Yale University Library
Medical Historical Library, Cushing/Whitney Medical Library

Wilfrid Rall computational neuroscience research collection

Ms Coll 83

Katherine Isham

Yale University
333 Cedar St.
New Haven, CT 06520-8014
203-737-1192
203-785-5636
historical.library@yale.edu
http://historical.medicine.yale.edu/

Last exported at 10:00 p.m. on Tuesday, January 30th, 2024

Table of Contents

Collection Overview 3
Requesting Instructions 3
Administrative Information 4
  Immediate Source of Acquisition 4
  Conditions Governing Access 4
  Conditions Governing Use 4
  Preferred Citation 4
  Existence and Location of Copies 4
Biographical / Historical 4
Biographical / Historical 4
Scope and Contents 5
Arrangement 5
Collection Contents 6
  Series I: Notebooks, 1963–1971 6
  Series II: Correspondence, 1964–1966 8
  Series III: Additional Materials, 1965–2020 9
Selected Search Terms 10

Collection Overview

REPOSITORY: Medical Historical Library, Cushing/Whitney Medical Library
Yale University
333 Cedar St.
New Haven, CT 06520-8014
203-737-1192
203-785-5636
historical.library@yale.edu
http://historical.medicine.yale.edu/

CALL NUMBER: Ms Coll 83

CREATOR: Rall, Wilfrid

TITLE: Wilfrid Rall computational neuroscience research collection

DATES: 1963–2020

PHYSICAL DESCRIPTION: 1.5 linear feet (2 boxes)

LANGUAGE: English

SUMMARY: Wilfrid Rall (1922-2018) was a neuroscientist whose work focused on the electrical properties of neurons and the functions of neuronal dendrites. His development of cable theory and the compartmental modeling approach for studying dendrites and synaptic integration helped found the discipline of computational neuroscience. The collection includes 11 of Rall's notebooks documenting his research on dendritic function from 1959-1971, Gordon Shepherd's (1933-2022) correspondence documenting his collaboration with Rall using the compartmental modeling method to study the functional organization of the olfactory bulb, reprints of related journal articles, obituaries for Rall, and an unpublished manuscript "Working with Wilfrid Rall: Documents from the origins of computational neuroscience 1957-1968" written by Shepherd.

ONLINE FINDING AID: To cite or bookmark this finding aid, please use the following link: https://hdl.handle.net/10079/fa/med.ms.0083

Requesting Instructions

To request items from this collection for use on site, please use the request links in the HTML version of this finding aid, available at https://hdl.handle.net/10079/fa/med.ms.0083.

Key to the container abbreviations used in the PDF finding aid:

b. box
f. folder

Administrative Information

Immediate Source of Acquisition

Gift of Gordon Shepherd and the family of Wilfrid Rall, 2021.

Conditions Governing Access

The collection is open for research.

Conditions Governing Use

Copyright has not been transferred to Yale University for unpublished materials in the collection. Copyright status for other collection materials is unknown. Transmission or reproduction of materials protected by U.S. Copyright Law (Title 17, U.S.C.) beyond that allowed by fair use requires the written permission of the copyright owners. Works not in the public domain cannot be commercially exploited without permission of the copyright owners. Responsibility for any use rests exclusively with the user.

Preferred Citation

Wilfrid Rall computational neuroscience research collection. Historical Library, Harvey Cushing/John Hay Whitney Medical Library, Yale University.

Existence and Location of Copies

Digital copies of Wilfrid Rall's research notebooks from this collection may be accessed on the Internet Archive website.

Biographical / Historical

Wilfrid Rall (1922-2018) trained as a physicist at Yale University (BS 1943) and participated in the Manhattan Project at the University of Chicago during WW II. He studied biophysics at the University of Chicago (MS 1948) and studied physiology with John Carew Eccles at the University of Otago in Dunedin, New Zealand (PhD 1953). From 1955-56 he worked with David Lloyd and Carleton Hunt at the Rockefeller Institute and Bernard Katz in London then joined the Navy Research Laboratories in Bethesda, Maryland. In 1957 Rall joined the Mathematical Research Branch of the National Institutes of Health, where he worked for the remainder of his career.

Rall is regarded as one of the founders of modern neuroscience. His work in establishing the integrative functions of neuronal dendrites included developing the use of cable theory, as well as passive and active compartmental modeling of the neuron, which provided a foundation for the field of computational neuroscience.

