

CHEMICAL HERITAGE FOUNDATION

**GREGORY J. HANNON**

The Pew Scholars Program in the Biomedical Sciences

Transcript of an Interview  
Conducted by

Andrea R. Maestrejuan

at

Cold Spring Harbor Laboratory  
Cold Spring Harbor, New York

on

16, 17, and 18 December 2002

From the Original Collection of the University of California, Los Angeles



Gregory J. Hannon

## ACKNOWLEDGEMENT

This oral history is part of a series supported by a grant from the Pew Charitable Trusts based on the Pew Scholars Program in the Biomedical Sciences. This collection is an important resource for the history of biomedicine, recording the life and careers of young, distinguished biomedical scientists and of Pew Biomedical Scholar Advisory Committee members.

This oral history was completed under the auspices of the Oral History Project, University of California, Los Angeles (Copyright © 2006, The Regents of the University of California) and is made possible through the generosity of



**From the original collection at the Center for  
Oral History Research, UCLA Library, UCLA.**

The following oral history, originally processed at the UCLA Center for Oral History Research, has been reformatted by the Chemical Heritage Foundation. The process involved reformatting the front matter, adding a new abstract, replacing the table of contents, and replacing the index. The paragraph spacing and font of the body of the transcript were altered to conform to the standards of the Oral History Program at the Chemical Heritage Foundation. The text of the oral history remains unaltered; any inadvertent spelling or factual errors in the original manuscript have not been modified. The reformatted version and digital copies of the interview recordings are housed at the Othmer Library, Chemical Heritage Foundation. The original version and research materials remain at the Darling Library, University of California, Los Angeles and at the Bancroft Library, University of California, Berkeley.

**REFORMATTING:**

Kim Phan, Program Intern, Oral History, Chemical Heritage Foundation. B.A. expected 2011, Anthropology, Cornell University.

David J. Caruso, Program Manager, Oral History, Chemical Heritage Foundation. B.A., History of Science, Medicine, and Technology, Johns Hopkins University; PhD., Science and Technology Studies, Cornell University.

UNIVERSITY OF CALIFORNIA, LOS ANGELES

Oral History Interview Agreement No. RO10703A

This Interview Agreement is made and entered into this 7 day of January, 2002 by and between THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, a California corporation, on behalf of the Oral History Program at the UCLA campus, hereinafter called "University," and GREGORY J. HANNON, having an address at Cold Spring Harbor Laboratory, 1 Bungtown Road, Cold Spring Harbor, New York 11724, hereinafter called "Interviewee."

Interviewee agrees to participate in a series of University-conducted tape-recorded interviews, commencing on or about December 16, 2002, and tentatively entitled "Interview with Gregory J. Hannon." This Agreement relates to any and all materials originating from the interviews, namely the tape recordings of the interviews and a written manuscript prepared from the tapes, hereinafter collectively called "the Work."

In consideration of the mutual covenants, conditions, and terms set forth below, the parties hereto hereby agree as follows:

1. Interviewee irrevocably assigns to University all his copyright, title and interest in and to the Work. This assignment applies to University, its successors, and assigns, for and during the existence of the copyright and all renewals and extensions thereof.
2. By virtue of this assignment, University will have the right to use the Work for any research, educational, or other purpose, including electronic reproduction, that University may deem appropriate.
3. Interviewee acknowledges that he will receive no remuneration or compensation for his participation in the interviews or for the rights assigned hereunder.
4. Interviewee will receive from University, free of charge, one bound copy of the typewritten manuscript of the interviews.
5. To insure against substantive error or misquotation, Interviewee will have the right to review the manuscript before it is put into final form. University therefore will send Interviewee a copy of the edited transcript for review and comment. Interviewee will return transcript and comments to University within 30 days of receipt of the transcript. In the event that Interviewee does not respond within 30 days, University will assume that Interviewee has given full approval of the transcript.
6. All notices and other official correspondence concerning this Agreement will be sent to the following:

If to University: Oral History Program  
University of California, Los Angeles  
Box 951575  
Los Angeles, California 90095-1575

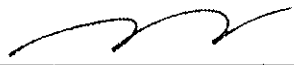
Attention: Janice L. Reiff

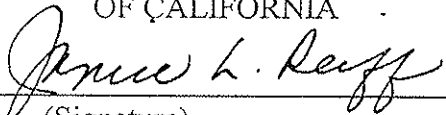
If to Interviewee: Gregory J. Hannon  
Cold Spring Harbor Laboratory  
P.O. Box 100  
1 Bungtown Road  
Cold Spring Harbor, NY 11724

University and Interviewee have executed this Agreement on the date first written above.

