

its discovery a little over 20 years ago.

Altman's book is a commendable effort to document and bring up to date this fast-moving field. The level is moderately advanced and the references are extensive, so that the book is an essential addition to the library of those working with tRNA; the book can also be used as a starting point for a graduate student making his or her first venture into the field.

B. R. REID

Department of Biochemistry,  
University of California, Riverside 92502

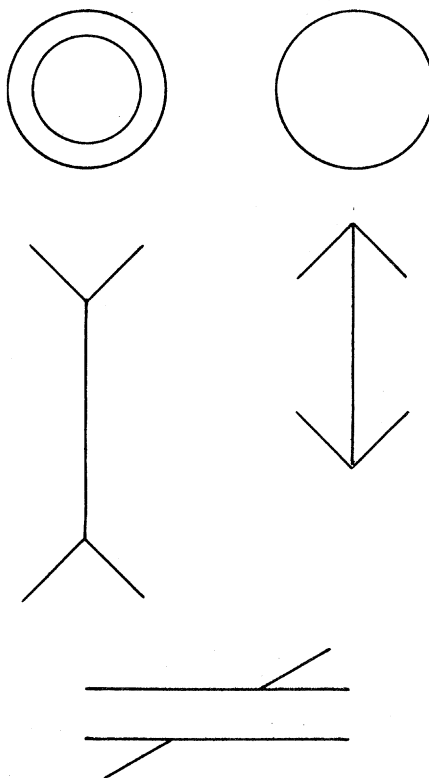
## Perceptual Phenomena

**Seeing Is Deceiving.** The Psychology of Visual Illusions. STANLEY COREN and JOAN STERN GIRGUS. Erlbaum, Hillsdale, N.J., 1978 (distributor, Halsted [Wiley], New York). xvi, 256 pp., illus. \$18.

Our senses do deceive us. The objects of interest are easy-to-draw two-dimensional line drawings whose illusory effects are not at all easy to explain. Venerable examples are the Delboeuf illusion, the Müller-Lyer illusion, and the Poggendorff illusion, producing the misperception of circle size, line length, and transversal collinearity, respectively (see illustration).

*Seeing Is Deceiving* provides comprehensive coverage of the wide array of visual geometrical illusions. With its introductory chapters on relevant historical issues and a systematic presentation in words and drawings of the major illusion families, the book can serve as a primer. The layperson or student will find the exposition interesting and informative. The prose is straightforward and relatively free of extraneous technical jargon.

Be not misled. The study of visual illusions has come of age, and succeeding chapters are meat for the expert. The authors are long-time collaborators in illusion research who have made sustained and significant contributions to data and theory. Having brought the reader's background up to snuff, they forge ahead, conveying in broad strokes what the 1000 or so articles that have been published on visual illusions collectively have to say. In comparison to J. O. Robinson's 1972 book, *The Psychology of Visual Illusion*, *Seeing Is Deceiving* is more readable, contains less detail, presents information in a more coherent fashion, and strongly presses a point of view. The Robinson treatise is closer to a handbook, while the Coren and Girgus



Visual illusions. Top to bottom: Delboeuf illusion, Müller-Lyer illusion, and Poggendorff illusion.

volume sacrifices detail in the cause of conveying the underlying theoretical principles, critically comparing theories, coming to conclusions, and thus providing badly needed structure and integration. One knows where to turn for further details; nearly half the total illusion output is referenced.

For the specialist what is different? First, there is an insistence on multiple causation. The fact that a few simple pen strokes suffice to create an illusion does not imply that simplicity extends to causes. Second, there is an emphasis on a spectrum of causes that begins with the error characteristics of the eye (for example, spherical aberration), considers neurophysiological mechanisms, both peripheral and central, and includes the cognitive factors dear to the hearts of certain psychologists. Third, the study of individual differences is touted as an important approach to the delineation and understanding of causes. Fourth, the diminution in measured perceptual error that results from merely looking at an illusion display is attributed to changes in the judgmental strategy of subjects. Although the book is light on data, the authors do present tables and graphs of their own individual-difference correlation studies and decrement studies.

