
Preface

For several decades now, scientists have attempted to translate ancient beliefs on the nature of the human mind inspired by Greek philosophers, into a scientifically based understanding of the functions and processes occurring within the physical matter amassed in the 1.5 kg of tissue that make up the human brain. The goal of this modern science that we call *Neuroscience* is to understand how brains are able to retain for decades, and recreate at will, the color and taste of a ripe apple or the scent of a rose.

Taboos are vanishing now as scientists are collecting mounting data on the question of mind with the empirical language of biology, physiology, ecology, and ethology. Indeed, during the last years, *Neuroscience* has expanded into and converged with quite many domains – from anatomy to zoology, from physiology to computer science and many more. *Neuroscience* has received vast attention in the media and in public discourse, among others through our increasing knowledge of neurological diseases such as Alzheimer and Parkinson's, by addressing ethical questions such as brain death, or because of interdisciplinary convergences which in turn create new disciplines – even pedagogy, politics, and prosthetics now have their own specific “neuro” flavors.

This textbook covers *Neuroscience* from the cellular and molecular level, to behavior, and cognitive processing – thus giving every interested reader a solid basis of knowledge about this now well-established discipline. We also address evolution of the nervous system, computational neuroscience, neurophilosophy, and the history of *Neuroscience* as a discipline – to name but a few. The book provides the newest state-of-the-art knowledge about *Neuroscience* from across the animal kingdom, with particular emphasis on model species commonly used in neuroscience labs across the world: mouse, zebra fish, fruit fly, honeybee, and nematode worm. This choice has not only practical roots – it is based on the observation that all animals share molecular mechanisms and a fundamental design in their nervous systems. After all, the function of nervous systems in general is to perceive sensory information and trigger actions that benefit the organism.

Thus, comprehending the human brain, understanding where consciousness arises, finding treatments for neurological diseases, all is based on knowing how the nervous system works and how it evolved to become what it is today. Quite astounding but true: our brains bear many structural and functional similarities to those of our many animal relatives – and yet again, there are important differences! In the light of these interrelationships, studying animals can provide insights that may help us understand ourselves.

Considering all, it is no longer merely *Neuroscience*, but indeed has become the *Neurosciences*! The approach of this book thus follows and expands on the tradition of its predecessor: the German textbook “Neurowissenschaft” edited by Dudel, Menzel, and Schmidt, published in two successful editions by Springer.

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