

EDITORIAL

This issue of *Methods: A Companion to Methods in Enzymology* deals with the description of current techniques of gene misexpression in higher eukaryotes. The ability to control at will when and where specific genes are expressed is of wide interest to developmental biologists, as it allows them to answer a variety of questions about how genes function during development. In addition, protocols that allow the control of gene expression have wider applications because these techniques will be starting points in the development of therapeutic approaches involving gene delivery. The goal of this issue is not to describe all of the methods that have been developed over the years to control the expression of specific genes, but to compile in the same issue some of the more successful current approaches.

Two of the articles describe methods of gene manipulation in *Drosophila*. Theodosiou and Xu review how the FLP–FRT system can be used to study *Drosophila* development, and Phelps and Brand describe how the yeast protein GAL4 can be used to control gene expression both temporally and spatially. Together these articles not only illustrate widely used technologies to dissect gene function, but also describe new modifications of the techniques that increase the utility of each. The remaining articles describe powerful systems for controlling gene expression in vertebrate systems. Sauer describes the use of the Cre recombinase from phage P1 to develop a system that creates genetic switches that target for ablation or “turn on” any gene of interest. Two articles illustrate the power of retroviruses to control gene expression in vertebrates. Cepko and colleagues describe the use of replication-incompetent viruses to determine cell lineages, and Logan and Tabin describe the use of replication-competent retroviruses to target gene misexpression. To complete the overview, Rivera describes a promising new system that uses chemical inducers of dimerization to control gene expression, which is achieved by regulating the activity of a transcription factor with a small-molecule drug.

It is my hope that this issue of *Methods* will achieve two goals: First, researchers not currently using these technologies will find information that can be applied to their current research areas. Second, the technologies described will perhaps stimulate other researchers to either modify or improve the existing methods or develop additional, novel techniques of misexpression in organisms not covered in this issue.

Norbert Perrimon
Guest Editor