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BOOK REVIEW

Advances in Vertebrate Neuroethology. Edited by J-P. Ewert, R. R. Capranica and D. J. Ingle. Plenum, New York. 1983. XVIII + 1238pp. Price US\$150.

The key question in theoretical neurobiology is not to obtain a detailed description of the mathematical physics of neurones or neural systems, but to relate the structure and behaviour of neural tissue to the overall functioning of the nervous system. It is necessary to know what, as well as how, the nervous system performs. Thus neuroethology, the relationship between neuroscience and behavioural science, should provide the foundations for theoretical neurobiology: "Advances in Neuroethology" is the proceedings of a NATO Advanced Study Institute that was held in August, 1981, and provides some of these foundations.

While invertebrate neuroethology has emphasized simple motor behaviours triggered by command neurones or generated by neural networks, vertebrate neuroethology has concentrated on sensory and motivational systems. Information and communication theory has provided a powerful conceptual framework that has been successfully applied to peripheral sensory mechanisms: this is illustrated by the symposium volume "Sensory Communication" (ed. W. A. Rosenblith, M.I.T. Press, Cambridge, 1961). This remarkable book is still to be seen on the shelves of many neurobiologists, and it has been influential not only because of its timely and authoritative contents, but because it was published in a form that graduate students could afford. One of its chapters dealt with Lettvin, Maturana, Pitts and McCulloch's pioneering approach to the frog visual system (What the frog's eye tells the frog's brain, *Proc. Inst. Radio Engr.*, 1959, 47, 1940-51).

This approach, in which sensory systems are characterized by using behaviourally relevant stimuli, forms the core of "Advances in Vertebrate Neuroethology". The volume, of 61 chapters, consists of 3 introductory position papers, then sections on Implications for Neuroethology (from ethology, comparative neurophysiology, neuroanatomy and insect neuroethology), the Neural Prerequisites of Signal Localization, the Neural Bases of Signal Identification, the Neural Bases of Intraspecific Communication, and the Central Control of Motivation. The 41 chapters dealing with signal localization, identification and intraspecific communication form a detailed and extensive description of what some well-defined neural systems actually do: examples are drawn from fishes, amphibians, mammals and birds, and involve olfactory, visual, auditory and electro-sensory systems.

This wealth of information presents two challenges to theoretical neurobiologists. The first is that there are several behaviours, such as prey-capture in the frog and the Jamming Avoidance Response of electric fish, where there is sufficient information

for detailed modelling of how a known behaviour is produced by a well defined neural system. This is in contrast to theoretical approaches to the cerebellum, where the neural system is well defined, but the function speculative. The second is that it is possible to abstract the principles of the neuronal operations involved in tasks like signal localization, from detailed information obtained from a range of sensory systems and species.

Thus this book contains much of interest to theoretical neurobiologists, and the organizers of the Advanced Study Institute deserve our thanks for bringing together the material in this timely volume. However, this volume will not be as influential as its contents deserve, as it is poorly produced and overpriced. The contents have been centrally retyped (which gives a uniform typeface but introduces errors) and the volume produced from this camera-ready copy. The result is an awkward, expensive volume of 1250 pages; a more sensible typeface would have given a cheaper, more manageable volume. The contents of this volume deserve to be widely read, but even university libraries will be reluctant to buy it.

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