what disjointed account of the who, why, and how of defense mechanisms. An alphabetical "how" list of "passive and overt behaviors" goes from "abdominal bursting" to "wing movements" with more attention to form than content. In the second chapter, S. Turillazzi briefly describes the Defense Mechanisms of *Polistes* Wasps. The third chapter (Vespine Defense, R. D. Akre and H. C. Reed) contains extensive descriptive material on yellow-jacket (*Vespula* and *Dolichovespula*) defense, much of which reiterates anecdotal observations. Little mention is made of hornet defenses (*Vespa*). The aggressiveness of the insects and cryptic nature of the nests undoubtedly contributes to the scarcity of systematic observations. Akre and Reed do a good job of organizing the current information on the different behaviors known to deter predation and parasitism.

The next two chapters make the book worth having been published. In "Defensive Behavior and Defensive Mechanisms of Ants," A. Buschinger and U. Maschwitz provide an extensive and well-organized review of structural, chemical, and behavioral means of survival. There is a superb chart of the glands used in defense, although the authors may draw some fire for the renaming of several glands (Janet's gland = tergal, anal, pygidial; Jessen's gland = sternal). Besides colony defense, they discuss food resource and territory defense and some evolutionary aspects of defense systems of ants.

In "Morphology and Ultrastructure of Termite Defense Glands," A. Quennedey at last presents extensive unpublished work (over 50% of the chapter!) from his uniquely valuable doctoral dissertation. This is an excellent systematic review of the fine structure and function of termite glands, despite its incredibly dense and stilted prose. Publishing delays render it out of date in some respects (over 50 papers on termite glandular secretions from 1980–1984 are not mentioned), but this is forgivable in view of the excellent TEM and SEM photographs which appear in no other English-language paper. A printing error resulted in missing half-pages on pp. 167, 179, and 182 of the review copy, something I've never seen before!

The final chapter, on "Elaboration and Reduction of the Venom Apparatus in Aculeate Hymenoptera" (Hermann) describes the structure of stinging weapons and associated glands. The prose is quite impenetrable at times: "In spite of the changes that have evolved along with furcular elaboration, the definitive muscle groups associated with ovipositor and sting levation and depression have retained their points of origin and insertion but have changed their significance in the maneuverability of these gonocoxapophyseal extensions" (p. 211). It is reasonable to have all of this information gathered into one place, but much is redrawn from only a few earlier papers. A useful glossary (6 pp.) is included before the index and (conveniently) right after Hermann's chapter.

This is really *Social Insects, Volume 5*, and should have been published three years ago to be timely. The contributions are not well balanced in content, with review or overview chapters mixed in with data published for the first time. There is also a serious stylistic imbalance which makes the book hard to enjoy fully. Libraries need it as a reference work, but few researchers will need to acquire it.

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FISHES OF THE WORLD. *Second Edition. A Wiley-Interscience Publication.*

By Joseph S. Nelson. John Wiley & Sons, New York. $44.95. xvii + 523 p.; ill.; index. 1984.

A thoroughly updated and expanded revision of the 1977 edition (reviewed in *QRB*, 52:215).

THE GASTRIC BROODING FROG.

Edited by Michael J. Tyler. Croom Helm, London. £14.95. ix + 163 p.; ill.; index. 1983.

Frogs perhaps more than any other group of vertebrates have an exceptional array of reproductive patterns. The discovery ten years ago that a small, relatively nondescript frog has the ability to convert its stomach into a chamber in which it broods its young attracted the attention of herpetologists and other biologists around the world. Gastric brooding is unknown among animals and this incredible modification of a digestive organ into a brood chamber adds a unique dimension to the already diverse and often-times bizarre spectrum of reproductive modes that characterize this most interesting group. It is perhaps fitting that this frog, described as *Rheobatrachus silus* in 1973 from a collection of twelve specimens, was restricted to a few rocky streams in a remote area of southeastern Queensland, Australia, a land typified by many unusual animals, often with strange reproductive habits (witness that egg-laying mammal, the duck-billed platypus). In addition to the obvious ecological and evolutionary questions generated in trying to account for the development of gastric brooding, considerable attention focused on the morphological, physiological and biochemical changes that take place in the process of converting the stomach to a brood chamber to nurture developing embryos. Veterinary and medical researchers became interested because an understanding of the mechanisms of gastric brooding potentially could enhance research on

problems associated with the control of hydrochloric-acid secretion in the stomach and the treatment of gastric ulcers. The apparent overwhelming requests for more information about this frog led several Australian researchers to summarize the knowledge of *Rheobatrachus silus* and gastric brooding. This book is the product of that effort.