INTERVIEWEE

THE REGENTS OF THE UNIVERSITY  
OF CALIFORNIA

X   
\_\_\_\_\_  
(Signature)

  
\_\_\_\_\_  
(Signature)

Gregory J. Hannon  
\_\_\_\_\_  
(Typed Name)

Janice L. Reiff  
\_\_\_\_\_  
(Typed Name)

Cold Spring Harbor Laboratory  
\_\_\_\_\_  
(Address)

Interim Director, Oral History Program  
\_\_\_\_\_  
(Title)

1 Bungtown Road  
\_\_\_\_\_

\_\_\_\_\_

Cold Spring Harbor, NY 11724  
\_\_\_\_\_

\_\_\_\_\_

X Date 12/16/03  
\_\_\_\_\_

Date 7 January 2003  
\_\_\_\_\_

This interview has been designated as **Free Access**.

One may view, quote from, cite, or reproduce the oral history with the permission of CHF.

**Please note:** Users citing this interview for purposes of publication are obliged under the terms of the Chemical Heritage Foundation Oral History Program to credit CHF using the format below:

Gregory J. Hannon, interview by Andrea R. Maestrejuan, at Cold Spring Harbor Laboratory, Cold Spring Harbor, New York, 16-18 December 2002 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript # 0471).



Chemical Heritage Foundation  
Oral History Program  
315 Chestnut Street  
Philadelphia, Pennsylvania 19106



The Chemical Heritage Foundation (CHF) serves the community of the chemical and molecular sciences, and the wider public, by treasuring the past, educating the present, and inspiring the future. CHF maintains a world-class collection of materials that document the history and heritage of the chemical and molecular sciences, technologies, and industries; encourages research in CHF collections; and carries out a program of outreach and interpretation in order to advance an understanding of the role of the chemical and molecular sciences, technologies, and industries in shaping society.

## GREGORY J. HANNON

1964 Born in Pittsburgh, Pennsylvania, on 5 May

### Education

1986 B.A., Biochemistry, Case Western Reserve University  
1991 Ph.D., Molecular Biology, Case Western Reserve University

### Professional Experience

Cold Spring Harbor Laboratory, Cold Spring Harbor, New York  
1992-1994 Postdoctoral Fellow  
1994-1995 Staff Associate II  
1996-2000 Assistant Professor  
2000-2002 Associate Professor  
2002-present Professor

### Honors

1982-1986 Andrew J. Squire Scholar  
1986 Phi Beta Kappa  
1992-1995 Damon Runyon-Walter Winchell Cancer Research Fund Fellowship  
1997-2000 Pew Scholars Program in the Biomedical Sciences Grant  
2000 Rita Allen Scholar  
2002-2005 U.S. Army Breast Cancer Research Program Innovator Award

### Selected Publications

Ranade, K., Hussussian, C., Sikorski, R., Varmus, H., Goldstein, A., Tucker, M., Serrano, M., Hannon, G., Beach, D. and Dracopoli, N. (1995) Mutations associated with familial melanoma impair p16INK4 function. *Nature Genetics* 10:114-116.  
Suzuki, H., Zhou, X., Yin, J., Lei, J., Jiang, H.Y., Suzuki, Y. Chan, T., Hannon, G., Mergner, W., Abraham, J. and Meltzer, S. (1995) Intragenic mutations of CDKN2B and CDKN2A in primary human esophageal cancers. *Human Molecular Genetics* 4: 1883-1887.  
Orlow, I., Lacombe, L., Hannon, G.J., Serrano, M., Dalbagni, G., Pellicer, I., Reuter, V.E., Zhang, Z.F., Beach, D. and Cordon-Cardo, C. (1995) Deletion of p16 (INK4A/MTS1) and p15INK4B/MTS2) in human bladder tumors. *J. Natl. Cancer Inst.* 87: 1524-1529.  
Brugarolas, J., Chandrasekaran, C., Gordon, J., Beach, D., Jacks, T. and Hannon, G. (1995)