Biographical / Historical

Gordon Shepherd (1933-2022) was professor of neuroscience at Yale School of Medicine. He received his BS at Iowa State College in 1955, MD at Harvard in 1959, and PhD at Oxford in 1962 and completed postdoctoral training at the National Institutes of Health, MIT, and the Karolinska Institute. His work included introducing the olfactory system as a model for analyzing the properties of neurons and synapses in the brain and the formation of neural images of olfactory molecules. His research contributed to the understanding of properties of neuronal dendrites and spines, olfactory processing, and

development of the new fields of computational neuroscience, brain microcircuits, neuroinformatics, and neurogastronomy.

Shepherd's publications include *Synaptic Organization of the Brain*(5 ed.), *Neurobiology (3 ed.)*, *Handbook of Brain Microcircuits*, *Neurogastronomy*, *Foundations of the Neuron Doctrine*, *Creating Modern Neuroscience*, and *Mosso's Circulation of Blood in the Human Brain*. He has been chief editor of the Journal of Neurophysiology and the Journal of Neuroscience and was a member of the American Academy of Arts and Sciences.

Scope and Contents

Wilfrid Rall (1922-2018) was a neuroscientist whose work focused on the electrical properties of neurons and the functions of neuronal dendrites. His development of cable theory and the compartmental modeling approach for studying dendrites and synaptic integration helped found the discipline of computational neuroscience. The collection documents his research from 1963-1971, particularly his collaborative work with Gordon Shepherd using the compartmental modeling method to study the functional organization of the olfactory bulb.

Series I. Notebooks, 1963-1971, includes 10 hardcover notebooks and 1 composition book documenting his research on dendritic function. Loose materials from the notebooks have been moved to adjacent folders. Rall's summary of contents from the first page of each notebook and Shepherd's content notes from his website Shepherd Lab: Wilfrid Rall Archive (https://medicine.yale.edu/lab/shepherd/projects/rall/) have been recorded in a scope and content note for each notebook.

Series II. Correspondence, 1964-1966, includes Gordon Shepherd's correspondence documenting his collaboration with Rall using the compartmental modeling method to study the functional organization of the olfactory bulb. The series includes original correspondence received by Shepherd and drafts or copies of correspondence sent by Shepherd. In addition to Shepherd, correspondents include Charles Phillips, Tom Powell, Wilfrid Rall, Thomas Reese, and others.

Series III. Additional materials, 1965-2020, includes reprints of related journal articles, obituaries for Rall, and an unpublished manuscript "Working with Wilfrid Rall: Documents from the origins of computational neuroscience 1957-1968" written by Shepherd.

Arrangement

The collection is arranged in three series: Series I. Notebooks, 1963-1971. Series II. Correspondence, 1964-1966, and Series III. Additional materials, 1965-2020.

Collection Contents
Series I: Notebooks, 1963–1971

b. 1, f. 1	Book 1: Computations and early program evolution From first page of notebook: Record begun May 10, 1963. Also summarizes loose records dating back to early 1959. Compartmental computations with More's program are in separate book (Book 2). Summary by Gordon Shepherd: Early studies of dendritic branching.	1963
b. 1, f. 2	Book 1 enclosures	1963
b. 1, f. 3	Book 2: Compartmental computations From first page of notebook: This record begun May 7, 1963, but retrospective to July 1962, based on loose notes from that period. From May 1963 onwards this became computations diary Book 2. Summary by Gordon Shepherd: Motoneuron dendrites; compartmental model development. With Kay Frank, Phil Nelson, Bob Burke, Tom Smith.	1963
b. 1, f. 4	Book 2 enclosures	1963
b. 1, f. 5	Book 3: Propagated activity From first page of notebook: This record begun November 6, 1963, but retrospective to Q dependence notes in other notebook (July 1963). Summary by Gordon Shepherd: Start olfactory bulb study with Gordon Shepherd.	1963–1964
b. 1, f. 6	Book 3 enclosures	1963–1964
b. 1, f. 7	Book 4: Mostly 1964 research diary From first page of notebook: The purpose of this record is to collect notes and outlines presently on loose sheets of paper, with a view to a more efficient dispatch of unfinished papers based on accumulated computations. Basic problem seems due to two principal factors: (1) evolving research interests, (2) priority given to invited papers. Solution would seem to lie in brief papers instead of buried notes. (This comment follows not long after completing Ojai manuscript.) Summary by Gordon Shepherd: Models of mitral and granule cells; APs, PSPs, e.c. potentials. p.56. 8/24/64 Prediction of dendrodendritic synaptic interactions.	1964
b. 1, f. 8	Book 4 enclosures	1964
b. 1, f. 9	Book 5: Continuation of research diary From first page of notebook: Book ran from March 11, 1964, to September 17, 1964. Summary by Gordon Shepherd: Olfactory bulb model. p.63. Eccles' after dinner speech.	1964
b. 1, f. 10	Book 5 enclosures	1963–1971

