ALFRED R. BADER

Transcript of an Interview Conducted by

Arnold Thackray

in

Milwaukee, Wisconsin

on

31 July 1987

Alfred R Bader Jul 3/15/96 CENTER FOR HISTORY OF CHEMISTRY

Oral History Program

RELEASE FORM

This document contains my understanding and agreement with the Center for History of Chemistry with respect to my participation in a tape-recorded interview conducted by Arnold Thackray on 31 July 1987 . I have read the transcript supplied by the Center and returned it with my corrections and emendations.

- 1. The tapes and corrected transcript (collectively called the "Work") will be maintained by the Center and made available in accordance with general policies for research and other scholarly purposes.
- I hereby grant, assign, and transfer to the Center all right, title, and interest in the Work, including the literary rights and the copyright, except that IX shall retain the right to copy, use and publish the Work in part or in full until my death.
- 3. The manuscript may be read and the tape(s) heard by scholars approved by the Center subject to the restrictions listed below. The scholar pledges not to quote from, cite, or reproduce by any means this material except with the written permission of the Center.
- 4. I wish to place the following conditions that I have checked below upon the use of this interview. I understand that the Center will enforce my wishes until the time of my death, when any restrictions will be removed.

				_	
a.	√	No	restrictions	for	access.

- b. My permission required to quote, cite, or reproduce.
- c. ____ My permission required for access to the entire document and all tapes.

This constitutes our entire and complete understanding.

(Signature)_

(Date)

an 24 1988

(revised 6 February 1986)

THE BECKMAN CENTER FOR THE HISTORY OF CHEMISTRY Oral History Program

		RELEASE	FORM	
my participation in the my par	Beckman Cent articipation <u>James J. B</u> ve read the	er for the History in a tape-recorde	derstanding and agreem y of Chemistry with re- ed interview conducted on 28 February ed by the Beckman Cent and emendations.	spect to by
1.	"Work") wil available i	l be maintained by	script (collectively carried to the Beckman Center and general policies for the second collections of the second collectio	nd made
2.	all right, literary ri retain the	title, and interes ghts and the copyr	transfer to the Beckman st in the Work, including right, except that I si a and publish the Work	ing the hall
3.	approved by listed belo or reproduc	the Beckman Center. W. The scholar pl	nd the tape(s) heard by er subject to the rest ledges not to quote from is material except with ekman Center.	rictions om, cite,
4.	below upon Beckman Cen	the use of this in	g conditions that I had nterview. I understand my wishes until the time will be removed.	d that the
	a	No restrictions f	for access.	
	b	My permission recreproduce.	quired to quote, cite,	or
	c	My permission red document and all	quired for access to the tapes.	ne entire
This	constitutes	our entire and co	omplete understanding.	
		(Signature)	Dr. Alfred R. Bader	200
		(Date)	October 1	४ ९/

(Revised 20 February 1989)

ALFRED R. BADER

1924 Born in Vienna, Austria on 28 April

Education

1939-1940	Brighton Technical College
1945	B.Sc., engineering chemistry, Queen's
	University
1946	B.A., history, Queen's University
1947	M.S., chemistry, Queen's University
1949	Ph.D., organic chemistry, Harvard University

Professional Experience

1943-1947	Chemist, Murphy Paint Company
1950-1954	Research Chemist and Organic Group Leader,
	Pittsburgh Plate Glass Company
1951	Co-founder, Aldrich Chemical Company
1954-1955	Chief Chemist, Aldrich Chemical Company
1955-1975	President, Aldrich Chemical Company
1975-1980	President, Sigma-Aldrich Corporation
1980-	Chairman, Sigma-Aldrich Corporation

Honors

1980	Honorary Sc.D. degree, University of Wisconsin-Milwaukee
1983	Engineer-of-the-Year Award, Engineers and Scientists of Milwaukee, Inc.
1984	Honorary Sc.D. degree, University of Wisconsin-Madison
1984 1986	Honorary Sc.D. degree, Purdue University Honorary LL.D. degree, Queen's University

ABSTRACT

Alfred Bader begins this interview with a discussion of his early years in Vienna, including his family background and Gymnasium education. This is followed by additional education in England, living in Canada as a refugee, and his undergraduate education at Queen's University. Bader then describes his graduate education with Louis F. Fieser at Harvard, and discusses the faculty and friends during his tenure there. The interview continues with Bader's move to Milwaukee, his research with PPG, and the origin and growth of the Aldrich Chemical Company, including the merger with Sigma Chemical Company and the decision to go public. The interview concludes with Bader's comments on his art collection and family matters.

