

PREFACE

Among the medical disciplines, psychiatry has for a long time held a special position separate from natural sciences. This may be rooted in the old philosophical problem of the mind–body dichotomy. Accordingly, psychiatry, with its focus on the mind, developed separately from natural sciences, which were concerned with the body. Thus, psychiatry laid out its own hypotheses, constructs, and methods. The substrate of the mind is formed by neuronal networks, and neurobiology as a natural science discipline developed on its own, focusing primarily on neuronal mechanisms, from computationally integrated networks all the way down to electrical, cellular, and molecular processes underlying neuronal communication. In the last decades, psychiatry has moved from psychoanalytical to biological approaches. Biological psychiatry has completely changed the treatment of psychoses, allowing outpatient treatment of psychotics who previously would have been locked up inside psychiatric institutions; more recently, neurotic symptomology is also being treated more and more by chemical approaches. In the meantime, neurobiology has been revolutionized by new techniques, among which the development of molecular biological tools is of primary importance. Now psychiatry and neurobiology are approaching each other, and our knowledge about the neurobiological basis of mental functions is increasing rapidly. *Dopamine and Glutamate in Psychiatric Disorders* is dedicated to fostering interactions between the two disciplines.

One could highlight two approaches to understanding psychiatric diseases within the realm of neurobiological and natural sciences. Psychiatric diseases can be regarded from a molecular genetic point of view, i.e., to be genetically caused by, or at least be susceptible to, a predisposition, with proteins being the end product of the genetic machinery. This view equates a psychiatric disease to a proteinopathy. In this sense Parkinson's disease can be regarded as a synucleinopathy, Alzheimer's disease as a tauopathy, and so forth. A book could easily be filled summarizing this type of knowledge. Another approach is to first study the biological properties and functions of proteins we know play an important role in mental processes. Thus, dopamine and glutamate receptors can be singled out as crucial targets for endogenous transmitters known to play a role in psychoses or other complex psychiatric diseases. The molecular biology of such receptors, their subtypes and subunits could also easily fill a book. *Dopamine and Glutamate in Psychiatric Disorders* wishes to focus on the combination of these approaches. We plan to address the basic molecular mechanisms, but psychiatric diseases will be primarily regarded as “synaptic or extrasynaptic diseases,” taking into account changes in dopamine and glutamate neurotransmission that can occur by communication through synaptic connections between neurons as well as by longer-range action through the extracellular space, sometimes referred to as volume transmission. This approach has led to effective medications in the past, for example, antipsychotics and antidepressants. In turn, the pharmacotherapy of psychiatric diseases has significantly contributed to concepts and hypotheses about neuronal dysfunctions underlying these diseases, such as the dopamine hypothesis of schizophrenia, or the monoamine-deficiency hypothesis of depression. However, better treatments are still badly needed. For example, antipsychotics, even the newer atypicals, have undesirable side effects; antidepressants, including the newer

Prozac-type, develop their therapeutic effect too slowly and offer no therapeutic help to a large percentage of depressed patients. Drug development is still an urgent priority.

Dopamine and Glutamate in Psychiatric Disorders reviews our progress in the field of dopamine and glutamate in psychiatric diseases. It includes both basic and clinical approaches and should be of interest to both basic scientists working at the bench on dopamine or glutamate neurotransmission and clinicians treating psychiatric diseases. In addition, graduate students and advanced undergraduates seeking a comprehensive overview of the field of dopamine and glutamate in psychiatric disorders will be interested in the book.

There is a fine line between symptoms of psychosis and symptoms of mood disorder. The latter can be secondary to an underlying psychosis; conversely, psychotic symptoms such as phobia can accompany depression. To make matters more complicated, many disorders that are targets for antidepressant treatment, such as obsessive compulsive phobic states, acute panic attacks, social phobias, and bulimia, are now considered to be clinical anxiety disorders rather than manifestations of an underlying depression. *Dopamine and Glutamate in Psychiatric Disorders* addresses many of these diseases originating in the central nervous system. Stress, as it is intricately related to depression, is also covered, as well as addiction, which is considered by many to be another brain disease, if not in origin, then created by repeated drug use.

Each chapter of *Dopamine and Glutamate in Psychiatric Disorders* summarizes the prevalence and symptoms of the disease, covers involvement of dopamine and/or glutamate systems with emphasis on findings with new molecular approaches, such as transgenic knockout or knockin mice and newer analytical techniques, such as brain imaging, and describes future directions and possibilities for new therapy development.

Werner J. Schmidt, PhD
Maarten E. A. Reith, PhD

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Schmidt, W.; Reith, M. (Eds.)

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