

about their biology, ecology, and distribution. Reproductive strategies are presented, along with longevity and age of maturity, and the importance of these variables for fisheries management is highlighted. Many species are targeted by fishermen in spawning aggregations, others live as long as 40 years, and most are hermaphrodites, a combination of traits that make them especially vulnerable to overfishing.

The second and third sections of the introduction deal with the delicate issues of fisheries and conservation status of these increasingly harvested animals. In addition to normal commercial, artisanal, and recreational fisheries, groupers are also heavily targeted by the live reef fish trade in Hong Kong, which impacts an enormous area around the Coral Triangle. The authors list IUCN status categories for every species, and conclude that many are on the decline, but perhaps even more troubling, they also show that many others are also heavily fished but lack sufficient information to fit specific criteria and are categorized as Data Deficient.

Grouper systematics has had recent radical changes. Craig and Hastings (2007) have proposed an extensive rearrangement of genera based on molecular phylogenetic analyses. Here the authors propose a new classification, partly following Craig and Hastings (2007), but also maintaining some of the older taxonomy. Epinephelidae is recognized as a family separate from Serranidae; however, genus level changes proposed by Craig and Hastings (2007) are reverted to a more "classic" arrangement (Heemstra and Randall, 1993) with one exception: *Hyporthodus* is treated as a valid genus. This new arrangement is justified by the lack of morphological characters to support the molecular hypotheses; unfortunately, it might introduce some confusion in the literature as many authors were already following Craig and Hastings (2007).

The outline of the guide includes instructions on how to interpret species accounts, a description of the IUCN criteria and categories, which are identified for every species (<http://www.iucnredlist.org/>), and a glossary all of technical terms present in the species accounts. There are also drawings of types of caudal fins (important in grouper identification); two grouper outline drawings: one showing color marks and their names, and another with landmarks for lengths; and two grouper head outlines identifying morphological features of the internal and external anatomy of the head.

Species accounts are arranged in alphabetical order by scientific name and list English, French, and Spanish common names. They start with a standard text description providing many characters that are useful for identification. A small map with the species geographic distribution is present at the end of the description. When available, information about population trends, threats, habitat, ecology, age, growth, and reproduction are also provided. Most accounts contain a black and white drawing of the species, a color photo of a dead (market) specimen, and an underwater photo of a living individual, but only a drawing is presented for rare species. Color descriptions (both in life and in the market) are given. The accounts end with the most recent IUCN red list status.

Altogether, this book does an excellent job of summarizing information available for groupers, and is an excellent guide for identification both in the field and in fish markets. The wealth of information about conservation is an added bonus, and it is hoped that it will influence fishermen in the tropics. In conclusion, I strongly recommend this book to anyone interested in grouper identification, biology and conservation.

LITERATURE CITED

- Craig, M. T., and P. A. Hastings. 2007. A molecular phylogeny of the groupers of the subfamily Epinephelinae (Serranidae) with a revised classification of the Epinephelini. *Ichthyological Research* 54:1–17.
- Heemstra, P. C., and J. E. Randall. 1993. *FAO Species Catalogue*. Vol. 16. Groupers of the world (family Serranidae, subfamily Epinephelinae). An annotated and illustrated catalogue of the grouper, rockcod, hind, coral grouper and lyretail species known to date. FAO, Rome.
- Sadovy de Mitcheson, Y., M. T. Craig, A. A. Bertoni, K. E. Carpenter, W. W. L. Cheung, J. H. Choat, A. S. Cornish, S. T. Fennessy, B. P. Ferreira, P. C. Heemstra, M. Liu, R. F. Myers, D. A. Pollard, K. L. Rhodes, L. A. Rocha, B. C. Russell, M. A. Samoilys, and J. Sanciangco. 2012. Fishing groupers towards extinction: a global assessment of threats and extinction risks in a billion dollar fishery. *Fish and Fisheries*. DOI: 10.1111/j.1467-2979.2011.00455.x.