Information is presented by eight authors in twelve chapters that cover topics from morphology, natural history, and larval development to the biochemistry and ultrastructure of the stomach. The chapters vary in approach, content, and style. Although some information has been published previously, most chapters contain new and informative data. I particularly enjoyed the following chapters: Natural History, in which Glen Ingram carefully documents aspects of the ecology of this frog and laces his account with anecdotes expressing the frustrations often encountered in field studies of this kind; Inhibition of Gastric Secretion, in which Paul O'Brien and David Shearman review the rather convincing evidence that prostaglandin (PGE2) secreted by the developing embryos inhibits the secretory properties of the stomach, thereby providing a modified environment suitable for brooding; Evolution of Gastric Brooding, in which Michael Tyler (the editor and major contributor to the volume) speculates about the evolution of this unique brooding pattern. He suggests that direct development preceded gastric brooding and that cannibalism of eggs or young was the initial step in the development of this mode. One could propose equally plausible evolutionary scenarios that do not require the evolution of direct development before that of gastric brooding or that argue for larval transport rather than cannibalism of offspring as an intermediate step and that are concordant with what is known about the movements of this species in the field and the developmental stages of brooded embryos. However, additional speculation is unwarranted until we know something about the site of egg deposition, and how and at what stage offspring are taken into the stomach.

In general, the book is well produced and free of errors. The occurrence of a few obvious typographical oversights, some poor layouts (Figures 2.3, 8.3, 8.16 and 8.17) and incomplete captions (RD vs RS in Figure 6.1; explanation of "p.r." in Figure 7.1) does not detract significantly from the overall work. While much remains to be learned about *Rheobatrachus silus*, this book more than adequately summarizes our current knowledge of this very unusual frog.

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DIE WÜRGER DER PALÄARKTIS: GATTUNG *Lanius*. *Die Neue Brehm-Bucherei 557.*

By E. N. Panow. A Ziemsen Verlag, Wittenberg Lutherstadt. 196 p.; ill.; no index. [Original work for the Neue Brehm-Bücherei from the Russian, translated by Gunther Grempe, Rostock. Original title: *Sorokoputy Palearktiki.*] 1983.

The shrikes (Laniidae) are a characteristic Old World family, two species of which have colonized North America. Most of the 30 species of the genus *Lanius* have been known for more than 150 years and even the subspecies are well known. What is still controversial is whether some allopatric forms are subspecies or full species.

The author lists and discusses all the species, but provides detailed life-history data only for the 13 Palearctic species. Since most of them have the major portion of their range in some part of the USSR, it is particularly fortunate that the author is a Russian ornithologist, with an excellent knowledge of the Russian literature. This greatly adds to the amount of the covered literature. This includes geographic range (breeding, migration, winter quarters), habitat and ecological niche, population density, pair formation and territoriality, nest building, nest structure and location, clutch size and number, incubation, nestlings, reproductive success, annual cycle (molt, migration), food, song, and call notes. The 89 illustrations are devoted to range maps, habitat photographs, drawings of courtship postures, and sonagrams of call notes and songs. Even though the volume summarizes a great deal of literature (a bibliography of 9 pages) there is much original information, based on the author's own researches. It is surely the best survey of the classification and biology of *Lanius* now available.

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CURRENT ORNITHOLOGY. *Volume 1.*

Edited by Richard F. Johnston. Plenum Press, New York. $39.50. xvi + 425 p.; ill.; author, subject, and bird names indexes. 1983.

This volume is the first in a new series that will present both review and position papers spanning the gamut of active ornithological research areas. Initiation of the series resulted largely from a questionnaire circulated by the Workshop on a National Plan for Ornithology. Suggestions received from the ornithological community are reflected in the topics and authors chosen for this and future volumes.

Volume 1 contains a collection of 12 papers on a diverse array of topics. These include avian demography, egg structure and function, clutch

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THE RETURN OF THE S
By John A. Love. Cam
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