THE
BIOLOGICAL BULLETIN
PUBLISHED BY THE MARINE BIOLOGICAL LABORATORY

THE MARINE BIOLOGICAL LABORATORY

EIGHTY-FIRST REPORT, FOR THE YEAR 1978—NINETY-FIRST YEAR

I. TRUSTEES AND EXECUTIVE COMMITTEE (AS OF AUGUST, 1978) .......... 1
II. CERTIFICATE OF ORGANIZATION ........................................... 5
III. ARTICLES OF AMENDMENT .................................................. 6
IV. BYLAWS OF THE CORPORATION ............................................. 7
V. REPORT OF THE DIRECTOR .................................................. 12
   Addenda:
   1. The Staff ........................................................................ 19
   2. Investigators, Fellowships, and Students ......................... 41
   3. Scholarships .................................................................... 56
   5. Institutions Represented ............................................... 57
   6. Friday Evening Lectures ................................................. 59
   7. Members of the Corporation ............................................. 61
VI. REPORT OF THE LIBRARIAN .................................................. 91
VII. REPORT OF THE TREASURER ............................................... 92

I. TRUSTEES

Including Action of 1978 Annual Meeting

PROSSER GIFFORD, Chairman of the Board of Trustees, Dean of Faculty, Amherst College, Amherst, Massachusetts 01002
GERARD SWOPE, JR., Honorary Chairman of the Board of Trustees, Croton-on-Hudson New York, New York 10520
DENIS M. ROBINSON, Honorary Chairman of the Board of Trustees, High Voltage Engineering Corporation, Burlington, Massachusetts 01803

Copyright © 1979, by the Marine Biological Laboratory
Library of Congress Card No. A38-518
(ISSN 0006-3185)
2  ANNUAL REPORT OF THE MARINE BIOLOGICAL LABORATORY

JONATHAN O’HERRON, Treasurer, Lazard Frères and Company, 1 Rockefeller Plaza,
New York, New York 10020
PAUL R. GROSS, President of the Corporation, and Director of the Laboratory, Marine
Biological Laboratory, Woods Hole, Massachusetts 02543
GERALD FISCHBACH, Clerk of the Corporation, Harvard Medical School, Boston, Massa-
chusetts 02215

EMERITI

PHILIP B. ARMSTRONG, State University of New York, Upstate Medical Center
ERIC G. BALL, Marine Biological Laboratory
DUGALD E. S. BROWN, Placida, Florida
FRANK A. BROWN, JR., Northwestern University
ANTHONY C. CLEMENT, Emory University
KENNETH S. COLE, National Institutes of Health
ARTHUR L. COLWIN, University of Miami
LAURA H. COLWIN, University of Miami
D. EUGENE COPELAND, Marine Biological Laboratory
PAUL S. GALTSOFF, Woods Hole, Massachusetts
HARRY GRUNDFEST, College of Physicians and Surgeons
DOUGLAS MARSLAND, Woods Hole, Massachusetts
HAROLD H. PLOUGH, Amherst, Massachusetts
C. LADD PROSSER, University of Illinois
JOHN S. RANKIN, JR., Ashford, Connecticut
A. C. REDFIELD, Woods Hole, Massachusetts
MARY SEARS, Woods Hole, Massachusetts
CARL C. SPEIDEL, University of Virginia
H. BURR STEINBACH, Woods Hole, Massachusetts
ALBERT SZENT-GYORGYI, Marine Biological Laboratory
W. RANDOLPH TAYLOR, University of Michigan
GEORGE WALD, Harvard University

CLASS OF 1982

EVERETT ANDERSON, Harvard Medical School
GEORGE H. A. CLOWES, JR., Boston City Hospital
ELLEN R. GRASS, The Grass Foundation
JOHN P. KENDALL, Boston, Massachusetts
EDWARD A. KRAVORITZ, Harvard Medical School
HANS LAUFER, University of Connecticut
MARJORIE R. STETTEN, National Institutes of Health
WALTER S. VINCENT, University of Delaware
J. RICHARD WHITTAKER, Wistar Institute

