To Madame Henriette P. D. Fredrickson
Contents

ix  Foreword  LeRoy Walters
xvii  Preface
xx  Acknowledgments

Chapter 1
1  Asilomar: the End of the Beginning (1975)

Chapter 2
28  A Federal Case (1975)

Chapter 3
44  The Gathering Storm (1975)

Chapter 4
60  Extending the Seed of Power to the Public (1976)

Chapter 5
80  Recombinant Ramblings (1976–77)

Chapter 6
105  The Environmental Impact Statement and the Polyoma Experiment (1976–77)

Chapter 7
133  Acts of Congress (1977)

Chapter 8
168  Returning to the Witness Table: the Remainder of the 95th Congress (1977–78)

Chapter 9
188  The Revising of the Guidelines (1976–78)
Chapter 10
220 A Major Action (1978–79)

Chapter 11
250 Winding Down (1979–81)

Chapter 12
278 Moral

Chapter 13
281 Epilogue
289 Notes
347 APPENDICES
367 Index
Foreword

Donald Fredrickson’s memoir provides a unique perspective on the recombinant DNA debate in the United States, especially during the years 1975 through 1981. As director of the National Institutes of Health (NIH), his perspective was that of the leading executive-branch policymaker for recombinant DNA research during this period. In the following pages we see the diverse roles played by the NIH director, other scientists, members of Congress, the Secretary of the U.S. Department of Health, Education and Welfare, multiple federal agencies, business leaders, experts in law and ethics, public-interest advocates, and members of the general public. In addition to mediating among these domestic individuals and groups, the NIH director found it necessary to remain in touch with scientific peers in other nations. The scientific and political leaders of all industrialized countries were wrestling with their responses to this exciting but potentially hazardous new type of research.

The central section of the book (chapters 1 through 10) focuses on one 3½-day meeting, the Asilomar Conference held in February of 1975, and one group that carried forward the work of the Asilomar meeting, the NIH Recombinant DNA Advisory Committee (RAC). This meeting and this group should be considered together because each complemented the other. The conference reached a consensus on reasonable initial rules for conducting recombinant DNA research (and for deferring certain kinds of experiments), while the RAC continued the work of Asilomar, refining the initial guidelines and revising them in the light of further research.

From my perspective as a three-term member of the RAC, the Asilomar meeting was an important and highly constructive endeavor. At the meeting, leading members of the scientific community sought to assess the potential
hazards of the research they were planning to conduct. One can quibble about details of the meeting—for example, the narrowness of the invitation list and the meeting’s semi-private character. However, in examining the trees one should not lose sight of the forest. An 18-month process of discussion and deliberation, led by Maxine Singer and Paul Berg among others, culminated in an international scientific summit. At the summit a provisional consensus was reached about the most prudent course for the early years of recombinant DNA research. The planners of the summit meeting also proposed that an ongoing advisory committee be created to oversee future research in the field.

For its part, the RAC met for the first time immediately after the Asilomar meeting and devoted its first year to developing an initial set of “Guidelines for Recombinant DNA Molecule Research.” After a public review of the draft guidelines, in which I was privileged to take part, they were published in July 1976. During the next 2½ years an increasingly interdisciplinary RAC struggled to revise the 1976 Guidelines in the light of data emerging from the conduct of the research. Meanwhile, legislators in the United States Congress and in some municipalities considered whether the RAC and its NIH-based staff were sufficient to oversee the rapidly expanding field of recombinant DNA research. In the end, a new social compact was implicitly adopted, and, beginning in 1979, an expanded RAC that represented a wider variety of perspectives was permitted to continue as the central oversight body. By about 1982 the task foreseen for the RAC at Asilomar had been essentially completed, and the few vestiges of oversight that remained had been delegated to local institutions.

Did scientists like Maxine Singer and Paul Berg make a mistake in calling attention to the potential hazards of laboratory research with recombinant DNA? With the benefit of hindsight, one can argue that recombinant DNA research turned out not to pose unique dangers. However, the knowledge that was available to the scientific community in 1973 or 1975 gave no firm basis for estimating the harms that this new type of research might cause to laboratory workers or the environment. The potential hazards to laboratory workers of research with infectious microbes and oncogenic viruses were well known, as were the risks of research involving radiation or toxic chemicals. Thus, careful thought and interdisciplinary deliberation before proceeding with at least certain types of experiments seems, even today, to have been a prudent course. In addition, the scientific community’s willingness to raise safety questions in the absence of any demonstrated harm enhanced public confidence that in the future scientists also would level
with the public in discussing the potential benefits and harms of new lines of research. (This thoughtful warning mode contrasts starkly with the overly optimistic reassurances that the public was given about the purity of the blood supply during the early years of the AIDS epidemic, or about the safety of eating beef despite increasing evidence that mad cow disease was somehow being transmitted from cattle to humans.)

Were the early research guidelines that emerged from Asilomar and the RAC too conservative, too stringent? Again, hindsight increases confidence. By the beginning of 1979 even one of the earliest proponents of caution, Maxine Singer, was expressing concern that the Guidelines were not being relaxed quickly enough and that the RAC was beginning to resemble a “ponderous” regulatory agency. However, the major problem in the years 1976 to 1978 may not have been the initial conservatism of the Guidelines as much as it was the lack of a clearly articulated process for their timely revision. Because of this oversight in the 1976 Guidelines, proposals for revision themselves may have seemed like potential violations of an unchanging (or unchangeable) code. An activist Secretary of Health, Education and Welfare and members of Congress who seemed ready to create a new regulatory agency may also have slowed the revision process. However, the delays of 1978 and 1980 gave way to a rapid relaxation of the Guidelines in the early 1980s, and oversight policies in multiple industrialized countries seem to have been relaxed roughly in parallel. In toto, recombinant DNA research is not likely to have been set back by more than 2 or 3 years at the most by Asilomar and the RAC, and the caution that caused this delay was, at least in part, arguably a prudent response to reasonable concerns about possible biohazards.

Was NIH the most appropriate agency for overseeing laboratory research with recombinant DNA in the late 1970s? While there are theoretical advantages to separating the distinct functions of funding research, on the one hand, and providing oversight for research, on the other, the ad hoc arrangement suggested by the planners of the Asilomar meeting seems to have worked reasonably well for recombinant DNA research. Several factors may have contributed to the apparent success of this arrangement. First, most funding for recombinant DNA research in the 1970s was federal, with the lion’s share being contributed by NIH and the National Science Foundation. Thus, a uniform set of federal research guidelines was likely to be adhered to by researchers who knew that failure to act in accordance with the NIH Guidelines could jeopardize their research funding. Second, the NIH Office of Recombinant DNA Activities (ORDA) and the RAC were
transparent in all of their early actions, meeting in public and publishing large volumes of material in a public record. Third, the NIH director was strongly supportive of the RAC, meeting with the committee regularly to brief RAC members on recent research developments or his thinking about their role; at the same time, he allowed the committee complete independence in its work. Fourth, in response to gentle prodding by the Secretary of Health, Education and Welfare, the NIH director expanded and diversified the membership of the RAC in late 1978. With this expansion the RAC came to be seen as broadly representative of the spectrum of public opinion on recombinant DNA research. Finally, the staff members at ORDA were dedicated public servants, and most RAC members took their oversight responsibilities very seriously.

The last three chapters of this memoir (chapters 11 through 13) cover scientific and public policy developments in 1980 and early 1981, as well as providing the author’s overall perspective on the recombinant DNA research controversy. During this time the RAC took on a quasi-regulatory role vis-à-vis the private sector, formulating guidance on safety standards for large-scale production using recombinant DNA techniques and reviewing proposals voluntarily submitted by companies like Genentech and Eli Lilly. For the first time, RAC members were confronted with decisions about whether to go into executive session to review information that companies wished to maintain as proprietary. As NIH director, Don Fredrickson encouraged RAC members to accept this role for the public good until other agencies—in this case, the Food and Drug Administration (FDA)—could develop their own oversight capabilities. In retrospect, Dr. Fredrickson expresses satisfaction that the RAC helped to prevent delays in the transition from the laboratory to the manufacturing plant.

The year 1980 was critical for the RAC and NIH in another way. Martin Cline of UCLA conducted an unauthorized attempt to use recombinant DNA techniques to treat two patients, one in Israel and one in Italy, who were afflicted with thalassemia. Rather than asking the RAC to perform an investigative and judicial role, the NIH director appointed an ad hoc committee composed of NIH employees. When the investigation verified that both the “Guidelines for Recombinant DNA Research” and federal regulations for the protection of human subjects had been violated by Dr. Cline, Don Fredrickson did not hesitate to impose the rather harsh penalties recommended by the ad hoc committee. Dr. Cline’s current NIH grants were affected, as was his ability to secure new NIH grants during the following 3 years.
In 1980 and 1981 the NIH director and the RAC itself also confronted serious proposals to abolish the RAC and its supporting organization, ORDA, and to transform the remaining mandatory Guidelines into a voluntary code of practice. Among the proponents of these changes were some of the organizers of the Asilomar Conference, who 7 years earlier had urged caution in research with recombinant DNA and had strongly supported the creation of the RAC. Don Fredrickson and the new RAC Chair, former Congressman Ray Thornton, advocated and indeed implemented a more moderate approach: further relaxation of the Guidelines and the retention of the RAC as an oversight body that could provide expert advice to the scientific community and that would simultaneously reassure the public and policymakers. In this connection, the NIH director proposed another metamorphosis for the RAC, into a “third-generation” body. The first-generation RAC had been predominantly scientific and had relied on the more broadly constituted NIH Director’s Advisory Committee (DAC) for additional perspective. In contrast, the second-generation RAC of late 1978 and 1979 included both scientific and socially oriented viewpoints within the RAC itself. In 1982, shortly after leaving the directorship of NIH, Don Fredrickson called for another transition in the role of the RAC, into an even more inclusive body that would be “better equipped to deal with the emerging problems” while simultaneously being “relieved of some of the detailed burden of reviewing minor administrative concerns.”

The next transformation of the RAC took place shortly after this proposal, but the change occurred in response to a report by a presidential advisory commission on bioethics and a new turn in biomedical research—the use of recombinant DNA techniques for human gene transfer (also called “human gene therapy”). In November of 1982 the President’s Commission on Bioethics released a report entitled *Splicing Life.* The commission’s report sought to de-dramatize the dangers posed by “human genetic engineering” by pointing to similarities between gene transfer for therapeutic reasons, on the one hand, and traditional drugs and biologics, on the other. In the final chapter of its report, the President’s Commission also discussed alternative oversight strategies for the emerging field of human gene transfer research. One of three options considered by the commission was the possibility of “revising RAC,” adapting its goals and membership to prepare the committee for the new task at hand. In this connection, the commission explicitly referred to Don Fredrickson’s notion of creating a “third-generation RAC.”

During the next 2 years, under the leadership of a new chair, Robert Mitchell, the RAC considered whether it should accept responsibility for
reviewing human gene transfer protocols on a case-by-case basis. In incre-
mental steps RAC members accepted this responsibility in principle, then
created a Working Group (later Subcommittee) on Human Gene Therapy
to perform the initial review of protocols on the RAC’s behalf. In late 1984
and the first half of 1985 this working group developed a set of guidelines
called “The Points to Consider” that served as the framework for evalu-
ating human gene transfer protocols. I had the privilege of chairing the
working group during the 7 years of its existence.

