CHEMICAL HERITAGE FOUNDATION

BRUCE J. NICHOLSON

The Pew Scholars Program in the Biomedical Sciences

Transcript of an Interview
Conducted by

Neil D. Hathaway

at

State University of New York at Buffalo
Buffalo, New York

on

14, 16, 17, and 18 March 1994

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

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 PewBiomedical Scholar Advisory Committee members.

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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. R010703F

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 BRUCE J. NICHOLSON, having an address at Department of Biological Sciences, SUNY at Buffalo, 619 Cooke Hall, Buffalo, New York 14260, hereinafter called "Interviewee."

Interviewee agrees to participate in a series of University-conducted tape-recorded interviews, commencing on or about March 14, 1994, and tentatively entitled "Interview with Bruce J. Nicholson. 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.

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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:

Bruce J. Nicholson
Department of Biological Sciences
SUNY at Buffalo
619 Cooke Hall
Buffalo, NY 14260

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

INTERVIEWEE	THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
X B J Nicholson	Janice L. Reiff
(Signature)	(Signature)
Bruce J. Nicholson	Janice L. Reiff
(Typed Name)	(Typed Name)
Department of Biological Sciences	Interim Director, Oral History Program
(Address)	(Title)
SUNY at Buffalo	
Buffalo, New York 14260	
X Date 12/10/02	Date 7 January 2003

Pew Scholars in the Biomedical Sciences

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This constitutes my entire and complete understanding.

Nicholson

Bruce J. Nicholson, Ph.D.

12/12/07

Date

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BRUCE J. NICHOLSON

1954 Born in Rockhampton, Australia, on 3 February

Education

1975 B.Sc., Biochemistry, University of Queensland
1976 1st Class Honours, Enzymology, University of Queensland
1983 Ph.D., Cell Biology, California Institute of Technology

Professional Experience

California Institute of Technology
1983-1986 Postdoctoral Fellow

State University of New York at Buffalo
1986-1992 Assistant Professor, Department of Biological Sciences
1992-1994 Director, Molecular Cell Biology Graduate Program
1992-present Associate Professor
1993-present Research Associate Professor, Department of Biophysical Sciences
1994-1996 Co-Director, Center for Advanced Molecular Biology and Immunology
1995-present Associate Chair

Honors

1976 University Medal, Queensland University
1976-1978 Earl C. Anthony Graduate Student Fellowship
1978-1983 Gordon Ross Graduate Student Fellowship
1983-1986 American Heart Association Postdoctoral Fellowship
1988-1992 Pew Scholar in the Biomedical Sciences

Selected Publications

Nicholson, B.J. et al., 1981. The rat liver gap junction protein: Properties and partial sequence. *Proceedings of the National Academy of Sciences USA,* 78:7594-98.

Nicholson, B.J. et al., 1983. Differences between the proteins of liver gap junctions and lens fiber junctions from rat: Implications for tissue specificity of gap junctions. *Cell,* 32:967-

78.
Gros, D.B. et al., 1983. Comparative analysis of the gap junction protein from rat heart and liver: Is there a tissue specificity of gap junctions? *Cell*, 35:539-49.
Nicholson, B.J. et al., 1985. The M_r 28,000 gap junction proteins from rat heart and liver are different but related. *Journal of Biological Chemistry*, 260:6514-17.
Nicholson, B.J. et al., 1987. Two homologous proteins of hepatic gap junctions. *Nature,* 329:732-34.
Zhang, J.T. and B.J. Nicholson, 1989. Sequence and tissue distribution of a second protein of hepatic gap junctions, Cx26, as deduced from its cDNA. *Journal of Cell Biology,* 109:3391-3401.
Kadle, R. et al., 1991. Tissue-specific distribution of differentially phosphorylated forms of Cx43. *Molecular and Cellular Biology,* 11:363-69.
WilleckeK. et al., 1991. Mouse connexin 37: Cloning and functional expression of gap junction gene highly expressed in lung. *Journal of Cell Biology*, 114:1049-57.
Barrio, L.C. et al., 1991. Gap junctions formed by connexin 26 and 32 alone and in combination are differently affected by applied voltage. *Proceedings of the National Academy of Sciences USA,* 88:8410-14.
Henneman, H. et al., 1992. Cloning and functional expression of a second connexin, Cx40, expressed highly in lung. *Journal of Cell Biology,* 117:1299-1310.
Henneman, H. et al., 1992. Molecular cloning of mouse connexins 26 and 32: Similar genomic organization but distinct promoter sequences of two gap junction genes. *European Journal of Cell Biology,* 58:81-89.
Henneman, H. et al., 1992. Two gap junction genes, connexin 31.1 and 30.3, are closely linked on mouse chromosome 4 and preferentially expressed in skin. *Journal of Biological Chemistry,* 267:17225-33.
Suchyna, T.M. et al., 1993. Identification of a proline residue in M2 of Cx26 as an element involved in voltage gating of gap junctions. *Nature,* 365:847-49.
Zhang, J.T. and B.J. Nicholson, 1994. The topological structure of Cx26 and its distribution compared to Cx32 in hepatic gap junctions. *Journal of Membrane Biology,* 139:15-29.
Suchyna, T.M. et al. Different ionic permeabilities for connexins 26 and 32 produce rectifying gap junction channels. Submitted.
Zhang, J.T. et al. Membrane integration of *in vitro* translated gap junctional protein: Co- and post-translational mechanisms. Submitted.
Garcia, A.M. et al. Prevention of pp60 $^{v\text{-}src}$ transformation of growth in NRK cells by expression of a src-resistant connexin-Cx32. In preparation.
Kadle, R. et al. Distribution of gap junction proteins among cell types in primary cultures of rat CNS: Connexin 43 in neuronal-neuronal and neuronal-glial coupling. In preparation.
Cao, F.L. et al. Quantitative analysis of differential permeabilities of connexins 32, 26 and 45 to dyes of different charge. In preparation.
Rosinski, C.R. and B.J. Nicholson. A mutagenic approach to defining the structure of the docking/adhesion domains of gap junctions. In preparation.

