

CHEMICAL HERITAGE FOUNDATION

JAMES A. GOODRICH

The Pew Scholars Program in the Biomedical Sciences

Transcript of an Interview
Conducted by

Robin Mejia

at

University of Colorado, Boulder
Boulder, Colorado

on

15, 16, and 17 August 2006

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



James A. Goodrich

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 © 2007, 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.

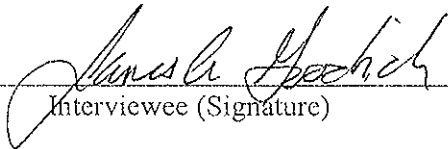
B102406A



In exchange for the UCLA Oral History Program conducting and recording the series of interviews with me beginning on or about August 15, 2006, I, James A. Goodrich, do hereby give all right, title, and interest, including copyright, in and to those interviews to the Regents of the University of California to be used for any research, educational, or other purpose that the University may deem appropriate. I understand that I may still use the information in the recordings myself without seeking permission from the University.

I have read and agree to the UCLA Oral History Program's Use Policy, which outlines the current and likely future uses of interviews donated to the Oral History Program's collection.

Unless otherwise specified below, I place no restrictions on access to and use of the interviews.



Interviewee (Signature)

James A. Goodrich
(Typed Name)

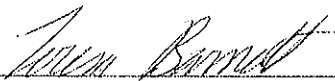
University of Colorado at Boulder, Boulder, CO 80309
(Address)

(303) 492-3273
(Phone Number)

james.goodrich@colorado.edu
(E-mail Address)

8/15/06
(Date)

Signed on behalf of the Regents of the University of California:



Head, UCLA Oral History Program

Teresa Barnett
(Typed Name)

(310) 206-2454
(Phone Number)

tbarnett@library.ucla.edu
(E-mail Address)

9/8/06
(Date)

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

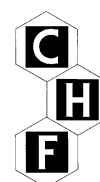
One may view, quote from, cite, or reproduce the oral history with the permission of CHF.

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:

James A. Goodrich, interview by Robin Mejia at the University of Colorado, Boulder, Boulder, Colorado, 15-17 August 2006 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript # 0609).



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.

JAMES A. GOODRICH

Born in Montrose, Pennsylvania

Education

1985 B.S., Biochemistry, University of Scranton
1991 Ph.D., Biological Sciences, Carnegie Mellon University

Professional Experience

1992-1996 University of California, Berkeley
Postdoctoral Fellow, Department of Molecular and Cell Biology,
with Dr. Robert Tjian

1996-2002 University of Colorado, Boulder
Assistant Professor, Department of Chemistry and Biochemistry
2002- 2006 Associate Professor, Department of Chemistry and Biochemistry
2006-present Professor, Department of Chemistry and Biochemistry

1998-2001 Cold Spring Harbor Laboratory
Instructor, Eukaryotic Gene Expression Course (Summer)

Honors

1992-1994 Damon Runyon Walter Winchell Postdoctoral Fellow
1995-1998 Leukemia Society of America Special Fellow
1998 University of Colorado Junior Faculty Development Award
1998 Outstanding Professor of 1998 - Mortar Board National Honor Society
1999-2003 Pew Scholar in Biomedical Sciences
2000 Runner up for the 2000 SOAR Teacher Recognition Award
2004 Sabbatical
2007 New Inventor of the Year, University of Colorado

Select Publications

Goodrich, J.A., Schwartz, M.L., and McClure, W.R. (1990). Searching for and predicting the activity of sites for DNA binding proteins: compilation and analysis of the binding sites for *Escherichia coli* integration host factor (IHF). *Nucleic Acids Res.* 18: 4993-5000.

