

behavior, herpetology, and entomology. These include a number of somewhat obscure but important references heretofore relatively unknown to the non-German-speaking world, especially on the mechanisms of insect hearing, including several Ph.D. dissertations. It generally is carefully edited. Like many first editions, the odd typographical or factual error inevitably infiltrates the otherwise uninfected text, but these are few and do not detract from the flow of the ideas. If I were to make one suggestion for the second edition, it would be to improve the general quality of the illustrations. For example, the photographs (e.g., Fig. 11.2), scanning electron micrographs (e.g., Fig. 5.6) and the sound spectrograms and oscillograms (e.g., Figs. 9.6 and 9.7) suffer from poor resolution. Despite these minor criticisms, I very much enjoyed reading the book, learned quite a bit from it, and emerged in awe of the authors' scholarship and remarkable synthesis of the communication neuroethology of these two disparate yet acoustically related taxa. It should serve as the definitive text in this area for the foreseeable future and will, with any luck, spawn other intriguing intergroup comparisons.

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- PROJECT PIABA. Ning Labbish Chao, Paulo Petry, Gregory Prang, Leonard Sonneschien, and Michael Tlusty (eds.). 2001. *Editoria de Universidade do Amazonas, Manaus, Brazil.* ISBN 85-7401-083-9. 310 p. \$40.00 (soft-bound).—The cardinal tetra, *Paracheirodon axelrodi*, was largely responsible for rejuvenation of the aquarium industry in the United States upon its entrance onto the market in the late 1950s. This species is exported from the middle Rio Negro of Brazil in huge numbers, comprising up to 80% of 20 million total fishes per year, and supports a US\$3 million local annual economy (65% of the total) involving roughly 80% of the local population of 16,000 in the vicinity of Barcelos. Although a minute fraction of the total commercial fishery in the Amazon basin (Bayley and Petrere, 1989), the ornamental fishery nevertheless represents the principal subsistence activity in the Barcelos region, following the decline in extractive economies for latex and palm fibers in the 1970s. This volume includes the majority of the papers and presentations offered at a workshop on Amazon River biodiversity held at the St. Louis Children's Aquarium in May 1999. The stated purpose of the workshop was to bring together representatives from all sectors of the ornamental fish industry with field researchers to discuss findings and review progress of Project Piaba—an independent, interdisciplinary project that seeks to understand and promote the economic and social-cultural systems involved in the ornamental fishery of the middle Rio Negro.
- The resulting book offers a heterogeneous assemblage of papers treating diverse subjects, ranging from the commercial and practical aspects of the ornamental fish trade, aquatic ecology and biodiversity, and cultural and economic anthropology. The style of presentation reflects that of a standard academic treatise, wherein most papers include an abstract (and Portuguese resumo), text, acknowledgments, and literature cited. Excerpts from the question and answer session following the respective workshop presentations accompany most chapters. However, the volume fails to deliver on the academic side because of the poor quality and limited scholarship offered by several of the included papers, many of which appear to represent third-party transcriptions of the oral workshop presentations. Contrary to the stated intentions for the volume (p. xiii), the included papers are not all directly related and well integrated within the overall theme of the Rio Negro ornamental fishery since several papers offer simplistic views of tangential relevance or address issues relevant to the aquarium trade in

other regions of the world. The production quality of the volume is atrocious, with multiple misspellings, sentence fragments, missing words, and similar errors occurring on nearly every page. The editors acknowledge that several speakers did not review the final versions of their papers, leaving that task to the editors. I was perplexed, however, to read the statement (p. xvi) absolving the editors from responsibility for the “accuracy of the articles.” Perhaps so for the data and interpretations contained in the individual papers, but surely five editors (native English speakers included among them) should have been sufficient to eliminate such errors. Furthermore, the volume also fails to provide a clear sense of what Project Piaba has accomplished to date and where it is headed.

The book is organized in three major sections, plus an overview chapter by three of the five editors (Chao, Prang, Petry) that provides a general introduction to Project Piaba and clearly states that project’s objectives: to derive a management strategy for the ornamental fishery in the vicinity of Barcelos, Brazil, through research on the biology, ecology, and socioeconomic factors of direct concern. One issue that comes through prominently as part of the management strategy is the desire to move more of the economic benefit of the fish trade to the local fishers. At present, most of the profit is garnered by the exporters in Manaus and the importers in Miami. Generation of baseline data on aquatic resources is listed among five major accomplishments of Project Piaba (p. 4); however, the volume does not specify or summarize the scope or content of those data, apart from listing five unpublished postgraduate theses on abundance and distribution of cardinal tetra and general fish community ecology. Another 24 titles are listed among the project’s bibliography, but only one of these appears to represent a peer-reviewed empirical paper and concerns the description of a new fish species. Given the importance of the cardinal tetra to the local economy, one would expect that study of its reproductive ecology, life history, population genetics, development, and husbandry would figure prominently in the research program of Project Piaba.

