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The Molecular Biology of Adenoviruses 1

30 Years of Adenovirus Research 1953–1983

Edited by Walter Doerfler

With 69 Figures

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The series "The Molecular Biology of Adenoviruses" is dedicated to Wallace Rowe (4, July 1983†) in memory of his approach to science

Preface

A puzzling epidemiological problem was the driving force behind the discovery of human adenoviruses by Wallace Rowe and his colleagues 30 years ago. The development of a plaque assay for poliomyelitis virus in 1953 led us to the threshold of quantitative virology, and in the same year the double-helical structure of DNA was discovered and became a cornerstone of molecular biology.

The potential of adenoviruses as research tools in the molecular and cellular biology of eukaryotic cells was recognized as early as the late 1950s and early 1960s by several investigators. Structural and biochemical studies dominated the early years. In 1962, some of the adenoviruses were the first human viruses shown to be oncogenic in experimental animals. Thus adenovirology offered the investigator the entire gamut of host cell interactions, productive and abortive, as well as transformed and tumor cell systems. The possibilities that adenoviruses afforded for the study of the molecular biology and genetics of eukaryotic cells were fully realized in the late 1960s and the 1970s.

Over many years, adenoviruses have proved to be a very successful model for research in molecular biology, facilitating the recognition and development of new principles in biology that have turned out to be generally applicable. Work on the icosahedral structure of the virion, the functional organization of the viral genome, a novel mode of DNA replication, problems of viral (foreign) DNA insertion into the host chromosome, the concept of transforming genes, the splicing of RNA, inverse correlations between DNA methylation and gene expression, and many other aspects attest to the viability of this model system. Recently, effects of adenovirus type 12 transformation on the class I major histocompatibility system of the host have been documented. Considering the complexity of the tumor problem, important parameters still remain to be discovered, and the model

of transforming viral or cellular genes will perhaps have to be refined and modified. The effects of adenovirus infection on amplifications and rearrangements of host genes are just beginning to be recognized. Recently discovered nucleotide sequence homologies between the E1A region of adenovirus type 12 and certain oncogenes raise tantalizing questions.

The role of adenoviruses in studies on the molecular biology of eukaryotes has occasionally been compared with that of bacteriophage lambda in investigations of prokaryotes. Some of the basic features of the organization and expression of the viral genome are still unknown, although the entire nucleotide sequence of human adenovirus type 2 has become available.

Adenoviruses will be used in the future to work out the detailed mechanisms and controls of some of the main reactions in molecular biology, and in that important role may indeed resemble that of bacteriophage lambda.

The main topics of adenovirus research have been repeatedly summarized in many excellent reviews. The three volumes in this series, The Molecular Biology of Adenoviruses, provide summaries of current research as well as more formal reviews.

I thank the editors of the series Current Topics in Microbiology and Immunology for inviting me to be guest editor, and I am indebted to all the contributors to the three volumes for submitting their manuscripts on time. I am particularly grateful to Prof. DIETRICH GÖTZE and MARGA BOTSCH at Springer-Verlag, Heidelberg, and to PETRA BÖHM and BIRGIT KIERSPEL in Köln for their careful and painstaking work.

Köln, December 1983 WALTER DOERFLER

Table of Contents

Indexed in Current Contents

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