- Goodrich, J.A. and McClure, W.R. (1992). Regulation of open complex formation at the Escherichia coli galactose operon promoters. *J. Mol. Biol.* 224: 15-29.
- Goodrich, J.A., Hoey, T., Thut, C.J., Admon, A., and Tjian, R. (1993). Drosophila TAFII40 interacts with both a VP 16 activation domain and the basal transcription factor TFIIB. *Cell* 75: 519-530.
- Goodrich, J.A. and Tjian, R. (1994). Transcription factors IIE and IIH and ATP hydrolysis direct promoter clearance by RNA polymerase II. *Cell* 77: 145-156.
- Kugel, J.F. and Goodrich, J.A. (1998). Promoter escape limits the rate of transcription from the adenovirus major late promoter on negatively supercoiled templates. *Proc. Natl. Acad. Sci.* 95: 9232-9237.
- Galasinski, S.K., Lively, T.N., Grebe de Barron, A., and Goodrich, J.A. (2000). Acetyl coenzyme A stimulates RNA polymerase II transcription and promoter binding by transcription factor IID in the absence of histones. *Mol. Cell. Biol.* 20: 1923-1930.
- Kugel, J.F. and Goodrich, J.A. (2000). A kinetic model for the early steps of RNA synthesis by human RNA polymerase II. *J. Biol. Chem.* 275: 40483-40491.
- Kim, L.J., Seto, A.G., Nguyen, T.N., and Goodrich, J.A. (2001). Human TAFII130 is a coactivator for NFATp. *Mol. Cell. Biol.* 21: 3503-3513.
- Lively, T.N., Ferguson, H.A., Galasinski, S.K., Seto, A.G., and Goodrich, J.A. (2001). c-Jun binds the N-terminus of human TAFII250 to derepress RNA polymerase II transcription in vitro. *J. Biol. Chem.* 276: 25582-25588.
- Ferguson, H.A. and Goodrich, J.A. (2001). Expression and purification of recombinant human c-Fos/c-Jun that is highly active in DNA binding and transcriptional activation in vitro. *Nucleic Acids Res.* 29: E98 (6 pages).
- Ferguson, H.A., Kugel, J.F., and Goodrich, J.A. (2001). Kinetic and mechanistic analysis of the RNA polymerase II transcription reaction at the human interleukin-2 promoter. *J. Mol. Biol.* 314: 993-1006.
- Kugel, J.F. and Goodrich, J.A. (2002). Translocation after synthesis of a four nucleotide RNA commits RNA polymerase II to promoter escape. *Mol. Cell. Biol.* 22: 762-773.
- Kugel, J.F. and Goodrich, J.A. (2003). In vitro studies of the early steps of RNA synthesis by human RNA polymerase II. *Methods Enzymol.* 370: 687-701.
- Lively, T.N., Nguyen, T.N., Galasinski, S.K., and Goodrich, J.A. (2004). The basic leucine zipper domain of cJun functions in transcriptional activation through interaction with the N-terminus of hsTAF1 (human TAFII250). *J. Biol. Chem.* 279: 26257-26265.
- Allen, T.A., Von Kaenel, S., Goodrich, J.A., and Kugel, J.F. (2004). The SINE encoded mouse B2 RNA represses mRNA transcription in response to heat shock. *Nat. Struct. Mol. Biol.* 11: 816-821.
- Espinoza, C.A., Allen, T.A., Hieb, A.R., Kugel, J.F., and Goodrich, J.A. (2004). B2 RNA binds directly to RNA polymerase II to repress transcript synthesis. *Nat. Struct. Mol. Biol.* 11: 822-829.
- Weaver, J.R., Kugel, J.F., and Goodrich, J.A. (2005). The sequence at specific positions in the early transcribed region sets the rate of transcript synthesis by RNA polymerase II in vitro. *J. Biol. Chem.* 280: 39860-39869.
- Nguyen, T.N. and Goodrich, J.A. (2006). Immobilized Protein-Protein Interaction Assays: Eliminating False Positive Interactions Caused by Contaminating Nucleic Acid. *Nature Methods.* 3: 135-139.

