
Guide to the Papers of Norman Horowitz, 1940-1992

Collection number: Consult repository

Archives

California Institute of Technology
Pasadena, California

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Descriptive Summary

Title: Norman H. Horowitz papers,

Date (inclusive): 1940-1992

Collection number: Consult repository

Creator: Horowitz, Norman H.

Extent: 9.5 linear ft.

Repository: California Institute of Technology. Archives.
Pasadena, California 91125

Abstract: The working papers, correspondence, manuscripts, and lectures of Norman Harold Horowitz form the collection known as the Papers of Norman Horowitz in the Archives of the California Institute of Technology. Horowitz was professor of biology at Caltech, and a pioneer in the fields of exobiology and biochemical genetics.

Language: English

Access

The collection is open for research. Researchers must apply in writing for access.

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Preferred Citation

[Identification of item, box and file number], Papers of Norman Horowitz. Archives, California Institute of Technology.

Acquisition Information

Norman Horowitz donated his papers to the Archives at the California Institute of Technology in several installments between 1982 and 1992.

Biography

Norman Harold Horowitz was born in Pittsburgh, Pennsylvania in 1915, the eldest of three boys, and the son of an émigré businessman and Bostonian mother. Raised in the middle-class neighborhood of Squirrel Hill, he attended public elementary and secondary schools, where at the latter he was made valedictorian.

In 1932, Horowitz entered the University of Pittsburgh after securing a scholarship. There he majored in zoology, carrying out independent research as an undergraduate. From Pittsburgh, he moved to Pasadena and the California Institute of Technology in the autumn of 1936, where he worked with T.H. Morgan and Albert Tyler. Attending Caltech gave Horowitz the opportunity to spend weekends at the Institute's laboratory in Corona Del Mar and summers accompanying Morgan and Tyler to Woods Hole. It was at Woods Hole that Horowitz met his future wife, Pearl, in 1937.

After receiving his Ph.D. in 1939, Horowitz accepted a fellowship to Douglas Whitaker's Stanford University laboratory. At Stanford he continued his research on the metabolism of embryos and became acquainted with George Beadle, who was working with *Drosophila*. He returned to Caltech to work in the laboratory of Henry Borsook, but after learning of Beadle's experiments with *Neurospora*, Horowitz joined Beadle's group in Stanford, working in Northern California until the group dissolved in 1946.

Dr. Horowitz returned to Caltech with Beadle, where he joined the faculty and where he became a key player in the formation of biochemical genetics. In particular, Horowitz - with colleagues such as Howard Teas and Marguerite Fling - used mutants to demonstrate the soundness of the "one-gene, one-enzyme" theory and the ways in which mutants could be exploited for practical applications. His work on the evolution of biochemical synthesis remains an important contribution to the theory of organic evolution and the origin of life.

Horowitz's attachment to the space program began shortly after the flight of Sputnik I in 1957. Soon thereafter, the National Aeronautics and Space Administration (NASA) announced that a major goal of their program would be the biological exploration of planets, and Horowitz took the opportunity to become involved in "exobiology," or the search for extra-terrestrial life. Working at the Jet Propulsion Laboratory (JPL) in Pasadena - and becoming chief of its bioscience section in 1965 - he helped design a number of instruments for the Mars Mariner and Viking missions, including "Gulliver" and the "pyrolytic release" experiments. His extensive work in this area eventually led him to the conclusion that Martian soil is "lifeless": indeed, by the time that he published his popular book, *To Utopia and Back*, (1986), Horowitz was "virtually certain that the earth is the only life-bearing planet in our region of the galaxy."

Following his prominent work on the Mars Mariner and Viking programs, Horowitz returned to his laboratory at the California Institute of Technology. In the early 1980s, he published notable work on Siderophores, a type of chelating agent in fungi that helps the fungi to absorb iron. During the 1980s Horowitz became increasingly involved in several controversies, including the debates about evolution and creationism in schools.

Currently, Dr. Horowitz is Professor Emeritus at Caltech, as well as a member of the National Academy of Sciences. He lives in Pasadena.

Scope and Content of Collection

Comprising twenty-one boxes and nine-and-one-half linear feet, the collection encompasses most of Horowitz's distinguished career, including both his work in Caltech's biology lab and at Pasadena's Jet Propulsion Laboratory. Indeed, a large percentage of the collection is devoted to Horowitz's involvement in the search for extra-terrestrial life and its accompanying problems. Yet, also included in the collection is material related to research, publishing, administrative duties, "think-tanks" and a diverse array of heated controversies in which Horowitz was involved.