INTERVIEWER

Arnold Thackray majored in the physical sciences before turning to the history of science, receiving a Ph.D. from Cambridge University in 1966. He has held appointments at Oxford, Cambridge, Harvard, the Institute for Advanced Study, the Center for Advanced Study in the Behavioral Sciences, and the Hebrew University of Jerusalem. In 1983 he received the Dexter Award from the American Chemical Society for outstanding contributions to the history of chemistry. He is Director of the Beckman Center for the History of Chemistry.

TABLE OF CONTENTS

- 1 Childhood and Early Education
 Parents and family situation in Vienna. "Adopted"
 mother. Gymnasium education in Vienna. Professor
 Sedlmayer. Forced to leave school. Stamp
 collecting. The move to England.
- 4 Education in England
 The East Hove Senior School for Boys. Support from
 Mrs. Wolff. Living as a refugee with the Scharff
 family. Brighton Technical College. The move to
 Canada. Living in a refugee internment camp.
- 9 Undergraduate Education in Canada
 Sponsorship by Martin Wolff. The International Student
 Service (ISS). Junior and senior matriculation at
 McGill University. Late registration at Queen's
 University. Engineering chemistry. Summer job with
 Murphy Paint Company. Bachelor's degree in engineering
 chemistry. Bachelor's degree in history. Interest in
 commercial part of paint chemistry. Laboratory work
 with Professor McKay. Incident with McKay leading to
 first publication.
- 15 Graduate Education at Harvard Applications to Harvard and the ETH in Zu"rich. Interest in making compounds. Fellowship from Louis Fieser. Courses at Harvard. Comparison of Harvard and Queen's. Work on the Hooker Oxidation. Making diazomethane from MNNG. Friends and faculty at Harvard. Ph.D. degree. Showing work by Mary Fieser to be incorrect.
- 23 The move to Milwaukee and Pittsburgh Plate Glass Co. Conditions at PPG. Noncatalytic transesterification of beta-keto esters. Preparation of conjugated unsaturated phenols for phenolic resins. Preparation of diphenolic acid. Reaction of diketene with acetone.
- 26 Early History of Aldrich Chemical Company
 Decision to remain in Milwaukee when PPG moves to
 Pittsburgh. Full-time with Aldrich. Partnership with
 Jack Eisendrath. Financial support from Bill
 Kesselman. Gaining full control of the company. Du
 Pont order for suberic acid. Earlier formation of
 Aldrich. First catalogs and products.

- 30 Growth of Aldrich Chemical Chemical Distribution of early catalogs. Addition of more compounds and early customers. Teaching afternoon Hebrew school. Competition from Eastman Kodak. Acquisition offer from J. T. Baker. Decision to go public. Stock offers. Company growth.
- 35 Merger with Sigma Chemical Company Approach to Sigma. Relationship with Dan Broida. Benefits from merger. Importance of product analyses. Aldrich "Gold Label" products.
- 37 Art Collecting and Family Matters
 Origins of art collecting. Paintings on catalog
 covers. Exhibits of paintings. First Wife. Marriage
 to Isabel. Sons. European trips. Comments on British
 research.
- 42 Notes
- 44 Index

