Preface

The technique of *in situ* hybridization, in its various forms, has been used routinely in many laboratories for a number of years. In the post-genome era, gene arrays and proteomics have allowed us to identify hitherto unknown unrecognized pathways and mechanisms. However, rather than diminish the importance of *in situ* hybridization, the now widespread use of screening technologies has increased the need to temporally and spatially localize the distribution of mRNA expression.

Our intention, in In Situ *Hybridization Protocols* is to provide ample information for novices planning to set up the *in situ* hybridization technique and use it in their laboratory for the first time, as well as giving updates of recent developments for those laboratories where *in situ* hybridization techniques are already in use.

Despite its widespread significance, *in situ* hybridization has retained a reputation as one of the more difficult and capricious molecular biological techniques. This may in part be because of the hybrid nature of the technique, which often requires a mixture of molecular biological and histological skills. The two techniques are usually taught and acquired in different streams of biological science. The step-by-step and detailed protocols provided in In Situ *Hybridization Protocols* by researchers active in the field should make it possible for both the molecular biologist with little experience of histology and the histologist with little experience of molecular biology to use the technique successfully in their laboratories.

In the third edition of In Situ *Hybridization Protocols*, we have concentrated on *in situ* hybridization of cells and tissues. Detailed methods are presented for the preparation and tissue hybridization, and for a variety of detection methods from a number of groups working in diverse areas. In particular, developments in non-isotopic *in situ* hybridization and amplification techniques are constantly improving. Furthermore, as the technology has matured, a number of new applications have evolved. As well as the fundamentals, this edition covers a number of derivative techniques including identification of transplanted cells, histones, nick end labeling for apoptosis, the use of peptide nucleic acid probes, and *in situ* hybridization of plant specimens. Many of these were not included in the first two editions of In Situ *Hybridization Protocols*. We therefore hope that the third edition of In Situ *Hybridization Protocols* is far more than simply

an update of previous editions and will reach a new audience with new problems.

In our own laboratories we have used *in situ* hybridization on tissue sections and cultured cells for a number of years, and when we look back on results gained even a few years ago, there have clearly been continual improvements in the technique leading to better resolution and more sensitive detection of low-level gene expression. We trust that those who use this new edition will find it a valuable aid in setting up the technique or improving the sensitivity and scope of applications of *in situ* hybridization in their own laboratories.

Finally, we would like to acknowledge the contributions made by our coworkers in the laboratory, in particular Teresa Bisucci, and all of the authors who have contributed their protocols for this edition.

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