

topics occupies the second volume. As an ignoramus when it comes to our most important star, the Sun, I was fascinated by the status of solar physics. Nine separate essays cover virtually everything recently learned about the physics of the Sun, its interior, and how its outer layers and atmosphere interact with its environment.

It might seem as if the planets are not so well treated, as there are only eight essays concerned with planetary research. However, these essays are comprehensive and well designed; they give the reader an interesting tour of the current state of planetary science. There are also three excellent pieces on comets.

In addition to four flavours of index — for acronyms, citations, names and subjects — the back of the second volume includes two appendices that deserve to be widely read, as they bring together information that is otherwise hard to find so neatly in one place. The first is Russo's 'basic chronology of the space age': six pages of space-age highlights, beginning with K. E. Tsiolkovsky's book on space exploration, published in 1903, and ending with the launch of the Soyuz vehicle that took the first crew to the International Space Station in 2000. The second appendix is a tour de force. It is a complete catalogue of space-science launches from 1957 to 2000, with important details of each, listed in a table that occupies an impressive 30 pages of text.

Although the notion of this publishing project would have seemed improbable to me, I have now seen it, lifted it (with some difficulty), and recommend it as an important milestone along the amazing road of space science. ■

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Ecology out of the blue

Coral Reef Fishes: Diversity and Dynamics in a Complex Ecosystem edited by Peter Sale

Academic Press: 2002. 724 pp. \$99.95, £69.95

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Peter Sale's first textbook, *The Ecology of Fishes on Coral Reefs*, became an instant classic for all those who are fascinated by the diversity and complexity of coral-reef fish, their adaptations and their ecology. It left little room for rival textbooks. Now, 11 years on, the steady accumulation of data and ideas has finally warranted a new edition. The title might have changed but fortunately the quality has not.

Coral Reef Fishes is full of fascinating



Evolutionarily quiet: these grunts are little changed from their ancestors 50 million years ago.

details, new evidence and new ideas. For example, we are told that fish on coral reefs 50 million years ago looked very much like they do today (David Bellwood and Peter Wainwright), and that the fish diversity found on coral reefs might largely be due to the constant high temperature, which allows adaptations to exploit low-quality food (Mireille Harmelin-Vivien). Most amazing is the accumulating evidence on the impressive capabilities of reef fish larvae with respect to swimming performance and orientation (Jeffrey Leis and Mark McCormick).

Chapters that describe data at the cutting edge of ecology are well balanced with more 'classical' textbook chapters. There are excellent overviews of reef-fish ecomorphology (Wainwright and Bellwood) and sensory capabilities (Arthur Myrberg and Lee Fuiman), along with critical discussions of methods such as ageing fish using otoliths (Howard Choat and Ross Robertson, Simon Thorrold and Jonathan Hare) and population genetics (Serge Planes).

There is certainly plenty of information on coral-reef fish, but this does have one downside: only a few authors (such as Geoffrey Jones, Julian Caley and Philip Munday) try to fit their data into the general framework of ecology and evolution. More comparisons of reef fish with other taxa could have helped to highlight why studying these fish is not only fascinating but also informative and important.

The final section of the book deals with reef-fish conservation issues and the role that ecology might play. There is a frightening honesty about gaps in our ecological knowledge that should be filled for the effective guidance of management decisions (Peter Sale and Garry Russ). But there is also information on the problem of conserving

sex-changing species (Phillip Levin and Churchill Grimes) and on the live fish trade, which may promote selective hunting of rare species (Yvonne Sadovy and Amanda Vincent).

So what is the future of coral-reef fish ecology? Two major issues emerge from this book. First, a detailed phylogeny down to the species level, including the ages of lineages, will yield the basis for further sophisticated studies of species diversity and the huge variety in adaptations and specializations found in coral-reef fish. Second, increasing our knowledge of the pelagic (open-water) stages of reef fish is of overwhelming importance for several key issues in ecology and conservation. In particular, knowing more about the degree of local retention of larvae has implications for population dynamics, the potential for sustainable local fishing licences and the design of marine protected areas.

Studies of the pelagic stages might also attract the attention of behavioural ecologists. As it stands, coral-reef fish are suitable subjects for behavioural questions only where fitness proxies (such as energy gain and growth rate) are accepted, such as optimal foraging and cooperation. The study of fish larvae opens the possibility of life-history studies and may even allow assessments of individual fitness. But such projects on fish larvae are likely to be labour-intensive and costly. So, to expand Christopher Peterson and Robert Warner's view, what it takes for behavioural ecologists to join the club is a willingness to think big and to get wet. ■

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