- Radiation-induced cell cycle arrest compromised by p21 deficiency. *Nature* 377: 552-557.
- Zhou, X., Suzuki, H., Lei, J., Cole, K., Yin, J., Suzuki, Y., Abraham, J.M., Shimada, Y., Imamura, M., Chan, T., Hannon, G.J., Meltzer, S.J. (1996) Growth suppression of esophageal cancer cells by p16 (INK4) and p15 (INK4B) in vitro. *Cancer J. Sci Am* 2(4): 221.
- Cobrinik, D., Lee, M.-H., Hannon, G., Mulligan, G., Bronson, R., Dyson, N., Harlow, E., Beach, D., Weinberg, R. and Jacks, T. (1996) Shared role of the pRB-related p130 and p107 proteins in limb development. *Genes & Dev* 10: 1633-1644.
- Li, R., Hannon, G.J., Beach, D. and Stillman, B. (1996) Subcellular distribution of p21 and PCNA in normal and repair-deficient cells following DNA damage. *Current Biology* 6:189-199.
- Terry, L.A., Boyd, J., Alcorta, D., Lyon, T., Solomon, G., Hannon, G., Berchuck, A., Beach, D. and Barrett, J.C. (1996) Mutational analysis of the p21/WAF1/CIP1/SDI1 coding region in human tumor cell lines. *Mol. Carcinogenesis* 16: 221-228.
- Alcorta, D., Xiong Y., Phelps, D., Hannon, G., Beach, D. and Barrett, J. Carl (1996) Involvement of the cyclin-dependent kinase inhibitor p16 (INK4a) in replicative senescence of normal human fibroblasts. *Proc. Natl. Acad. Sci. USA* 93: 13742-13747.
- Balbin, M., Hannon, G.J., Pendas, A.M., Ferrando, A.A., Vizoso, F., Fueyo, A. and Lopez-Otin, C. (1996) Functional analysis of a p21WAF1,CIP1,SDI1 mutant (Arg94 $\rightarrow$ Trp) identified in a human breast carcinoma. Evidence that the mutation impairs the ability of p21 to inhibit cyclin-dependent kinases. *J. Biol Chem* 271: 15782- 15786.
- Xie, Q., Sanz-Burgos, A.P., Hannon, G.J. and Gutierrez, C. (1996) Plant cells contain a novel member of the retinoblastoma family of growth regulatory proteins. *EMBO J.* 15: 4900-4908.
- Carnero, A., Hannon, G.J. (1998) The INK4 family of CDK inhibitors. *Curr Top Microbiol Immunol* 227:43-55.
- Fearnhead, H.O., Rodriguez, J., Govek, E.E., Guo, W., Kobayashi, R., Hannon, G. and Lazebnik, Y.A. (1998) Oncogene-dependent apoptosis is mediated by caspase-9. *Proc Natl Acad Sci USA* 95(23): 13664-13669.
- LaMontagne, K.R., Jr., Hannon, G., Tonks, N.K. (1998) Protein tyrosine phosphatase PTP1B suppresses p210 bcr-abl-induced transformation of rat-1 fibroblasts and promotes differentiation of K562 cells. *Proc Natl Acad Sci USA* 95(24): 14094-14095.
- Wang, J., Xie, L.-Y., Allan, S., Beach, D. and Hannon, G. (1998) Myc activates telomerase. *Genes & Dev* 12:1769-1774.
- Sun, P., Dong, P., Dai, K., Hannon, G. and Beach, D. (1998) p53-independent role of MDM2 may contribute to TGF $\beta$ 1. *Science* 282: 2270-2272.
- Hannon, G.J., Sun, P., Carnero, A., Xie, L.-Y., Maestro, R. Conklin, D. and Beach, D. (1999) MaRX: An approach to genetics in mammalian cells. *Science* 283:1129-1130.
- Maestro, R., Dei Tos, A., Hamamori, Y., Krasnokutsky, S., Sartorelli, V., Kedes, L., Doglioni, C., Beach, D. and Hannon, G.J. (1999) Twist is a potential oncogene that inhibits apoptosis. *Genes & Dev.* 13: 2207-2217.
- Hudson, J.D., Shoaibi, M., Maestro, R., Carnero, A., Hannon, G. and Beach, D. (1999) A pro-inflammatory cytokine inhibits p53 tumor suppressor activity. *J. Exp. Med.* 190: 1375-1382.

