systematic darkening of past recollections, the inability to take pleasure in what one has achieved, and the impoverishment of hope for the future. Unlike patients with ADHD, patients with depression cannot only vividly imagine a future, but anticipate in great detail the various forms their subsequent sufferings are likely to take.

Unraveling the genetic and neurobiological mechanisms leading to prefrontal cortex participation in the complex and heartbreaking pictures of ADHD and major depression remains a key challenge for neuroscience in the next millennium. For the present, Barkley presents a scholarly working model of ADHD. In the process he highlights the need for society to re-evaluate its judgmental stance towards behavioral syndromes such as ADHD in which self-regulation is impaired. He also eloquently expresses the urgency for additional resources to treat this major public health problem and to elucidate its fundamental etiology.

BOOKS: PHYLOGENETICS

# Bowfins and the Revenge of Comparative Biology

**Philippe Janvier**

The North American "bowfin" has many other nicknames—dogfish, mudfish, cotton fish, grindle, cypress trout, and lawyer, for example—but they all refer to a single freshwater species, *Amia calva*. This fish is the only living representative of a once flourishing family, the amiids, known from 150 million years ago. Lance Grande and William Bemis use the family to challenge modern biology—that is, to show that an extensive anatomical and paleontological study (one based on examination, as much as possible, of multiple specimens and developmental series) provides highly reliable phylogenetic and historical results.

**A Comprehensive Phylogenetic Study of Amiid Fishes (Amiidae) Based in Comparative Skeletal Anatomy**
An Empirical Search for Interconnected Patterns of Natural History
*by Lance Grande and William E. Bemis*
Society of Vertebrate Paleontology, Chicago, 1998. 700 pp. $75. ISSN 0272-4634. Memoir 4.

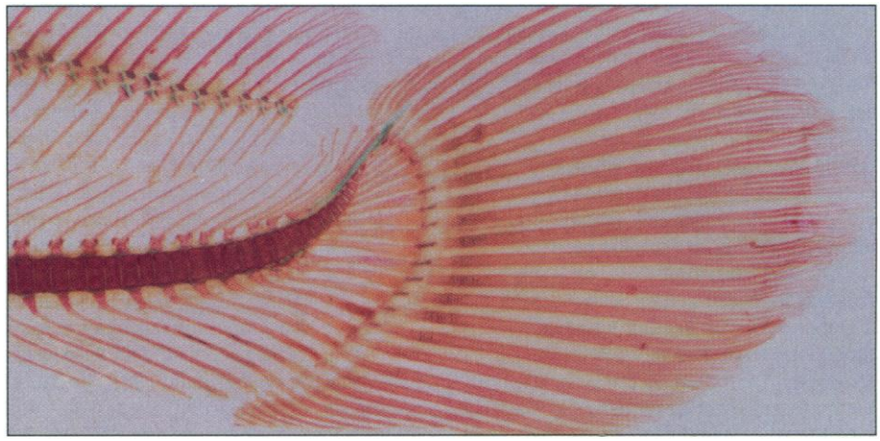
For this monograph, Grande (a paleontologist at Chicago's Field Museum of Natural History) and Bemis (at the University of Massachusetts, Amherst) prepared and dissected new specimens of the living bowfin and traveled around the world visiting all the major collections of Mesozoic and Tertiary fossil amiids. To support their identification of characters for phylogenetic analyses and to provide objective information on specimens that subsequent researchers may be unable to examine, they have thoroughly illustrated well-preserved material in over 1300 photographs (for documentation) and line drawings (for interpretation). Publishing such a detailed and data-rich volume on a relatively minor fish family is a challenge indeed, given the relatively small number of scientists directly interested in the subject. Through this masterpiece, however, the authors demonstrate that even within the scope of a single fish family, hundreds of new insights and new results arise when the work is thoroughly done. One must praise the National Science Foundation and a private foundation for having supported this endeavor, thereby giving a reputedly outdated science the chance to show that it can perfectly compete with "high-tech"' biology. That this admirable attitude of U.S. funding agencies has proved so rewarding should serve as an incentive to other countries.

The authors begin their systematic descriptions of amiids with 117 pages on the living bowfin, focusing their attention on its skeleton. This section includes numerous superb explanatory drawings, stereographs, and color photographs of cleared and stained juvenile specimens. The consideration of the 680 individual bones of *Amia calva* shows that skeletal data alone can provide as many phylogenetically valuable characters as, say, DNA sequences. Through the following 417 pages, Grande and Bemis present descriptions, often detailed, of all fossil amiids, taxa which are known from the Jurassic to Quaternary.

The analytic part of the book is a cladistic survey of the interrelationships of amiids and of their position within a larger group, the halecomorphs (which includes fishes having the symplectic articulating with the lower jaw, a notch in the posterior margin of the maxilla, and a single supramaxilla). Along with this phylogenetic study, Grande and Bemis include detailed descriptions and illustrations of the species used as "outgroups" (the non-amiid taxa that are used to define the primitive states of the characters employed in the analysis). The book ends with a consideration of the distribution of amiids in time and space, seen in the light of plate tectonics. Two pages of "concluding remarks" succinctly outline the goals of comparative biology (the search for replicated patterns in nature) and re-emphasize the fact that actinopterygian (ray-finned) fishes, with their diversity and abundant fossil record, are certainly one of the best animal groups for such studies.

Technically, this book reaches perfection. It also includes detailed taxonomic and subject indices, and two foldouts for the abbreviations in figures and the phylogenetic diagrams, which are extremely helpful.

This book is clearly a "must" for specialists of fossil and Recent ray-finned fishes, but it also includes sections of more general, methodological interest (for example, on historical biogeography and paleoecology), which can easily be read by the lay biologist. To lecturers, thesis supervisors, and postgraduate students, it provides a model of what should be done to carry comparative biology to the level of technical and methodological perfection that will allow the discipline to proudly enter the 21st century and compete on equal terms with molecular phylogenetics.



FROM GRANDE AND BEMIS

**Fish tail.** Caudal skeleton of a cleared and double-stained (bones, red; cartilage, blue) specimen of an adult bowfin (724 mm total length).

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