NOTES

- 1. Ruth Beckermann, <u>Die Mazzesinsel</u> (Wien-Mu"chen: Lo"cker Verlag, 1984), p. 106.
- 2. A. F. McKay and A. R. Bader, "The Preparation and Properties of the Eight Diastereoisomers of 9,10,12,13-Tetrahydroxystearic Acid," <u>Journal of Organic Chemistry</u>, 13 (1948): 75-85.
- 3. Daniel Swern, "Chemistry of Epoxy Compounds. VII. Stereochemical Relationships between the 9,10-Epoxy-, Chlorohydroxy- and Dihydroxystearic Acids," <u>Journal of the American Chemical Society</u>, 70 (1948): 1235-1240 (See footnote 24).
- 4. Samuel C. Hooker, "The Constitution of "Lapachic Acid" (Lapachol) and its Derivatives," <u>Journal of the</u> Chemical Society, 61 (1892): 611-620.
- 5. Samuel C. Hooker, "The Constitution of Lapachol and its Derivatives. Part IV. Oxidation with Potassium Permanganate," <u>Journal of the American Chemical</u> Society, 58 (1936): 1168-1173.
- 6. Louis F. Fieser and Alfred R. Bader, "Rearrangement and Reduction of Hindered 2-Hydroxy-3-alkyl-1,4-naphthoquinones," <u>Journal of the American Chemical</u> Society, 73 (1951): 681-684.
- 7. Louis F. Fieser and Mary A. Peters, "The Addition of Diazomethane and Some of its Derivatives to Alphanaphthoquinone," <u>Journal of the American Chemical Society</u>, 53 (1931): 4080-4893.
- 8. Alfred R. Bader and Martin G. Ettlinger, "Pyrolysis of the Addition Product of Diphenyldiazomethane and 1,4-Naphthoquinone," Journal of the American Chemical Society, 75 (1953): 730-734.
- 9. Alfred R. Bader, Lowell O. Cummings, and Henry A. Vogel, "Transesterification. I. Beta-Keto Esters,"

 Journal of the American Chemical Society, 73 (1951):

 4195-4197; Bader and Vogel, "Transesterification. II.

 Esters of Strong Organic Acids," Journal of the American Chemical Society, 74 (1952): 3992-3994.
- 10. Alfred R. Bader, "Cyclopentenylphenols," <u>Journal of</u> the American Chemical Society, 75 (1953): 5967-5959; Bader,

- "Unsaturated Phenols. II. Attempted Syntheses of o-Vinylphenol," <u>Journal of the American Chemical Society</u>, 77 (1955): 4155; Bader, "Unsaturated Phenols. III. Alkali Isomerization," <u>Journal of the American Chemical Society</u>, 78 (1956): 1709-1713.
- 11. For example, see Alfred R. Bader and Lowell O. Cummings, "Preparation of Novel Dialkylol Derivatives of Alkenylphenols," U.S. Patent 2,802,882, issued 13 August 1957 (application filed 4 December 1953); and Bader, "Preparation of Terpene Diphenolic Compounds," U.S. Patent 2,811,564, issued 29 October 1957 (application filed 21 September 1955).
- 12. Alfred R. Bader, "Addition Products of Phenols and Keto Acids and Derivatives of the Same," U.S. Patent 2,933,520, issued 19 April 1960 (application filed 27 August 1953).
- 13. Alfred R. Bader and Anthony D. Kontowicz, "Gamma, gamma-Bis-(p-hydroxyphenyl)-valeric Acid," <u>Journal of the</u> American Chemical Society, 76 (1954): 4465-4466.
- 13. Michael F. Carroll and Alfred R. Bader, "The Reaction of Diketene with Ketones," <u>Journal of the American</u> Chemical Society, 74 (1952): 6305.
- 15. A copy may be found in the Beckman Center Oral History Program File #0074.