- Hammond, S.M., Bernstein, E., Beach, D. and Hannon, G.J. (2000) An RNA-directed nuclease mediates post-transcriptional gene silencing in *Drosophila* cells. *Nature* 404: 293-296.
- Wang, J., Hannon, G.J. and Beach, D. (2000) Risky immortalization by Telomerase. *Nature* 405: 755-6.
- Carnero, A., Hudson, J., Hannon, G. and Beach, D. (2000) Loss-of-function genetics in mammalian cells: the p53 tumor suppressor model. *Nucleic Acid Res* 28, 2234-2241.
- Bernstein, E., Caudy, A. A., Hammond, S. H. and Hannon, G. J. (2001) Role for a bidentate nuclease in the initiation step of RNA interference. *Nature*, 409: 363-366.
- Hammond, S. M., Caudy, A. A. and Hannon, G. J. (2001) Post-transcriptional Gene silencing by double-stranded RNA. *Nature Reviews Genetics*, 2: 110-119.
- Hammond, S. M., Boettcher, S. and Hannon, G. J. (2001) Argonaute2, a Link Between Genetic and Biochemical Analyses of RNAi. *Science*, 293: 1146-1150.
- Stolarov, J., Chang, K., Reiner, A., Rodgers, L., Hannon, G. J., Wigler, M. and Mittal, V. (2001) Design of a retroviral-mediated ecdysone-inducible system and its application to the expression profiling of the PTEN tumor suppressor. *Proc Natl Acad Sci USA*, 98: 13043-13048.
- Bernstein, E., Denli, A. M., Hannon, G. J. (2001) The rest is silence. *RNA*, 7: 1509- 1521.
- Ketting, R. F., Fischer, S. E., Bernstein, E., Sijen, T., Hannon, G. J., Plasterk, R. H.. (2001) Dicer functions in RNA interference and in synthesis of small RNA involved in developmental timing in *C. elegans*. *Genes & Dev.*, 15(20): 2654-9.
- Paddison, P., Caudy, A. A. and Hannon, G. J. (2002) Stable suppression of gene expression by RNAi in mammalian cells. *Proc. Natl. Acad. Sci. USA*, 99(3): 1443- 1448.
- Ferbeyre, G., de Stanchina, E., Lin, A. W., Querido, E., McCurrach, M. E., Hannon, G. J., Lowe, S. W. (2002) Oncogenic *ras* and p53 cooperate to induce cellular senescence. *Mol. Cell. Biol.*, 22(10): 3497-3508.
- Paddison, P.J., Caudy, A.A., Bernstein, E., Hannon, G.J. and Conklin, D.S. (2002) Short hairpin RNAs (shRNAs) induce sequence-specific silencing in mammalian cells. *Genes & Dev.*, 16: 948-958.
- Paddison, P.J., Hannon, G. (2002) RNA interference: the new somatic cell genetics? *Cancer Cell*, 2:17-23.
- Hannon, G. J. (2002) RNA interference. *Nature*, 418(6894):244-251.
- McCaffrey, A. P., Meuse, L., Pham, T. T., Conklin, D. S., Hannon, G. J., and Kay, M.A. (2002) RNA interference in adult mice. *Nature*, 418:38-39.

## ABSTRACT

**Gregory J. Hannon** was raised in New Castle, a town in western Pennsylvania just north of Pittsburgh, the elder of two children in a large Irish-Catholic family. His father worked as a quality inspector at Johnson Bronze Company; his mother was a homemaker.

