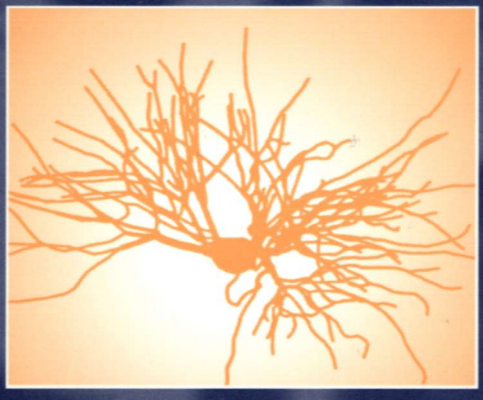
MONOGRAPHS OF THE PHYSIOLOGICAL SOCIETY 49

Thalamocortical Assemblies

How ion channels, single neurons and large-scale networks organize sleep oscillations

Alain Destexhe & Terrence J. Sejnowski



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Thalamocortical Assemblies

How Ion Channels, Single Neurons and Large-Scale Networks Organize Sleep Oscillations

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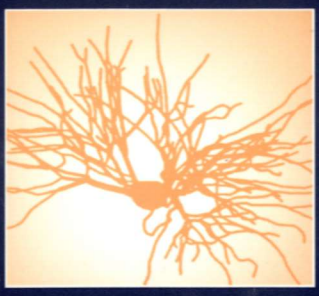
To Beatrice and Laurence, who helped us in many ways and for their forbearance with our sleep deprivation

Contents



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During sleep, the mammalian brain generates an orderly progression of low-frequency oscillations. The nature of these oscillations changes as the brain moves from sleep onset into deep sleep. Although readily measured and recorded, the underlying neural mechanisms involved and the purpose of these oscillations have remained unclear. However, as we learn more about the properties of neurons in the thalamus and cerebral cortex and their interactions, it has become possible to suggest a role for these occurrences.

This book reviews the molecular components and ionic mechanisms underlying sleep oscillations, including the properties of ion channels, synaptic receptors and the patterns of interconnectivity among thalamic and cortical neurons. These properties have been used to build detailed computational models of thalamocortical assemblies and their collective behavior.

The precise experimental data collected has provided a foundation for the study of dynamic activity in the central brain systems and it is now possible to suggest a role for thalamocortical oscillations in memory consolidation.

Thalamocortical Assemblies is for neuroscientists, neurobiologists, physiologists and other researchers interested in sleep and memory processes.

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