INDEX

```
Albiani's (cafeteria), 19
Aldrich-Boranes, 34
Aldrich Chemical Company, Inc., 21, 26, 28-37, 39, 40
advertisements, 40
catalog, 29, 32, 36
catalog covers, 37
catalog number two, 29
catalog of paintings, 38
first compound, 18
flyer number one, 2, 29
Gold Label, 37
merger with Sigma, 35
prospectus, 34
stockholders, 33
stock offerings, 34, 36
Alkenylphenols, 24
American Chemical Society, 38
American Sugar Refining Company, 18
Ann Arbor, Michigan, 34
Arandora Star, 7
Art history through chemistry, 37
Austria, 1, 3, 4
В
Bader, Alfred R.
Bachelor of Arts degree (history), 12
Bachelor of Science degree (engineering chemistry), 12
"Bobby" (nickname), 4
collecting paintings, 37, 38
cumulative examinations (Harvard University), 19
first wife, 30, 39
divorce, 39
entrance examinations (Harvard University), 16
father, 1
female lab partner, 19
French lessons, 6
grandfather, 11
history courses, 12
job with RCA Victor, 12
"kneeball" match, 4
master's degree, 12, 15, 16
medal in chemistry, 12
mother, 1, 2, 5
patents, 2, 4
paint chemist, 13
Ph.D. degree, 19
```

```
post-office savings book, 6
principal of afternoon school, 31
research fellowship, 16
scholarship, 12
sister, 2
soccer, 3
Bader, Alfred R. (continued)
stamp collecting, 2, 4, 6
teaching Sunday School, 26
Bader Chemical Company, 27
Bader's black box, 19
Bader, David (son), 39
Bader, Isabel (wife), 19, 20, 38, 39
von Bader, Moritz Ritter, 1
Badger Meter Company, 31
Baird, Robert W., 34
J. T. Baker Chemical Co., 32
Barberton, Ohio, 30
Bartlett, Paul D., 16, 17, 20
Benzocyclopentanone, 18
Berlin, Germany, 10
Bethabarra wood, 18
Biochemicals, 35
Bisphenol, 24, 25
Blair, --, 9
Bloomsbury House (London, England), 5
Bloomsbury Square (London, England), 5
Boston, Massachusetts, 21
Brighton, England, 7
Brighton Technical College, 6, 7
Brighton train, 5
British government, 8
Broida, Daniel, 35, 36
Brown, Herbert C., 38
Bryn Mawr College, 21
Burton-upon-Trent, Staffordshire, England, 2
Butadiene, 24
Butadiene epoxide, 30
ortho- and para-Butenylphenols, 24
B-Line, 35
C
Cambridge, England, 39
Cambridge, Massachusetts, 15, 16
Can coatings, 24
Canada, 7-9
Canadian censors, 9
Canadian immigration, 9
```

```
Cancer chemotherapy, 21
Carcinogenic standard, 29
Carroll, Michael, 25, 30
Chemical & Engineering News, 25
Chemistry 20 (Harvard), 18, 19
Churchill, Winston S., 7
Columbia University, 20, 21
Columbia Organic Chemicals Company, Inc., 28
Converse Laboratory (Harvard University), 18-20
Countercurrent extraction, 23
Cyanoacetates, 24
Cyclopentadiene, 24
ortho- and para-Cyclopentenylphenols, 24
D
Dachau (concentration camp), 8
Denver, Colorado, 17
Diazomethane, 18, 29
Dicyclohexylcarbodiimide, 33
Dicyclopentadiene, 24
Dienes, 24
Diketene (from acetone), 25
Diphenolic acid, 25
Djerassi, Carl, 2
Doering, William von Eggers, 20
The Dow Chemical Company, 22
E. I. du Pont de Nemours & Co., Inc., 27, 28
Ε
East Hove Senior School for Boys, 3, 5-7
Eastman Kodak Company, 14, 25, 32, 33, 36, 39
catalogs, 22, 32
Ecole des Ponts et Chaussees, 1