After completing high school, Hannon attended Case Western Reserve University, choosing to major in biochemistry. During his sophomore year he began working in Joyce E. Jenhofs laboratory, which served as a pivotal moment in his scientific career. The experience of scientific research in the Jenhofs lab encouraged Hannon to participate in a program for early admission to Case Western's graduate school. Upon starting his graduate career, he entered Timothy N. Nilsen's lab and began his work on RNA processing, developing new techniques to answer his research questions. Hannon completed his PhD at Case Western and then chose to continue his studies as a postdoctoral fellow with David Beach at the Cold Spring Harbor Laboratory in New York. In Beach's lab he worked on cell cycle interacting proteins and RNA interference (RNAi). It was during this time that Hannon began collaborating with Yue Xiong (Pew Scholar, Class of 1995) and Manuel Serrano on CDK.

He accepted a permanent research position at Cold Spring Harbor, and worked through the complexities associated with transitioning from someone else's lab to one's own research lab at the same institution; he also started his work with Genetica, Inc.

Throughout the remainder of the interview, Hannon talks about partnerships and collaborations between academia and industry; the privatization of scientific research; and trademark issues. He also discusses his perspectives on the grant-writing process; the peer review system; and gender issues in science. The interview concludes with his reflections on balancing his career and his family life, his scientific aspirations, and the impact of the Pew Scholars Program in the Biomedical Sciences on his work.

## UCLA INTERVIEW HISTORY

### INTERVIEWER:

Andrea R. Maestrejuan, Interviewer, UCLA Oral History Program. B.S., Biological Sciences, University of California, Irvine; M.A., History, University of California, Riverside; C. Phil., History, UCLA

### TIME AND SETTING OF INTERVIEW:

**Place:** Hannon's office, Cold Spring Harbor Laboratory.

**Dates, length of sessions:** December 16, 2002; December 17, 2002; December 18, 2002.

**Total number of recorded hours:** 4.0

**Persons present during interview:** Hannon and Maestrejuan.

### CONDUCT OF INTERVIEW:

This interview is one in a series with Pew Scholars in the Biomedical Sciences conducted by the UCLA Oral History Program in conjunction with the Pew Charitable Trusts's Pew Scholars in the Biomedical Sciences Oral History and Archives Project. The project has been designed to document the backgrounds, education, and research of biomedical scientists awarded four-year Pew scholarships since 1988.

To provide an overall framework for project interviews, the director of the UCLA Oral History Program and three UCLA faculty project consultants developed a topic outline. In preparing for this interview, Maestrejuan held a telephone preinterview conversation with Hannon to obtain written background information (curriculum vitae, copies of published articles, etc.) and agree on an interviewing schedule. She also reviewed documentation in Hannon's file at the Pew Scholars Program office in San Francisco, including Hannon's proposal application, letters of recommendation, and reviews by Pew Scholars Program national advisory committee members.

### ORIGINAL EDITING:

Carol Squires edited the interview. She checked the verbatim transcript of the interview against the original tape recordings, edited for punctuation, paragraphing, and spelling, and verified proper names. Words and phrases inserted by the editor have been bracketed.

Hannon did not review the transcript. Consequently, some names remain unverified.

Carol Squires prepared the table of contents and TechniType Transcripts compiled the guide to proper names.

## TABLE OF CONTENTS

Childhood, College, and Graduate School	1
Family background. Parental expectations. Growing up in New Castle, Pennsylvania. Early schooling. Influential high school teachers. Love of reading. Extracurricular activities in high school. Religion. Case Western Reserve University. Majors in biochemistry. Decides to pursue a career in research after working in Joyce E. Jenhoff's laboratory at Case Western Reserve University during his sophomore year. Participates in a program for early admission to graduate school at Case Western Reserve University. Reasons for doing Ph.D. research in Timothy W. Nilsen's laboratory. Doctoral research on RNA processing. Develops new techniques to answer research questions. Nilsen's mentoring style.	
More on Graduate School and Cold Spring Harbor Laboratory	27
Timothy W. Nilsen's laboratory. Criteria for judging a laboratory for postdoctoral research. Postdoctoral fellowship with David Beach at Cold Spring Harbor Laboratory. Beach's mentoring style. Work in Beach's laboratory on cell cycle interacting proteins and RNA interference. Collaborations with Yue Xiong and Manuel Serrano. Accepts a position at Cold Spring Harbor. Setting up his laboratory. Relationship with David Beach and Genetica, Inc. Partnerships and collaborations between academia and industry. Privatization of scientific research. Patents, intellectual property ownership, and rights of the inventor. Trademark issues.	
Reflections on Science, Family, and Work at Cold Spring Harbor Laboratory	54
Grant-writing process. Peer review system. Funding history. Laboratory management style. Watson School of Biological Sciences at Cold Spring Harbor Laboratory. Teaching responsibilities. Faculty levels at Cold Spring Harbor Laboratory. Gender. Wife and children. Typical day. Wife's career. Pew Scholars Program in the Biomedical Sciences award. Current research on the biochemistry and biology of RNA interference. Clinical applications of his work. Future research plans. Assessment of professional goals.	
Index	80

