the quality of data before and after the 1980s.

The book is valuable as an entry point to a large and scattered literature, for identifying unsatisfactory — or missing — data from particular island settings and for conveying the same mixed sensations that assailed Darwin on St Jago, Cape Verde Islands: "The scene, as beheld through the hazy atmosphere of this climate, is one of great interest; if, indeed, a person, fresh from the sea, and who has just walked, for the first time, in a grove of cocoa-nut trees can be a judge of anything but his own happiness." □

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The San Andreas Fault, taken from the cover of *Earthquakes and Geological Discovery* by Bruce A. Bolt, a well-illustrated popular account of earthquake case histories and geophysical studies that gives a flavour of the broad scientific accomplishments of seismology. W. H. Freeman/Scientific American Library, $32.95, £19.95.

Astronomical histories

Desmond King-Hele

History of Astronomy and Cosmology. By John North. *Fontana (UK)/Norton (US): 1994. Pp. 697. $35 (hbk); £12.99, $18.95 (pbk).*

Early Astronomy. By Hugh Thurston. *Springer: 1994. Pp. 268. DM86, £34, $49.*

Planets, Stars and Orbs. By Edward Grant. *Cambridge University Press: 1994. Pp. 816. £45, $69.95.*

OF the making of books on the history of astronomy there is no end, it seems, and here are three more, all admirable. Why does astronomy outdo all other scientific subjects in the popularity of its history? One relevant factor is its links with ultimate questions of how the Universe began and came to be as it is. Religion has tended to evaporate in countries where Mammon is the chief deity, and many people like to sample cosmology instead, as shown by the huge sales of Stephen Hawking's *A Brief History of Time*. The astronomy of the past also attracts scholars, because it is a triumph of human intellectual enquiry, usually being the most sophisticated and complex scientific construct of its time, even if later seen to be wrong.

John North's history of astronomy and cosmology is the fourth in a series on the history of science from Fontana/Norton. His book is a major achievement that trembles on the brink of being a masterpiece, although there are a few too many flaws to justify the last superlative. In the first 300 pages of narrative, North sweeps through pre-Keplerian astronomy with impressive thoroughness and confidence. All of human astronomical life is here, in chapters on prehistory, ancient Egypt, Mesopotamia, the Greeks and Romans, China and Japan, pre-Columbian America, India and Persia, and Islam. North is well qualified to write this book: he has a lifetime of experience in the history of astronomy and a narrative style that is a pleasure to read. He does his best to overcome the perennial problem of explaining spherical geometry to the uninitiated, with many diagrams to help. But nonspecialists may still find it all rather baffling, and pass on to the easier chapters.

North moves rapidly across the seventeenth and eighteenth centuries, lingers a little in the nineteenth, and then offers a full assessment of twentieth-century astronomy, right up to the feats of the Hubble Space Telescope. This modern section is quite different from the rest of the book, because its success depends on the selection of subjects and on fitting them into an integrated picture. Selection implies value judgement, and not everyone will agree with all of North's choices of important themes. To me, however, his analysis seems persuasive and reasonably well balanced, though deficient in scepticism, especially over cosmology, where ideas are apt to blaze up and fade away. (Cosmologists have an imaginative drive akin to fiction writers, and sometimes the similarity extends to the products.)

The book ends with a 35-page bibliographical essay and a splendid 38-page index. But readers should note that accented vowels come after all others in the index. Thus R might be expected to end with 'Ryle, M'; but after that comes 'Régis, P. S.' and 'Rømer, O.' (actually misprinted as 'Rmer'). The only other feature that deserves a warning is the preliminary page on numbers and units: for angles and time, North introduces an unfriendly sexagesimal system that needs careful definition; and unfortunately the definitions are marred by misprints. Overall, though, as an up-to-date general history of astronomy at a reasonable price, the book can be warmly recommended.

Hugh Thurston's *Early Astronomy* covers the same ground as North's first 350 pages, and the corresponding chapters are similar in title and length. Mesopotamian, Greek and Mayan astronomy, for example, receive 40, 73 and 8 pages respectively in North's book, and 18, 68 and 9 pages in Thurston's. So the difference is not in the substance but in the presentation. North's book is a continuous narrative addressed to a wide spectrum of readers; Thurston's is more of a scientific textbook, with much technical detail and numbered references. North's is a fairly cheap paperback; Thurston's a fairly expensive hardback. Both books have an attractive typeface, but North is disadvantaged because his signs for opening and closing quotations are the same as for minutes of arc (and he therefore cannot use the sign for minutes).

Thurston begins with a chapter on fundamentals: he discusses the constellations, the spherical geometry of the Sun, Moon, planets and stars, and the instruments used by early astronomers, including a long and useful section on armillar-