In summary, the work is a readable, coherent presentation of the state of the art in visual-illusion research and theory.

Coren and Girgus have chosen to define an illusion as "an *apparently inexplicable* discrepancy between the appearance of the stimulus and its physical reality" (p. 23). They go on to say, "Ultimately, when we know exactly how the visual system works, visual illusions should no longer exist" (p. 23). Have they managed to put themselves (and the rest of us) out of business? By no means. They have, however, made significant progress. The book is indispensable for student and specialist. To the specialist: You will not see eye to eye with the authors, but I can promise widened horizons. As in many other fields, progress in illusion research has suffered because investigators are afflicted with tunnel vision.

DANIEL WEINTRAUB

Department of Psychology,  
University of Michigan,  
Ann Arbor 48109

## Archeological Summary

**European Prehistory.** SARUNAS MILISAUSKAS. Academic Press, New York, 1979. xiv, 336 pp., illus. \$18. Studies in Archeology.

Europe has a long history of archeological research, with considerable changes in techniques and aims through time. Moreover, there is tremendous regional variation in the available data owing to differing local or individual research priorities and methods. Much of the European research has been conducted with the primary goal of establishing regional chronologies and distribution patterns. As a result, the literature of European prehistory is often frustrating to archeologists grounded in anthropological theory and concerned with processes of cultural adaptation and evolution.

In writing this much-needed synthesis of European prehistory, consequently, the author has faced the problems not only of a large and heterogeneous data base but also of significant differences in background and research interests between many European archeologists on the one hand and much of the English-speaking audience for the book on the other. Milisauskas has handled the difficulties remarkably well.

It must be emphasized that the book is narrower in scope than the title suggests. It focuses on Central and Eastern Europe from the Neolithic through the Iron Age, and there is only brief discussion of the Paleolithic and Mesolithic and little coverage for any period of Spain, Por-

tugal, Italy, France, Belgium, the British Isles, and the Netherlands. The treatment benefits from the author's extensive research and excavation in Poland and provides access to much literature that is not readily available to the English-speaking reader, but those seeking an overview of the entire continent will still have to turn to the primary literature. Now, though, they will at least have the general framework provided by this book for guidance.

The book begins with chapters on geography and the preagricultural background. The remaining chapters are arranged in chronological sequence, and each is divided into sections on economy, settlement, sociopolitical organization, and ritual, with in some cases additional sections devoted to special topics such as warfare and fortifications, writing, and local state development. The discussion of sociopolitical organization uses the general framework of level of complexity—band, tribe, chiefdom, and state—defined in terms amenable to archaeological determination. The benefits of this organization are that it imposes order upon a large and complex body of data and permits easier comparisons through time and space. The drawbacks include a tendency to impose uniformity at the expense of local variation and to compartmentalize different aspects of cultural behavior, obscuring their relationships. Examples for different sections within a chapter are often drawn from different sites or areas, further obscuring the relationships.

To illustrate the account numerous tables of food remains and burial goods are presented. Unfortunately, the data are presented without context, so that little evaluation of the tables can be made without extensive research into the primary sources. The many charts give (and were perhaps chosen to give) an impression of the variability among sites, though the text downplays this variability.

Within the framework the author has adopted, the trends of culture change are described. The processes underlying these trends are dealt with only in general terms. For example, it is stated (p. 45) that the archeological differences between the Neolithic of southeastern Europe and that of the Near East are "to some extent . . . accounted for" by environmental conditions, but no elaboration is offered. The expansion of farming populations from the southeast is likewise proffered with little support as the most likely explanation for the initial appearance of domesticates in much of Europe. The implications of this process of ex-

pansion, such as the differences between frontier and heartland in terms of selective pressures, the sociopolitical significance of the adoption of longhouses in Central Europe, and the relationships between farmers and foragers, are virtually ignored.