## INDEX

### A

Albany, New York, 42  
American Kennel Club, 61  
Arnold and Mabel Beckman Laboratory, 33  
*Ascaris*, 22, 23, 24

### B

Baltimore, David, 39  
Beach, David, 30, 32, 33, 36, 37, 38, 39, 42, 57, 59, 68  
Bence-Jones protein, 16  
Bernstein, Emily, 63  
biochemistry, 13, 15, 19, 22, 23, 36, 39, 76, 77  
Bischoff, James R., 32  
Blumenthal, Thomas, 22  
Boston, Massachusetts, 42  
Brent, Roger, 34  
Broadhollow Bioscience Park, Inc., 41  
*Brugia malayi*, 22  
Bruzik, James P., 15

### C

*C. elegans*, 22, 24, 77  
California, 42, 43  
Calvin, John, 7  
Canada, 35  
Carolina Biological Supply Company, 23  
Case Western Reserve University, 12, 15, 17, 18, 22, 31  
Caudy, Amy A., 63  
CDC25. *See* cell division cycle 25  
CDK. *See* cyclin-dependent kinase  
CDK4, 36  
CDK6, 36  
cell cycle, 30, 35, 36, 77  
cell division cycle 25, 33, 34, 35  
Chapel Hill, North Carolina, 36  
Cleveland, Ohio, 14, 16  
Clorox, 24

Cold Spring Harbor Laboratory, 1, 8, 21, 28, 31, 34, 37, 40, 41, 42, 43, 44, 46, 47, 48, 53, 54, 55, 57, 58, 64, 65, 72, 77, 78  
collaborations, 45, 46  
competition, 37  
Cooper, Cecil, 15  
cyclin-CDK, 35  
cyclin-dependent kinase, 33, 35, 36

### D

Davis, Richard E., 22  
DNA, 13, 22, 30, 34, 51, 53  
cDNA, 22, 34, 39  
DOD. *See* U.S. Department of Defense  
Dolan DNA Learning Center, 72  
Draetta, Giulio, 32

### E

E. I. du Pont de Nemours and Co, 51  
Edman degradation, 36  
elephantiasis, 22  
Elledge, Stephen J., 34, 59  
England, 31, 38, 73  
ethics, 52, 53, 54, 56  
ethnicity, 71  
African American, 71  
Europe, 73  
expressed sequence tags, 22

### F

Feilotter, Harriet E., 35  
Fields, Stanley, 33, 34, 35  
Fordham University, 57  
Franklin, Benjamin, 7  
*From Dawn to Decadence*  
*500 Years of Western Cultural Life*, 7

### G

Galaktionov, Konstantin, 33  
gender, 67, 72  
Genetica, Inc., 38, 41, 42, 47

genetics, 13, 24, 30, 39, 59, 76, 77  
grants/funding, 42, 45, 46, 47, 57, 58, 59,  
60, 61, 62, 64, 66, 67, 69, 71, 73  
Grewal, I.S., 77

## H

Hannon, Claire (daughter), 5, 10, 69, 70  
Hannon, Gretchen E. (wife), 10, 69, 71  
Hannon, Jennifer (sister), 2  
Hannon, Patricia (mother), 1  
Hannon, Walter (father), 1  
Hannon, Will (son), 5, 10, 11, 69, 70  
Harlow, Edward E., 35  
Harvard University, 66, 72  
Hirano, Tatsuya, 25  
Hirsh, David, 22  
Holland, 74  
Howard Hughes Medical Institute, 38  
Huntington Jewish Center, 10

