REVIEWS

Brain and Learning. Edited by Timothy Teyler. (D. Reidel Publishing Company, P.O. Box 17, Dordrecht, Holland), 1978. Pp. 163. Price : Not given.

This book provides the student of Neurosciences and Behavioral sciences relevant up-to-date information on this subject and speculates on the nature of learning and memory. It has been shown that the effect of environment can change the neural plasticity in many ways and the response of the organism is potentially multifaceted.

Kendell and woody have a profound understanding of response plasticity by using invertebrate mollusc animal model. This animal has a simple nervous system with ganglia consisting of a few hundred cells only. The stimuli to the ganglion produces a defensive withdrawal reflex and this is shown to habituate to repeated stimulation. In several of these experiments, an attempt has been made to study whether one or a few kinds of neuronal mechanisms can account for learning in all its manifestations or whether there are as many neuronal mechanisms as there are situations of learning studies. It is clear that a multifaceted approach is presently required. In chapter 3, the authors have presented several models of vertebrate nervous system showing nonassociative plasticity and synaptic mechanisms involved in neuronal plasticity. Whether this knowledge, by model system approach, will prove useful in the learning mechanisms of intact brain remains to be seen. It is probable that the neural basis of such complex behaviour will be found to lie in dense patterns of interconnectivity. It is reasonable to expect some elementary behavioural learning can be explained by simple mechanisms of synaptic plasticity.

In the next chapter there are overviews of modern approaches and the experimental studies on the neurons in the spinal cord, cortex and hippocampus, etc. It has been shown that many neurons in the brain possess plasticity, the property of changing their activity as a result of past activity or experience. It is not sure whether all neurons are equally plastic or some have different plastic properties and different inputs can yield different plasticity values. The brain has many highly organised systems and each of these appear to be doing different things in terms of learning and memory, and all these interact in complex and still unknown ways. The human memory is now viewed in terms of information flow, through shorter and longer term process of memory. Studies in this chapter suggest the limbic structures, particularly the hippocampus is involved in short term memory processes. The pattern that is beginning to emerge is one of different brain systems, playing differing but often overlaping and complementary roles in the memory systems.

In chapter 5, Gold and McGaugh discuss neurobiology and memory. They give clear warning that one should not consider a single mechanism, to be responsible for the information storage in the nervous system and further point out that the traditional ways of subdividing the brain are only creations of our own mind and are, at best, a logical if not warranted parcellation of a natural system.

In the next chapter, Lynch and Wells discuss plasticity of a neuroanatomical nature. They show that dramatic changes occur to the cells of the brain, both neurons and glia, following environmental manipulations and following damage to the brain. This suggests that the fine sgructure of the brain is not at all fixed, rather dynamic, and, everchanging in response to altered demands put on its own operation. An important observation is made that the behavioural alterations which follow lesions, might be due not only to the loss of the tissue but also to the aberrant circuitry set up throughout the wide reaches of the brain. Furthermore while studying the recovery function after brain damage, the behavioural effects of lesions to central nervous system are not always permanent and in many cases ameliorate with time.

In the chapter on the development and memory, researchers generally assume that individual engrams are formed which are specific memories of behavioral events and experience seems to add to the existing structures. Hence developmental memory may involve in reorganization of the existing structures and may be reflected in the "Wiring diagram of the brain". In particular, changes in the number and/or pattern of synaptic connections in the brain have been reported after different forms of stimulation. Animals reared in complex environments have more synapses. The experimental findings are compatible with selective preservations of synapses and this may have to be investigated as information storage mechanism in the brain.

In the last chapter, Primbram has studied modes of central processing in human learning and remembering. His observations are on the results obtained with technique of psychosurgery. In this, he studies the effects of localized resections of brain tissue on behavioural performances. Learning deficits are related to one of the other sensory modes, namely, the auditory, visual, somatosensory, gustatory or olfactory stimuli. The sensory input, after reaching the

association cortex is converted into the output pathway to the basal ganglia, cerebellum and other areas. There seems to be two clear types of processing, important to learning and remembering. One process is involved in shaping, in orienting and its habituation, sensory search, attention and memory. This process is drastically interfered with by lesions in the frontolimbic part of the forebrain. The second is involved in the attainment of sensory motor skills and this process is impaired by the resection of the posterior convexity of the cerebral cortex. Resections of the frontal cortex, the amygdala, result in the impaired viseroautonomic response, orienting and failure of behavioral habituation to occur. Hence these experiments have contributed a great deal to the understanding of human learning and memory.

The various chapters in this book are well written with extensive bibliography. The contents give valuable information to the understanding of brain learning and memory and speculate further studies in the various fields. This book is recommended as a must for scientists working in the fields of Neurosciences and Behavioral sciences, and for a good medical library.

V. S. ACHAR.

Geological Maps. By G. W. Chiplonkar and K. B. Powar. (Dastane Ramachandra & Co., 456, Ravivar Peth, Pune 411 002). Pp. 113. Price Rs. 15.

This is the third edition of the book originally published in the year 1952. Excepting that brief descriptions are given for the figures, not much change has been effected in the organisation. It would have been better if metric scale had been adopted throughout in the revised edition. Some of the illustrations are of poor quality and require to be improved in future editions. References given at the end of the book are totally inadequate. Most of the references cited are very old, latest being 1949. A list of the modern books dealing with the subject would be welcome.

The usefulness of the book lies in the many illustrative examples of local geology, a thing which is missing in many of the lavishly produced American Text Books. The price of the book has been kept low at Rs. 15 to persuade students to possess their own copy.

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Particulars of *Current Science*—The Fortnightly Journal of Research in Science, India—as per Form IV under Rule 8 of the Registration of Newspapers (Central), 1956.

1. Place of Publication: Bangalore.
2. Periodicity of Publication: 5th and 20th of each month.
3. Printer's Name and Address: The Bangalore Printing and Publishing Co. Ltd., P.B. 1807, Mysore Road, Bangalore 560 018.
4. Publisher's Name, Nationality and Address: Prof. M. R. A. Rao, Indian, Current Science Association, Bangalore 560 080.
5. Editor's Name, Nationality and Address: Prof. M. R. A. Rao, Indian, Editor, *Current Science*, Bangalore 560 080.
6. Name and Address of the Individual who owns the Paper: The Current Science Association, Bangalore 560 080.

I, Prof. M. R. A. Rao, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Bangalore-80,
March 5, 1980.

(Sd.) Prof. M. R. A. Rao,
Publisher, *Current Science*.

8016/80 Edited and Published by Prof. M. R. A. Rao, Current Science Association, Bangalore 560 006 and Printed at The Bangalore Press, Bangalore 560 018.