cophagy ("ant-eating") results in convergence toward what appears to be an optimal means of exploiting this trophic resource, regardless of the initial stock from which the anteater has sprung. Moreover, optimal exploitation seems to depend on a particular body plan, or morphotype.

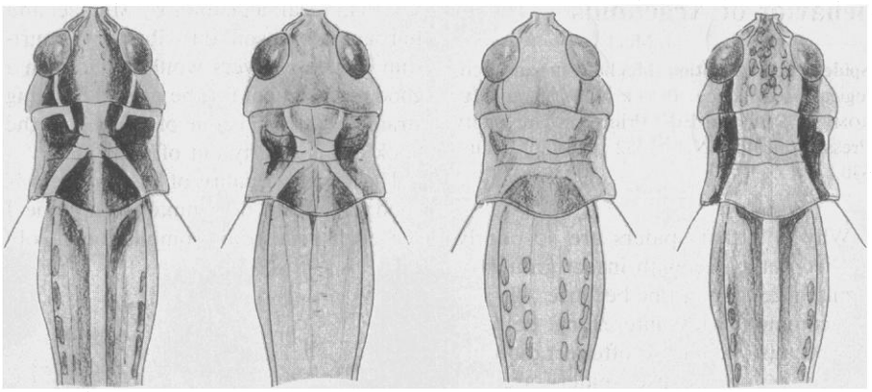
It is refreshing to me, at least, to see an argument as well reasoned as this one that is frankly "adaptationist" in its outlook. The "adaptationist program" has come under attack in recent years by a number of biologists who question the interpretation of organismic structure and function (and behavior) solely in terms of adaptations produced as a result of natural selection. One of the most eloquent spokesmen for this group of iconoclasts is Stephen Jay Gould. I once heard a witty and fascinating talk of his entitled "The Spandrels of Saint Marks," in which he argued that many seemingly adaptive features of animal structure are simply the product of other evolutionary pressures, just as the decorations in the spaces between adjacent church arches are the opportunistic result of a quite different solution to a structural problem. One may agree with Gould that not every squinch and pendentive of mammalian architecture is adaptive. Nevertheless, Eisenberg's book provides abundant evidence that adaptation has been by far the most important evolutionary factor leading to the great richness and diversity of the mammals with which we share the world today.

ROBERT S. HOFFMANN
Department of Systematics and Ecology and *Museum of Natural History, University of Kansas, Lawrence 66045*

Insects: A Manual

The North American Grasshoppers. Vol. 1, Acrididae: Gomphocerinae and Acridinae. DANIEL OTTE. Harvard University Press, Cambridge, Mass., 1981. xii, 276 pp., illus., + plates. $45.

Insects play major roles in all terrestrial ecosystems, but their use in ecological research is impeded by inadequate knowledge of their taxonomy and a lack of authoritative identification manuals. These impediments are unfortunate because the abundance, diversity, and short generation time of insects often make them, rather than vertebrates, animals of choice in testing ecological theory. The plenitude of insect species contributes to the poor state of their taxonomy. North America, for example, has 2,000 species of tetrapod vertebrates but more than 90,000 species of insects. Even in insect groups that are taxonomically well worked, identification of North American species is generally impossible without help from a specialist. Specialists are scarce, and to identify insects for field biologists they usually must take time from their own research—yet another reason why many insect species are still to be discovered, recognized, and described.



"Pattern variation in *Aulocara elliotti* females." The species, "very abundant in the western half of the United States, southern portions of the prairie provinces of Canada, and north-central Mexico," is "often associated with bare patches of ground." [From *The North American Grasshoppers*, vol. 1]

Daniel Otte has made a praiseworthy start toward easing the problems of species identification of North American grasshoppers, an insect group that has been taxonomically well studied and that is important both ecologically and economically. In this, the first of a projected three volumes that will include all species north of Panama, Otte treats the 127 species of two subfamilies in a manner that makes the user as confident of grasshopper identifications as he or she would be of bird identifications in using Peterson's *Field Guide to the Birds*. Otte accomplishes his purpose with clear, concise text and an abundance of pertinent, well-executed illustrations. Like Peterson, he does his own artwork, and each drawing shows features that facilitate correct choices among candidate species.

Like birds, grasshoppers often vary intraspecifically in hue and pattern. Otte illustrates much of this variation in full color—16 plates, including 159 portraits of whole insects and 44 "bust" drawings (head and prothorax). Further, he inserts unnumbered hundreds of line drawings of portions of grasshoppers, showing key interspecific differences and noteworthy intraspecific variants. He depicts the known distribution of each species by bold points on a base map.

The North American Grasshoppers is directed primarily toward professional biologists rather than amateur naturalists. It spares no space for common names or suggestions of how to maintain a hobby interest in grasshoppers. On the other hand, it is not written chiefly for other taxonomists. A three-page glossary helps the nonspecialist build needed vocabulary, and one page is devoted to how taxonomists pronounce the 42 valid generic names. (An ecologist thus need not risk embarrassment in talking to a grasshopper expert about *Boopedon* or *Xeracris*—"Boh*oh*pedon" or "Zeer-*a*cris.") Taxonomic esoterica, such as nomenclatural histories and locations of type specimens, are made brief and consigned to appendixes. The main text keeps to the business of state-of-the-art species identifications using well-illustrated dichotomous keys, tables of identifying features, and succinct species accounts that deal with geographical distribution, recognition, habitat, seasonal life cycle, and references.

I know of no finer or more authoritative identification manual for any group of animals. For North American insect species, this book has no equal. Adolescent field biologists may become partial to taxonomic groups in which they can identify the species they encounter. If this be so and if Otte completes the remaining volumes of his projected trilogy, we should observe within the decade a surging of research on grasshoppers.

THOMAS J. WALKER
Department of Entomology and Nematology, University of Florida, Gainesville 32611