- Heib, A., Baran, S., Goodrich, J.A., and Kugel, J.F. An 8 nt RNA triggers a rate-limiting shift of RNA polymerase II complexes into elongation. Manuscript submitted.
- Goodrich, J.A. and Kugel, J.F. Noncoding RNA regulators of RNA polymerase II transcription. *Nat. Rev. Mol. Cell Biol.* Manuscript submitted.
- Hieb, A.R., Baran, S., Goodrich, J.A., and Kugel, J.F. (2006). An 8 nt RNA triggers a rate-limiting shift of RNA polymerase II complexes into elongation. *EMBO J.* 25: 3100-3109.
- Hofmann, W.A., Vargas, G.M., Ramchandran, R., Ljuba, S., Goodrich, J.A., and de Lanerolle, P. (2006). Nuclear myosin I is necessary for the formation of the first phosphodiester bond by RNA polymerase II. *J. Cell. Biochem.* 99: 1001-1009.
- Goodrich, J.A. and Kugel, J.F. (2006). *Binding and Kinetics for Molecular Biologists*. Cold Spring Harbor Laboratory Press. 182 pages. Computer simulations: <http://kinetics.cshl.edu/>.
- Kugel, J.F. and Goodrich, J.A. (2007). An RNA transcriptional regulator templates its own regulatory RNA. *Nature Chem. Biol.* 3: 89-90.
- Espinoza, C.A., Goodrich, J.A., and Kugel, J.F. (2007). Characterization of the structure, function and mechanism of B2 RNA, an ncRNA repressor of RNA polymerase II transcription. *RNA.* 13: 583-596.
- Weaver, J.R., Good, K., Walters, R.D., Kugel, J.F., and Goodrich, J.A. (2007). Characterization of the sequence and architectural constraints of the regulatory and core regions of the human interleukin-2 promoter. *Mol. Immunol.* 44: 2813-2819.

ABSTRACT

James A. Goodrich grew up in Honesdale, Pennsylvania, the oldest of five children. His father owned his own business; his mother was a homemaker. Both parents finished high school but did not go to college, so Goodrich felt no expectations for college himself. From about fifth grade, when he had a genuine science teacher, he gravitated toward science. His junior high school was pod-style, and he lost interest as a result until the reversion to regular classroom style. His sophomore chemistry teacher inspired Goodrich's love of chemistry and established his firm desire to be a scientist. Unusually for such a small town, his high school had excellent science and mathematics classes, including his junior-year organic chemistry class

Not realizing what other options science majors had, Goodrich decided to become a doctor. As a result he applied only to the University of Scranton, a Jesuit university nearby that had a very good reputation for placing its graduates in medical schools. He majored in biochemistry. He also had to work throughout.

He did his doctoral work in Carnegie Mellon's biology department. There he worked on transcription in William McClure's lab. Goodrich here discusses his doctoral research in the McClure molecular biology laboratory; the running of the McClure laboratory; bioinformatics on transcription regulation; his marriage; and the birth of his first daughter.

Next Goodrich accepted a postdoc in Robert Tjian's molecular genetics laboratory at University of California, Berkeley; there his research focused on human transcription. Here he compares McClure's mentoring style with Tjian's; he talks about living in and at Berkeley; and he explains the process of writing journal articles in the Tjian lab. Meanwhile, his wife became a lab technician in Tjian's lab.

After about four years as a postdoc Goodrich accepted a position at University of Colorado, Boulder. He discusses setting up his lab and its makeup; the impact of the Pew Scholars Program in the Biomedical Sciences grant on his work; and his teaching responsibilities. He talks about his current research studying the molecular mechanisms of mammalian transcription; about the University of Colorado, Boulder's facilities; about competition and collaboration in science; tenure; and his administrative duties.

During a recent sabbatical, he spent half of his time writing a training grant; the second half he spent in the lab. He describes the fun he had being at the bench again. He goes on to give his opinions on such issues as the small numbers of minorities in science; decreasing percentage of women in science as they progress from students to faculty members; science education in the schools; patents; funding; and publishing. He talks a little more about his current research in molecular biophysics on regulation of transcription and the practical applications of his research, and about his professional goals. He concludes by explaining how he tries to balance his work life with his life at home with his wife and two daughters.

UCLA INTERVIEW HISTORY

INTERVIEWER:

Robin Mejia, Interviewer, UCLA Oral History Program; B.A., Biology, University of California, Santa Cruz, 1997

TIME AND SETTING OF INTERVIEW:

Place: Goodrich's office at the University of Colorado at Boulder

Date: August 15, 16, and 17, 2006.