In the Epilogue to his memoir (chapter 13), Don Fredrickson recounts
several important moments in this new phase of the RAC’s activity. He
briefly reports on the first authorized human gene transfer experiment,
which was performed at NIH in 1990 by R. Michael Blaese, W. French
Anderson, and their colleagues. He also acknowledges the FDA’s acquisition
of formidable expertise in cell and gene therapy in the early 1990s but notes
that the RAC review process for gene-transfer protocols was a matter of
public record, while FDA’s reviews of Investigational New Drug (IND) ap-
lications occur behind closed doors. With a trace of sadness the author
reviews the attempt by NIH director Harold Varmus to abolish the RAC
in 1996 and the opposition to the proposed abolition that was expressed by
a variety of individuals and groups, including the American Society for Mi-
crobiology, “the largest single life science society in the world.” With re-
gret Don Fredrickson carries his account forward to 1999 and to the death
of Jesse Gelsinger, a relatively healthy participant in a University of Penn-
sylvania protocol focused on ornithine transcarbamylase (OTC) deficiency.
He comments that, in the wake of this subject’s death, new and more string-
gent rules for all research with human subjects are likely to be enacted—
especially regarding researchers’ financial involvement in the research they
are conducting.

Dr. Fredrickson’s reference to the financial dimension of biomedical re-
search reminds us quite forcefully of the major changes in the context of
this research that occurred between 1975 and 2000, to choose two conven-
ient dates. These breathtaking changes are reflected at several points in this
memoir. For example, in 1976, Don Fredrickson notes, there was “the pat-
ent”—the Boyer-Cohen patent, held by Stanford University and the Uni-
versity of California on one of the major techniques for combining DNA
from different organisms. He notes that this patent was governed by one
of 167 Institutional Patent Agreements (IPAs) that had been reached be-
tween the Department of Health, Education and Welfare and universities.8
Under the terms of an IPA, a university could grant an exclusive license to
a third party only if it could demonstrate that a nonexclusive license was infeasible. Further, the IPA stipulated that the federal government must be granted a license for use of an invention for research purposes at no cost. While acknowledging the importance of private enterprise for translating researching findings into useful products, Don Fredrickson notes somewhat ruefully that the *Diamond v. Chakrabarty* decision by the U.S. Supreme Court (1980) and the Bayh-Dole Act of 1980 have contributed in major ways to a paradigm shift in biomedical research. Today most innovations in biomedical research, including genes, are aggressively patented by both private companies and academic institutions. Quite clearly the author is concerned that the pendulum may have swung too far in the entrepreneurial direction, to the detriment of basic science.  

The sources of funding for biomedical research and development have changed radically since the 1970s, as Don Fredrickson’s narrative suggests. According to figures compiled by the NIH, federal expenditures for medical and health-related research and development nearly doubled from $6.8 billion to $13.4 billion between 1986 and 1995. During the same period, industry expenditures for biomedical and health-related research more than tripled, growing from $6.2 billion in 1986 to $18.6 billion. In one part of industry, the segment represented by pharmaceutical companies, the rate of growth in research and development expenditures has been even more dramatic. According to the industry’s trade association, PhRMA, pharmaceutical company investments in this sphere have increased from $1.5 billion in 1980—the year of the Cline experiment—to $22.4 billion in 2000.  

Is there a role for the RAC and other RAC-like oversight bodies in this new era when private investment in biomedical research and development will clearly outstrip public funding? Or would it be better to have all oversight of this research focused in regulatory agencies, in particular, the FDA? One’s answer to these questions will depend largely on one’s overall regulatory and political philosophy. If the primary goal of biomedical research and development is to speed useful products to the market and to preserve one nation’s competitive position in the global economy, then minimal regulation and a tilt toward approval would seem to be the appropriate regulatory stance. However, if one considers the informing of the public about new biomedical developments and the protection of human subjects in clinical trials to be equally important goals, then a more transparent and inclusive oversight system may be required. From my perspective, the RAC in its early years of overseeing recombinant DNA research and human gene transfer research provides an excellent model for the responsible introduc-
tion of a new technology. Again, in my own view, this model is eminently applicable to other emerging fields of biomedical research, for example, xenotransplantation. Where the RAC and parallel advisory committees should be located within the structure of the federal government is, of course, a different question. In the future, there are at least good theoretical arguments for separating the oversight of research from its funding and for stipulating that the RAC and similar bodies should report to a Cabinet secretary or even to an independent agency dedicated to the promotion of ethically responsible research.\textsuperscript{13}

One of the most striking statements in Don Fredrickson’s memoir appears in chapter 4. There he comments, “Although the directorship of NIH was itself a full-time job, I estimated later that I had to devote at least half of my time to recombinant DNA during 1976–78.”\textsuperscript{14} This level of commitment to an exciting but potentially hazardous field of research was by no means required of the NIH director. Prior and later directors of NIH would undoubtedly have handled the circumstances of 1976 differently, perhaps deferring to the will of Congress, to the political instincts of the Secretary of Health, Education and Welfare, or to the regulatory authority of the FDA or the EPA. Instead, Don Fredrickson immersed himself in the day-to-day activities required to protect scientific freedom—a freedom that was, from the beginning and almost without exception, exercised in a socially responsible manner. He also nurtured a fledgling advisory committee, the RAC, maintaining regular communication with its members and helping the committee to adapt to changing scientific and social circumstances.

The payoff from this investment of time and energy, both within the United States and in the scientific community around the world, was enormous. Recombinant DNA research techniques were introduced into the world’s laboratories in a thoughtful, cautious, and ultimately innocuous way in full view of the public and public policymakers. We owe a great debt of gratitude to the author of this book both for his dedicated public service during those critical months and years and for this vivid account of the major steps in the policy-making process.

\textbf{LeRoy Walters}
Kennedy Institute of Ethics
Georgetown University
Washington, D.C.
December 2000
Preface

I remember the Asilomar Conference as an event both exciting and confusing. Exciting because of the scale of the scientific adventure, the great expanses which had opened to research, and because no one could be indifferent to the debate over the powers and responsibilities of scientists. Confusing because some of the basic questions could only be dealt with in great disorder, or not confronted at all. On the frontiers of the unknown, the analysis of benefits and hazards was locked up in concentric circles of ignorance . . . how could one determine the reality . . . without experimenting . . . without taking a minimum of risk?1

PHILIPPE KOURILSKY

The controversy over recombinant DNA broke out suddenly over 30 years ago, when it was discovered that genes from different species of bacteria could be recombined in the laboratory. Fear of the potential hazards quickly grew, and in 1974 a small group of American academic molecular biologists called for a worldwide moratorium on such experiments until the risks could be assessed. In February 1975, 150 scientists from the world’s premier laboratories convened for three days at Asilomar Conference Center in Pacific Grove, Calif., to study the problem and formulate an approach to its solution. The conference voted to replace the moratorium with a complicated scheme of rules for containment and restriction of research, which severely limited experimentation and paradoxically hobbled determination of the actual risks. Prior to Asilomar, the conference organizers, led by Paul Berg, had also requested that the National Institutes of Health (NIH) establish guidelines for all research with recombinant DNA.

On the 25th anniversary of Asilomar, in February 2000, I visited the conference site for the first time. In the company of many scientists who had earlier been conferees, I walked along the beach, poked my head into the chapel, and listened to the luncheon bell which had ended that first gathering so long ago. For me there was a special meaning in the occasion, for I had just completed this memoir of how the Asilomar meeting had touched my scientific career, setting the daily calendar and demanding my every attention for six eventful years. I became the director of NIH in July 1975 and unsuspectingly inherited the job of guiding the recombinant DNA
controversy through its first exciting, tormented years. The issuance, evolution, and adaptation of the *NIH Guidelines for Recombinant DNA Research* became the focus of more than a decade of suspicion of this audacious new science. This book attempts to describe the actions which NIH and a new Recombinant DNA Advisory Committee (the RAC)—under the careful watch of the scientific community, the government, and skeptical members of the public—undertook to win society’s acceptance of this new technology while keeping the science moving cautiously forward.

When the lay public realized the extent of the strange new dangers discussed at Asilomar, the tolerance of many critics suddenly took a turn for the worse. Laymen, scientists, and legislators, on one side or the other, engaged in an angry struggle over the resumption of research and the rules *established by scientists* to control it. Some prominent scientists warned that the new power to join pieces of genes from different sources would create chimeric products that could seed into niches in the environment and possibly spread new diseases beyond control. As expected, and as it should, society reacted. Many hearings, demonstrations, forums, and town meetings were held. In townships, state legislatures, and the U.S. Congress, bills to govern laboratory research were drafted and debated at length. Injunctions to forbid all such experimentation were sought in the courts. More than half a decade of recriminations and anxiety passed before society and biomedical science gingerly patched up the largest rents in their mutually beneficial entente.

Why did this happen? Could it have been avoided? Can we be sure that such a threat to a relationship necessary for the advancement of our civilization will not happen again?

The purpose of this memoir is not to re-tell the story of Asilomar, but to place in context all that subsequently happened. Because I inherited principal responsibility for the *NIH Guidelines for Recombinant DNA Research* that grew from the Asilomar meeting, I became the federal officer answerable for protection of the public welfare as well as the furtherance of the scientific research that had come abruptly to a halt. As such I was the principal spokesman in Congress, and the focal point of attention of the secretary and the hierarchy of the Department of Health, Education and Welfare, on all matters of fear and uncertainty created by recombinant DNA.

Most of what all of us did in that atmosphere of crisis to fulfill our public duties and to preserve the nation’s capacity for preeminence in biomedical research has never been published. Thus our successes and our errors have
been unavailable for such instruction as they might hold of how best, in the future, to help preserve intact the interface between high science and a powerful government. I attempt here to lay out the roots of that vital relationship as it involved NIH, the nation’s single most important biomedical research agency.

Fortunately, great pains were taken to maintain from the beginning most of the vast archives of hearings records, correspondence, and documents relative to our actions. In addition, I preserved a thorough record of my own activity, including extensive diaries covering this period. Across the pages of this memoir move numerous personalities from microbiology, molecular biology, and other scientific disciplines, as well as the leaders among Congress, the administration, and government agencies, environmentalists, and many others who had a role at this time of testing.

At the moment of the Asilomar meeting, the modern world was entering a phase of transition, evolving toward a society in which the once arcane discipline of molecular biology was swiftly becoming a significant force in medicine, commerce, ethics, sociology, politics, and the very nature of science itself. The initial phase of this transition was taken up with determining how dangerous was the new technology and informing the public of every step by a totally open process.

With the booming development of a whole new culture of genomics and medicine, the early fears of physical danger have disappeared, to be succeeded by new controversies—many involving serious moral and ethical issues. The basic scientists, their government sponsorship—joined now by commerce—and the public are striving to preserve a workable social contract. This book describes in detail the earliest of such endeavors, a serious and prolonged struggle that set the stage for more extraordinary times to come.