Overall, this is a cautious presentation of the trends of culture history, downplaying earlier sweeping interpretations involving massive early migrations and simplistic economic dichotomies between farmers and raiding pastoralists. On the other hand, little is advanced to replace these generalizations and no new theoretical ground is broken. A more stimulating presentation might have been achieved had Milisauskas taken a stronger theoretical position and presented more specific hypotheses to explain spatial variation and temporal change. The recommendations for future work could then have been in the form of testable hypotheses rather than the vague suggestions for further excavation or more frequent regional studies presented here.

On the whole, this book is valuable and welcome as a summary and partial synthesis of a complex culture history. It may stimulate many questions, but their answers, even in the form of initial hypothesis formulation and evaluation, must be pursued well beyond its pages.

MICHAEL JOCHIM

*Department of Anthropology,  
Queens College,  
City University of New York,  
Flushing, New York 11367*

## The Phylogeny of Clams

**Evolutionary Systematics of the Bivalve Molluscs.** Papers from a meeting, London, May 1977. The Royal Society, London, 1978. pp. 199-436, illus., + plates. Paper, £17. Philosophical Transactions of the Royal Society, London, series B, vol. 284.

Since their initial radiation in the Ordovician, clams have developed the "most successful of all types of ciliary feeding mechanisms," and they show a reasonably steady and continual increase in taxonomic diversity up to the Recent. They are the subject of a rich fossil record stemming from their center of abundance in shallow-water marine areas and provide significant material for students of evolutionary phenomena, taxonomists, and stratigraphers. Unfortunately, for much of this century clam evolution and higher classification attracted very few workers. Some paleontologists continued the Douvillean tra-

dition of studying hinge and shell, while a school of mainly European workers, characterized by Paul Pelseneer, derived classifications from gill structure.

Inspired in large part by the nearly 50 years of holistic studies of C. M. Yonge on clam functional morphology, paleontologists have recently expanded their horizons to include living specimens, and several neontologists have extended their study horizons backward in time. This symposium proceedings is a major status report on the knowledge of and opportunities for study presented by this ancient group. The leading contemporary workers on clam evolution and systematics have summarized their current thinking, providing a mine of ideas for evolutionary biologists seeking data-rich sources for investigation as well as achieving a quantum jump in the information available to malacologists.

The advances are many, and the descriptions of new ordinal and class level taxa are almost incidental to them. A major function of the volume is to focus attention on matters of total uncertainty and controversy. J. Pojeta beautifully documents the initial clam radiation in the Ordovician in a paper that overlaps with a survey of the Rostroconchia by B. Runnigar. These authors' controversial views on the initial radiation of the mollusks are consolidated and refined, but there is no agreement as to clam origin or the systematic position of early experiments in "bivalvity." Pojeta and Runnigar believe that the Rostroconchia are ancestral to the Bivalvia and are the only extinct class of mollusks; O. A. Scarlato and Y. I. Starobogatov place them as a suborder of the order Septibranchia; and E. Yochelson continues to believe that they are only one of several extinct molluscan experiments.

Most of the papers mark genuine advances in knowledge or are well-crafted summaries of recent major studies. J. A. Allen points out that the extant deep-sea bivalve fauna is most similar in life-style to the initial Ordovician radiation and probably consists of ancient survivors thereof. Kauffman's study of evolutionary rates in Cretaceous bivalves, Stanley's review of the Trigoniidae, and Waller's major revision, taking a Hennigian approach, of the Pteriomorpha all provide major conceptualizations based on factual observations and stratigraphic data. On a more philosophic level, the contributions of Skelton on rudist design and Thomas on arcid limitations provide stimulating views of important groups.

The more general survey papers include a well-balanced review by Newell and Boyd of approaches to evolutionary