CLASS OF 1981

JOHN M. ARNOLD, University of Hawaii
JANE FESSENDEN, Marine Biological Laboratory
HELEN HOMANS GILBERT, Dover, Massachusetts
STEPHEN W. KUFFLER, Harvard Medical School
MAURICE LAZARUS, Federated Department Stores, Boston
ROBERT MAINER, Boston Company, Incorporated
GEORGE PAPPAS, University of Illinois Medical Center
W. D. RUSSELL-HUNTER, Syracuse University
RAYMOND E. STEPHENS, Marine Biological Laboratory
TRUSTEES

CLASS OF 1980

PHILIP B. DUNHAM, Syracuse University
TIMOTHY H. GOLDSMITH, Yale University
BENJAMIN KAMINER, Boston University
KEITH R. PORTER, University of Colorado
LIONEL I. REBHUN, University of Virginia
DOROTHY ROWE, Boston, Massachusetts
W. NICHOLAS THORNDIKE, Boston, Massachusetts
EDWARD O. WILSON, Harvard University

CLASS OF 1979

ROBERT D. ALLEN, Dartmouth College
FRANCIS D. CARLSON, The Johns Hopkins University
HAYS CLARK, Avon Products, Incorporated
DENNIS FLANAGAN, Scientific American
PHILIP GRANT, University of Oregon
CATHERINE HENLEY, National Institutes of Health
E. SWIFT LAWRENCE, Pawtucket Institution for Savings
JOHN W. MOORE, Duke University Medical Center
MELVIN SPIEGEL, Dartmouth College

STANDING COMMITTEES

Executive Committee of the Board of Trustees

PROSSER GIFFORD, ex officio
PAUL R. GROSS, ex officio
JONATHAN O’HERRON, ex officio
JOHN W. MOORE, 1981
MELVIN SPIEGEL, 1981

Budget Committee

JOHN W. MOORE, Chairman
JOHN M. ARNOLD
GEORGE H. A. CLOWES, Jr.
PAUL R. GROSS, ex officio
WILLIAM T. GOLDEN

Buildings and Grounds Committee

FRANCIS HOSKIN, Chairman
FRANK CHILD
LAWRENCE B. COHEN
ALAN FEIN
DANIEL GILBERT
ROBERT GUNNING, ex officio

COMPUTER SERVICE COMMITTEE

JOHN HOBIE, Chairman
WILLIAM J. ADELMAN
FRANCIS P. BOWLES
ALLAHVERDI FARMANFARMAIAN

AUDREY E. V. HASCHHEMEYER
FRANK LONGO
ROBERT D. PRUSCH
RONALD PRZYBYLSKI
ALLEN SCHUETZ
EVELYN SPIEGEL

E. F. MACNICHOL, JR.
MELVIN ROSENFELD, JR.
CONSTANTINE TOLIOS
ANNUAL REPORT OF THE MARINE BIOLOGICAL LABORATORY

Employee Relations Committee

JOAN HOWARD, Chairman
CAROL EBERHARD
CHARLOTTE FRANK
JUDITH GRASSLE

LEWIS LAWDAY
DONALD LEHY
RAYMOND STEPHENS

Housing, Food Service and Day Care Committee

JUDITH GRASSLE, Chairman
DANIEL ALKON
EARLENE ARMSTRONG
SAMUEL I. BEALE
AIMLEE LADERMAN

BRIAN M. SALZBERG
HOMER P. SMITH, ex officio
ANN STUART
LEON P. WEISS
JANE ZAKREVICH

Instruction Committee

BENJAMIN KAMINER, Chairman
DANIEL ALKON
ROBERT ALLEN
CLAY M. ARMSTRONG
ESTHER GOUDSMIT
ARTHUR HUMES

R. K. JOSEPHSON
MORTON MASER, ex officio
MERLE MIZELL
JOEL ROSENAUM
SHELDON J. SEGAL
GEORGE WOODWELL

Investment Committee

W. NICHOLAS THORNDIKE, Chairman
PROSSER GIFFORD, ex officio
WILLIAM T. GOLDEN

MAURICE LAZARUS
JOHN W. MOORE
JONATHAN O'HERRON, ex officio

Library Committee

KEITH R. PORTER, Co-chairman
EDWARD A. ADELBERG, Co-chairman
FRANK M. CHILD
BERNARD DAVIS
JOHN DOWLING
J. W. HASTINGS
SHINYA INOUE
STEPHEN W. KUFFLER
LUIGI MASTROIANNI, JR.
ROBERT MORSE
ARTHUR PARDEE
SHELDON J. SEGAL
MARJORIE R. STETTEN
STANLEY WATSON

