75 percent of the total commercial catch (of the total Amazon Basin?) is based on flooded forests, but his calculations are not given. The estimate is suspect, yet it is the sort of figure likely to become numerical folklore, increasingly quoted without qualification. In any case, data of this type can only suggest possible effects of deforestation. Goulding's current studies may provide direct confirmation, and this book may inspire new studies.

In addition to the data on stomach contents that are the basis for his conclusions, Goulding includes introductory chapters on the hydrology and fish fauna of the Amazon and gives accounts of the natural history and illustrations of each species of fish and food plant studied. Since Goulding's only other reference to this research is a technical report to the Brazilian Instituto Nacional de Pesquisas de Amazônia, this book is the only report most specialists will see; therefore, it must also be judged technically.

While few of Goulding's statements on food habits are novel, many of the previous reports on the subject have been anecdotal or based on hearsay. His observations are the most thorough and well-documented on Amazonian fishes published to date—based on year-round samples of large numbers of many species, identification of species of fruit or seed eaten, determination of viability of digested seeds by planting, and deposition of voucher specimens of both fish and plants. This thoroughness makes the general absence of data even more frustrating. Some of the most intriguing and original observations are of the migrations of the large characins—spawning movements from tributaries into and slightly down the main river at the onset of the floods, and nonspawning movements (the piracema) into and up the main river at low water. The nature and possible evolutionary causes of these movements are discussed, but the reader is referred to the INPA report for the evidence. The data on temporal patterns of fruit-eating are summarized too thoroughly, and no data on fat levels, gonadal development, distribution of catch within seasons, or fruiting times are presented. The format of the book seems ample, with sparse tables and wide margins, to have allowed inclusion of additional data. There are numerous minor discrepancies between data in the tables and those in the text.

Mercifully, Goulding doesn't force his data into supporting competitive exclusion, niche specialization during periods of scarcity, or other traditional theoretical suppositions. He concludes that most species specialize during high water, when food is abundant; congeners often overlap greatly; many species overlap with respect to what little is eaten during low water. Occasionally, Goulding reverts to completely speculative, competitive-evolutionary explanations (for instance that the characins "prevent—or better, have prevented, in the evolution of feeding behaviors—[the catfish] from making serious inroads into their food supply between sunset and sunrise"; p. 187). Old habits die hard.

The conflict between the demands of scientific presentation and those of popular writing has separated books of travels and natural history from scientific works. Goulding mars the presentation of some important work by trying to make this book a little of each. Nevertheless, the Amazon remains very poorly known, and this book stimulates both in what it can and in what it cannot answer. The effects of Amazonian deforestation on aquatic ecosystems are important, and Goulding's plausible argument deserves attention and further study.

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Vertebrate Physiology

Epithelial Transport in the Lower Vertebrates. Transports Epithéliaux chez les Vertébrés Inférieurs. Jean Maetz Symposium, Villefranche-sur-Mer, France, June 1978. B. LAHLOU, Ed. Cambridge University Press, New York, 1980. xiv, 366 pp., illus. $55.

This volume is the proceedings of a memorial symposium to Jean Maetz. A distinguished group of investigators has contributed 29 papers, five of them in French, dealing primarily with the structure and function of fish gills. Thus the title is misleading, since amphibians receive minor treatment and reptiles none. The papers are grouped into four categories, morphology, transport, biochemistry, and endocrine regulation.

The heavy reliance of this treatise on the study of fish gills illustrates a curious propensity of certain schools of comparative physiology to study a preparation despite its unsuitability for rigorous testing of hypotheses. Bentley (p. 7) acknowledges this problem in an amusing fashion: "Gills appear to have been designed to provide the ultimate intellectual exercise for those who wish to study epithelial membrane physiology." Everyone recognizes the importance of gills and the significance of understanding mechanisms of gill transport, but I would suggest that few basic principles of transport can be discovered in such complicated, heterogeneous structures. In any case, gills have been "fashionable" for some years now, and the work of Maetz and his followers is the best of the efforts devoted to this complex epithelial structure. I wish that a similar array of talent could be brought to bear on the study of elasmobranch, reptilian, and avian salt glands, which are virtually pure populations of specialized transport cells.

The present volume is, however, an excellent introduction to epithelial transport in fish and will be of interest to all physiologists who want to keep abreast of recent developments in the field. A wide variety of experimental approaches is utilized, and the papers are of high quality. I was especially interested in the work reported by Potts on the effect of low *p*H on gill potentials and sodium balance. This is a rather neglected phenomenon that has great practical significance in relation to acid pollution; development of nonlethal bioassays based on changes in gill sodium transport rates is possible. Hughes's paper on the functional morphology of gills also seems a particularly valuable summary. Several of the authors discuss isolated fish skin and sheets of opercular epithelium. These topics deserve further study.

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Books Received

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Calmodulin and Cell Functions. Papers from a conference, New York, May 1980. D. Martin Watterson and Frank F. Vincenzi, Eds. New York Academy of Sciences, New York, 1980. xii, 446 pp., illus. Cloth or paper, $86. *Annals of the New York Academy of Sciences*, vol. 356.