Total number of recorded hours: 4.5

Persons present during interview: Mejia and Goodrich

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' 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, Mejia corresponded with Goodrich by email and talked by phone to obtain background material, including Goodrich's CV, and to schedule the interview. Mejia also obtained and read copies of Goodrich's published articles, reviewed his descriptions of his work on his website, and reviewed background information on the institutions at which he has been trained and has worked.

ORIGINAL EDITING

Carol Squires edited the interview. She edited for punctuation, paragraphing, and spelling, and verified proper names. Words and phrases inserted by the editor have been bracketed.

Goodrich reviewed the transcript. He verified proper names and made a number of corrections and additions.

TABLE OF CONTENTS

Childhood and Entering College	1
Family background. Siblings. Early education. Childhood interests and experiences. Parental expectations. Attending middle school and high school in Honesdale, Pennsylvania. Influential teacher. Decision to pursue science. Growing up in Honesdale. Attends the University of Scranton. College experiences. Majors in biochemistry.	
College and Graduate School	21
Senior research project in college. Typical day in college. Extracurricular activities. Attends graduate school at Carnegie Mellon University. Marries. Graduate program at Carnegie Mellon. Works in William R. McClure's molecular genetics laboratory. Doctoral research on regulation of transcription.	
Postdoctoral Research and Becoming Faculty	48
More on doctoral research. Birth of daughter. Postdoctoral fellowship in Robert Tjian's molecular genetics laboratory at University of California, Berkeley. Research in Tjian's lab on human transcription. William R. McClure's mentoring style. Tjian's mentoring style. Berkeley. Wife's career. Writing journal articles in the Tjian lab. Accepts a position at University of Colorado, Boulder. Setting up lab. Pew Scholars Program in the Biomedical Sciences. Teaching responsibilities. Current research studying the molecular mechanisms of mammalian transcription. University of Colorado, Boulder facilities. Collaboration in science. Tenure at the University of Colorado. Administrative duties.	
The Scientific Life	84
More on teaching responsibilities. Gender. Underrepresented groups in science. Science education. Source of his research ideas. Lab management style. More on current research in molecular biophysics on regulation of transcription. Practical applications of research. Patents. Collaboration in science. Sabbatical. Writing journal articles. Duties to professional community. Grant-writing. Funding history. Professional goals. Conducting scientific research. Reasons for becoming a principal investigator. Balancing family and career. Competition in science.	
Index	120

INDEX

A

Ahn, Natalie, 81, 96
Appleton, Dr., 23, 24

B

Berkeley, California, 56, 83
Betterton, Meredith D., 98
bioinformatics, 50, 51, 52, 98
Boonie, Mr., 13
Boston, Massachusetts, 66
Boulder, Colorado, 1, 43, 44, 49, 52, 60, 63,
66, 67, 68, 69, 70, 76, 84, 87, 92, 93, 94,
95, 99, 100, 110, 114
Bush, President George W., 113

C

California, 55, 66
cancer, 21, 25, 32, 38, 39, 49, 50
Carnegie Mellon University, 32, 34, 35, 36,
37, 42, 50, 55, 61
Caruthers, Marvin, 101
catabolite activator protein/cyclic AMP, 50
Cech, Thomas R., 83
Clements, Wilson, 73
Cold Spring Harbor Laboratory, 56, 91,
109, 110, 111
Colgate University, 46
Colorado, 93
Columbia University, 32, 35
competition, 79, 93, 94, 104, 112

D

DNA, 6, 51, 76, 98, 101
Drosophila, 61

E

E. coli, 33, 44, 45, 50, 51, 52, 56
El Cerrito, California, 57, 94

F

France, 32

G

Galasinski, Shelly, 73
Gann, Alex, 111
genetics, 39, 40, 41
Gold, Larry, 52, 101
Goodrich, Andrea (sister), 2
Goodrich, Andrew (father), 2
Goodrich, Beverley (mother), 2
Goodrich, Brad (brother), 2, 19
Goodrich, Cristen (daughter), 69, 82, 83, 94,
110
Goodrich, Julia (daughter), 52, 69, 84, 94,
110
Goodrich, Karen (wife), 18, 26, 36, 46, 52,
57, 62, 66, 69, 83, 84, 90, 110
Goodrich, Lonnie (brother), 2
Goodrich, Rod (brother), 2
grants/funding, 25, 43, 49, 58, 71, 72, 74,
75, 81, 89, 90, 93, 95, 96, 97, 105, 112,
113, 114, 115, 118