Macy Scholarship Committee

JOEL E. BROWN, Chairman
ALLEN COUNTER
LOWELL DAVIS
MORTON MASER, ex officio

WILLIAM W. SUTTON
JAMES TOWNSEL
CHARLES WALKER

Marine Resources Committee

SEARS CROWELL, Chairman
FRANCIS P. BOWLES
TOM HUMPHREYS
JACK LEVIN
CYRUS LEVINTHAL
ROBERT PRENDERGAST

ROBERT D. PRUSCH
JOHN S. RANKIN
CARL P. SWANSON
JONATHAN WITTENBERG
JOHN VALOIS, ex officio
CERTIFICATE OF ORGANIZATION

Radiation Committee

WALTER S. VINCENT, Chairman
EUGENE BELL
FRANCIS BOWLES
RICHARD L. CHAPPELL
PAUL J. DEWEER

JOHN HOBHE
E. F. MACNICHOL, JR.
MORTON MASER, ex officio
HARRIS RIPPS

Research Services Committee

ARTHUR DUBOIS, Chairman
NINA S. ALLEN
FRANCIS P. BOWLES
S. S. KOIDE
E. F. MACNICHOL, JR.
MORTON MASER, ex officio

T. NARAHASHI
GEORGE PAPPAS
JEROME SCHIFF
BRUCE SZAMIER
JAY WELLS
SEYMOUR ZIGMAN

Research Space Committee

TIMOTHY GOLDSMITH, Chairman
JOHN ARNOLD
PHILIP GRANT
FREDERICK GRASSLE
GEORGE LANGFORD

MORTON MASER, ex officio
BRIAN SALZBERG
ANN STUART
BETTY WALL
GEORGE WOODWELL

Safety Committee

ROBERT GUNNING, Chairman
DANIEL ALKON
FRANCIS P. BOWLES
LEWIS LAWDAY
DONALD LEHY

E. F. MACNICHOL, JR.
MORTON MASER, ex officio
TOSHI NARAHASHI
RAYMOND E. STEPHENS
FREDERICK THRAsher

II. CERTIFICATE OF ORGANIZATION

(On File in the Office of the Secretary of the Commonwealth)

No. 3170

We, Alpheus Hyatt, President, William Stanford Stevens, Treasurer, and William T. Sedgwick, Edward G. Gardiner, Susan Mims and Charles Sedgwick Minot being a majority of the Trustees of the Marine Biological Laboratory in compliance with the requirements of the fourth section of chapter one hundred and fifteen of the Public Statutes do hereby certify that the following is a true copy of the agreement of association to constitute said Corporation, with the names of the subscribers thereto:

We, whose names are hereeto subscribed, do, by this agreement, associate ourselves with the intention to constitute a Corporation according to the provisions of the one hundred and fifteenth chapter of the Public Statutes of the Commonwealth of Massachusetts, and the Acts in amendment thereof and in addition thereto.

The name by which the Corporation shall be known is THE MARINE BIOLOGICAL LABORATORY
The purpose for which the Corporation is constituted is to establish and maintain a laboratory or station for scientific study and investigations, and a school for instruction in biology and natural history.

The place within which the Corporation is established or located is the city of Boston within said Commonwealth.

The amount of its capital stock is none.


That the first meeting of the subscribers to said agreement was held on the thirteenth day of March in the year eighteen hundred and eighty-eight.

_In Witness Whereof_, we have hereunto signed our names, this thirteenth day of March in the year eighteen hundred and eighty-eight, Alpheus Hyatt, President, William Stanford Stevens, Treasurer, Edward G. Gardiner, William T. Sedgwick, Susan Mims, Charles Sedgwick Minot.