Series I, Horowitz's correspondence, encompasses approximately one-third of the collection. Ranging from the end of the Second World War to the early nineties, this section includes letters by six winners of the Nobel Prize: George Beadle, Francis Crick, Joshua Lederberg, Linus Pauling, Roger Sperry and James Watson. Notably, the collection includes extensive correspondence between Horowitz and Beadle, who won the 1958 Nobel Prize in medicine for his discovery that genes act by regulating definite chemical events. There exists also extensive correspondence with Carl Sagan and other eminent scientists in the field of biochemical genetics, including David Bonner, Howard Teas, Marguerite Fling, John Fincham, and Aleksandr Ivanovich Oparin.

Although some correspondence is not directly connected to academia, most of these letters reflect Horowitz's different research passions in biochemical genetics throughout his career: *Drosophila*, *Neurospora* and Siderophores. Letters are arranged chronologically within the

alphabetically ordered folders. Both incoming and outgoing correspondence - Horowitz made carbon copies of nearly every letter he sent - are filed together in tandem.

Series II of the collection contains Horowitz's laboratory notebooks and research notes. The notebooks span four decades, although the majority of them cover his work on *Neurospora* and *Drosophila* in the 1940s and 1950s. Included in these books is Horowitz's work in Paris in 1954-55, while he was on sabbatical at the Laboratoire de G n tique. Also housed in this section is work and correspondence related to Siderophores.

Many of Horowitz's manuscripts, journal offprints and lecture notes are found in the collection's third series. It reveals the diversity in Horowitz's interests and the broad range of his talents as researcher and writer - the problem with creationism, biochemical genetics, the search for extra-terrestrial life, inter-planetary flight and reconstructing the origin of life. Included also within this section is correspondence between Horowitz and various publishers.

Series IV, "Exobiology and Space Exploration," encapsulates Horowitz's important contributions to the space program. Contained in this section is extensive material on the design and implementation of several instruments for detecting extra-terrestrial life, the principal work in which Horowitz was involved during his years at the Jet Propulsion Laboratory. For instance, the collection contains much material - proposals, budgets, specifications, photographs and the like - relating to "Gulliver," a radioisotopic biochemical probe, and the "pyrolytic release" instrument, a Viking experiment which used radiation detectors to "sniff" for the presence of Martian life.

Also contained in this section is much of Horowitz's committee work, including his involvement in the Western Panel on Extra-terrestrial Life (WESTEX), the Space Science Board (SSB), the Committee on Space Research (COSPAR) and Richard Nixon's 1968-69 Task Force. Moreover, the section houses much correspondence related to space exploration. For instance, the bulk of the correspondence between Horowitz and Carl Sagan, as well as between Horowitz and Joshua Lederberg, is housed in this section. Noteworthy, too, are the exchanges between Horowitz and Gilbert Levin, with whom Horowitz discussed the labeled-release experiment and who was later ridiculed for his espousal of Martian life.

Series V contains material that relates directly to the California Institute of Technology. Amongst the papers are course materials, undergraduate and graduate examinations, and letters of recommendation for Horowitz's students. Also included in this section are documents - committee minutes, memos, correspondence and reports - concerning broader university issues, notably the relationship between Caltech and the Jet Propulsion Laboratory.

Series VI of the Horowitz collection encompasses some of the debates in which Horowitz was involved, as well as his contributions to important symposiums and committees. Relatively early in life, Horowitz developed a distaste for organized religion, and this distaste was reinforced throughout his career. Partially for this reason, and partially because of his work on the origin of life, he became an active opponent of the teaching of creationism in schools: much material chronicling his involvement in the anti-creationism campaign is contained in this section and complements other material in the collection, notably his manuscripts "Towards the Nature of Life" and "What's Wrong with Creationism," which are housed in Series III.

Some of Horowitz's other deep-seated convictions surface in this section: this is particularly the case when he deals with the thorny issue of genetics, "race" and intelligence, and with what he considers the fanciful theorizing of his longtime friend and colleague, Roger Sperry. Moreover, with his involvement with science in the Soviet Union and the stateside Committee on Science and Public Policy, Horowitz's attempts to balance the ineluctable force of scientific method with compassion and civility, not to mention his sense of a global scientific community in the midst of a Cold War, emerge. Yet, to varying degrees, all these aspects of Horowitz's personality are reflected throughout the entire collection.

Indexing Terms

The following terms have been used to index the description of this collection.

Horowitz, Norman H.