Donald S. Fredrickson, M.D.
Acknowledgments

I am grateful to Dr. Donald A. Lindberg, director of the National Library of Medicine (NLM), for generous access to the resources and the invaluable assistance of many of the staff of NLM in the preparation of this book. The photos in the insert are from NLM archives. I am also fortunate for the assignment by ASM Press of Mary McKenney as copyeditor, in company with the production oversight of Ellie Tupper. Special acknowledgment is due Dr. Bernard Talbot for both encouragement and redaction during the long period of work on this manuscript, especially its extensive annotation.
Index

A
Aaron, Henry, on S.1217, 152–153
Abelson, Philip, 235, 320n.15
Adams, John, at DAC meeting, 335n.37
Adelberg, Edward
on Guidelines, 225
as RAC member, 34, 38
Adenoviruses, hybrid, 9–10
Adler, Michael, on environmental impact
statement, 127
Administrative Procedure Act, Guidelines
and, 52–53
Ahmed, A. Karim
at DAC meeting, 334n.36
on Guidelines revisions, 202
as proposed RAC member, 228
Ahrens, Edward H., Jr., on reductionism, 287
Alberty, Robert, on Guidelines, 323n.34
ALS (Assembly of Life Sciences), 15, 113–114
Ancker-Johnson, Betsy, 98
as FIC member, 309n.23
at Thornton hearings, 146
Anderson, Carl, at Libassi hearing, 336n.55
Anderson, Ephraim
at Asilomar Conference, 19, 21
at Falmouth workshop, 192, 333n.12
Anderson, W. French, gene therapy proposal
of, 286
Andrews, Richard, on Guidelines, 74
Anfinsen, Christian B., 43
APA (Administrative Procedure Act),
Guidelines and, 52–53
Appleyard, Bryan, on science of genetics,
285–286
Arber, Weiner, as Nobel prize winner, 221
Ashby, Lord, on Berg letter, 30–31
Asilomar Conference, 1–27
aftermath of, 44–46, 53–57
Berg experiments preceding, 7–10
consensus of, vs. Guidelines, 39–40
dissonance in (Feb. 26, 1975), 22–24
final session of (Feb. 27, 1975), 24–26
“first” (1973), 10–13
French reactions to, 53–54
Gordon Conference on Nucleic Acids
(1973) preparation for, 13–17
Guidelines revision restraints in, 189
Guidelines sessions of (Feb. 25, 1975), 20–22
historical background for, 1–7
National Academy of Sciences and, 15
opening day of (Feb. 24, 1975), 18–20
participants in, 347–354
planning committee for, 15–17
polyoma experiment conceived at, 123
reflections on, 279
report of, 26, 35, 36
Senate hearings after, 54
twenty-five years after, 27
University of Michigan reaction to, 54–56
Assembly of Life Sciences, 15, 113–114

367

Downloaded from www.asmscience.org by
IP: 54.70.40.11
On: Wed, 24 Jul 2019 10:56:00
Astoria, England, meeting, 207–208
Atkinson, Richard
  on Guidelines, 221, 223, 360–361
  on RAC membership, 240
  visit to China, 336n.51
Auerbach, Stuart, 77
Ausubel, Fred, letter to Asilomar Conference, 297n.52
Avery, Oswald, early DNA studies of, 1–2

B
Baltimore, David, 43, 265
  at Asilomar Conference, 15, 17, 18, 26, 28
  at Cambridge meeting, 82
  at congressional hearing of Sep. 22, 1976, 88
  on containment laboratory, 55–56
  at DAC meeting, 62, 68–69
  on Escherichia coli K-12 experiments, 256–257
  on Guidelines, 271–272, 361
  as proposed RAC member, 229–233, 235
  on recombinant DNA patent, 92
  at Thornton hearings, 146
Banks, Daryl, meeting on S.1217, 162
Barkley, Emmett
  on containment systems, 39
  at DAC meeting, 64–65
  at EMBO workshop, 191
  on environmental impact statement, 108, 128
  on Executive Recombinant DNA Committee, 85
  on Guidelines, 190, 200, 323n.34
  at Harris meeting, 265
  as Kitchen RAC member, 49
  as RAC member, 252
Barth, Delbert S., as FIC member, 309n.23
Baruch, Jordan, 98, 336n.51
Bayev, A.A.
  at Asilomar Conference, 297n.55
  visit to, 245
Bezalen, David, 48, 61, 66
Beadle, George W., 4
Beardon, James C., on Guidelines, 361
Beattie, Dick
  at Califano farewell meeting, 258
  on H.R. 11192, 178
Beatty, Jon, at DAC meeting, 334n.36
Beckwith, Jonathan
  at Cambridge meeting, 82
  letter at Asilomar Conference, 23, 297n.52
Beijing, China, Fredrickson visit to, 211–215
Beisel, William R., as FIC member, 309n.23
Belgium, visit to, 247–248
Bell, Griffen, 214
Bell, Peter
  at Califano farewell meeting, 258
  on RAC membership, 227–232, 234
Benacerraf, Beruj J., at NIH meeting on
  federal activities, 321n.15
Bereano, Philip L.
  on Escherichia coli K-12 experiments, 261
  at Libassi hearing, 336n.55
Berg, Paul
  at Asilomar Conference, 11, 15–20, 24–26, 279
“Berg letter”
  British attention to, 30–31
  on government role, 29
  proposing guidelines vs. regulations, 50
  RAC formation in response to, 31
  on containment laboratory, 55
  at DAC meeting, 63
  at Davos meeting, 104
  early molecular biology studies of, 7–10
  on EcoRI enzyme, 12
  on Escherichia coli K-12 risk, 194
  on Guidelines, 361
  on hybrid molecule hazards, 15
  letter to Cambridge mayor, 82
  letter to Handler, 31–32
  Pollack criticism of, 9
  as RAC member, 38–39
  on RAC membership, 33
  on recombinant DNA patent, 92–93
  Toulmin comments on, 45
Bergmann, Kostia, letter to Asilomar Conference, 297n.52
Berlowitz, Laurence, as FIC member, 309n.23
Bernard, Jean, 303n.15
Berns, Kenneth, on Guidelines, 361
Bernstein, G.C., 265
Bernstein, Jodie, 265
Berry, Mary, at Califano farewell meeting, 259
Bers, Naum, at DAC meeting, 335n.38
Biggs, P.M., on Ashby Committee, 298n.7
Bingham, Eula, on Guidelines, 361
Biotechnology companies, 282–283
Black, Douglas, on Ashby Committee, 298n.7
Index 369

Black, Francis, on biohazards, 293n.24
Blaese, Michael, gene therapy proposal of, 286
Blessing, Thomas
  at Guidelines revision hearing, 217–218
  at Libassi hearing, 336n.55
Bock, Robert M.
  at DAC meeting, 335n.37
  at Libassi hearing, 336n.55
Bockelman, Charles K., at NIH meeting on federal activities, 321n.15
Bodmer, W.F., on Ashby Committee, 298n.7
Bogorad, Lawrence, meeting with Kennedy, 327n.84
Bohen, Fred, at Califano farewell meeting, 258
Bohr, Niels, 291n.6
Botstein, David
  at Cambridge meeting, 82
  at Falmouth workshop, 333n.12
Bowen, Patricia, 86
Boyer, Herbert, 136
  at Asilomar Conference, 19
  as Berg letter signer, 294n.37
  EcoRI enzyme isolation, 11–12
  at Gordon Conference of 1973, 13–14
  polyoma experiment of, 123
  as proposed RAC member, 228
  recombinant DNA patent of, 92–93, 98–101
  somatostatin experiment of, 172
  at Stevenson hearing, 175
Brenner, Donald, at Falmouth workshop, 333n.12
Brenner, Sydney
  at Asilomar Conference, 17, 21, 25, 26, 191
  at Falmouth workshop, 333n.12
  in Guidelines preparation, 39
  polyoma experiment of, 123
Bross, on Escherichia coli K-12 experiments, 261
Broussard, Flo, visit to China, 336n.51
Brown, Donald
  at Asilomar Conference, 17, 23
  at DAC meeting, 62
  on Guidelines revision, 218
  at Libassi hearing, 336n.55
  at science in free society hearing, 54
Bruce, Malcolm, on environmental impact statement, 109
Brussels, visit to, 247–248
Bryant, John, visit to Tokyo, 245–246
Brzezinski, Zbigniew, China visit suggested by, 211
Bulwinkle, Congressman Alfred, 134, 139
Bumpers, Senator Dale
  DNA Research Act of 1977, 136–137, 138
  on recombinant DNA patent, 98
  at S.1217 hearings, 148
Bush, Vannevar, 2
Byrne, Governor, at S.1217 hearings, 148