(Approved on March 20, 1888 as follows):

_I hereby certify_ that it appears upon an examination of the within written certificate and the records of the corporation duly submitted to my inspection, that the requirements of sections one, two and three of chapter one hundred and fifteen, and sections eighteen, twenty and twenty-one of chapter one hundred and six, of the Public Statutes, have been complied with and I hereby approve said certificate this twentieth day of March A.D. eighteen hundred and eighty-eight.

CHARLES ENDICOTT
Commissioner of Corporations

III. ARTICLES OF AMENDMENT

(On file in the office of the Secretary of the Commonwealth)

We, James D. Ebert, President, and David Shepro, Clerk of the Marine Biological Laboratory, located at Woods Hole, Massachusetts 02543, do hereby certify that the following amendment to the Articles of Organization of the Corporation was duly adopted at a meeting held on August 15, 1975, as adjourned to August 29, 1975, by vote of 444 members, being at least two-thirds of its members legally qualified to vote in the meetings of the corporation:

VOTED: That the Certificate of Organization of this corporation be and it hereby is amended by the addition of the following provisions:

"No Officer, Trustee or Corporate Member of the corporation shall be personally liable for the payment or satisfaction of any obligation or liabilities incurred as a result of, or otherwise in connection with, any commitments, agreements, activities or affairs of the corporation."
"Except as otherwise specifically provided by the Bylaws of the corporation, meetings of the Corporate Members of the corporation may be held anywhere in the United States.

"The Trustees of the corporation may make, amend or repeal the Bylaws of the corporation in whole or in part, except with respect to any provisions thereof which shall by law, this Certificate or the Bylaws of the corporation, require action by the Corporate Members."

The foregoing amendment will become effective when these articles of amendment are filed in accordance with Chapter 180, Section 7 of the General Laws unless these articles specify, in accordance with the vote adopting the amendment, a later effective date not more than thirty days after such filing, in which event the amendment will become effective on such later date.

In Witness whereof and Under the Penalties of Perjury, we have hereto signed our names this 2nd day of September, in the year 1975, James D. Ebert, President; David Shepro, Clerk.

(Approved on October 24, 1975, as follows):

I hereby approve the within articles of amendment and, the filing fee in the amount of $10 having been paid, said articles are deemed to have been filed with me this 24th day of October, 1975.

PAUL GUZZI
Secretary of the Commonwealth)

IV. BYLAWS OF THE CORPORATION OF THE MARINE BIOLOGICAL LABORATORY
(Revised August 11, 1978)

I. (A) The name of the Corporation shall be The Marine Biological Laboratory. The Corporation's purpose shall be to establish and maintain a laboratory or station for scientific study and investigation, and a school for instruction in biology and natural history.

(B) Marine Biological Laboratory admits students without regard to race, color, sex, national and ethnic origin to all the rights, privileges, programs and activities generally accorded or made available to students in its courses. It does not discriminate on the basis of race, color, sex, national and ethnic origin in employment, administration of its educational policies, admissions policies, scholarship and other programs.

II. (A) The members of the Corporation ("Members") shall consist of persons elected by the Board of Trustees, upon such terms and conditions and in accordance with such procedures, not inconsistent with law or these Bylaws, as may be determined by said Board of Trustees. Except as provided below, any Member may vote at any meeting, either in person or by proxy executed no more than six months prior to the date of such meeting. Members shall serve until their death or resignation unless earlier removed, with or without cause, by the affirmative vote of two-thirds of the Trustees then in office. Any Member who has attained the age of seventy years or has retired from his home institution shall automatically be designated a Life Member provided he signifies his wish to retain his membership. Life Members shall not have the right to vote and shall not be assessed for dues.
(B) The Associates of the Marine Biological Laboratory shall be an unincorporated group of persons (including associations and corporations) interested in the Laboratory and shall be organized and operated under the general supervision and authority of the Trustees.