California Institute of Technology

Biology

Genetics

Space Biology

Biologists

Geneticists

- Biology Divisional Records
- Papers of George W. Beadle
- James Bonner, Norman Horowitz, Sterling Emerson, and Donald Poulson Oral History with Judith Goodstein, Harriet Lyle, and Mary Terrall (1981)
- Norman Horowitz Oral History with Rachel Prud'homme (1987)

Series I. Correspondence: Personal and Institutional

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Box 1, Folder 2 **Adelberg, E. A. 1950-85**
Box 1, Folder 3 **Adler, Lennart 1980-82**
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 Box 5, Folder 3 **Nuckolls, James 1949**
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 Box 5, Folder 10 **Orgel, Leslie 1968-78**
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 Box 5, Folder 13 **Pall, Martin 1967-78**
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 Box 5, Folder 20 **Phillips, R. L. 1967**
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Box 7, Folder 12 **Vogel, Henry J. 1956**
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Box 7, Folder 15 **Wagner, R. P. 1949-73**
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Box 7, Folder 38 **Y miscellaneous**
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Box 7, Folder 40 **Unidentified correspondents**

Series II. Notebooks and Research

Notebooks

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Box 8, Folder 2 **Neurospora I: 1942-43**
Box 8, Folder 3 **Neurospora II: 1943**
Box 8, Folder 4 **Neurospora III: 1944**
Box 8, Folder 5 **Neurospora IV: 1946**
Box 8, Folder 6 **Neurospora V: 1947**
Box 8, Folder 7 **VII [1949-51]**
Box 8, Folder 8 **VIII [1951-52]**
Box 8, Folder 9 **IX [1952-53]**
Box 9, Folder 1 **X: Paris [1954-55]**
Box 9, Folder 2 **Paris: 1954-55**
Box 9, Folder 3 **Drosophila XI: 1955**
Box 9, Folder 4 **No. 11 [1956-58]**
Box 9, Folder 5 **No. 12 [1958-59]**
Box 9, Folder 6 **Sept. 1980 [1980-82]**

Other Research

Box 9, Folders 7-8 **Siderophores correspondence 1975-80**

Physical Description: [2 folders]

Bentrup, F.W.
Brain, Robert
Diekmann, H.
Emery, Thomas
Keller-Schierlein, W.
Neilands, J.B.
Sypherd, Paul
Van der Helm, Dick
Winkelmann, G.
Woodward, Dow

Box 9, Folder 9 **National Institutes of Health (NIH) final report 1984**

Series III. Manuscripts, Offprints, Lectures, and Related Material

Manuscripts

- Box 10, Folder 1 "Neurospora and the Beginnings of Molecular Genetics" Neurospora Newsletter (1973; includes offprint)
Box 10, Folder 2 "Towards the Nature of Life," from 1979 Origin of Life conference (includes related correspondence)
Box 10, Folder 3 "The Search for Extra-terrestrial Life" for unpublished Unveiling the Universe (includes related correspondence)
Box 10, Folder 4 "What's Wrong with Creationism?" (includes related correspondence 1982-89)
Box 10, Folder 5 "Henry Borsook" [obituary] 1984
Box 10, Folder 6 "Biological Water Requirements" [undated]

Offprints and Publications

- Box 10, Folder 7 **Journal offprints**
"Planetary Contamination I: The Problem and Agreements (1967)
"Germination and Growth of Neurospora at Low Water Temperatures" (1971)
"Isolation and Identification of the Conidial Germination Factor of Neurospora Causa" (1976)
"Cellular and Extracellular Siderophores of Aspergillus nidulans and Penicillium chrysogenum" (1981)
"Extracellular Siderophores of Rapidly Growing Aspergillus nidulans and Penicillium chrysogenum" (1982)
Box 10, Folder 8 **Viking: The Exploration of Mars (JPL brochure; includes related correspondence)**

Lectures

- Box 10, Folder 9 "Gènes et les Enzymes" (Paris, 1955)
Box 10, Folder 10 **Lectures on Mars**
"Space research and the origin of life" (Stanford, 1959)
"Mars" (Long Beach City College, 1960)
"The challenge of biogenesis" (USC, 1962)
"Genetics, space, and the origin of life" (Lexington, 1966)
"The origin of life" (Cornell, 1967)
"Planetary exploration and the origin of life" (Washington State, 1967)
"A biologist's view of recent American and Soviet Space Missions" (1967)
"The search for life on Mars" (1967)
"The biological exploration of Mars" (Beckman Auditorium, Caltech, 1968)
"A biologist looks at Mars" (Western Valley College, 1973)
"The Viking project" (Caltech, 1976)
"The Viking search for life on Mars" (Chicago, 1976)
"The Viking mission" (multiple locales, 1977-78)
"Astronomy seminar" (Caltech, 1977)
"The Viking instruments" (2nd International Colloquium on Mars, 1979)
"The origin of life" (Space Science Board, 1979)
"The search for life in the solar system" (Kellogg Lab, 1981)
"The origin of life problem" (Planetology seminar, Caltech, 1985)
Box 10, Folder 11 **Siderophores: lecture notes 1974-82**