The first major section (Part Two: Ornamental Fish Industry and Local Subsistence) offers eight papers on history of discovery of the cardinal tetra (Axelrod) and extractive economies in the Barcelos region (Machado); hobbyist involvement via ecotourism (Dowd); socioeconomic organization of the ornamental fishery in Barcelos (Prang); efforts to promote cyanide-free capture of Philippine fishes (Baquero); cli-

mate warming (McAllister and Goreau); and pet industry involvement in sustainable use, captive breeding, and conservation initiatives (Myers, Dawes). Several of these papers are simplistic, offering cursory treatment and little insight into the issues at hand. The chapter by Prang is exceptional in providing a fascinating, insightful analysis of the socioeconomics of the ornamental fish trade. The author describes the dynamic between patron (buyers or *atavessadores*—the intermediary representatives of the few local exporters) and client (subsistence fisherman or *piabeiros*) as a barter form of merchant capitalism, analogous with (but somewhat modified over) the oligopolistic trade practiced in the form of indentured servitude between patron and client rubber tapper during the rubber boom years. Now, however, the relationship between patron exporter and client *piabeiro* is monetary—cash or goods paid for fishes on delivery, rather than as payment for goods advanced previously by the patron. Also, in contrast to the *seringueiros* (rubber tappers), *piabeiros* do not generally incur large debts, are free to sell fishes to multiple patrons, and often are opportunistically engaged in other extractive activities, fishing only when economically most favorable. So that more of the profit remains with the *piabeiros* and their families, Prang argues that direct export of fishes from Barcelos (rather than from Manaus) should be encouraged. However, this strategy will require greater collaboration and provision of government incentives, both of which represent major obstacles at present.

The second major section (Part Three: Aquatic Ecosystem and Biodiversity) offers six papers on Rio Negro and Amazonian aquatic ecology (Forsberg et al., Walker), review of fishery statistics and diversity of fishes of the middle Rio Negro (Chao), description of a proposed study on population genetics of the cardinal tetra (Harris and Petry), review of cytogenetic studies on Amazonian fishes (Porto et al.), and ecology and fishery biology of aquatic turtles, *Peltecephalus dumerilianus* and *Podocnemis erythrocephala* (Vogt). The chapter by Forsberg et al. is essentially a summary description of results from a long-term research program examining the influence of physical factors on the biological dynamics of the Rio Jaú, a tributary of the lower Rio Negro. Because much of the original data was published elsewhere or is contained in unpublished theses and because no methods are described, it is difficult to evaluate much of the content and interpretations offered. The paper by Walker describes the results of a long-term study of benthic biodiversity of a blackwater for-

est stream near Manaus—a system characterized by a highly diverse and dense assemblage of consumer species that overlap greatly in terms of resource use, yet has remained stable over the 20-year observation period. However, to explain this apparent paradox, the author invokes an obscure and abstract theoretical argument that I found to be a distraction and out of place in this volume. Chao provides a nice review of Project Piaba's objectives and results to date, mostly related to fishery catch and export dynamics; however, missing data on shipments from Barcelos for certain periods and the proportion of totals represented by cardinal tetra make it difficult to distinguish between variance in environmental conditions affecting production versus availability of fishes relative to fluctuations in market demand as explanations for the patterns observed.

The final section (Part Four: Fish Health) includes two papers on veterinary medicine and infectious diseases (Lewbart) and the importance of monitoring water quality during transport of fishes (Waichman et al.). The former paper details methods of diagnosis and treatment for several diseases and parasite infestations, both common and exotic. The latter chapter examines water quality fluctuations during transport of fishes from the field to exportation and concludes that transport-induced stress is primarily responsible for mortality (over 50%) at import.

In addition to the socioeconomics of the ornamental fishery, the history of the discovery and controversy surrounding the original description of the cardinal tetra are almost as colorful as the fish itself. Although not detailed herein, the literature indicates that a small characin similar in color to the neon tetra (*Parachanna innesi*) had been discussed by German biologists and aquarists as early as 1952 (Weitzman, 1956; Geisler and Annibal, 1986). In 1956, specimens were sent independently to L. P. Schultz by Axelrod, who originally acknowledged (Axelrod, 1956) that the specimens had been received from a New Jersey fish dealer on 10–11 February 1956, and to G. S. Myers and S. H. Weitzman by W. T. Innes and Paramount Aquarium (Myers and Weitzman, 1956). Both Schultz (1956) and Myers and Weitzman (1956) published a description of the species in February 1956, and, after a contentious debate and split vote, the International Commission (ICZN) ruled on the priority of the name *Cheirodon axelrodi* Schultz (ICZN, 1957; Opinion 485). So that the commercial interests of the exporters were protected, these authors were not provided with precise locality information

on the specimens provided to them, with Axelrod (1956) contending that they had come from Porto Velho (Rio Madeira), Brazil, and Myers contending that they had come from Manaus.