III. The officers of the Corporation shall consist of a Chairman of the Board of Trustees, President, Director, Treasurer and Clerk, elected or appointed by the Trustees as set forth in Article IX.

IV. The Annual Meeting of the Members shall be held on the Friday following the Second Tuesday in August in each year at the Laboratory in Woods Hole, Massachusetts, at 9:30 a.m. Subject to the provisions of Article VIII(2), at such meeting the Members shall choose by ballot six Trustees to serve four years, and shall transact such other business as may properly come before the meeting. Special meetings of the Members may be called by the Chairman or Trustees to be held at such time and place as may be designated.

V. Twenty five Members shall constitute a quorum at any meeting. Except as otherwise required by law or these Bylaws, the affirmative vote of a majority of the Members voting in person or by proxy at a meeting attended by a quorum (present in person or by proxy) shall constitute action on behalf of the Members.

VI. (A) Inasmuch as the time and place of the Annual Meeting of Members are fixed by these Bylaws, no notice of the Annual Meeting need be given. Notice of any special meeting of Members, however, shall be given by the Clerk by mailing notice of the time and place and purpose of such meeting, at least 15 days before such meeting, to each Member at his or her address as shown on the records of the Corporation.

(B) Any meeting of the Members may be adjourned to any other time and place by the vote of a majority of those Members present or represented at the meeting, whether or not such Members constitute a quorum. It shall not be necessary to notify any Member of any adjournment.

VII. The Annual Meeting of the Trustees shall be held promptly after the Annual Meeting of the Corporation at the Laboratory in Woods Hole, Massachusetts. Special meetings of the Trustees shall be called by the Chairman, the President, or by any seven Trustees, to be held at such time and place as may be designated. Notice of Trustees' meetings may be given orally, by telephone, telegraph or in writing; and notice given in time to enable the Trustees to attend, or in any case notice sent by mail or telegraph to a Trustee's usual or last known place of residence, at least one week before the meeting shall be sufficient. Notice of a meeting need not be given to any Trustee if a written waiver of notice, executed by him before or after the meeting is filed with the records of the meeting, or if he shall attend the meeting without protesting prior thereto or at its commencement the lack of notice to him.

VIII. (A) There shall be four groups of Trustees:

(1) Trustees (the "Corporate Trustees") elected by the Members according to such procedures, not inconsistent with these Bylaws, as the Trustees shall have determined. Except as provided below, such Trustees shall be divided into four classes of six, one class to be elected each year to serve for a term of four years. Such classes shall be designated by the year of expiration of their respective terms.
(2) Trustees ("Board Trustees") elected by the Trustees then in office according to such procedures, not inconsistent with these Bylaws, as the Trustees shall have determined. Except as provided below, such Board Trustees shall be divided into four classes of three, one class to be elected each year to serve for a term of four years. Such classes shall be designated by the year of expiration of their respective terms. It is contemplated that, unless otherwise determined by the Trustees for good reason, Board Trustees shall be individuals who have not been considered for election as Corporate Trustees.

(3) Trustees ex officio, who shall be the Chairman, the President, the Director, the Treasurer, and the Clerk.

(4) Trustees emeriti who shall include any Member who has attained the age of seventy years (or the age of sixty five and has retired from his home institution) and who has served a full elected term as a regular Trustee, provided he signifies his wish to serve the Laboratory in that capacity. Any Trustee who qualifies for emeritus status shall continue to serve as a regular Trustee until the next Annual Meeting whereupon his office as regular Trustee shall become vacant and be filled by election by the Members or by the Board, as the case may be. The Trustees ex officio and emeriti shall have all the rights of the Trustees, except that Trustees emeriti shall not have the right to vote.

(B) The aggregate number of Corporate Trustees and Board Trustees elected in any year (excluding Trustees elected to fill vacancies which do not result from expiration of a term) shall not exceed nine. The number of Board Trustees so elected shall not exceed three and unless otherwise determined by vote of the Trustees, the number of Corporate Trustees so elected shall not exceed six.

(C) The Trustees and Officers shall hold their respective offices until their successors are chosen in their stead.