Eidgenössische Technische Hochschule (ETH), 15, 16
Eisendrath, Jack, 26-29
Emanuel, Mrs., 4, 6, 7
Emery Chemicals, 25
England, 3, 4, 7, 8, 25, 30, 39, 40
English life, 5
Epoxidation, 40
Ethyl acetoacetate, 24
Ettlinger, Martin, 21, 22, 27, 34
Fieser, Louis F., 16-21, 25
Fieser, Mary (Peters), 19, 21, 22
Fluka Chemie AG, 30, 32
Forbes, George S., 16
Fort Lennox, Quebec, Canada, 8
```

```
Franconia, Germany, 9
Franz Josef, 1
Friedel-Crafts catalyst, 24
Furfural, 24
G
Gas chromatography, 36
Gates, Marshall, 25
Georgian, Vlasios, 16
Gergel, Max, 28
Gerhart, Howard, 23, 25, 26, 28
Germany, 3, 4, 8, 21
Gilman, Henry, 14
Gold Label (Aldrich Chemical Company), 37
Goldman Sachs & Co., 35, 36
Goren, Mayer Bear, 17
Grand Avenue (Hove, England), 4
Gymnasium, 2, 3
Η
Haifa, Israel, 21
Hammett indicators, 24
Harrison, Anna, 38
Harvard University, 13, 15, 16, 20-23, 38
Harvard Square Cambridge, Massachusetts), 19
Harwich, England, 4
Hebrew school, 31
1,6-Hexanediol, 27
Hillel Foundation, 17
Holland, 4
Hooker, Samuel C., 18
Hooker Oxidation, 18, 19
Houston, Texas, 21
Hove, Sussex, England, 3-5, 9
Hurd, Charles, 23, 26
Huyton (near Liverpool), England, 7
2-Hydroxy-3-cyclohexyl-1,4-napthoguinone, 17
2-Hydroxy-3-octadecyl-1,4-naphthoquinone, 18
Hydroxyguinones, 17, 18
Hydroxystearic acids, 17
Ile-au-noix, Quebec, Canada, 8
Imidazolidines, 14
Imperial College, 39
Indanone, 18
Indianapolis, Indiana, 33
International Student Service (ISS), 10
Internment camp, 7, 8, 10, 12, 38
```

```
Investment club (of Parke-Davis chemists), 34
Iodine numbers, 23
Isle of Man, 7
Ismailia Section (Suez Canal), 1
Isoprene, 24
Isopropanol, 22
2-Isopropyl-3-hydroxynaphthoquinone, 22
ortho-Isopropylphenol, 22
Israel, 17, 21
J
Journal of the American Chemical Society, 25, 30
Jewish community in Montreal, 8
Jewish refugees, 7
Jews, 8-10, 13, 23
Johns Hopkins University, 10
Johnson & Johnson, 23
S. C. Johnson & Son, Inc., 24, 25
Johnson Wax (see S. C. Johnson & Son, Inc.)
Jones, Norman, 15
Jones, Magda, 15
Journal of Organic Chemistry, 30
J.T. Baker Chemical Company, 32
K
Kalamazoo, Michigan, 33
Kesselman, William, 26, 27
ß-Keto esters, 24
Kippen, Major -- , 8
Kitchener Refugee Camp, Kent, England, 8
Klitsner, Marvin, 28, 39
Kovenock, Harry, 27
Kupchan, Morris, 21
L
Lapachol, 18
Lesseps, Ferdinand M., Vicomte de, 1
Levulinic acid, 24, 25
Ley, Steven, 39
Eli Lilly and Company, 33
Linoleic acid, 14, 15
Linoleic acids, 19
Liverpool, England, 7
London, England, 5
Lonza, Inc., 25
Lowestoft, England, 4
Lowestoft Isolation Hospital, 5
Lycan, William, 23
```

```
M
Malonates, 24
Manchester, England, 15, 17, 39
Mandell, Leon, 19
The Marshall Company, Inc., 33
McGill University, 10, 14
McKay, Arthur F., 13-15, 17-19, 29, 30
McRae, Alexander, 13, 16
Methyl acetoacetate, 24
1-Methyl-3-nitro-1-nitrosogaunidine [MNNG], 15, 18, 29, 30
Middle Street Synagogue (Brighton, England), 7
Mills, Jack, 33
Milwaukee, Wisconsin, 20, 23-25, 26, 30, 31, 33, 38
Milwaukee Sentinel, 34
Minneapolis, Minnesota, 24
Modest, Edward J., 21
Montreal, Quebec, Canada, 9, 10, 12, 14, 20