H

Harvard Medical School, 68
Harvard University, 32
Honesdale High School, 3
Honesdale, Pennsylvania, 1, 2, 3, 4, 5, 16,
95
Hoopes, Barbara, 33, 46
Howard Hughes Medical Institute, 83

I

IHF. *See* integration host factor
integration host factor, 52
interleukin-2, 78

J

Jones, Elizabeth W., 39, 40, 41

K

Keck Foundation, 116
Kim, Loree J., 70, 88, 107
Kugel, Jennifer F., 85, 87, 88, 90, 97, 105,
111, 115, 118

L

Lake Tahoe, California, 61
Lively, Tricia N., 70, 88
Long Island, New York, 111

M

Massachusetts Institute of Technology, 32
Maxon, Mary E., 66
McClure, William R., 33, 38, 40, 41, 43, 44,
45, 51, 57, 59, 115
Mellon Institute, 37
minority, 93, 94
Montrose, Pennsylvania, 1
Mulligan, Martin E., 51

N

Napa, California, 61
National Institutes of Health, 43, 57, 75, 81,
93, 97, 112, 113, 114
National Science Foundation, 75, 90, 97,
113, 114
New Jersey, 32
New York, 1, 46
New York City, New York, 4, 111
NIH. *See* National Institutes of Health
NSF. *See* National Science Foundation

P

Pardi, Art, 116
patent, 100, 101
Pennsylvania, 2, 4, 9, 14, 34
Perkins, Thomas T., 97
Pew Scholars Program in the Biomedical
Sciences, 49, 74, 75, 76, 87, 97
phage, 33, 51, 52, 56, 110
Philadelphia, Pennsylvania, 36
Pittsburgh, Pennsylvania, 32, 35, 38, 46, 52,
54, 63

polymerase, 44, 51, 55, 57, 98, 99
polymerase II, 55, 57, 65, 98
Ptashne, Mark, 111
publish/publication, 21, 22, 52, 58, 63, 64,
65, 67, 74, 89, 106

R

religion, 29, 31
(Roman) Catholic
Jesuit, 16, 19, 26, 29
(Roman) Catholicism, 16
RNA, 44, 55, 57, 97, 98, 99, 101, 116
mRNA, 55

S

San Francisco, California, 61
Scranton, Pennsylvania, 16, 18, 32, 35
SELEX, 101
Sherman, Dr., 21
sodium dodecylsulfate, 22
Stormo, Gary D., 52
Stourbridge Elementary School, 3

T

T cell, 78, 97, 99
TAFs. *See* TBP-associated factor
TATA-binding protein, 58
TBP. *See* TATA-binding protein
TBP-associated factor, 58
tenure, 71, 80, 92, 102, 103, 118
Tjian, Robert, 54, 55, 56, 57, 58, 59, 61, 62,
63, 64, 65, 66, 67, 68, 69, 70, 78, 82, 83,
84, 85, 108, 115
transcription, 33, 38, 39, 41, 43, 45, 49, 50,
51, 55, 56, 57, 58, 60, 61, 65, 67, 68, 76,
78, 88, 97, 98, 99, 109, 110, 111, 116
transcription factor IID, 58
transcription factor IIE, 66

U

United States of America, 55
University of California, Berkeley, 56, 60,
69
University of Chicago, 68

University of Colorado, 1, 43, 44, 49, 52,
60, 63, 67, 68, 69, 87, 92, 93, 100, 110,
114
University of Pittsburgh, 37
University of Pittsburgh Medical Center,
Presbyterian, 47
University of Scranton, 16, 22, 26, 30, 36
University of Wisconsin, 32, 35

W

Wilson, Mr., 10, 11, 12
Wisconsin, 56
Woolford, John L., 41
Wuttke, Deborah, 70

Y

Yosemite National Park, 61
Young Men's Christian Association, 19
Young Women's Christian Association, 19