I was left with two general impressions after reading this volume. First, I was disappointed by its content and left wanting to know more about Project Piaba—what science the project has generated to date and what is planned for the future. The heterogeneity of the included chapters and the numerous errors and editorial problems were an inescapable distraction. Second, I was left somewhat discouraged about the future prospects for the piabeiros in Barcelos. The “Buy a Fish, Save a Tree” slogan offer on the outside back cover of the book is a catchy phrase intended to spark interest in the book and in Project Piaba, but it is inaccurate given that the annual flooding of the forests, rather than the value of the ornamental fishery, effectively prohibits timber extraction in the region. In my rather limited experience, it seems that cardinal tetras are now seldom available in local pet shops, likely because of the increased cost at retail resulting from higher mortality relative to captive-bred neons and other species. At present, the piabeiro's income from fishing is not limited by availability of fishes, but rather by market demand for ornamental fishes that fluctuates widely, has declined steadily at about 8% per year for the previous four to five years and is under severe competition from the availability of captive bred stocks from Asia and North America. Wild-caught specimens represent less than 10% of the global market of tropical freshwater aquarium fishes, yet remain an important component of the industry from the standpoint of maintenance of genetic diversity of captive stocks. Because the ornamental fishery in Barcelos represents a fraction of the fishes exported from South America, one may ask: to what extent can efforts to organize and manage the Rio Negro fishery at the local level succeed in the face of global market conditions that ultimately determine the piabeiro's potential income from fishing? Project Piaba is to be commended for its efforts to promote sustainable use and conservation of these aquatic resources.

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DENYING EVOLUTION: CREATIONISM, SCIENTISM, AND THE NATURE OF SCIENCE. Massimo Pigliucci. 2002. Sinauer Associates, Inc., 23 Plumtree Road, Sunderland, Massachusetts 01375–0407; E-mail: orders@sinauer.com. ISBN 0-87893-659-9. x + 338 p. \$24.95 (paperback).—The response by many to another book on the evolution/creationism controversy might be ho hum. But *Denying Evolution* is not ho hum; it is an important book that deserves wide readership. A review of a volume on the evolution/creationism controversy might seem out of place in a journal dedicated to ichthyology and herpetology, but it is appropriate, I feel, because a very large percentage of the readers of *Copeia* are involved in some manner with education. It should be noted that an active member of ASIH, Tim Berra, has published a book that provides a good introduction to the controversy (Berra, 1990). Most people, including many scientists, do not realize the potential harm that a relatively small number of zealots can inflict on

our system of public education and in the long run on the future of science in this country.

Opposition to the concepts of evolution appears to be stronger in the United States than in any other country in the West. Difficulties in apprehending these fundamental biological principles stem from inadequate education, particularly in the sciences but in other areas as well, and from the long-standing belief in the account of creation given in the Book of Genesis, a belief reinforced by the purveyors of ultraconservative religious doctrines. It is little understood by the public at large that an appreciation of evolution is basic to an overall understanding of the biological sciences and undergirds all research in those disciplines. Attempts to restrict or prevent the teaching of evolutionary theories are clear evidence that many people not only do not grasp the centrality of those concepts to the life sciences but also fail to appreciate the importance of supporting the freedom to explore ideas that lead to deeper knowledge, even if the facts revealed contradict conventional wisdom or religious beliefs. A poorly educated public, religious conservatism, and an inadequate understanding of academic freedom, factors that are not entirely independent, feed upon one another to varying degrees, producing an environment that is often unfriendly to activities of the intellect.

In the first chapter, “Where Did the Controversy Come From?” the author presents a short history of the dispute, touching on events such as the Huxley-Wilberforce debate, the Scopes trial, and recent legal encounters, including acts passed by the legislatures of Arkansas and Louisiana that were ruled as unconstitutional by Federal courts.

“Evolution-Creationism 101,” is the title of the second chapter, in which Pigliucci examines, among other items, the many forms of creationism (concentrating on “scientific creationism” and intelligent design, ID) and what evolution is and is not. In the United States, many of the most influential antievolutionists have been associated with the Institute for Creation Research in El Cajon, California, and/or the Creation Research Society (Numbers, 1992). Beginning in the mid-1990s neocreationists and their ID theory moved to the forefront of the battle. The neocreationists “largely do not believe in a young Earth or in a too-literal interpretation of the Bible,” but “neocreationism is still propelled mostly by a religious agenda and financed by mainly Christian sources, such as the Templeton Foundation and the Discovery Institute” (p. 53–54). The Discovery Institute’s Center for Renewal of Science and Culture in