

PREFACE

Advances in our understanding of biological mechanisms have frequently been associated with the development of new techniques, and this is certainly true for the method of *in situ* hybridisation. Although the methods of molecular biology have led to the identification and characterisation of innumerable genes and their mechanisms of regulation, a crucial piece of evidence was lacking in early work: detailed knowledge of the sites of gene expression in tissues. In essence, *in situ* hybridisation combines histochemistry with molecular biology, and enables the rapid analysis of the distribution of RNA (or DNA) in tissues. This information is proving particularly important in the field of developmental biology, since a fundamental aspect of development is the spatial and temporal expression of genes. The application of *in situ* hybridisation is leading to a revolution in our understanding of plant and animal development, in particular when the technique is combined with other approaches, for example, genetics. In addition, the sensitivity and specificity of *in situ* hybridisation has found application in the field of medicine, where it is giving new insights into the functioning of healthy tissues and the diagnosis and study of diseases.

The two-day meeting on 'In situ hybridisation', held during the SEB Edinburgh Conference in April, 1989, was the first venture to be sponsored jointly by the SEB and the Royal Microscopical Society; it also received support from DuPont, ICI Seeds and Shell. The sessions brought together workers in the fields of development and medicine, and emphasised practical aspects and variations of the technique, and both the strengths and limitations of its applications. All of the speakers have contributed to this volume. Chapters 1 and 2 discuss non-radioactive methods of *in situ* hybridisation, and Chapter 3 details radioisotopic methods and their application to studies of neuropeptides. Chapters 4-7 describe the ways in which *in situ* hybridisation has led to advances in understanding developmental mechanisms in sea urchins, fruit flies, frogs and mice. The plant papers (Chapters 8-11) cover evolutionary aspects of endosymbiosis, studies of floral biology and the incompatibility mechanism, and aspects of seed

biology. Finally, Chapters 12-14 describe some recent medical applications in the sexing of embryos and the analysis of viral infections.

We have sought to produce a volume which both reviews progress and will help the reader and would-be exponent through the various options and variations of the technique. To this end we asked authors to include, where appropriate, a protocol section at the end of their chapter.

Finally, we give our thanks to the authors who gathered from Europe, North America and Australia and gave freely of their time, ideas and experience both to the Conference and to this volume.

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