(D) Any Trustee may be removed from office at any time with or without cause, by vote of a majority of the Members entitled to vote in the election of Trustees; or for cause, by vote of two-thirds of the Trustees then in office. A Trustee may be removed for cause only if notice of such action shall have been given to all of the Trustees or Members entitled to vote, as the case may be, prior to the meeting at which such action is to be taken and if the Trustee so to be removed shall have been given reasonable notice and opportunity to be heard before the body proposing to remove him.

(E) Any vacancy in the number of Corporate Trustees, however arising, may be filled by the Trustees then in office unless and until filled by the Members at the next Annual Meeting. Any vacancy in the number of Board Trustees may be filled by the Trustees.

(F) A Corporate Trustee or a Board Trustee who has served an initial term of at least 2 years duration shall be eligible for re-election to a second term, but shall be ineligible for re-election to any subsequent term until two years have elapsed after he last served as a Trustee.

IX. (A) The Trustees shall have the control and management of the affairs of the Corporation. They shall elect a Chairman of the Board of Trustees who shall be elected annually and shall serve until his successor is selected and qualified and who shall also preside at meetings of the Corporation. They shall elect a President of the Corporation who shall also be the Vice Chairman of the Board of Trustees and Vice Chairman of meetings of the Corporation, and who shall be elected annually and shall serve until his successor is selected and qualified. They shall elect a Treasurer and Clerk to serve one year, and Board Trustees as described in Article VIII (B). They shall appoint a Director of the Laboratory for a term not to exceed five years, provided the term shall not exceed one year if the candidate has attained the age of 65 years prior to the date of the appointment. They may choose such other officers and agents as they may think best. They may fix the compensation and define the duties of all the officers
and agents of the Corporation and may remove them at any time. They may fill
vacancies occurring in any of the offices. The Board of Trustees shall have the power
to choose an Executive Committee from their own number as provided in Article X,
and to delegate to such Committee such of their own powers as they may deem expedi-ent in addition to those powers conferred by Article X. They shall from time to
time elect Members to the Corporation upon such terms and conditions as they shall
have determined, not inconsistent with law or these Bylaws.

(B) The Board of Trustees shall also have the power, by vote of a majority of the
Trustees then in Office, to elect an Investment Committee and any other committee
and, by like vote, to delegate thereto some or all of their powers except those which
by law, the Articles of Organization or these Bylaws they are prohibited from delegating.
The members of any such committee shall have such tenure and duties as the Trustees
shall determine; provided that the Investment Committee, which shall oversee the
management of the Corporation's endowment funds and marketable securities, shall
include the Chairman of the Board of Trustees, the Treasurer of the Corporation, and
the Chairman of the Corporation's Budget Committee, as ex officio members, together
with such Trustees as may be required for not less than two-thirds of the Investment
Committee to consist of Trustees. Except as otherwise provided by these Bylaws or
determined by the Trustees, any such committee may make rules for the conduct of its
business; but, unless otherwise provided by the Trustees or in such rules, its business
shall be conducted as nearly as possible in the same manner as is provided by these
Bylaws for the Trustees.

X. (A) The Executive Committee is hereby designated to consist of not more
than ten members, including the ex officio Members (Chairman of the Board of Trus-
tees, President, Director and Treasurer); and six additional Trustees, two of whom
shall be elected by the Board of Trustees each year, to serve for a three-year term.

(B) The Chairman of the Board of Trustees shall act as Chairman of the Executive
Committee, and the President as Vice Chairman. A majority of the members of the
Executive Committee shall constitute a quorum and the affirmative vote of a majority
of those voting at any meeting at which a quorum is present shall constitute action on
behalf of the Executive Committee. The Executive Committee shall meet at such
times and places and upon such notice and appoint such sub-committees as the Com-
mittee shall determine.

(C) The Executive Committee shall have and may exercise all the powers of the
Board during the intervals between meetings of the Board of Trustees except those
powers specifically withheld from time to time by vote of the Board or by law. The
Executive Committee may also appoint such committees, including persons who are not
Trustees, as it may from time to time approve to make recommendations with respect
to matters to be acted upon by the Executive Committee or the Board of Trustees.