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Hemoparasites of the Reptilia: Color Atlas and Text. S. R. Telford, Jr. 2009. CRC Press. ISBN 9781420080407. 376 p. \$159.95 (hardcover).—Sam Telford, Jr., the author of *Hemoparasites of the Reptilia*, has enjoyed a long, productive, and illustrious career at the intersection of herpetology and parasitology. That's a sweet spot in biology; what could be better than catching lizards and snakes in the morning and looking at their parasites in the evening? Telford has been publishing for six decades; his first paper was written when he was a teenager. His professional (that is to say, paying) positions with major public health organizations have allowed him to travel the world, being stationed in the Americas, South Asia, and Africa. This allowed Telford to pursue his amateur (in the original meaning of the word) studies on the diversity of parasites exploiting their reptile hosts. His productivity has been astonishing, particularly when we recognize that scores of significant papers resulted from his "spare-time" activities, often completed under challenging conditions. A lifetime of studies is assembled into this brilliant monograph, an instant classic in parasitology that a century from now will remain a standard reference.

Why should *Copeia's* readers view Telford's monograph as a must-have for their private or university library? Blood parasites exploit many populations of lizards, snakes, turtles, and crocodylians from the driest deserts to rainforests and even the oceans (sea turtles are infected with blood parasites!). For example, after just a day of collecting, I found several species of blood parasites from a few species of lizards living on a sand dune in the Gobi Desert of Inner Mongolia. Our understanding of the influence of these parasites on the population biology, ecology, behavior, physiology, and evolution of reptiles is still scant, but what we know tells us we cannot understand the biology of reptiles without knowledge of the biology of their parasites (Sorci et al., 1996; Scholnick et al., 2010). In turn, there is a commotion in the blood when parasite species compete and conspecific genotypes interact in complex ways, so reptiles provide useful models for studies of the ecology of parasites. The first step to

enter this world is to identify the parasites. I have been asked many times how to do this and now *Hemoparasites of the Reptilia* provides a place for anyone to get started.

Haemoparasites of the Reptilia begins with a helpful and concise review of the basic biology of the parasitic organisms, including morphology, life cycles, course of infection, and vectors. Each species is then presented with photographs of stained blood films and very detailed descriptions that emphasize the phenotypic variation observable under the microscope. This is important because the parasites of non-avian reptiles often are much more variable than those seen in the blood of birds or mammals. Each species account concludes with what is known of the vectors, if any, and effects on the vertebrate host. The organization is thus standardized across all the species of malaria parasites (*Plasmodium* and related genera), hemogregarines, hemococcidia, trypanosomes, and finally the prokaryotes and viruses. Telford seems to have read every word published on each species, and reviews the older literature that is not readily accessible in digital form. Where else could we find a complete review of the *Trypanosoma* of Australian turtles or haemogregarines of African lizards? Telford has strong opinions and they are on display throughout the volume. For example, my publications are chastised for being “laden with theory” making it a “challenge to abstract only the data, separate from the theory” (p. 133). But Telford’s “Remarks” sections are intriguing and I predict that his comments will catch the eye of readers looking for potential research projects for decades to come.

Molecular data do not appear in Telford’s monograph, which could be taken as an odd choice by the author. Over the past 15 years, the molecular revolution has informed both the alpha taxonomy and systematics of blood parasites, especially the malaria parasites (Martinsen et al., 2008). Molecular phylogenies of the malaria parasites show that morphological similarity is a poor indicator of the relationships among species. Indeed, the most closely related species can be the most dissimilar in morphology and life-history traits (Perkins and Schall, 2002). Biogeography too may not concord with the molecular phylogeny, which suggests that the history of malaria parasites includes host switching between birds and non-avian reptiles, with birds moving the parasites across vast areas (Perkins and Austin, 2009). And cryptic species appear to be common among the malaria parasites infecting birds, which may also be true for the *Plasmodium* of reptiles (Perkins, 2000). Yet this omission does not make the monograph outdated upon publication. On the contrary, it serves as a pleasant antidote to an unfortunate trend in studies of blood parasites. In many recent publications, the parasites are never actually examined, but only studied via sequence data. Almost all of the parasites covered in Telford’s monograph are eukaryotes with characteristic morphologies that can be readily viewed under the light microscope. By omitting references to inferences drawn solely from DNA, Telford reminds us to look first at the organism before examining its sequence data. There is still a great deal to be learned with the microscope.