## I

interferon, 21  
Irish, 2  
Italy, 11, 32, 74

## J

Jehovah's Witness, 4  
Jenhoft, Joyce E., 16, 17  
Jew/Jewish/Judaism, 10, 11  
Johnson Bronze Company, 2

## K

Kamb, Alexander, 36  
Kung, Hsing-Jien, 39

## L

Latin Club, 8  
license, 46, 51, 53, 55  
London, England, 42  
Long Island, New York, 14, 41, 54  
*loxP*, 51  
Luther, Martin, 7

## M

Maroney, John P., 42, 47  
Maroney, Patricia A., 23, 28, 64  
Martienssen, Robert, 77  
Massachusetts Institute of Technology, 72  
material transfer agreement, 53, 54, 55  
Medusa Cement Company, 2  
Mello, Craig C., 74, 77  
Milan, Italy, 32  
MTA. *See* material transfer agreement  
Myriad Genetics, Inc., 36

## N

National Cancer Institute, 46, 51, 61  
National Institutes of Health, 45, 51, 58, 60,  
61  
NCI. *See* National Cancer Institute  
New Castle, Pennsylvania, 1, 2, 3  
New Jersey, 15  
NIH. *See* National Institutes of Health  
Nilsen, Timothy W., 17, 18, 19, 20, 21, 22,  
23, 26, 28, 32, 33, 57, 74, 78  
Nobel Prize, 29  
Nurse, Sir Paul, 30, 31

## O

Ohio, 2, 14

## P

p130, 35, 37  
p15, 37  
p16, 36, 37, 50, 54, 57, 58  
p53, 36  
Packy, 15  
patents, 48, 49, 50, 51, 53  
Pennsylvania, 4, 16  
Pennsylvania State University, 12  
Pew Scholars Program in the Biomedical  
Sciences, 1, 28, 30, 57, 62, 74  
Pharmacia Corporation, 32  
Philippines, 71  
phosphate-buffered saline, 24  
Pittsburgh, Pennsylvania, 1, 4  
Poland, 71

polymerase chain reaction, 36, 51  
Ptashne, Mark, 18  
publish/publication, 18, 28, 29, 34, 37, 46,  
52, 53, 54, 60, 77, 78

## R

Ransohoff, Richard M., 28  
Rb. *See* retinoblastoma  
religion  
    (Roman) Catholic, 2, 9, 10, 11  
    Confraternity of Christian Doctrine, 5,  
    10  
retinoblastoma, 35  
retroviruses, 39  
Rita Allen Foundation, 62  
RNA, 19, 21, 22, 24, 25, 30, 34, 58, 74, 76,  
77  
    mRNA, 22  
    RNAi, 44, 46, 51, 54, 58, 63, 76, 77  
Rust Belt, 4, 14

## S

*S. pombe*, 30, 77  
Sambrook, Joseph F., 47  
serendipity, 35  
Serrano, Manuel, 36, 37  
Sharp, Phillip A., 47  
Smith, Judy, 43  
Stanford University, 53, 54, 55  
State University of New York, Farmingdale,  
41  
State University of New York, Stony Brook,  
33, 34, 65  
Stillman, Bruce, 37, 40, 42  
structural biology, 18, 19  
Switzerland, 74

## T

Takacs, Adrienne M., 22

tennis, 8  
tenure, 38, 59, 65, 66  
T-loop, 35  
tumor suppressor, 35, 36  
Turkey, 71

## U

U.S. Army, 60, 61  
U.S. Army Medical Research and Materiel  
Command, 45  
U.S. Department of Defense, 46, 57, 61  
United States of America, 26, 45, 46, 49,  
57, 58, 61, 72, 74  
University of North Carolina, 36  
University of Oxford, 30  
Utah, 36

## W

Watson School of Biological Sciences, 40,  
65  
Watson, James D., 40, 41  
Weiss, Chas, 15  
Westchester, New York, 15  
Westminster College, 3  
Whyte, Peter F.M., 35  
Wigler, Michael H., 66  
Wisconsin, 23

## X

*Xenopus*, 23  
Xiong, Yue, 35, 36, 37

## Y

Yale University, 70  
Youngstown, Ohio, 1

## Z

Zhang, Hua, 35