b. 1, f. 11	Book 6: Research and computation diary From first page of notebook: Continuation from Book 5. This begins in January 1965, goes through July 2, 1965. Summary by Gordon Shepherd: Synapse properties and models p.87. 3/15. Finding of dendrodendritic synapses: Tom Reese and Milton Brightman pp.157-163. Reese and Brightman questions. p.191. 6/15/65. GS at NIH to go over paper. Science rejects. Submit instead to Journal of Experimental Neurology: Rall, Shepherd, Reese, Brightman 1966.	1965
b. 1, f. 12	Book 6 enclosures	1963–1971
b. 1, f. 13	Book 7: Research and computation diary From first page of notebook: Continued from Book 6. This begins August 3, 1965, and extends through (December 15, 1965). Summary by Gordon Shepherd: Return to motoneuron. Rall wide consultation. p.8. 9/24/65. Per Anderson. p.22. 9/30/65. Eccles lecture.	1963–1971
b. 1, f. 14	Book 7 enclosures	1963–1971
b. 1, f. 15	Book 8: Research and computation diary From first page of notebook: Continued from Book 7 on December 15, 1965. Past few months have been very active computing with SAAM22 (Beriman program). Produced several summary charts not in Book 7. See page 30 of this book for recap and stock taking. Summary by Gordon Shepherd: p.6. 12/16/65 Four classic motoneuron papers. p.162. 5/17/66. Thoughts on a book: "Neuron Theory and Practice." p.130. 3/7/66 Reese consult.	1963–1971
b. 1, f. 16	Book 8 enclosures	1963–1971
b. 1, f. 17	Book 9: Research and computation diary From first page of notebook: Continued from Book 8 on June 27, 1966. Summary by Gordon Shepherd: Finally time to finish a full description of the dendrodendritic computational model. Rall and Shepherd 1968.	1963–1971
b. 1, f. 18	Book 9 enclosures	1963–1971
b. 1, f. 19	Book 10: Research and computation diary From first page of notebook: This book begun November 1968. Summary by Gordon Shepherd: Dendritic spines. John Rinzel joins Wil.	1963–1971
b. 1, f. 20	Book 10 enclosures	1963–1971
b. 1, f. 21	Composition book: Running checklist From first page of composition book: Started October 1969 to replace loose sheets recently in use. Summary by Gordon Shepherd: Rinzel and dendritic spines.	1963–1971
b. 1, f. 22	Composition book enclosures	1963–1971

Series II: Correspondence, 1964–1966

Gordon Shepherd's scientific correspondence with Charles Phillips, Tom Powell, Wilfrid Rall, Tom Reese, and others.

b. 2, f. 1-3

Series III: Additional Materials, 1965–2020

	Reprints	1965–1968
b. 2, f. 4	Rall, Wilfrid, G. M. Shepherd, T. S. Reese, M. W. Brightman, "Dendrodendritic synaptic pathway for inhibition in the olfactory bulb."	1965
b. 2, f. 5	Rall, Wilfrid, "Distinguishing theoretical synaptic potentials computed for different soma-dendritic distributions of synaptic input." Journal of Neurophysiology Vol. 30 no. 5, pp. 1138-68.	1967
b. 2, f. 6	Rall, W., R. E. Burke, T. G. Smith, P. G. Nelson, K. Frank, "Dendritic location of synapses and possible mechanisms for the monosynaptic EPSP in motoneurons." Journal of Neurophysiology Vol. 30 no. 5, pp. 1169-93.	1967
b. 2, f. 7	Rall, W. and G. M. Shepherd, "Theoretical reconstruction of field potentials and dendrodendritic synaptic interactions in olfactory bulb." Journal of Neurophysiology.	1968
b. 2, f. 8	Obituaries	2018
b. 2, f. 9	Shepherd, Gordon, "Working with Wilfrid Rall: Documents from the origins of computational neuroscience 1957-1968"	2020

Selected Search Terms

The following terms have been used to index the description of this collection in the Library's online catalog. They are grouped by name of person or organization, by subject or location, and by occupation and listed alphabetically therein.

Subjects

Computational neuroscience
Dendrites
Neurology -- Research -- United States
Neurosciences
Neurosciences -- History
Synapses

Occupations

Neurobiologists

Contributors

Rall, Wilfrid
Shepherd, Gordon M., 1933-