(D) The Executive Committee shall keep appropriate minutes of its meetings and
its action shall be reported to the Board of Trustees.

(E) The elected Members of the Executive Committee shall constitute as a standing
"Committee for the Nomination of Officers," responsible for making nominations, at
each Annual Meeting of the Corporation, and of the Board of Trustees, for candidates
to fill each office as the respective terms of office expire (Chairman of the Board, Presi-
dent, Director, Treasurer, and Clerk).

XI. A majority of the Trustees, the Executive Committee, or any other committee
elected by the Trustees shall constitute a quorum; and a lesser number than a quorum
may adjourn any meeting from time to time without further notice. At any meeting of
the Trustees, the Executive Committee, or any other committee elected by the Trustees,
BYLAWS OF THE CORPORATION

the vote of a majority of those present, or such different vote as may be specified by law, the Articles of Organization or these Bylaws, shall be sufficient to take any action.

XII. Any action required or permitted to be taken at any meeting of the Trustees, the Executive Committee or any other committee elected by the Trustees as referred to under Article IX may be taken without a meeting if all of the Trustees or members of such committee, as the case may be, consent to the action in writing and such written consents are filed with the records of meetings. The Trustees or members of the Executive Committee or any other committee appointed by the Trustees may also participate in meeting by means of conference telephone, or otherwise take action in such a manner as may from time to time be permitted by law.

XIII. The consent of every Trustee shall be necessary to dissolution of the Marine Biological Laboratory. In case of dissolution, the property shall be disposed of in such manner and upon such terms as shall be determined by the affirmative vote of two-thirds of the Board of Trustees then in office.

XIV. These Bylaws may be amended by the affirmative vote of the Members at any meeting, provided that notice of the substance of the proposed amendment is stated in the notice of such meeting. As authorized by the Articles of Organization, the Trustees, by a majority of their number then in office, may also make, amend, or repeal these Bylaws, in whole or in part, except with respect to (a) the provisions of these Bylaws governing (i) the removal of Trustees and (ii) the amendment of these Bylaws and (b) any provisions of these Bylaws which by law, the Articles of Organization or these Bylaws, requires action by the Members.

No later than the time of giving notice of the meeting of Members next following the making, amending or repealing by the Trustees of any Bylaw, notice thereof stating the substance of such change shall be given to all Corporation Members entitled to vote on amending the Bylaws.

Any Bylaw adopted by the Trustees may be amended or repealed by the Members entitled to vote on amending the Bylaws.

XV. The account of the Treasurer shall be audited annually by a certified public accountant.

XVI. The Corporation will indemnify every person who is or was a trustee, officer or employee of the Corporation or a person who provides services without compensation to an Employee Benefit Plan maintained by the Corporation, for any liability (including reasonable costs of defense and settlement) arising by reason of any act or omission affecting an Employee Benefit Plan maintained by the Corporation or affecting the participants or beneficiaries of such Plan, including without limitation any damages, civil penalty or excise tax imposed pursuant to the Employee Retirement Income Security Act of 1974; provided, (1) that the Act or omission shall have occurred in the course of the person's service as trustee or officer of the Corporation or within the scope of the employment of an employee of the Corporation or in connection with a service provided without compensation to an Employee Benefit Plan maintained by the Corporation, (2) that the Act or omission be in good faith as determined by the Corporation (whose determination made in good faith and not arbitrarily or capriciously shall be conclusive), and (3) that the Corporation's obligation hereunder shall be offset to the extent of any otherwise applicable insurance coverage, under a policy maintained by the Corporation or any other person, or other source of indemnification.
V. REPORT OF THE DIRECTOR

To: The Trustees of the Marine Biological Laboratory

"We should be careful to get out of an experience only the wisdom that is in it—and stop there; lest we be like the cat that sits down on a hot stove-lid. She will never sit down on a hot stove-lid again—and that is well; but also she will never sit down on a cold one anymore."

