of recessive genes is very small." Reading passages like these, one inevitably wonders why the authors have chosen to write a book including subjects that they know so little about.

There is scope for a better book on this subject, one that will not only be more accurate but also pay more attention to the question of the statistical power of small samples. Large surveys on various animal populations using DNA markers frequently turn out to have disappointing and equivocal results, largely because they are carried out thoughtlessly by field workers who are not aware of the large sample sizes needed to establish general principles of population structure and behaviour. □

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■ Columbia University Press has published the second edition of *The Evolutionary Process: A Critical Study of Evolutionary Theory* by Verne Grant. For a review, see *Nature* 320, 317; 1986. Price \$60. The book now covers molecular evolution.

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