ABSTRACT

Bruce J. Nicholson was born in Rockhampton, Queensland, Australia, in the middle of a hurricane, but was raised, principally, in Brisbane, the younger of two brothers. His mother was a bank teller until she wed; his father was in insurance sales until he opened his own insurance loss adjuster consultancy. Both of his parents believed in the value of a good education and encouraged both sons to excel, though in whatever direction they chose. Nicholson had a normal childhood, and learned that he had some athleticism (running track for some time). He had a general interest in science and focused on that through school, and he also enjoyed participating in school plays and debate.

He matriculated at the local university (staying local was quite common in Australia), the University of Queenslandfrom which he received his baccalaureate in science. He had his first independent research experience in John Mansbridge's laboratory, during which time he learned that he did not have the best experimental "hands"; he went on to be mentored by Burt Zerner, an enzymologist, and Robert L. Blakely, completing an honors thesis on inhibition kinetics in jack bean urease in Zerner's lab. Wanting to do graduate studies in the United States Nicholson applied to several universities, including the California Institute of Technology (Caltech) at which his brother had already matriculated for his graduate studies. He was accepted at Caltech and decided to pursue studies in neurobiology; he was initially assigned to do a rotation with John D. Pettigrew on horseradish peroxidase retroactive tracing of neuronal pathways, but then moved on to work with Jean-Paul Revel researching gap junction proteins. Nicholson remained at Caltech for his postdoctoral studies, and also worked with Norman Davidson; he sequenced connexin 26. From Caltech he moved on to a faculty position at the State University of New York, Buffalo, where he worked with Daniel B. Gros to publish evidence of the existence of more than one gap junction protein

For the remainder of the interview, Nicholson talks about trying to alert the scientific community to the importance of gap junction research; difficulties in crystallizing gap junction proteins; his collaboration with Klaus Willecke, and the generosity of David L. Paul, Eric C. Beyer, and Willecke; and his policies on authorship in collaborations. He ends the interview with a discussion of the benefits of being a Pew scholar; the importance of electrophysiology in gap junction research; using mutagenesis to analyze the structure and function of connexins; the relationship of cell coupling to cell transformation; and the importance of his wife and family.

UCLA INTERVIEW HISTORY

INTERVIEWER:

Neil D. Hathaway, Interviewer, UCLA Oral History Program. B.A.., English and History, Georgetown University; M.A. and C. Phil., History, UCLA.

TIME AND SETTING OF INTERVIEW:

Place: Nicholson's office, State University of New York at Buffalo.

Dates, length of sessions: March 14, 1994 (32 minutes); March 16, 1994 (155 minutes); March 17, 1994 (68 minutes); March 18, 1994 (115 minutes).

Total number of recorded hours: 6.2

Persons present during interview: Nicholson and Hathaway.

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, from 1988 through 1992.

In preparing for this interview, Hathaway, in consultation with the director of the UCLA Oral History Program and three UCLA faculty project consultants, developed a topic outline to provide an overall interview framework. Hathaway then held a telephone preinterview conversation with Nicholson to obtain extensive written background information (curriculum vitae, copies of published articles, etc.) and agree on a research and interviewing timetable.

Hathaway further reviewed the documentation in Nicholson's file at the Pew Scholars Program office in San Francisco, including his proposal application, letters of recommendation, and reviews by Pew Scholars Program national advisory committee members. For general background on the recent history of the biological sciences, Hathaway consulted such works as: J.D. Watson et al., *The Molecular Biology of the Gene.* 4th ed. 2 vols. Menlo Park, CA: Benjamin/Cummings, 1987; Lubert Stryer, *Biochemistry.* 3d ed. New York: W.H. Freeman, 1988; *The Journal of the History of Biology;* H.F. Judson, *The Eighth Day of Creation: Makers of the Revolution in Biology.* New York: Simon and Schuster, 1979; and recent issues of *Science, Nature,* and *Cell.*

The interview is organized chronologically, beginning with Nicholson's childhood in Brisbane and continuing through his education at University of Queensland and California Institute of Technology and his career at State University of New York at Buffalo. Major topics discussed include the gap between mathematical and biological sciences, Nicholson's mentors, the setup of his lab, collaborations, and studying the structure and function of gap junctions.

ORIGINAL EDITING:

Vimala Jayanti, editor, 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.

Nicholson reviewed the transcript. He verified proper names and made minor corrections.

Kristian London, assistant editor, prepared the table of contents and the interview history. Steven J. Novak, senior editor, assembled the biographical summary.

Gregory M. Beyrer, editorial assistant, compiled the index.

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