Emerging Methods in Molecular Biology and Genetics

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When the American College of Neuropsychopharmacology was founded in the mid-1950s, molecular biology and genetics were in their infancy and had little to offer neuropsychopharmacology. By 1967, when the first volume in this series was published, it still had not become apparent how greatly our field would be influenced by research on genes and on DNA. Of more than a hundred papers in that volume—*Psychopharmacology: A Review of Progress 1957–1967*—only a few used tools of molecular biology. None of those papers, including my own, envisioned the central role that such tools have now come to play.

This central role, which is documented in this section, is the result of the development of two types of new technologies. One of them, the automated sequencing of the nucleotides in DNA, facilitated the decoding of the structure of all genes, including those that make up the human genome. The other consists of ways to manipulate the structure of individual genes in isolated cells or in intact organisms, and to measure their levels of expression. This made it possible to directly study the biological actions of particular genes, and the effects of changes in their regulatory regions and coding regions.

These technologic advances are now being applied to a variety of problems in neuropsychopharmacology. For example, measurements of the levels of expression of large numbers of genes in various brain regions and nerve cells are providing information about the molecular basis of normal brain functions, and the effects of drugs on these functions. The same technologies are also being used to learn about the molecular pathogenesis of mental disorders. As work on the human genome continues it will lead to the identification of gene variants that influence susceptibility to mental disorders, as well as of gene variants that influence the alternative ways that individuals respond to particular psychiatric drugs. It will also provide new targets for the creation of better drugs, with greater efficacy and specificity.

The six chapters in this section provide a sampling of the molecular and genetic tools that are being used to advance neuropsychopharmacology. Because these tools are changing so rapidly, the authors provide overviews rather than extensive details. In this way they hope to make these tools comprehensible to the nonspecialist, and to invite their further application.

As you read these overviews you will become increasingly familiar with a series of new terms—from *gene chips*, *knockouts*, and *viral vectors*, to *genome scans* and *pharmacogenetics*. These terms are becoming commonplace, and are already scattered throughout this book. By the time the next volume in this series appears, it is likely that the methods that they refer to will be so widely used in our field that a separate section about them will no longer be needed.

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