Montreal Gazette, 9, 10
Moravia, Czechoslovakia, 1
Mount Holyoke College, 38
Murphy Paint Company, 12, 13, 16, 19, 20, 23
Ν
Naphthoquinones, 22
ortho-Naphthoquinones, 18
National Institutes of Health (NIH), 21
National Research Council, 15
Natural gas, 24
Natural products, 21
Nazis, 1, 3, 7, 8, 9
New Brunswick, University of, 23
Nitrocellulose lacquers, 13
Nitrogen, 29
Nitroquanadine, 14
Nitroguanidine condensations, 15
Nobel Prize, 38, 40
Northwestern University, 23, 26
Ottawa, Ontario, Canada, 15
Oxford University, 39
Ρ
Paint industry, 24
Paint research laboratories, 20
Paris, France, 1, 6
Parke-Davis Company, 30
Perfumery chemicals, 30
PFS (prepared for Sigma), 36
```

```
Phenol, 22, 24
Phenolic resins, 24
Philadelphia, Pennsylvania, 33, 39
Pittsburgh, Pennsylvania, 26
Pittsburgh Plate Glass Company (See PPG Industries, Inc.)
Potassium permanganate, 18
PPG Industries, Inc., 19, 20, 23-26, 28, 30
Prelog, Vladimir, 15
1,2-Propanediamine, 14
1,3-Propanediamine, 14
Quaker Oats Company, 24
Quebec, Canada, 8
Queen's University, 10-13, 15-17, 20
Ouinine, 20
Quinone chemistry, 21
R
Racine, Wisconsin, 24, 25
Ramsey, Isle of Man, British Isles, 7
Raphael, Ralph, 40
RDX explosive, 15
Reich, Gisela ("adopted" mother), 1, 2, 4
Rice University, 21
Richelieu River (Canada), 8
A. Boake Roberts, Ltd., 30
Robinson, Mrs., 9
Rochester Institute of Technology, 39
Russian-American Oil Company, 1
Ruzicka, Leopold, 15
Salford, England, 39
Saponification, 23
Scharff, Mr. and Mrs., 5, 6
Securities and Exchange Commission (SEC), 33
Sedlmayer, -- , 3, 10
Seed crystals, 19
Sharpless, K. Barry, 40
Sheehan, John C., 33
Sheffield, England, 39
Sigma Chemical Co., 35, 36
Sigma-Aldrich Company, 36, 39
Sitosterols, 23
Skeff, George, 26
Smith Kline & French Laboratories, 33
S.S. Sobieski, 8
Social workers, 9
```

```
Society of Fellows, 21
Sodium cyanide, 28
Southend-on-Sea, England, 5
Soybean oil, 24
Staffordshire, England, 2
Stanford University, 19
Stearic acid, 15
Stockwood, Warren, 22
Stork, Gilbert, 17, 19, 20, 24
St. Felixstowe School (Suffolk, England), 5
St. Lawrence River, 8
Suberic acid, 27
Suez Canal, 1
Sussex, England, 41
Swern, Daniel, 14, 15
Synthetic organic chemistry, 15
Szmuszkovicz, Jacob, 21
Т
Tag, Ernest, 33
Technion University, 21
Tetrahydroxystearic acids, 14, 19
Theresienstadt (concentration camp), 1, 2
3M Company, 24, 25
Thorpe, -- , 20, 23
Tinker, John, 19
Tocopherols, 23
Toronto, University of, 13
Transesterification, 24
Tufts Medical School, 16
U
U-boat, 7
Ultraviolet spectra of natural products, 15
Union Carbide Corporation, 25, 27
University College, 39
Van Tamelen, Eugene, 19, 22
Varnishes, 13
Victoria Station (London, England), 5
Vienna, Austria, 1-5, 10
Vinyl finishes, 13
W
Wacker Chemical Corporation, 25
War of 1812, 8
Weizmann, Chaim, 17
Westcliff, England, 5
```

Westmount, Quebec, Canada, 10, 11
Wisconsin, University of, 23
Witkop, Bernhard, 21
Wolff, Martin, 9, 11, 14
Wolff, Rosetta, 10
Wolff, Sarah, 4, 5, 9
Woodward, Robert B., 16, 17, 19, 20
Wright, George, 13, 14, 15

Z Zürich, Switzerland, 15