

## Scales of progress

### **Air-Breathing Fishes: Evolution, Diversity and Adaptation**

by Jeffrey B. Graham  
*Academic: 1997. Pp. 299. \$79.95, £55*

### **Molecular Systematics of Fishes**

edited by Thomas D. Kocher and Carol A. Stepien  
*Academic: 1997. Pp. 314. \$79.95, £57*

**John Long**

Perhaps the greatest step in vertebrate evolution was the transition from fishes dwelling in an aqueous habitat to tetrapods crawling on land. Many scientists tend to think of the complex skeletal and physiological changes that happened during the geologically short time span involved, yet few are aware of the many inherent changes in the evolution of fishes that set the stage for their invasion of a new habitat.

Study of the anatomy and physiological mechanisms of air-breathing in living fishes gives an insight into the environmental factors that may have driven the first fishes into adapting an air-breathing behaviour. In *Air-Breathing Fishes*, Jeffrey B. Graham outlines the complete biology of how and why some fishes breathe air, investigates possible reasons for how such adaptations may have evolved, and revisits the fish-tetrapod transition from a fresh viewpoint.

Today some 49 families of fishes have representative air-breathers, falling broadly into two behavioural categories, the amphibious air-breathers and the aquatic air-breathers. Although lungfishes are commonly known as typical air-breathing fishes, there is also a great diversity of actinopterygian fishes

which can partially respire subaerially. The first two chapters of the book comprehensively cover the environmental factors affecting air-breathing, the terminology involved and the diversity of living air-breathing fishes. The remaining chapters deal with the anatomy and physiology of air-breathing fishes, specifically the anatomy of respiratory organs, circulatory adaptations, aerial and aquatic gas exchange and metabolic mechanisms, cardiorespiratory control, blood respiratory properties and metabolic adaptations. The book is well illustrated with clear diagrams, good photographs of dissected specimens, tissue sections and some scanning electron micrographs. It is written in a clear style, is well referenced and has a good index. It should have wide appeal for all interested in the anatomy of fishes and their physiology.

*Molecular Systematics of Fishes* is a collection of 17 papers covering the range of new and improved methods for taxonomic investigation using such molecular techniques as polymerase-chain-reaction amplification and DNA sequencing. Such methods are now widely used for comparing populations of living fishes with their neighbours, or for more distant phylogenetic relationships between species in widely distant taxonomic groups. Despite the all-encompassing title, the book only covers the largest living group of fishes, the teleostean fishes. It holds a wealth of valuable information visually well presented by many cladograms and tables. A must for teleost taxonomists and general fans of phylogenetic systematics. □

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From the cover of *Fishes of Chesapeake Bay* by E. O. Murdy, R. S. Birdsong and J. A. Musick. Smithsonian Institution Press, \$49.95, £38.95.

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