FAST OSCILLATIONS IN CORTICAL CIRCUITS.
By Roger D. Traub, John G. R. Jeffreys and Miles A. Whittington.

Justification for writing a book on fast oscillations is chiefly the idea that they are related to ‘binding’ to perceptual stimuli—that is, consciousness of a sort. In the authors’ ‘Final thoughts’, the question is raised ‘How can we be sure that gamma oscillations are necessary for brain function at all?’ At present we cannot be sure that they are. But work of the sort presented in this book will at least make us well prepared for the analysis of consciousness in mathematical and physiological terms once/if this necessity can be demonstrated.

The general reader who wants to know whether there is a relationship between oscillations in the cerebral cortex and behavioural states may be put off by the start to Chapter 1 which begins with an example of a wave equation with periodic oscillations. However, s/he should not be deterred from reading further. The book is, of course, a tough read— it is a tough subject. There is, however, plenty that the reader without a background in mathematical modelling can understand.

The chapter that describes and explains the properties of single hippocampal neurones in terms of their membrane properties and the spatial distribution of different kinds of ion channels is relatively easy to read and provides a clear description of the starting point for oscillatory activity. The chapters on synaptic input pull together a huge area of research in a clear and interesting way. Since epilepsy involves the synchronous firing of populations of neurones its study is relevant to the production of oscillations and neuronal modelling of epileptiform discharges in hippocampal slice preparations leads to proposals for possible mechanisms for the epileptic chain reaction. Not surprisingly, the work on neuronal networks is not particularly accessible to the general reader. However, the chapter on the occurrence and possible significance of gamma oscillations in vivo makes an important introduction to the subject for those not familiar with the evidence, drawing examples from a wide range of brain structures and behavioural states.

Overall, the book seems well able to serve the dual purpose of providing useful and detailed information for those directly involved in the field and of introducing the subject in an interesting and mainly accessible way to the general neuroscientist who wants to know more about this subject which is likely to become of central importance within the next few years.

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