C
Califano, Joseph A., Jr.
  appointment of, administrative changes after, 114–118
  on China visit, 211–213
  on Cline experiment, 275
  Custard letter to, 120
  on environmental impact statement, 130
  Friends of the Earth suit against, 122–123
  Guideline revision draft for, 196
  on Guidelines, 224, 226, 227
  Handler letter to, 239–240
  on H.R. 11192, 178–179
  Mack suit against, 124–126, 131
  meeting on legislation, 166
  post-China meeting with, 213–214
  on RAC membership, 233–235
  on recombinant DNA legislation, 142
  resignation of, 258–259
  S.1217 and, 152–154
  hearings, 148
  meeting on, 162
  speaking to NIH employees, 117–118
Callahan, Daniel
  as DAC member, 61, 68
  at Stevenson hearings, 329n.5
Cambridge, Massachusetts, recombinant DNA research opposition in, 81–84
Cambridge Biohazards Committee, 83–84
Cambridge Experimental Review Board, 83–84
Campbell, Allan
  on Escherichia coli K-12 experiments, 256
  at Falmouth workshop, 333n.12
  on Guidelines simplification, 271–272
Cantley, Mark F., on European visit, 248–249
Cape, Ronald
  at DAC meeting, 335n.37
  at Thornton hearings, 146
Capron, Alexander, at Asilomar Conference, 24
Carpenter, Charles, at Falmouth workshop, 333n.12
Carrigan, William
  on environmental impact statement, 127
  in Kitchen RAC, 50
Carter, Charles E., as FIC member, 309n.23
Carter, Congressman Tim Lee
  on H.R. 7897, 167
  on recombinant DNA research, 144–145, 156
Carter, Herbert E., at NIH meeting on federal activities, 321n.15
Carter, James (chauffeur), 258
Carter, President Jimmy
  on agency reduction, 299n.14
  budget cuts by, 229
  China visit suggestion by, 211
  on new Department of Health Education and Welfare appointments, 259–260
  President’s Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, 276
  on RAC membership, 234
  succession of, administrative changes after, 114–118
Caulkins, David, 264
Cavaliere, Liebe
  on Escherichia coli K-12 experiments, 261
  on Guidelines, 206–207, 323n.34
  on recombinant DNA research, 87–88
Ceja, Bel, 50, 213, 258
Centers for Disease Control
  creation of, 140
  Guidelines comments by, 90–91
CERB (Cambridge Experimental Review Board), 83–84
Cetus Corporation, at Thornton hearings, 146
Chafee, Senator, on S.1217, 161
Chakrabarty, Ananda M., 94
Chalfen, Melvin, on Guidelines, 322n.34
Chamot, Dennis, at DAC meeting, 335n.37
Champion, Hale, 116, 182–183
Chargaff, Erwin, 136
  as recombinant DNA research opponent, 80–81, 113
Chilton, Mary-Dell
  at DAC meeting, 335n.37
  on Guidelines revision, 203, 206
Chin, Carolyn, 265
China, Fredrickson visit to, 211–215
Chou En-Lai, Nixon visit to, 211
Chu, Ernest, as RAC member, 34, 37
Clayton, Michael, 311n.33
Cleaver, Dr., 174
Clem, David, at S.1217 hearings, 148
Cleveland, Marcia, on Guidelines, 323n.34, 361
Cline, Martin J., genetic experiments of, 272–275
Clinton, President Bill, 284
Coalition for Responsible Genetic Research, on Guidelines, 362
Cohen, Stanley
  at Asilomar Conference, 19, 25–26
  as Berg letter signer, 294n.37
  at Gordon Conference of 1973, 13
  on H.R. 7897, 167
  Kennedy communication with, 147–148
  plasmid named for, 12
  polyoma experiment of, 123
  recombinant DNA definition of, 147, 195
  recombinant DNA patent of, 92–93, 98–101
  on S.1217, 148–149
  at science in free society hearing, 54
Cohn, Victor, 137, 166
Cold Spring Harbor Laboratory, Watson as director of, 10
Collaborative research and development agreements, 283
Committee on Medical Research, visit to, 247–249
Congressional actions and hearings, 133–187
  American Society for Microbiology
    involvement in, 149–150
  bills with “commissions,” 140–141
  FIC bill, 141–143
  Guidelines, 76, 88–89
    extending to private sector, 135–136
  H.R. 4759 (Recombinant DNA Research Act of 1977), 143–145, 150–151
  H.R. 4849, 143
  H.R. 5020, 136
  H.R. 6158, 146–147, 150–151
  H.R. 7418 (later H.R. 7897), 155–157, 159
  H.R. 11192, 169, 177–182
involvement in medical research, 133–137
NIH meeting concerning, 137–138
patents, 151
Public Health Service Act Section 361, 135, 139–140, 182–185
S.621 (DNA Research Act of 1977), 136–137, 138
S.1217 (Kennedy bill), 146–149, 152, 169
administration position on, 152–154
commission, 153–156
Fredrickson letter on, 160
Gorbach letter on, 160
Kennedy visit on, 154–158, 160–162
Kennedy's views on, 159–160
“one-page” version of, 164
opposition to, 159
revisions and amendments to, 154–158, 160–164, 178
withdrawal of, 165–166
Stevenson oversight, 170–176, 186
summary of, 168–170
Thornton Committee, 179–180
Consumer Coalition for Health, on Guidelines, 362
Cooper, Richard, on Guidelines, 226
Cooper, Theodore, 300n.39, 316n.34
Coplin, David, at Libassi hearing, 336n.55
Corn, Morton, as FIC member, 309n.23
Cornell University, recombinant DNA patent of, 100
Costle, Don, 234
Cotton, Rick, 211
at Califano farewell meeting, 258
on environmental impact statement, 118, 126, 127, 129, 130
on Guidelines, 212–214, 224, 225, 226
on H.R. 11192, 178
on rac membership, 228–232, 234
Crick, Francis, 3, 291n.6
Cromwell, Paul, on environmental impact statement, 106, 108–110, 112, 118–119, 126
Curtin, Richard
on environmental impact statement, 129
in Kitchen RAC, 50
Curtiss, Roy, III
at Asilomar Conference, 19, 22
at DAC meeting, 62, 65–66, 70
on Escherichia coli K-12 experiments, 261
at Falmouth workshop, 333n.12
on Guidelines, 194, 361–362
polyoma experiment of, 123
as RAC member, 34, 38
on recombinant DNA definition, 178
recombinant DNA patent, 100
at Stevenson hearings, 329n.5
at Thornton hearings, 146
Cutler, Rupert, visit to China, 336n.51

D
DAC, see Director's Advisory Committee (DAC)
Dach, Leslie
at DAC meeting, 335n.37
on Escherichia coli K-12 experiments, 261
on Guidelines revisions, 202, 204, 206
at Libassi hearing, 336n.55
Dann, Marshall, as Commissioner of Patents and Trademarks, 98
Daphne, Princess of Belgium, 248
Darnell, James, as RAC member, 34
Davis, Barbara, 301n.2
Davis, Bernard
at Cambridge meeting, 82
Chargaff debate with, 81
at DAC meeting, 335n.37
on Guidelines, 323n.34
Davis, Ronald
on EcoRI enzyme, 12
at Falmouth workshop, 333n.12
polyoma experiment, 123
Davis, R.W., as Berg letter signer, 294n.37
Day, Peter
on Guidelines revision committee, 190
meeting with Kennedy, 327n.84
as RAC observer, 37
Dazansky, Doc, 214
Delbrück, Max, 291n.6
Délégation Générale à La Recherche Scientifique et Technique, on containment laboratory, 53–54
DeLuca, Marlene, luciferase experiments, 209–210
Deng Xiaoping, visit with, 212
DeNike, on Escherichia coli K-12 experiments, 261
Department of Agriculture, on Guidelines, 90, 220, 364
Department of Commerce, on Guidelines, 91

Downloaded from www.asmscience.org by
IP: 54.70.40.11
On: Wed, 24 Jul 2019 10:56:00
Departments of Defense, on Guidelines, 90
Department of Transportation, on Guidelines, 91
DeRoos, Roger, at DAC meeting, 334n.36
Deutsch, John, visit to China, 336n.51
Dickson, James, 245
Friends of the Earth suit against, 122–123
Director's Advisory Committee (DAC), 60–63
agenda of, 62–63
on biologic patents, 96–97
commitment to action, 71–73
dissension in, 66–68
environmental impact statement of, 73–74
favorable comments by, 68–69
FIC involvement with, 222
guests of, 62
Guidelines release by, 74–79
Guidelines revisions by, 73, 198, 200–205
comments on, 206–208
history of, 60–61
members of, 61, 365–366
questions to, 69–70
on Section 361, 139
summary of, 71
tutorial in recombinant DNA research, 63–66
DNA, naked, in decision document, 355
Dodds, Joseph, as DAC member, 61
Donato, Luigi, 248
Dubos, Rene, on Guidelines, 362
Dukakis, Governor Michael, at S.1217
hearing, 148
Dulbecco, Renato, 7–8
Dunsmore, Mr., 108
Dupree, A. Hunter, 2
Dutton, Diana, on S.1217, 154
Duvick, Donald, at DAC meeting, 335n.37
Dworkin, Roger, at Asilomar Conference, 24
Dyer, Rolla Eugene, 134, 140

E
Eagleton, Senator Thomas, 161, 301n.2
Ebbin, Steven, on environmental impact
statement, 118–120
Ebert, James, 29
Eckhardt, Congressman Bob, 167, 257
EcoRI enzyme, isolation of, 11–12
Edelman, Gerald, at NIH meeting on federal
activities, 321n.15
EDF, see Environmental Defense Fund
Edgell, Marshall
at Libassi hearing, 336n.55
as RAC member, 38
Edsall, John T.
at NIH meeting on federal activities,
321n.15
at Thornton hearings, 165
Egeberg, Roger, 316n.34
Elder, Robert L., as FIC member, 309n.23
Eli Lilly, RAC visit to, 253
EMBO, see European Molecular Biology
Organization
Emerson, Charles, at Libassi hearing,
336n.55
Emmott, Carole, 166, 184
EMRC (European Medical Research
Council), 101–102
Endicott, Kenneth, 316n.34
Environmental Defense Fund
on environmental impact statement, 111
on Guidelines revisions, 202
on recombinant DNA research, 88
Environmental impact assessment, 106–107
revised Guidelines, 210–211
Environmental impact statement, 105–132
alternatives to, 106–107
approval of, 129–130
criteria for, 107–108
draft
final, 118–122
plans for, 105
preparation, 109–110
public comment on, 110–114
revision, 114
with Guidelines, 73–74
legal actions and, 122–123
in Mack case, 130–131
National Environmental Policy Act and,
105–107
Office of Environmental Affairs and, 109
for polyoma experiment, 123–126, 131–132
presidential administration change during,
114–118
on research vs. guidelines, 108–109
scientists’ resigning from, 126–130
Environmental Protection Agency, Guidelines
comments by, 90–91
Escherichia coli
K-12
discussion at Falmouth workshop, 191–195
in early genetic studies, 5
Guidelines recommendations and actions
concerning, 255–266
Index 373

in polyoma experiment, 123–126, 131–132
risks of, public comments on, 201–205
ESF (European Science Foundation), 101–102
Etzioni, Amitai, 15
European Community, visit to, 246–247
European Medical Research Council, 101–102, 246
European Molecular Biology Organization (EMBO), 6–7, 102–103
Astoria meeting, 207–208
DNA restriction and modification workshop (1972), 12
NIH Guidelines revision meeting of, 191
European Science Foundation, 101–102
Executive Recombinant DNA Committee, 85

F
FACA (Federal Advisory Committee Act), 52–53, 137–138
Falkow, Stanley
at Asilomar Conference, 19, 22
at Falmouth workshop, 333n.12
as RAC member, 34, 38, 329n.11
Falmouth, Mass., Guideline revision workshop at, 191–195
Fang-Yi, Vice Premier, visit with, 212
Faust, Robert M., at Libassi hearing, 336n.55
Federal Advisory Committee Act, 52–53, 137–138
Federal Interagency Committee on Recombinant DNA Research (FIC)
early activities of, 89–92
formation of, 75, 85–89
on Guidelines, 220–221
meeting of October 12, 1978, 221–223
members of, 309n.23
RAC representation, 222
on recombinant DNA research, 141–143
Subcommittee on Authorities, 91
Federation of American Societies for Experimental Biology, 116
Feinberg, Deborah, at Libassi hearing, 336n.55
Feldman, Harry, at Falmouth workshop, 333n.12
Feldman, Susan, regulations tutorial by, 51–52
FIC, see Federal Interagency Committee on Recombinant DNA Research
Fields, Bernard, at Falmouth workshop, 333n.12
Finklea, John F., as FIC member, 309n.23
Flood, Congressman Daniel, 301n.2
Foege, William, visit to China, 211
Fogarty, Congressman Joseph, 134, 302n.8
Food and Drug Administration
gene therapy experiments and, 286
generic analysis and, 106
Ford, President Gerald R.
on Federal Interagency Commission formation, 87
NIH director appointment by, 43
Formal, Samuel, at Falmouth workshop, 333n.12
Foster, Susan, at Califano farewell meeting, 259
Fox, Allan, on S.1217, 148–149
Frederick Cancer Research Center, 124
Fredrickson, Donald S.
Califano communication with, 142
at Califano farewell meeting, 259
China visit of, 211–213
at congressional ferment meeting, 166
at congressional hearing of Sep. 22, 1976, 88–89
as DAC meeting chairman, 62–63, 70–71
departure from NIH, 277
on Escherichia coli K-12 experiments, 263
as FIC meeting chairman, 89–92
Friends of the Earth suit against, 122–123
on Guidelines, 46–47, 226
acceptance, 223–227
compliance, 254–255
at Guidelines revision hearing, 215–218
guidelines revision meeting chairman, 201–205
at Harris meeting, 265
Hubbard letter to, 312n.41
at Institute of Medicine, 43
letter on recombinant DNA patent, 92–93, 96–97
letter to Califano, 258
letter to Horowitz, 160
Mack suit against, 124–126, 131
at March 15–17, 1977 hearings, 144
at National Academy of Sciences forum (March, 1977), 194–195
Ottinger exchange with, 324n.36
presidential succession changes affecting, 114–118

