

Chapter 3

How the Brain is Organized

This chapter describes what neuroscience knows, until the moment, about brain areas and functions.

3.1 The Neuron

The neuron is the major brain-processing unit (Figure 3.1). It is composed by a cell body containing its nucleus, where information about neuronal physiology is encoded into DNA, by axon (long cable) in charge of transmitting information encoded in its electrical activity to other neurons located in other areas of the brain, and dendrites that are short cellular ramifications in charge of receiving information transmitted by axons of neurons in other brain areas (Figure 3.1). Connections between neurons are established among pre-synaptic terminals, and dendrites.

Since the classical Galvani's experiments, electrical membrane gradients and their induced variations play an important role in the understanding of the cerebral physiology. These electrical membrane gradients are created by keeping a high concentration of sodium (Na) inside the cell and of potassium (K) at the outside cellular space. The Nobel prized work of Hodgkin and Huxley in the first half of the 20th century clearly identified the main membrane components governing its electrical behavior and formalized this behavior as equivalent to that of a dynamic system having two stable and one unstable equilibrium states (for further discussion of this subject, see Rocha, 1992).