Publication Correspondence

- Box 10, Folder 12 **Freeman, Cooper and Company 1974**
Freeman, Cooper and Company [re: To Utopia and Back]
Box 10, Folder 13 **1982-83**
Box 10, Folder 14 **1984-85**
Box 10, Folder 15 **1985-88**
Box 10, Folder 16 **Referee reviews 1962-77**

Series IV. Exobiology and Space Exploration: Conferences; Task Forces; Committees; Experiments; Related Correspondence

Western Panel on Extra-Terrestrial Life (WESTEX) 1959-1960

Box 11, Folders 1-2

Minutes and reports

Physical Description: [2 folders]

Box 11, Folder 3

Correspondence 1959-60

**Lederberg, J.
Oparin, A.
Oyama, V.I.
Rossi, B.**

National Aeronautics and Space Administration (NASA)

Box 11, Folders 4-5

Space Sciences Steering Committee 1960-63

Physical Description: [2 folders]

Box 11, Folder 6

Correspondence 1960-61

**Calvin, Melvin
Crow, James
Dryden, Hugh
Glennan, T.K.
Hobby, George
Jacobs, George
Quimby, F.H.
Pickering, W.H.
Randt, Clark
Young, Richard**

Box 11, Folder 7

Correspondence 1962-63

**Bolton, Virginia
Brown, Allen
Brusch, Carl
Jacobs, George
Klein, Harold
Meid, G.D.
Newell, Homer
Peavey, R.C.
Quimby, F.H.
Reynolds, Orr
Soffen, G.A.
Sagan, Carl**

Box 11, Folder 8

Bioscience Subcommittee of the Space Science Steering Committee 1963

Box 11, Folder 9

"Survey of life detection experiments for Mars," 1963

Box 11, Folder 10

NASA Mars conference 1986

Box 12, Folder 1

Soviet Space Sciences

Miscellaneous reports and documents 1959-67

Committee on Space Research (COSPAR)

Box 12, Folder 2

Fourth International Space Science Symposium, Warsaw, 1963

Box 12, Folder 3

Sterilization issues and objectives 1966-67

Box 12, Folders 4-5

Twelfth International Space Science Symposium, Seattle, 1971

Physical Description: [2 folders]

Nixon Taskforce

Box 12, Folders 6-7

Memos, minutes, correspondence 1968-69

Physical Description: [2 folders]

Box 12, Folder 8	Final report 1969
	Sterilization and Quarantine
Box 13, Folder 1	Proceedings of NASA conference, July 9, 1962
Box 13, Folder 2	JPL reports and memos 1965-68
	Miscellaneous offprints, photocopies and documents
Box 13, Folder 3	1960-64
Box 13, Folder 4	1965
Box 13, Folder 5	1966
Box 13, Folder 6	1967
Box 13, Folder 7	1968
Box 13, Folder 8	1969
Box 13, Folder 9	Jupiter and Outer planets (1971)
	Space Science Board (SSB)
	Miscellaneous reports and memos
Box 14, Folder 1	1959-60
Box 14, Folder 2	1961
	Mars exobiology summer study 1964
Box 14, Folder 3	Planning and correspondence
Box 14, Folders 4-5	Reports and memos
	Physical Description: [2 folders]
Box 14, Folder 6	Statements and publications
Box 14, Folder 7	Summaries and reviews
Box 14, Folders 8-9	Meeting Jan. 22-23, 1971
	Physical Description: [2 folders]
Box 14, Folder 10	Meeting April 29-30, 1971
Box 15, Folder 1	Meeting Aug. 21-22, 1971
Box 15, Folder 2	Meeting Nov. 12-13, 1971
Box 15, Folder 3	Meeting Feb. 8-9, 1972
Box 15, Folder 4	Microbial Ecology Evaluation Device (MEED), implementation plan 1970
Box 15, Folder 5	MEED correspondence
	Eagle, Harold
	Hall, L.B.
	Odishaw, Hugh
	Spizizen, John
	Townes, Charles
	Vishniac, Wolf
	Wagoner, Ann
Box 15, Folder 6	Outer planets quarantine 1971-74
Box 15, Folder 7	Committee on Space Biology and Medicine 1972
Box 15, Folder 8	Exobiology Panel 1974
Box 15, Folder 9	American Institute of Biological Sciences Survey 1982
	Martian Exobiological Experiments
	Mars Gulliver (Radioisotopic biochemical probe for extra-terrestrial life)
Box 16, Folders 1-2	Preliminary proposals 1965
	Physical Description: [2 folders]
Box 16, Folder 3	Proposal 1966
Box 16, Folder 4	Specifications and memos
Box 16, Folder 5	Correspondence 1962-65
	Calvin, Melvin
	Heim, Allen
	Lederberg, Joshua
	Newell, Homer

