

ject of symmetry breaking.

Fluid flow has long been a rich source of symmetry paradoxes, as they used to be called before symmetry breaking became both better understood and fashionable. A useful chapter deals with these problems and forms a good introduction to the chapter entitled "The Universe and Everything", where we are reminded of the original sin: "The most spectacular broken symmetry of them all is our own Universe".

One of the most fascinating cases of broken symmetry arises in the problem of the growth of biological structures. Although these systems may start by being fairly homogeneous, this homogeneity becomes unstable, thus allowing patterns and structures to emerge. This is the observation that led Alan Turing to his famous mathematical theory of morphogenesis. But more surprises await us in the way in which symmetry breaking creeps into everything: when a horse stands still it shows, with any luck, bilateral symmetry, that is, there is a symmetry plane cutting along the length of the animal through its centre. When the horse walks, however, this symmetry is destroyed: we are thus entertained with a full chapter on gait with examples from throughout the animal kingdom. Chaos has been one of the developments in mathematics since the Second World War that has engaged more popular interest, and it is not surprising that chaos, bifurcation and symmetry breaking are all intimately connected.

We are now approaching the last chapter of this entertaining book and the authors have still not commented on the geometric proclivities of the deity. This is a great and relevant question, especially now that Roger Penrose has declared himself a Platonist in mathematics. Mathematics is so unreasonably effective, in the words of Eugene Wigner, in describing the Universe, that one is highly tempted to see in it the stamp of the Creator. The authors are too well mannered to try to impose their views on us, but very discreetly, in two lines, they neatly dispose of the problem: Wigner's puzzle, they say, "may have a simple answer: mathematics is effective in describing the universe because that's where we got it from". It is a pity that they do not produce evidence for this statement. Could it be that they are keeping it for their next book?

All in all, the book is a very good read: I would have enjoyed even more a more restricted range of subjects treated a little more sparsely, but those who want a bit of everything will find plenty to attract their curiosity. □

Simon L. Altmann is at Brasenose College, Oxford OX1 4AJ, UK.

Neighbours

M. G. Edmunds

The Andromeda Galaxy. By Paul Hodge. *Kluwer: 1992. Pp. 358. DFL 160, \$79, £55.*

OUR 'big sister' Andromeda is one of a handful of galaxies that can be seen with the naked eye. Many readers may recall its being pointed out to them when they were young, with hushed tones reminding them that its light had started out on its two-million-year journey before humans had evolved.

The serious study of Andromeda began more than a hundred years ago, when a supernova appeared in the galaxy in August 1885. Until the revolution in light-detection techniques of the past 30 years, detailed observations required heroic efforts — 80-hour exposures for photographic spectra were not unknown. Exploration was dominated by two of the great characters of twentieth-century astronomy, Edwin Hubble and Walter Baade. Since the 1960s, extensive studies have been carried out, particularly by Sidney van den Bergh and Paul Hodge himself, with a vast increase in both data and the number of Andromeda acolytes.

Although it is really its proximity that makes Andromeda special, its family resemblance to our own Galaxy is an obvious attraction. It is perhaps twice as massive and 40 per cent larger than the Milky Way, but appears to be lazier, forming new stars at a considerably slower rate — only about one-tenth of that of our own Galaxy. This weaker star formation is concentrated, for no appa-

rent reason except that interstellar gas is concentrated in a similar way in a broad ring midway out in the disk. A proper understanding of the causes of the different rates of star formation in galaxies remains an important problem in astrophysics.

Is a compilation of observations on a single object really helpful? A biography of a person can sometimes illuminate history much better than a collection of general works, and at least this book forces one to try to interrelate an extraordinarily wide range of galactic phenomena. The book is very much a well-illustrated review and betrays some signs of hasty final preparation. But Hodge writes with a lightness of touch, providing a huge amount of material in a surprisingly readable way. As a source of references the volume is invaluable; Hodge is particularly good in not neglecting the oft-forgotten work from the former Soviet Union. His is an observer's approach, presenting the observations with little — one might say refreshingly little — theoretical interpretation. He confines comparisons to a few members of our own local group of galaxies and intentionally omits discussion of Andromeda's little elliptical companions.

The reader with a moderate background in the astronomy of galaxies is bound to learn (or re-learn) a lot about Andromeda. It is our nearest spiral-galaxy companion, and surely it is a good thing to get to know one's neighbours better. □

M. G. Edmunds is in the Department of Physics and Astronomy, University of Wales College of Cardiff, PO Box 913, Cardiff CF2 3YB, UK.

New references

- *Dictionary of Inorganic Compounds.* Contains physical, structural and bibliographical data on about 42,000 compounds, as well as providing synthetic routes and hazard data. Chapman & Hall, 5 volumes (1–3 entries, 4 & 5 Indexes), 5,400 pages. Pre-publication price, £2,350 (£2,750 for orders after 31 December 1992).
- *Academic Press Dictionary of Science and Technology.* Contains some 124,000 fully defined entries, about 2,000 illustrations, and brief essays by "prestigious scientists" on 124 different fields. Academic, 2,432 pages, £68.
- *Encyclopedia of Marine Sciences* edited by J. G. Baretta-Bekker, E. K. Duursma and B. R. Kuipers. Contains about 3,000 entries. Springer, DM 58 (pbk).
- *Free-Living Freshwater Protozoa: A Colour Guide* by D. J. Patterson and S. Hedley. Wolfe, £48.

New in paperback

- *Deep-Sea Biology: A Natural History of Organisms at the Deep-Sea Floor* by J. D. Gage and P. A. Tyler. Cambridge University Press, £24.95, \$39.95. For a review see *Nature* **352**, 294 (1991).
- *Dinosaur Systematics: Approaches and Perspectives* edited by K. Carpenter and P. J. Currie. Cambridge University Press, £17.95, \$29.95.
- *Infectious Diseases of Humans: Dynamics and Control* by R. M. Anderson and R. M. May. Oxford University Press, £22.50, \$47.50. For a review see *Nature* **358**, 29 (1992).
- *The Creative Mind* by M. A. Boden. Basic Books, \$15. For a review see *Nature* **349**, 378 (1991).
- *Our Universe: An Armchair Guide* by Michael Rowan Robinson. Freeman, \$19.95. For a review see *Nature* **348**, 355 (1990).
- *Centuries of Darkness* by P. James. Pimlico, £12.99. For a review see *Nature* **353**, 712 (1991).