Downloaded from www.asmscience.org by IP: 54.70.40.11
On: Wed, 24 Jul 2019 10:56:00
Fredrickson, Donald S. (continued)
  RAC revealed to, 44–45
  on recombinant DNA patent analysis, 99
  Russian visit of, 245
  S.1217 involvement by, 148, 153–154, 162
  Schneider meeting with, 102
  scientific career of, before NIH, 43
  on senatorial reply to recombinant DNA
  legislation questions, 184–185
  Singer editorial reply by, 237–238
  Singer memorandum to, 305n.15
  Stetten communication with, 42–43
  at Stevenson hearings, 172, 174–176
  Teague meeting with, 145
  Toulmin comments on, 45
  at Utah atom bomb test hearings, 257–258
Freret, Rolf, at Falmouth workshop, 333n.12
Friends of the Earth
  on environmental impact statement, 122–
  123
  on Guidelines, 78, 202
  on H.R. 11192, 177
  at National Academy of Sciences forum
  (March, 1977), 195
Frodenman, Robert, on social contracts, 284
Frosch, Robert, visit to China, 336n.51

G
Gangarosa, Eugene, at Falmouth workshop,
333n.12
Ganley, Oswald H., as FIC member, 309n.23
Garb, on *Escherichia coli* K-12 experiments,
261
Gartland, William, 43
  at Asilomar Conference, 17, 28
  on environmental impact statement, 128
  on *Escherichia coli* K-12 experiments, 255
  on Guidelines, 198, 225
  in Kitchen RAC, 49–50
  as ORDA director, 84
  on RAC membership, 228, 229
  at Wyne, England, meeting, 278
Gaylin, Willard, at science in free society
  hearing, 54
Gelfand, David, at DAC meeting, 335n.38
Gems, Peter, at Falmouth workshop,
333n.12
Gene therapy, RAC and, 286–287
Generic analysis, vs. environmental impact
  statement, 106–107
Genetic Engineering Group of Science for
  the People, letter to Asilomar
  Conference, 297n.52
Genetic Manipulation Advisory Group
  (British), 41, 101, 103
Georgiev, George P., visit to, 245
Germany
  recombinant DNA research in, 102–103
  visit to, 246
Gibson, Keith, 246, 298n.9
Gilbert, Walter, 245, 333n.12
Ginsburg, Harold
  at Astoria meeting, 207–208
  at DAC meeting, 334n.36
  on Guidelines revision, 203
  on S.1217, 150
Glass, Bentley, at Thornton hearings, 165
Godber, Sir George, on Berg letter, 30
Godell, Rae, at NIH meeting on federal
  activities, 321n.15
Goldberg, Michael
  in Kitchen RAC, 49
  on recombinant DNA legislation, 185
Goldman, Lee, 301n.2
Goldstein, Richard
  at Cambridge meeting, 82
  at DAC meeting, 62, 70
  at Falmouth workshop, 333n.12
  on Mack v. Califano et al, 131
  at NIH meeting on federal activities,
  321n.15
  as RAC member, 253
Gonzales, Dr., Federation of American
  Societies for Experimental Biology, 116
Goodfield, Jane
  on containment laboratory, 55, 56
  at National Academy of Sciences forum
  (March, 1977), 195
Goodman, Howard, on *Eco*RI enzyme, 12
Gorbach, Sherwood
  at Falmouth workshop, 192–193, 201,
  333n.12
  on recombinant DNA legislation, 160
Gordon Conference on Nucleic Acids of
  1973, 13–17
Gordon Conference on Nucleic Acids of
  1977, 161
Gore, Congressman Albert, Jr.
  human genome hearing of, 276–277
  at Stevenson hearings, 170–171
Gorini, Luigi, letter to Asilomar Conference, 297n.52

Gottesman, Susan
  on Cline experiment, 274
  on *Escherichia coli* K-12 experiments, 262–263
  in Guidelines revision, 198, 200
  in Guidelines simplification, 269
  in Kitchen RAC, 49
  on RAC dismantling, 271
  as RAC member, 228

Green, Harold
  at Asilomar Conference, 20
  on Cambridge city council meeting, 82
  on environmental impact statement, 108, 109
  on Guidelines release, 74
  on recombinant DNA controversy, 29

Grobstein, Clifford
  on recombinant DNA controversy, 29
  at Stevenson hearings, 329n.5

Gros, François, 7

Gryder, Rosa, as FIC member, 309n.23

Guidelines
  definition of, 51
  National Institutes of Health, see National Institutes of Health Guidelines

Gunsalus, Irwin C., at NIH meeting on federal activities, 321n.15

Gustafson, Bengt, at National Academy of Sciences forum (March, 1977), 194–195

Gustafson, James
  at DAC meeting, 334n.36
  on Guidelines revision, 204

Guston, David H., on social contracts, 284

H

Halford, Scott, visit to China, 336n.51

Hall, Stephen, on Stevenson hearing, 173, 175

Hallvorson, Harlyn O.
  on Guidelines, 225
  on H.R. 11192, 178

Kennedy meeting with, 327n.84
  on legislation, 176
  at Libassi hearing, 336n.55
  at NIH meeting on federal activities, 321n.15
  on S.1217, 149–150, 158–159, 165–166

Hamburg, David, 233, 321n.15

Hamilton, Peter, at Califano farewell meeting, 258–259

Handler, Philip, 15
  at Asilomar Conference, 26
  as DAC member, 61, 68
  on Fredrickson reappointment, 115
  at NIH meeting on federal activities, 321n.15
  on RAC membership, 33, 239–240
  Stevenson hearings and, 170–171, 175–176
  Stone letter to, 31–32

Harris, Patricia Roberts
  at Califano farewell meeting, 258–259
  Fredrickson relationship with, 266–268
  meetings with, 264–266
  swearing-in ceremony for, 260

Hartzman, Richard
  on *Escherichia coli* K-12 experiments, 261
  at Libassi hearing, 336n.55

Harvard University, recombinant DNA research opposition in, 81–84

Hassan II, King of Morocco, 301n.42

Hassell, Florence, in Kitchen RAC, 50

Havas, Stephen
  on Guidelines, 323n.34
  on Mack v. Califano et al, 131

Hayes, Daniel, at S.1217 hearings, 148

Haygood, Margo, as DAC member, 61, 70

Health and Safety Executive (British), 31, 41

Heinemann, Ben, 233, 258–259

Helinski, Donald
  in Guidelines revision, 190, 198, 200–203
  as RAC member, 34, 37, 38

Hellman, Alfred, 11

Hellman, Lou, 316n.34

Helms, Dennis
  at DAC meeting, 334n.36
  on Guidelines revision, 204

Henderson, W.M., on Ashby Committee, 298n.7

Heppel, Leon
  at congressional hearings, 144
  at NIH meeting on federal activities, 321n.15

Hernandez, Joe, 161
  on H.R. 7897, 177
  in Kitchen RAC, 49
  on S.1217, 158
  on Stevenson hearing, 175

Hill, Senator Lister, 134
Hinchman, James
  on environmental impact statement, 118, 120–121, 130
  on Guidelines revision, 212
Hirsch, Donald S., 142, 155
Hogness, David S.
  as Berg letter signer, 294n.37
  at DAC meeting, 62, 65
  as RAC member, 34, 37–39
Hollenback, Congressman, at Thornton hearings, 146
Holman, Halstead R.
  at congressional hearing of Sep. 22, 1976, 88
  on S.1217, 161–162
  at science in free society hearing, 54
Holton, Gerald, on social contracts, 285
Hopson, Janet, 136
Hornick, Richard, at Falmouth workshop, 333n.12
Horowitz, Lawrence, 181
  Fredrickson letter to, 160
  Kennedy communication with, 148
  on S.1217, 162, 164–166
  at science in free society hearing, 54
Hoskins, Lansing, at Falmouth workshop, 333n.12
Huang Chia-Szu, visit with, 212, 213
Hubbard, Ruth, 82
  on Guidelines, 323n.34
  on Mack v. Califano et al, 131
Hubbard, W.N., Jr., letter on recombinant DNA patents, 312n.41
Huberman, Ben, visit to China, 336n.51
Hudson, Roy, as DAC member, 61, 69
Human genome maps, 284
Hutt, Peter Barton
  as DAC member, 61, 68–71
  on Guidelines revision, 202, 204, 207
  at NIH meeting on federal activities, 321n.15
  on philosophy of risk and benefit, 46
  on Section 361, 139

I
Institute of Medicine, 43, 294n.30
Institute of Society, Ethics and the Life Sciences, on environmental impact statement, 111
Institutional biohazards committees, 37, 269–270, 358
  on Cline experiment, 273
Institutional Patent Agreement, 94
International Conference on Recombinant DNA Molecules (Asilomar, CA 1975), see Asilomar Conference
Intersociety Council for Biology and Medicine, 150
Ishibest, Jim, 316n.34

J
Jackson, David, 10
  on containment laboratory, 55
  simian virus 40 studies of, 8
Jacob, François, 7
Jacobs, Leon, 84
  in Asilomar Conference planning, 49
  on Guidelines release, 71
  on RAC membership, 33, 36
Janssen, Kaaren, letter to Asilomar Conference, 297n.52
Japan, visit to, 245–246
Javits, Senator Jacob, 301n.2
  at congressional hearing of Sep. 22, 1976, 88
  on Federal Interagency Commission formation, 86
  on Guidelines, 86–87
  on S.1217, 165–166
Jerne, Niels, in Asilomar Conference planning, 17
Johnson, President Lyndon, consumer adviser of, 61
Jonas, Hans, on moral issues in science, 251–252
Jones, Stanley, 86, 117

K
Kanamori, Jinsaku, visit to, 245
Kass, Leon
  on proposed Stanford experiments, 9
  on regulations, 44
Keatley, Ann, visit to China, 336n.51
Keefe, Congressman Frank B., 134
Keiser, Harry, on Cline experiment, 274
Kelly, James
  as DAC member, 61
  on Fredrickson reappointment, 115
Kendrew, John, 291n.6, 334n.36
Kennedy, Donald
  on advisory group ethnic composition, 227–228
on Guidelines, 226, 243–244
on Guidelines compliance, 250
at NIH meeting on federal activities, 321n.15
on RAC membership, 233, 234
Kennedy, President John F., executive order no. 11007, 52
Kennedy, Senator Edward, 230
at atom bomb test hearing, 257
consultation on H.R. 11192, 177
favoring commission mode, 140–141
on Federal Interagency Commission formation, 86
on Guidelines, 86–87
at hearing of Sep. 22, 1976, 88
Perpich on staff of, 4848
on recombinant DNA legislation, 185
recombinant DNA seminar, 135
S.1217 bill of, see Congressional actions and hearings, S.1217
science in free society hearing of, 54
on Section 361, 182
Keusch, Gerald, at Falmouth workshop, 333n.12
Kidd, Charles, 302n.8
Kimsle, Lee, at Califano farewell meeting, 259
Kinder, Randy, 264, 265
King, Jonathan
  at Cambridge meeting, 82
  on containment laboratory, 55–56
  at DAC meeting, 333n.37
  at Falmouth workshop, 193–194, 333n.12
letter to Asilomar Conference, 297n.52
at Libassi hearing, 336n.55
at Stevenson hearings, 329n.5
King, Patricia, 164–165
  at DAC meeting, 334n.36
  on Guidelines revision, 206
  as proposed RAC member, 228, 229
  on RAC dismantling, 271
Kirstein, Lincoln, 237
Kissinger, Henry, 78
Kitchen RAC
  in Cambridge controversy, 83
  on environmental impact statement, 107–110, 114, 118–119, 126
formation of, 48–50
on Guidelines release, 72
Guidelines revisions by, 190, 198
on guidelines vs. regulations, 50–53
on legislation, 151
members of, 48–50
on Stanford patent, 95
value of, 279
Kleiman, Mark, on Guidelines, 362
Klerman, Jerry, at Califano farewell meeting, 259
Kline, Carl E.
  at Guidelines revision hearing, 218
  at Libassi hearing, 336n.55
Kornberg, Hans L., 30, 298n.7
Koshland, Marion, as DAC member, 61, 69
Kourilsky, Philippe, at Asilomar Conference, 26
Krause, Richard, on Cline experiment, 274
Kreps, Juanita, on recombinant DNA patent, 98
Krevans, Julius, at NIH meeting on federal activities, 321n.15
Krimsky, Sheldon
  at Gordon Conference of 1973, 13
  as RAC member, 231, 252–253, 254
simian virus 40 studies of, 8
Kuo Hsing-Hsein, visit with, 212
Kutter, Elizabeth, as RAC member, 34, 37, 39
Kwon, Byung, as FIC member, 309n.23

