ANNALS OF THE NEW YORK ACADEMY OF SCIENCES

Volume 758
June 30, 1995

DNA: THE DOUBLE HELIX
PERSPECTIVE AND PROSPECTIVE AT FORTY YEARS

Editor and Conference Chairman
DONALD A. CHAMBERS

CONTENTS

Dedication xi
Preface. By DONALD A. CHAMBERS xiii
Conference Participants xv
Forty Years of DNA. By DONALD A. CHAMBERS 1

The Historical Papers [in facsimile]
Molecular Structure of Nucleic Acids: A Structure for Deoxyribose Nucleic Acid (J. D. WATSON and F. H. C. CRICK); Molecular Structure of Deoxypentose Nucleic Acids (M. H. F. WILKINS, A. R. STOKES, and H. R. WILSON); and Molecular Configuration in Sodium Thymonucleate (R. E. FRANKLIN and R. G. GOSLING) 12
Photos from the Conference 18

Part I. The Double Helix: Perspective
Introduction. By DONALD A. CHAMBERS 24
The Aperiodic Crystal of Heredity. By GUNther S. STENT 25
Photos from the Past 33

Part II. The Pathway to the Double Helix
Introduction: “On the Shoulders of Giants” By IRVING M. KLOTZ 46
A Fifty-Year Perspective on the Genetic Role of DNA.
By MACLYN MCCARTY 48

* This volume represents the proceedings of a conference entitled DNA: The Double Helix—Forty Years: Perspective and Prospective, sponsored by the New York Academy of Sciences, the University of Illinois at Chicago, and Green College, University of Oxford, and held in Chicago, Illinois on October 13–16, 1993.
DNA in the Decade before the Double Helix.
   By ROLLIN D. HOTCHKISS ........................................... 55
Linus Pauling: Chemist and Molecular Biologist. By ALEXANDER RICH 74
Historic Reflections on the Clinical Roots of Molecular Biology.
   By PAUL HELLER ...................................................... 83

Part III. The Structure and Synthesis of DNA

Introduction. By ROBERT V. STORTI .................................. 94
The Nucleic Acids: A Backward Glance. By ALEXANDER RICH ........ 97
Gene Regulatory Proteins and Their Interaction with DNA.
   By AARON KLUG .................................................. 143
Genetics of Retroviruses. By HOWARD M. TEMIN ....................... 161
In Memoriam: Howard Temin, the Fierce Scholar.
   By DAVID BALTIMORE ............................................. 166

Part IV. Banquet Program

In Honor of James D. Watson, Francis Crick, and Maurice Wilkins.
   By DONALD A. CHAMBERS ......................................... 171
Greetings. By RODNEY W. NICHOLS ................................... 174
Greetings. By JOSHUA LEDERBERG .................................... 176
Intellectual Dawns. By CRISPIN UCKELL .............................. 180
What the Double Helix Has Meant for Basic Biomedical Science:
   A Personal Commentary. By JOSHUA LEDERBERG ................. 182
Values from a Chicago Upbringing. By JAMES D. WATSON ............ 194
DNA: A Cooperative Discovery. By FRANCIS H. C. CRICK ........... 198
DNA at King's College, London. By MAURICE H. F. WILKINS ......... 200
"The Night Before Crickmas": A Poem and Deliverance.
   By ROLLIN D. HOTCHKISS ...................................... 205
Photos from the Banquet .............................................. 208

Part V. Molecular, Cellular, and Integrative Biology

Introduction. By R. JOHN SOLARO ................................... 211
Mammalian Learning and Memory Studied by Gene Targeting.
   By SUSUMU TONEGAWA ........................................... 213
Circuits. By FRANÇOIS JACOB ....................................... 218
The NK-2 Homeobox Gene and the Early Development of the Central Nervous System of *Drosophila*. By MARSHALL NIRENBERG, KOHZO NAKAYAMA, NORIKO NAKAYAMA, YONGSOK KIM, DERVLA MELLERICK, LAN-HSIANG WANG, KEITH O. WEBBER, and RAJNIKANT LAD ............................................................... 224

**Part VI. DNA and Molecular Medicine**

Introduction. *By LORD WALTON OF DETCHANT* ........................................... 243

The Molecular Basis for Phenotypic Diversity of Genetic Disease. *By DAVID J. WEATHERALL* ................................................................. 245

A Molecular Switch for the Consolidation of Long-Term Memory: cAMP-Inducible Gene Expression. *By CRISTINA M. ALBERINI, MIRELLA GHIRARDI, YAN-YOU HUANG, PETER V. NGUYEN, and ERIC R. KANDEL* ........................................ 261


Transgenic Mouse Models of Disease: Altering Adipose Tissue Function *in Vivo*. *By SUSAN R. ROSS, REED A. GRAVES, LISA CHOY, VERONICA SOLEVEVA, and BRUCE M. SPIEGELMAN* ... 297

Recombinant DNA Technology and Oral Medicine. *By HAROLD C. SLAVKIN* ................................................................. 314

**Part VII. DNA, Oncogenes, and Cancer**

Introduction. *By SIR RICHARD DOLL* ......................................................... 329

The Molecular Basis of Oncogenes and Tumor Suppressor Genes. *By ROBERT A. WEINBERG* ................................................................. 331

A Nuclear Tyrosine Kinase Becomes a Cytoplasmic Oncogene. *By DAVID BALTIMORE, RUIBAO REN, GENHONG CHENG, KONSTANTINA ALEXANDROPoulos, and PIERA CICCHETTI* .......... 339

Recombinant Toxins: New Therapeutic Agents for Cancer. *By IRA H. PASTAN, LEE H. PAI, ULRICH BRINKMANN, and DAVID J. FITZGERALD* ......................................................... 345

**Part VIII. Recombinant DNA and Biotechnology**

Introduction. *By RICHARD L. DAVIDSON* ................................................. 355

DNA: Template for An Economic Revolution. *By DAVID A. JACKSON* 356
The Molecular Biology of Thyroid Hormone Action.
By RALFF C.J. RIBEIRO, JAMES W. APRILETTI, BRIAN L. WEST,
RICHARD L. WAGNER, ROBERT J. FLETTERICK, FRED SCHAUFLE,
and JOHN D. BAXTER ............................................................. 366

Human and Mouse T-Cell Receptor Loci: Genomics, Evolution,
Diversity, and Serendipity. By LEROY HOOD, LEE ROWEN,
and BEN F. KOOP .............................................................. 390

Part IX. The Double Helix: Prospective

Introduction. By DONALD A. CHAMBERS ............................... 413

Where Will Genome Analysis Lead Us Forty Years On?
By SIR WALTER BODMER ...................................................... 414

The World We Have Lost. By HORACE FREELAND JUDSON ........ 427

The Biomedical Revolution at 40 Years: An Overview of the
Conference. By DONALD A. CHAMBERS, KENNETH B. M. REID,
and RHONNA L. COHEN ....................................................... 441

Index of Contributors ............................................................ 459

Subject Index ............................................................................. 461