

PREFACE

Investigations on the mammalian genetic apparatus were initiated about one hundred and five years ago when Friedrich Miescher published his findings on the preparation and characterization of chromatin (termed nuclein at that time) from human pus cells in 1871. Not until about thirty years ago did nucleic acids, particularly DNA, gain recognition as the genetic material which is responsible for the physical transfer of hereditary information. Only about 25 years ago, the basic features of the double helix of DNA were formulated, which provided a structural basis for its function. During the ensuing years from 1955 to 1970, intensive efforts were made to decipher the universal genetic code of nucleotide sequences in nucleic acids specifying the amino acid sequences in proteins, and to investigate the translational machinery, i.e. the transfer RNA and the ribosomes. Concurrently, the replication and transcription enzyme systems for nucleic acids were beginning to be revealed. It was then generally acknowledged that the elucidation and understanding of the programming/control of the expression/replication of the genetic apparatus as related to differentiation/development must be the next most important challenge to be faced in our research.

Thus, the first World Conference on Histone Biology and Chemistry was organized by Professor James Bonner and myself in 1963; this conference, together with the published proceedings, 'The Nucleohistones', have provided an impetus to the research on chromatin. In the years following this conference, tremendous progress has been made in the purification of histones; determination of the primary structure of histones; characterization of their secondary modification, i.e. phosphorylation and acetylation; studies on conformation and mutual interaction of histones, as well as studies of interaction of histones with DNA; elucidation of the organization of DNA sequences; investigation of the synthesis, structure, and function of messenger RNA; and active research on the possible role of chromatin-associated nonhistone proteins; as well as in other areas. In

addition, it was generally recognized that an understanding of the cell can only be attained through knowledge of the genetic apparatus. Furthermore, to reach an understanding of many medical problems such as genetic diseases, cancer and aging rests on knowledge of the mammalian cells, which in turn depends on elucidation of the mammalian genetic apparatus. Thus, the prevention and control of these major medical problems are indeed directly dependent on the research on the mammalian cell and its genetic apparatus.

With this background, the 'International Symposium on the Molecular Biology of the Mammalian Genetic Apparatus - Its Relationship to Cancer, Aging and Medical Genetics' was held at the California Institute of Technology in December of 1975. This symposium not only provided an opportunity to examine the recent achievements and future developments in the research on the mammalian genetic apparatus, but also recognized the contributions made to this field by the Caltech people (faculty, students, alumni, associates, and friends) and particularly those from Professor James Bonner's laboratory on the occasion of his 65th birthday. This symposium was organized by Roger Chalkley, Norman Davidson, Ru-chih Huang and Jerome Vinograd*, with myself as chairman. We are grateful for the support and assistance of the following organizations and the people in these organizations principally responsible for this support: Energy Research and Development Administration (Dr. James Liverman), National Cancer Institute (Dr. Gary Flamm), National Science Foundation (Dr. Herman Lewis), National Institute on Aging (Dr. Richard Greulich and Dr. Donald Murphy), Fogarty International Center (Dr. Fred McCrumb* and Dr. Maureen Harris), California Institute of Technology (Dr. Robert Sinsheimer and Dr. John Baldeschwieler) and Johns Hopkins University (Dr. John C. Hume).

The proceedings of this symposium are divided into three parts to be published in two volumes: Volume 1 contains - Structure; Volume 2 contains Part A - DNA organization and gene expression, and Part B - Relationship to somatic genetics, cancer and aging. Encouraged by the rapid growth in this important field and recognizing the need for reference and educational materials, a continuing series of books on this subject, entitled 'Molecular Biology of the Mammalian Genetic Apparatus - Its Relationship to Cancer, Aging and Medical Genetics' has been planned. Thus, these two volumes will be the initial publication of this series. In the coming decades, armed with the confidence that we have made enormous strides in the elucidation/control of the genetic apparatus of microorganisms such as phages, bacteria and other prokaryotic protozoans, we are destined to understand the genetic apparatus of the mammalian cells. Through this knowledge, we hope to control the mammalian cells and eventually our own cells and ourselves. This symposium and this series of books may provide

* Recently deceased.

an impetus to the effort and progress in this direction, as did the first World Conference on Histones and the book 'Nucleohistones'.

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