L
Ladwig, Alan, as DAC member, 61, 69
LaFalce, John J., on Stanford patent application, 312n.42
Lamont-Havers, Ronald, 33–34, 44
Lappé, Marc, at Stevenson hearings, 329n.5
Latker, Norman, on biologic patents, 95–96
Lawton, Steve, on H.R. 7897, 176
Lear, John
  as Berg letter signer, 294n.37
  at Gordon Conference of 1973, 13
  on proposed Stanford experiments, 8–9
Leary, Warren, 77, 137
Leder, Phil, on Guidelines, 225
Lederberg, Joshua, 5
  at Asilomar Conference, 21, 26
  paper relating to Asilomar Conference, 54
Lefkowitz, Attorney General, on recombinant DNA research, 87–88
Legal issues, in molecular biology research, 24
Leive, Loretta, on environmental impact statement, 112–113
Leopold, King of Belgium, 248
Levin, Bruce
at Falmouth workshop, 333n.12
at Stevenson hearings, 329n.5
Levine, Arnold, at Falmouth workshop, 333n.12
Levine, Myron, at Libassi hearing, 336n.55
Levy, Stuart, at Falmouth workshop, 333n.12
Lewis, Andrew
at Asilomar Conference, 22
on cancer-causing virus danger, 11
hybrid virus studies of, 9–10
on proposed Stanford experiments, 9
on RAC, 44
Lewis, Charles F.
as FIC member, 309n.23
on Guidelines, 323n.34
Lewis, Herman W., 7
on Asilomar Conference, 11
in Asilomar Conference planning, 15, 17
as FIC member, 309n.23
on Guidelines, 221, 223
Libassi, Peter, 160
congressional ferment meeting, 166
on environmental impact statement, 118, 129, 130
on Guidelines, 212, 223–226, 243
Guidelines revision hearing of, 215–219
decision document prepared after, 355–359
on NIH director, 242
on RAC membership, 228–233, 235
on recombinant DNA patent, 99–100
on S.1217, 148–149, 152–153, 155
on Section 361, 139
at Utah atom bomb test hearings, 257–258
Liberman, Daniel F.
at DAC meeting, 335n.38
at Libassi hearing, 336n.55
Liliane, Princess of Belgium, 248
Liotta, Anthony, as FIC member, 309n.23
Lippe, Pamela T.
at DAC meeting, 335n.38
at Libassi hearing, 336n.55
Luria, Salvador, 291n.6
Lwoff, André, 7
Lynch, Marjorie, Acting Secretary, on Federal Interagency Commission formation, 86
Lythcott, George, visit to China, 211

M
Maas, Werner, at Falmouth workshop, 333n.12
Mack, Ferdinand, suit to prevent polyoma experiment, 124–126, 131
MacLeod, Colin, early DNA studies of, 1–2
Madansky, Charles, at DAC meeting, 62, 68
Magnuson, Senator Warren G., 117, 301n.2
Maguire, Congressman, on House recombinant DNA bills, 150–151, 179
Malone, Tom, 264
Markey, Congressman Howard
on House recombinant DNA bills, 150–151, 179
at Thornton hearings, 165
Marks, Paul
on H.R. 11192, 179
on hybrid molecule hazards, 15
Marshall, Thurgood, 260
Marston, Robert Q., 115
Martin, Malcolm, 45
at Falmouth workshop, 192, 333n.12
in Guidelines revision, 198
in Kitchen RAC, 49
polyoma experiment of, 123
Martinez, Anabellah, at Califano farewell meeting, 259
Mathews, Secretary David
on Federal Interagency Commission formation, 85–87
Guidelines description to, 75–76
Mathias, Senator Charles, 301n.2
Mays, as proposed RAC member, 228, 229
Mazur, Barbara, on Guidelines, 362
McCarthy, Charles, 235
on Cline experiment, 272–275
in ORDA, 84–85
McCarty, Maclyn, early DNA studies of, 1–2
McCintock, Barbara, 4
McCulloch, James, 146, 180
McElroy, William, luciferase experiments of, 209–210
McFee, Thomas S.
at Califano farewell meeting, 258
on environmental impact statement, 118, 120
McGowan, Alan, on recombinant DNA research, 88
Mead, Margaret, at Stevenson hearings, 172
Meade, David, 176
H.R. 7897 draft, 165
Medical Research Council
on Berg letter, 30
molecular biology study support by, 6
Mellinkoff, Sherman, 138, 321n.15
Melnick, Joseph, as DAC member, 61, 69
Menard, Rosemary, at DAC meeting, 334n.36
Menard, William, visit to China, 336n.51
Mertz, Janet
on EcoRI enzyme, 12
simian virus 40 studies of, 8–9
Meselson, Matt
in Cambridge controversy, 82, 83
as proposed RAC member, 228, 229
Metzenbaum, Senator, at S.1217 hearings, 148
Michel, Congressman Robert, 301n.2
Mikulak, Robert, as FIC member, 309n.23
Mikulski, Congresswoman Barbara, 165, 167
on H.R. 11192, 179
Miller, Charles, 211
Miller, Oscar L., at Libassi hearing, 336n.55
Mintz, Beatrice, 145
Mitcham, Carl, on social contracts, 284
May, Marian, as FIC member, 309n.23
Molina, Mario, at DAC meeting, 334n.36
Monod, Jacques, 7, 54
Montgomerie, John, at Falmouth workshop, 333n.12
Morgan, Thomas E., at NIH meeting on federal activities, 321n.15
Morgan, Thomas Hunt, 4
Morris, Tom, 258, 275
Morrison, Philip, as proposed RAC member, 228
Morrow, John, 12
Moulton, Dan, 177
Mountin, Joseph, 140
Muir, Warren R.
on environmental impact statement, 109
as FIC member, 309n.23
Murray, Ken, at Asilomar Conference, 19
Murray, Robert, at NIH meeting on federal activities, 321n.15
Murtaugh, Joseph, 302n.8

N
Nader, Ralph, on H.R. 7897, 165
NAS, see National Academy of Sciences
Nathans, Daniel, 10
in Asilomar Conference planning, 15
at Gordon Conference of 1973, 13
on Guidelines, 225
at Libassi hearing, 336n.55
as Nobel prize winner, 221
as proposed RAC member, 230–232
at Thornton hearings, 146
National Academy of Sciences
on Asilomar Conference, 15, 16
on environmental impact statement, 113–114
forum on recombinant DNA research, 194–195
on recombinant DNA controversy, 29
National Cancer Advisory Board, on environmental impact statement, 113
National Cancer Institute
Asilomar Conference support by, 11
virus laboratories of, 7
National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 88, 140–141, 148, 149, 156–158
in decision document, 355–356
environmental impact statement requirements of, 105–107
recombinant DNA research and, 73–74
National Institute for Occupational Safety and Health (NIOSH), Guidelines comments by, 90–91
National Institutes of Health (NIH)
administrative changes in, upon Carter succession, 114–118
at Asilomar Conference, 28
on biologic patents, 95
creation of, 134
Director's Advisory Committee of, see Director's Advisory Committee (DAC)
early years of, 2
generic analysis application of, 106–107
National Institutes of Health (NIH)
(continued)
guidelines of, see National Institutes of Health Guidelines
Harris visit to, 264–265
mechanisms for modification, 78
Memorial Laboratories, 9
National Academy of Sciences cooperation with, 29
negative features of, 47–48
Perpich appointment as associate director, 48
police function of, 358–359
polyoma experiment facilities of, 124
positive features of, 47
preamble, 77
Recombinant DNA Advisory Committee,
see Recombinant DNA Molecule Program Advisory Committee (RAC)
role of, vs. other government agencies, 31
scientists’ meeting of February 19, 1977, 137–138
as source of financial support, 7, 13, 30
specimen sharing by, 10
stewardship characteristics of, 280
National Institutes of Health Guidelines, 188–189
administration of, 58–59
Administrative Procedure Act and, 52–53
vs. Asilomar consensus, 39–40
vs. British guidelines, 40–42
Bumpers on, 136–137, 138
compliance with, 250–255
congressional comments on, 88–89
containment provisions of, 269–275, 356–357
copyrights about, 46–47
decision document on, 355–359
development of, 31–39
Director's Advisory Committee conference on, 60–72
director's first knowledge of, 44–46
distribution of, 78
environmental impact of, 108–109
*Escherichia coli* K-12 recommendations in, 255–266
Eurasian exposure to, 245–249
Federal Advisory Committee Act and, 52–53
FIC meeting on (October 12, 1978), 221–223
Hogness draft of, 37–39
implementation of
Executive Recombinant DNA Committee in, 85
Federal Interagency Committee on Recombinant Research in, 85–89
Office of Recombinant DNA Activities for, 84–85
industry's entry under, 251–252
lifting of, 268
memorandum of understanding requirement in, 269–270
“moral” of, 278–280
Ottinger on, 135–136
prohibitions in, 39–40
promulgation of, 56–57
proprietary information issues in, 253
public comments on, 56–59, 360–364
registration provisions of, 243–244
vs. regulations, 50–53
release of, 74–79
congressional hearing on, 76
environmental impact statement with, 73–74
Federal Interagency Committee on Recombinant DNA Research creation before, 75
industry meetings before, 76
official (June 23, 1976), 77–79
press reactions to, 78–79
questions before, 74–75
Weinberger meeting before, 75–76
responsibilities under, 357
revision of, 188–219, 241–242
barriers to, 189–190
comments on, 199–200, 206–208, 218–219
committee for, 190–191
continuous nature of, 190–196
definition changes in, 195
Director's Advisory Committee in, 200
draft, 73
EMBO meeting in, 191
Falmouth meeting for, 191–195
future, 243
Libassi hearing on, 215–218
need for, 209–210
path to official acceptance, 223–235
public airing in December, 1977, 200–205
RAC in, 208–209
Index