The quality of this volume is superb, with the highest quality paper and printing. It is a pleasure to hold and peruse. The quality of the photographs is not the best, but not because of the printing, rather because these are from smears that often seem to have been stained to emphasize the pink end of the color spectrum. I had trouble recognizing some of my old friends. However, this is the way preparations of parasites often actually look. Apparently Telford chose not to present pretty drawings or the best-possible photographs. I find drawings more useful, such as

those in the companion monograph on avian malaria parasites (Valkiunas, 2005), also from CRC Press.

For anyone working with reptiles, it is fairly simple to make a blood smear from each animal handled during surveys and population studies. With the publication of *Hemoparasites of the Reptilia*, herpetologists can readily identify the parasites and get started on new and intriguing research projects. The lifetime of research by Dr. Telford on display in this monograph should inspire generations of scholars to do just that.

LITERATURE CITED

- Martinsen, E. M., S. L. Perkins, and J. J. Schall. 2008. A three-genome phylogeny of malaria parasites (*Plasmodium* and closely related genera): evolution of life-history traits and host switches. *Molecular Phylogenetics and Evolution* 47:261–273.
- Perkins, S. L. 2000. Species concepts and malaria parasites: detecting a cryptic species of *Plasmodium*. *Proceedings of the Royal Society of London B* 267:2345–2350.
- Perkins, S. L., and C. C. Austin. 2009. Four new species of *Plasmodium* from New Guinea lizards: integrating morphology and molecules. *Journal of Parasitology* 95: 424–433.
- Perkins, S. L., and J. J. Schall. 2002. A molecular phylogeny of malaria parasites recovered from cytochrome *b* gene sequences. *Journal of Parasitology* 88:972–978.
- Scholnick, D. A., R. V. Manivanh, O. D. Savenkova, T. J. Bates, and S. L. McAlexander. 2010. Impact of malarial infection on metabolism and thermoregulation in the fence lizard *Sceloporus occidentalis* from Oregon. *Journal of Herpetology* 44:634–640.
- Sorci, G., J. Globert, and Y. Michalakis. 1996. Cost of reproduction and cost of parasitism in the common lizard, *Lacerta vivipara*. *Oikos* 76:121–130.
- Valkiunas, G. 2005. *Avian Malaria Parasites and Other Haemosporidia*. CRC Press, Boca Raton, Florida.
- Jos. J. Schall, *Department of Biology, University of Vermont, Burlington, Vermont 05405; E-mail: jschall@uvm.edu*.

Perú: Yaguas–Cotuhé. Rapid Biological and Social Inventories Report 23. N. Pitman, C. Vriesendorp, D. K. Moskovits, R. von May, D. Alvira, T. Wachter, D. F. Stotz, and A. del Campo (eds.). 2011. The Field Museum, ISBN 9780982841914. 378 p. \$30.00 (soft cover).—Describing the fauna, flora, and human social structure of a region is critical to making informed decisions about the conservation status and needs of an area. This new book, based on of a rapid assessment conducted in 2010, contributes to our knowledge of the landscape, vertebrates, plants, and local communities of the Yaguas–Cotuhé region of Peru. This zone lies in northeastern Peru in the department of Loreto, on the Colombian frontier. Very few biological surveys have been conducted in this area, which makes this assessment necessary and timely.

This work is published in both Spanish and English and was produced with pages of different colors so readers may easily locate their preferred language; the English version begins on p. 155. Thirteen one- or two-page figures are printed on full color plates that include photographs of the landscape, soils, rivers, plants, vertebrates, local human communities, and evidence demonstrating the need for