zoans, and cellular slime molds are attempted, even though the adaptations are in some cases parallel and pregnant with theoretical implications. For a systematic account of animal coloniality it will still be necessary to consult the first volume of W. N. Beklemishev's *Principles of Comparative Anatomy of Invertebrates*. But even this review is overly brief and unnecessarily technical, leaving the need for a modern general synthesis of the subject largely unfilled.

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## Neural Bases of Rhythmicity

**Neurobiology of Invertebrates.** Mechanisms of Rhythm Regulation. Proceedings of a symposium, Tihany, Hungary, 1971. J. SALÁNKI, Ed. Akadémiai Kiadó, Budapest, 1973. 494 pp., illus. $24.

In his introductory remarks to this satellite symposium of the 25th International Congress of Physiological Sciences Salánki notes that "rhythmicity and cyclic character is one of the rules of the living processes." The proceedings volume presents 33 papers examining aspects of rhythmicity at various levels of biological organization.

In line with the current emphasis on physiological analysis of arthropod and molluscan nervous systems, little attention is given to rhythmic phenomena in invertebrates other than crustaceans, gastropods, insects, and pelecypods.

Most of the papers may be cataloged under three topic categories: the cellular basis of pacemaker rhythmicity, the regulation of cardiac rhythms, and the generation of rhythmic behavior patterns.

Three papers examine the contributions of $K^+$ conductance changes and $Na^+$ pump activity to the generation of neuronal pacemaker activity. The reports of Carpenter and of Wachtel and Wilson respectively support the primary pacemaking role in *Aplysia* of $K^+$ conductance changes and of $Na^+$ pump activity. A synthesis of these contradictory results is suggested by Livengood and Kusano, who demonstrate in the crustacean cardiac ganglion that rhythmic pacemaker activity is most likely generated by a decrease in $K^+$ conductance and modulated by an electrogenic $Na^+$ pump.

Several papers deal with the role of neurotransmitters, neurohormones, and pharmacological agents in the regulation of cardiac rhythmicity. Among the most interesting are the three by Greenberg *et al.*, Miller, and Richter, who examine the cardioregulatory effects of extracts from neural tissues. A lively discussion erupts when Miller demonstrates the myogenic nature of cockroach heart rhythmicity.

Complete analysis of the neural generation of complex rhythmic behavior patterns requires quantitative study at two levels: detailed analysis of motor neuron activities that generate the behavior, and intracellular recording from the neuronal elements that participate in the generation of the motor neuron output. Elegant examples of the first type of study are provided in this book by Elsner's paper on grasshopper courtship and Wyman's statistical analysis of dipteran flight motor neurons. Reports of intracellular examination of neuronal interactions in the locust, presented by Hoyle, and in *Tritonia*, presented by Willows, provide new insight into the structure of the neuronal circuits which generate rhythmic motor outputs.

As Prosser notes in his concluding remarks, this symposium was characterized by the diversity of topics considered. Unfortunately it was also afflicted by a great disparity in the interest and quality of the work presented. Some papers are excellent, providing concise reviews of recent work with supporting experimental data. These are counterbalanced by several papers of poor quality which in terms of ideas, experimental design, and results presented should have been excluded from this volume.

A general characteristic of most papers in this symposium is insufficient breadth for the general reader in physiology or zoology and insufficient depth for the interested comparative neurophysiologist. While I cannot recommend the book to the general reader, about two-thirds of the papers do present work of sufficient interest to merit the attention of the neurobiologist. For the neurophysiologist interested in rhythmic phenomena the book contains a sufficient number of provocative discussions supported—in part—by experimental data to merit inclusion in his or her personal library.

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## Instruments and Their Use

**The Encyclopedia of Microscopy and Microtechnique.** PETER GRAY, Ed. Van Nostrand, Reinhold, New York, 1973. xii, 638 pp., illus. $32.50.

Microscopy is covered by five pages of contributors from Acanthocephala to zoom microscopes, in alphabetical order, and an index facilitates access to the material. The statement that this is not a second edition of Clark's *Encyclopedia of Microscopy* (1961) precludes comparison with that work. Gray has included useful information on stains and preparation methods from his earlier out-of-print books. This book is new and different.

Many of the biological entries give preparation technics and information useful to microscopists. Most entries have up-to-date reference lists. Some (automatic histology, fluorescence, Quantimet, reconstruction, stereo, zoom, and others) fail to indicate that more is known than is given in the entry itself. The illustrations vary from excellent to poor. Most of the entries should be usable for high school seniors and college freshmen; a few (holography, resolution) use simple mathematics.

Industrial microscopy is included: atmospheric, bakery products, clay, metals, sand, and so on. Microscopes receive less full treatment than preparation methods. For example, the account of polarized light microscopy is limited to crystallography and fails to indicate its usefulness in particle identification or biological applications. Resolution is discussed in several entries and one ten-page entry that fails to mention modern work of Charman, Osterberg, van Duijn, and others. It does compare optical and poor electron microscope pictures of diatom shells. Diatoms are not listed. Only the entry on photomicrography mentions accommodation of the eye with reference to depth of field and focus.

Of recent active methods, stereology and, in a limited way, microspectrophotometric methods are recognized. I am amazed that interference microscopy (except for a listing under another topic) and the considerable developments and trends toward automated microscopy are not included. The item on blood fails to mention instruments developed for automatic blood counts, nor does the item on chromosomes mention computer methods for typing and analysis. The only entry along these lines is Quantimet, which lacks refer-