O

Occupational Health and Safety Administration (OSHA), on Guidelines, 90–91, 361
Ochenburg, Mike, visit to China, 336n.51
Oehen (head of Swiss Republican Party), 103
Office of Environmental Affairs, environmental impact statement requirements of, 105–106, 109, 118–119
Office of Management and Budget, 142–143
Office of Recombinant DNA Activities (ORDA), 84–85, 147
Harvard Guideline violation and, 270–271
Oliver, Christine
on Guidelines, 323n.34
at Libassi hearing, 336n.55
on Mack v. Califano et al, 131
Omenn, Gil
as RAC member, 253
on RAC membership, 240
at Stevenson hearings, 171
Onek, Joe, 143
Opposition, to recombinant DNA research, 80–84
ORDA, see Office of Recombinant DNA Activities, 84–85
Orskov, Frits, at Falmouth workshop, 333n.12
Osborn, June E., at Libassi hearing, 336n.55
OSHA, see Occupational Health and Safety Administration
Osheroff, Boris, on environmental impact statement, 106, 108–110, 121–122
Ottinger, Congressman Richard L.
Fredrickson exchange with, 324n.36
on Guidelines, 135–136
at Guidelines revision hearing, 217
on H.R. 4759, 150–151
on H.R. 6158, 150–151
on H.R. 7418, 155–157, 159
on H.R. 11192, 177, 179
at Libassi hearing, 336n.55
at Thornton hearings, 146
Overberger, Charles, 55, 321n.15
Oviatt, Vinson, 106, 108
Owens, William D., as FIC member, 308n.23
Oxman, Michael
on Asilomar Conference planning, 11
on biohazards, 293n.24

September 1977 version of, 196–200
September 1978 version of, 210–219
Singer editorial on, 235–238
summary of, 188–189
testing of, 195–196
travel to China with, 211–214
senatorial comments on, 86–87
simplification of, 269–275
summary of, at DAC meeting, 64
vs. United Kingdom guidelines, 101–104
violation of, 171–173, 269–270
Woods Hole draft, 38, 39
National Recombinant DNA Safety Regulation Commission, 149, 154, 157–158
National Science Foundation (NSF)
Asilomar Conference support by, 11
on Guidelines, 90, 220, 360
as source of financial support, 7, 30
Natural Resources Defense Council on environmental impact statement, 111
on Guidelines, 361
on recombinant DNA research, 88
Neel, James
at DAC meeting, 334n.36
on Guidelines revision, 206
Nelson, Senator Gaylord, 301n.2
on recombinant DNA patent, 94–95, 100
on S.1217, 161, 163–164
NEPA, see National Environmental Policy Act of 1969–1970
NIH, see National Institutes of Health
NIOSH (National Institute for Occupational Safety and Health), Guidelines comments by, 90–91
Nixon, Nan, 177
Nixon, President Richard
administrative changes under, 115
visit to China, 211
Nobel prize winners, 221, 291n.7
Norman, Colin, 77
Notice of Proposed Rule Making, 51–52
Novick, Richard
at Asilomar Conference, 17, 20
at Falmouth workshop, 333n.12
on Guidelines, 323n.34
as RAC member, 228, 229, 252
NSF, see National Science Foundation
Nutter, John E., Mack suit against, 124–126, 131
P

Packwood, Senator, 116
Parran, Surgeon General Thomas, 134
Pasteur Institute
  containment laboratory of, 53–54
  molecular biology studies at, 7
Patel, Dhun, at Libassi hearing, 336n.55
Patents
  biological, 94–95
  on recombinant DNA inventions, 92–101
    accelerated, 98
    Cohen-Boyer, 92–93, 98–101
  Health Education and Welfare policies
    on, 93–94
  House subcommittee on, 151–152
  information exchange and, 95–96
  NIH deliberations on, 95
  opinions sought on, 96–97
Perkins, Maxwell, in Kitchen RAC, 50
Perpich, Joseph, 53, 211, 223, 264
  appointment of, 48
  on biologic patents, 95
  on Cambridge city council meeting, 82
  at congressional ferment meeting, 166
  on containment laboratory, 55
    as DAC member, 61
  on environmental impact statement, 107–
    108, 122, 129
  on Federal Interagency Commission
    formation, 86
  on Guidelines, 208, 225, 226
  on Guidelines release, 71–72, 75
  at Harris meeting, 265
  on H.R. 7897, 165
  in Kitchen RAC, 48
  on RAC membership, 233
  on S.1217, 152, 158, 165
  on Stevenson hearing, 175
  Wanner letter to, 106
Perutz, Max, 291n.6
Pesnya, Gayle, 159, 180, 183
Petersdorf, Robert, as DAC member, 61, 70
Peterson, Esther, as DAC member, 61
Petricciani, John C., as FIC member, 309n.23
Pettinga, Cornelius, on Guidelines, 362
Pfund, Nancy
  at DAC meeting, 335n.37
  on Guidelines, 202–203, 225
Pharmaceutical Manufacturers Association,
  250, 252
Pickering, Senator, 116
Pierce, Nathaniel J., at Falmouth workshop,
  333n.12
Pimental, George, on RAC membership, 240
Pintet, Mariano, as FIC member, 309n.23
Piñon, as proposed RAC member, 228, 229
Pires, Sheila, on RAC membership, 228–234
Plumlee, Lawrence, as FIC member, 310n.23
Pollack, Robert, 8–9, 11
Polyoma experiment, 123–126, 131–132
Porter, R.R., on Ashby Committee, 298n.7
Postgate, J.R., on Ashby Committee, 298n.7
Potts, John T., at Falmouth workshop,
  333n.12
President's Commission for the Study of
  Ethical Problems in Medicine and
  Biomedical and Behavioral Research, 276
Press, Frank, 170, 233
  on Section 361, 183
  at Stevenson hearings, 171
  visit to China, 212, 213, 336n.51
  visit to Tokyo, 245–246
Proprietary information, protection of, 253
Ptashne, Mark, 82, 323n.34

Q

Quinn, Joseph
  visit to Brussels, 247
  visit to Russia, 245

R

RAC, see Recombinant DNA Molecule
  Program Advisory Committee (RAC)
Rall, J.E., at NIH meeting on federal
  activities, 321.n15
Randal, Judith, 166
Ransdall, Senator Joseph, 134
Rauscher, Frank, at NIH meeting on federal
  activities, 321.n15
Reagan, President Ronald, Fredrickson
  service under, 267, 277
Recombinant DNA
  commercial value of, 282–283
  definition of, 147, 178, 195
  technical power of, 282
Recombinant DNA Molecule Program
  Advisory Committee (RAC), 31–39
  administrator of, 84–85
  appeal mechanisms of, 222
  Asilomar Conference document and, 20–21
  chairman's disillusionment with, 42–43
charter of, 32
on compliance, 252–255
DAC letter to, 73
“despoiling” of, 238–241
director’s first awareness of, 44–45
on Escherichia coli K-12 experiments, 256–257, 260–263
expanded, meeting of February 1979, 244
Falmouth workshop recommendations by, 191–192
FIC member agencies represented on, 222
final draft, 39
first director of, 31–32
first steps of, 36–37
formation of, 31
gene therapy and, 286–287
Guidelines revisions by
director meeting on, 208–209
at Falmouth, 191–192
plans for, 189–191
report on, 192–195
review, 208–209
testing, 195–196
Hogness draft by, 37–39
informal group within, see Kitchen RAC
meeting of February 1982, 281
members of, 32–34
new, 241
procedure for selection, 357–358
revised, 228–241
suggestions for, 206
metamorphosis of, 275–277
new roles and responsibilities of, 242–243
polyoma experiment of, 123
proposal for dismantling, 271–272
recombinant DNA definition of, 147
Singer editorial on, 235–238
tasks of, 34–35
termination of, opposition to, 286–287
value of, 279–280
Recombinant DNA Technical Bulletin, 85
Redford, Emmette S., as RAC member, 34
Reductionism, 281, 287
Registry, for recombinant DNA experiments, 223
Regulations
definition of, 51
vs. guidelines, 50–53
Reid, Feather, 117
Reimers, Niels, on recombinant DNA patent, 92
Rettig, Richard, on Nixon administration, 115
Rich, Alex
on Guidelines, 323n.34
on RAC membership, 229, 240
Richardson, John H., as FIC member, 309n.23
Richmond, Julius, 99, 211, 258
at Califano farewell meeting, 258
on environmental impact statement, 130
on Guidelines, 214, 224, 226
Guidelines revision draft for, 196
at Guidelines revision hearing, 215–218
meeting on congressional ferment, 166
visit to Russia, 245
Rifkin, Jeremy
on Guidelines, 323n.34
at National Academy of Sciences forum (March, 1977), 194
Riley, R., on Ashby Committee, 298n.7
Riseberg, Richard, 252
on Cline experiment, 274
on environmental impact statement, 107, 109, 125, 129
on Guidelines, 74, 76, 225
on H.R. 11192, 178
in Kitchen RAC, 50, 51
on National Environmental Policy Act, 106
Roberts, at Asilomar Conference, 26
Robinson, Judith, 161
Roblin, Richard, at Asilomar Conference, 15, 17, 26
Rockefeller Institute, DNA studies of, 1–2
Rodriguez, as proposed RAC member, 229
Rogers, Congressman Paul, 117, 152
departure of, 230
H.R. 4759 (Recombinant DNA Research Act of 1977), 143–145, 150–151
H.R. 4849, 143
H.R. 6158, 146–147, 150–151
H.R. 7418, 155–156
on recombinant DNA legislation, 185
at Thornton hearings, 155–156
Rogers, Michael, at Asilomar Conference, 21
Roosevelt, President Franklin Delano, on scientific research support, 2
Rosenberg, Steven
gene therapy proposal of, 286
on Guidelines revision, 206–207
Rosenblith, Walter
as DAC member, 61
Index

Rosenblith, Walter (continued)
on Guidelines revision, 204
at NIH meeting on federal activities, 321n.15
on recombinant DNA research, 82
Rosenzweig, Robert M., on recombinant DNA patent, 92–93, 95
Rosovsky, Dean Henry, on recombinant DNA research, 81
Ross, Stan, 117
Rous, Peyton, 5–6
Rowe, Wallace P.
at Astoria meeting, 207–208
on environmental impact statement, 128–129
on Escherichia coli K-12 experiments, 256
at Falmouth workshop, 192, 193–194, 333n.12
on Guidelines, 190, 198, 200, 203–204, 323n.34
in Kitchen RAC, 49
polyoma experiment of, 123
as RAC member, 34, 44–45, 228
Ruddle, Frank
on Guidelines revision, 218
at Libassi hearing, 336n.55
as proposed RAC member, 231, 232
Russell, Christine, 77, 231
Russia, visit to, 245
Rutter, William, at Stevenson hearing, 172, 173
Ryan, Kenneth, 141, 156–157, 164–165

