Thalamocortical Assemblies
How ion channels, single neurons and large-scale networks organize sleep oscillations
Alain Destexhe & Terrence J. Sejnowski
Thalamocortical Assemblies
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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
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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 deep sleep into slow sleep. Although widely 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 interconnections, it has become possible to suggest a role for these oscillations.

This book reviews the molecular components and gene mechanisms underlying these 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 nervous system and it is now possible to suggest a role for thalamocortical oscillations in memory consolidation.

The monograph is intended for neuroscientists, neurologists, psychologists, and other researchers interested in sleep and memory processes.