Box 16, Folder 6	Correspondence, Levin, Gilbert 1962-65
Box 16, Folder 7	Gulliver probe: color photographs
	Mars Viking
Box 17, Folder 1	Pyrolytic release experiment: documents 1968-82
	Pyrolytic release experiment: instrument specifications
Box 17, Folder 2	1968-69
Box 17, Folder 3	1969-71
	Pyrolytic release experiment: correspondence
Box 17, Folder 4	1968-69
Box 17, Folder 5	1970-75
Box 17, Folders 6-8	Pyrolytic release experiment: miscellaneous documents 1976
	Physical Description: [3 folders]
Box 17, Folder 9	Pyrolytic release experiment: color photographs
	Instrument planning:
Box 17, Folder 10	1969-71
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Box 17, Folder 12	Panel documents 1969-70
Box 17, Folder 13	Sterilization 1971
Box 17, Folder 14	Sterilization 1972
	Mars Mariner 6-9
	Mariner 6 and 7: visual imaging experiment:
Box 18, Folders 1-2	Proposals and reports
	Physical Description: [2 folders]
Box 18, Folders 3-4	Data and results
	Physical Description: [2 folders]
Box 18, Folder 5	Encounter schedule
	Mariner 9: visual imaging experiment
Box 18, Folders 6-7	Proposals and reports
	Physical Description: [2 folders]
Box 18, Folder 8	Memos, reports and minutes
Box 18, Folder 9	Correspondence
	Mars Miscellaneous
	Correspondence
Box 19, Folder 1	1963
Box 19, Folder 2	1964
Box 19, Folder 3	1965
Box 19, Folder 4	1966-68
Box 19, Folder 5	1970
Box 19, Folder 6	1971
Box 19, Folder 7	1972
Box 19, Folders 8-9	Memos, surveys, studies and strategies 1964
	Physical Description: [2 folders]
Box 19, Folder 10	Reports and studies 1966-67
Box 19, Folder 11	"The biological exploration of Mars" [JPL objectives] 1967
Box 19, Folder 12	Mars-related biological studies: grant proposals and reports 1973-77
Box 19, Folder 13	Mars: Back-contamination issues: reports and correspondence 1973

Series V. California Institute of Technology: Correspondence and Documents: Caltech Administration, Teaching Material

Box 20, Folders 1-2 **Undergraduate and graduate exams 1942-70**

Physical Description: [2 folders]

Box 20, Folders 3-6 **Letters of recommendation 1953-70**

Physical Description: [4 folders]

Laboratory course material: Bi. 127: Biochemical Genetics

Box 20, Folder 7 **1961**

Box 20, Folder 8 **1962**

Box 20, Folder 9 **1963**

Box 20, Folder 10 **1964**

Box 20, Folder 11 **Caltech-JPL: relationship and goals 1968-75**

Box 20, Folder 12 **Caltech-Immaculate Heart College alliance 1970**

Box 20, Folder 13 **Training grant applications 1971-77**

Box 20, Folder 14 **Daniel McMahon tenure issue 1974**

Series VI. **Symposiums, Committees and Debates: Moscow Symposium; Public Policy; Evolution and Creationism; Genetics, "Race" and IQ; Roger Sperry and the "Mentalist" Debate**

- Box 21, Folder 1 **Moscow Symposium on the Origin of Life 1957**
- Box 21, Folder 2 **Committee on Science and Public Policy (COSPUP): Correspondence 1967-69**
 Brooks, Harvey
 Drake, Frank
 Greene, Laura
 Handler, Philip
 Pahl, Herbert
 Sagan, Carl
 Evolution vs. Creationism
- Box 21, Folders 3-4 **Miscellaneous documents 1981-87**

 Physical Description: [2 folders]
- Box 21, Folders 5-7 **William Benetta correspondence 1989-91**

 Physical Description: [3 folders]
- Box 21, Folder 8 **Darwinism vs. creationism in schools**
- Box 21, Folder 9 **Genetics, "Race" and IQ: Reports, newspaper articles and correspondence**
- Box 21, Folders
10-11 **Roger Sperry and the "Mentalist" Debate: Correspondence and offprints 1966-92**

 Physical Description: [2 folders]