S
Sack, R. Bradley, at Falmouth workshop, 333n.12
Samuels, Sheldon, at DAC meeting, 335n.37
Saxon, David, on Guidelines, 362
Schiaffino, Stephen, on RAC membership, 32–33
Schmeck, Harold, 77, 137, 231, 233
Schmitt, Max, 316n.34
Schmitt, Senator Harrison
on H.R. 11192, 181–182
oversight report of, 186
on Section 361, 182, 183
at Stevenson hearings, 170–171
Schneider, Franz, 102
Schrödinger, Erwin, 291n.6
Schultz, Jane, as FIC member, 309n.23
Schuster, Gunter, visit to, 247–249
Schwartz, Arthur, at DAC meeting, 335n.38
Schweiker, Richard, 88, 267, 301n.2
Science for the People
at DAC meeting, 67–68
on Guidelines, 363
letter at Asilomar Conference, 23
on University of Michigan containment laboratory, 55
Scientists’ Institute for Public Information, on DNA research, 88
Scriabin, Constantine, visit to, 245
Sedat, Paul
at DAC meeting, 62
at Gordon Conference of 1973, 14
Semmel, Herbert, on Guidelines, 362
Sencer, David, 316n.34
Setlow, Jane, 34
as RAC head, 210
on RAC membership, 231
Shannon, James A., 43, 48
DAC establishment under, 60
departure of, 115
on scientific freedom, 58
Shapiro, Marshall, at Stevenson hearings, 329n.5
Shatkin, Aaron, at Asilomar Conference, 17, 22
Shaw, Marjorie
as DAC member, 61
on Guidelines revision, 203
Shelton, Elizabeth, in Kitchen RAC, 50
Sherman, John, meeting with Kennedy, 327n.84
Shore, Lee, 116
Sierra Club, on Guidelines, 202, 225
Signer, Ethan
on Guidelines, 323n.34
letter to Asilomar Conference, 297n.52
Simian virus 40, early studies on, 8, 9
Siminovitch, Louis, as RAC observer, 37
Simring, Francine
at DAC meeting, 335n.38
on Escherichia coli K-12 experiments, 261
on Guidelines, 78, 362
at National Academy of Sciences forum (March, 1977), 195
at RAC meeting, 244
Singer, Daniel, at Asilomar Conference, 20, 24
Singer, Maxine, 45
at Asilomar Conference, 17, 21, 279
at Cambridge meeting, 82
on containment laboratory, 55
at DAC meeting, 64, 70
DAC meeting reflections of, 72–73
on environmental impact statement, 107–110, 126, 127
Fredrickson memorandum of, 305n.15
at Gordon Conference of 1973, 13–14
Guidelines involvement by, 225, 323n.34
preparation, 39
revision, 198, 200, 215, 235–238
simplification, 269–275
at Harris meeting, 265
on hybrid molecule hazards, 15
in Kitchen RAC, 49
at RAC meeting, 244
on RAC membership, 230, 231, 233
on recombinant DNA definition, 147
on Stanford experiments, 9
Sinkford, Jeanne, at DAC meeting, 334n.36
Sinsheimer, Robert
at Asilomar Conference, 22
at congressional hearing of Sep. 22, 1976, 88
as DAC member, 61, 66–67, 69
on environmental impact statement, 112, 113
on Guidelines revisions, 202
paper relating to Asilomar Conference, 54
as proposed RAC member, 228, 229
on recombinant DNA research, 88
on S.1217, 161
Skalka, Anna
at DAC meeting, 335n.38
on Guidelines revision, 201, 203
Skolimowski, Henryk, 55
Slesin, L., on Guidelines, 361
Sloan-Kettering Institute, on Guidelines, 363
Smith, H. Williams, at Falmouth workshop, 333n.12
Smith, Hamilton, as Nobel prize winner, 221
Smith, William
in Asilomar Conference, 19
at Falmouth workshop, 192
Smithies, Oliver, meeting with Kennedy, 327n.84
Söll, Dieter, at Gordon Conference of 1973, 14
Sonnewborn, Tracy
meeting with Kennedy, 327n.84
at Thornton hearings, 165
Sonnert, Gerhard, on social contracts, 285
Sorenson, James, at Thornton hearings, 165
Spizizen, John, as RAC member, 34
Sprague, Charles, as DAC member, 61
Staggers, Congressman Harley
Califano message to, 153
on Federal Interagency Commission formation, 86
H.R. 7897, 167, 176, 177
H.R. 11192, 177–179
on recombinant DNA legislation, 186–187
Stanford University
early molecular biology studies at, 7–10
recombinant DNA patent of, 92–101
Stark, Nathan, 265
Stetten, DeWitt (Hans), Jr., 45, 127, 176
at DAC meeting, 62–64
on environmental impact statement, 128
as Executive Recombinant DNA Committee head, 85
on Fredrickson reappointment, 115
on Guidelines public airing, 56
on Guidelines release, 71, 74
on Guidelines revision committee, 190, 210
as RAC chair, 33, 36, 38, 39, 42–43
on recombinant DNA research, 173
resigning as RAC head, 210
Talbot assistant to, 48
Stevenson, Senator Adlai E.
DNA legislation oversight by, 170–176, 186
on Escherichia coli K-12 experiments, 261
on Guidelines, 220, 224, 226, 363
on H.R. 11192, 181
on recombinant DNA legislation, 185–186
Stever, H. Guyford, as FIC member, 309n.23
Stoker, M.G. P., on Ashby Committee, 298n.7
Stoker, Michael, 32
Stone, Jeremy, on Guidelines, 74
Stone, Robert S., 31, 115
Stoney, Joanne, 135
Strigini, Paulo, letter to Asilomar Conference, 297n.52
Sturgis, Katherine, at DAC meeting, 334n.36
Subak-Sharpe, J. H., on Ashby Committee, 298n.7
Sullivan, Roger, visit to China, 336n.51
Supreme Court, rulings on patenting living things, 94
Suzuki, David T., at DAC meeting, 335n.37
Swanberg, Frank, Jr., as FIC member, 309n.23
Switzerland, recombinant DNA research in, 103–104
Symons, R. H., simian virus 40 studies, 8
Szilard, Leo, 291n.6
Szybalski, Waclaw
at Asilomar Conference, 26
at DAC meeting, 335n.38
as RAC member, 34, 37

T
Taft, William H., IV, on Guidelines release, 75–76
Talbot, Bernard, 223
on Cline experiment, 274
on environmental impact statement, 109–110, 127–128
Guidelines involvement by, 224–226
release, 71, 72
revision, 198, 208
simplification, 269
at Harris meeting, 265
on H.R. 7897, 165
in Kitchen RAC, 48
at RAC meeting, 244
on RAC membership, 228, 230, 232–234
Tatum, Edward L., 4, 5
Teague, Congressman Olin E., on recombinant DNA legislation, 145, 146, 155, 159, 173
Thatcher, Scott
at DAC meeting, 335n.38
on Guidelines, 206, 363
Thomas, Charles, 34
Thomas, Lewis, 138
on Guidelines, 363
at NIH meeting on federal activities, 321.n15
at Thornton hearings, 165
Thompson, Larry, on Cline experiment, 273, 275
Thompson, Lewis, 134
Thorne, Grace, at Falmouth workshop, 333n.12
Thornton, Congressman Ray
on RAC dismantling, 271
as RAC member, 227, 228, 252–253

subcommittee hearings of, 145–146, 154–155, 164–165, 179–180
Three Mile Island incident, 278
Tokyo, visit to, 245–246
Tooze, John, 191
at Astoria meeting, 207–208
at DAC meeting, 335n.38
on Guidelines revision, 201, 203
Torriani, Annamaria, letter to Asilomar Conference, 297n.52
Tosteson, Daniel C., at NIH meeting on federal activities, 321.n15
Toulmin, Stephen, on NIH, 45
Turner, Stansfield, 159

U
Unger, David, on Guidelines, 364
Ungers, Grace, at Libassi hearing, 336n.55
United Kingdom
Berg letter attention in, 30–31
Genetic Manipulation Advisory Group, 41
guidelines of, 101–104
vs. NIH guidelines, 40–42
Health and Safety Executive, 31, 41
University of Alabama, recombinant DNA patent of, 100
University of California, recombinant DNA patent of, 100
University of California Los Angeles, Cline experiment and, 272–275
University of Michigan
Asilomar Conference reaction in, 54–56
on environmental impact statement, 111
University of Pennsylvania, gene therapy experiment of, 287
Upton, Arthur, 259, 264

V
Van Apersele, C., 248
Varmus, Harold, on RAC termination, 286–287
Vaughan, Martha, 301n.2
Vellucci, Alfred E., 82, 245
Veterans Administration, on recombinant DNA research, 143
Vidaver, Ann, at DAC meeting, 334n.36

W
Wade, Nicholas, 39, 77, 172
on Guidelines revision, 204
on Sinsheimer, 67
Wald, George, 82, 83
on Guidelines, 323n.34
at National Academy of Sciences forum
(March, 1977), 194
Wallace, David, as FIC member, 309n.23
Walsh, William J., as FIC member, 309n.23
Walters, LeRoy
as DAC member, 61
on *Escherichia coli* K-12 experiments, 261
in Guidelines revision, 190, 200
as RAC member, 34, 286
Wanner, Rudolph
on environmental impact statement, 107, 110
on Executive Recombinant DNA Committee, 85
as Office of Environmental Affairs liaison, 106
Warden, Dick, 135
at Califano farewell meeting, 258
at congressional ferment meeting, 166
on Guidelines, 226
on H.R. 11192, 181
on recombinant DNA legislation, 184
at S.1217 meeting, 162
Watson, James D., 205–206, 291n.6
at Asilomar Conference, 15, 21, 26
on biohazards, 293n.24
at DAC meeting, 198, 335n.38
DNA structure discovery by, 3
on RAC membership, 240–241
Waxman, Congressman Henry
on *Escherichia coli* K-12 experiments, 261
Health Research Bill, 266
on H.R. 11192, 179
on National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 88
Weaver, Warren, 3
Weinberger, Caspar W., 43
Mathews succeeding, 75
on RAC charter, 32
Weissman, Charles, 103
Weissman, Sherman, in Asilomar Conference planning, 15, 17
Welch, Murray, on Guidelines, 364
Welsh, William B., 266
Weyzen, Walter H., as FIC member, 309n.23
Whaley, Storm, 267
Whelan, W. J.
in Guidelines revision, 201
at Libassi hearing, 336n.55
at Thornton hearings, 146
White, Paul Dudley, visit to Russia, 245
Whiteley, Helen R., at NIH meeting on federal activities, 321n.15
Wilkens, M. H. F., on Ashby Committee, 297n.7
Williams, Luther, on *Escherichia coli* K-12 experiments, 256–257
Williams, R. E. O., on Ashby Committee, 298n.7
Williams, Senator Harrison, 44, 182–183, 301n.2
Williams, Sir Robert
on Berg letter, 31
British guidelines of, 40–43, 191, 197
Winter, David L., as FIC member, 309n.23
Wohl, Frank, 124–125
Wolff, Bruce, on RAC membership, 227–231, 234
Wolsey, Sue, 143
Woodcock, Leonard, 212, 213
Woods Hole draft, National Institutes of Health Guidelines, 38, 39
Workshop on Studies for Assessment of Potential Risks Associated with Recombinant DNA Experimentation, Falmouth, Mass., 191–195
Wright, Susan
on British vs. American guidelines, 41
at DAC meeting, 62, 67–68, 335n.38
on environmental impact statement, 111
on *Escherichia coli* K-12 experiments, 261
on Guidelines, 73
as Science for People member, 55
Y
Yoshimori, R. N., *Eco*RI enzyme isolation, 11–12
Young, Frank
on Guidelines, 323n.34
meeting with Kennedy, 327n.84
on recombinant DNA definition, 178
Z
Zaitlin, in Guidelines revision, 200
Zander, Al, 55
Ziff, Ed, at Gordon Conference of 1973, 14
Zimmerman, Burke
  at congressional hearing of Sep. 22, 1976, 88–89
  H.R. 7897 draft, 165
  on H.R. 7897, 176
on H.R. 11192, 177
Zinder, Norton, 45
  in Asilomar Conference planning, 15, 17
  at congressional hearing of Sep. 22, 1976, 88
  at Libassi hearing, 336n.55
  on RAC dismantling, 271