—Mark Twain

The calendar year to which this report refers saw many changes. Not the least of these was the departure of James Ebert for the Presidency of the Carnegie Institution of Washington. Ebert’s tenure extended through about half of the year, although he was present in person, and by way of generous advice and guidance from Washington in spirit, for a far larger part of it. Other changes have taken place; some in management, some in programs and courses, and some in the Laboratory’s rules of operation. A most significant event of the latter kind was adoption by the Trustees, in February of 1979, of a comprehensive seven-year plan for programs, space utilization, and campus improvement.

Many of the transitional changes, like the Trustees’ plan and its related actions, came in 1979, and will therefore not be covered in this report. Their occurrence is felt, however, at the time of writing, and their impact upon the style of life and work at the Laboratory will doubtless increase in the year to come.

James D. Ebert

Although a State of the Institution report is not the appropriate place for a tribute to its retired chief executive officer, there being better occasions and places, I cannot let pass the opportunity to mark the debt we owe to Dr. Ebert. His long association with the MBL, which we trust will continue, reached a peak of intensity during an influential tenure as the Laboratory’s first full-time Director and President. Always forceful and direct in his views, more analytical and better-prepared than most who disagreed with him, Ebert brought about a series of major alterations in the way the MBL functions, meeting successfully, thereby, a number of crises in finance and management. He was able to accomplish this without any infringement of program quality nor of the traditional rights and responsibilities of the Corporation.

I have a more detailed view of his efforts than is generally available, owing to the records of his work, upon which we are daily dependent, and to my now frequent contacts with friends of the Laboratory to whom Ebert first took the MBL’s case. There can be no denial of the fact that his efforts were as fruitful as they were tireless and self-sacrificing. I believe that his contribution to the Laboratory will stand permanently as having been central to its survival in strength.

Research

To separate research from education is a process even more artificial for the MBL than it is for universities. The intertwining of the two is here less an accident and more a design than in any other scientific institution. It has been so ever since Director Whitman wrote in the first Annual Report:

“Other things being equal, the investigator is always the best instructor. The highest grade of instruction in any science can only be furnished by one who is thoroughly imbued with the scientific spirit, and who is actually engaged in original work. Whence the propriety—and, I may say, the necessity—of linking the function of instruction with that of investigation.”
It is nevertheless useful to report separately upon research activity at the MBL, to the extent that it is characterized by numbers of persons so engaged, by the sums awarded and spent for the purpose, and by the facilities given up to it, as opposed, for example, to those employed solely for classroom activities.

We can be proud that in a time of declining real support for research nationwide, and of exponentially-growing costs and demands upon physical facilities, the MBL has been able, upon a comparatively uncertain financial base, to enlarge the scope and impact of its research, and to do so without denying access to its facilities by any properly qualified person or group.

There are four broad areas of research that together encompass most, although not all, investigative activities at the Laboratory. These are (1) Ecology, (2) Cellular, Developmental, and Reproductive Biology, (3) Neuroscience, Physiology, and Biophysics, and (4) Marine Biology and Biomedicine. In each of these areas the Laboratory provides for permanent (or year-round) as well as transient (mainly, but not exclusively summer) programs.

In 1978 there was growth in all four, as measured by people, funds, and—since no decline of standards was, or will ever be permitted—by impact upon biology as a whole, i.e., by quality. The simple argument underlying this last conclusion is from information theory, in which one obtains first the information content per individual in an assemblage (the units being "bits" or "nats," or some other, depending upon the base of logarithms chosen), and then the information content of the entire assemblage by multiplying the result by the number of individuals.

Lest this be interpreted as an argument for unlimited growth, I make haste to demur. It is not. It is, rather, a way of saying that, within limits, growth accompanied by maintained standards is *ipsos facto* an increase in total quality.

The Ecosystems Center, the Boston University Marine Program, the Laboratory of Sensory Physiology, and Laboratory of Biophysics, and a group of some twenty individual research programs operated at the MBL have all performed as well or better in 1978 than they did in 1977. By performance I mean the sum of those measures employed in our system of program evaluations: important publications; grants awarded; honors and awards to staff; presentations of important lectures; quality of students and other participants attracted; and the like.

These activities, which comprise the currently permanent part of the MBL's research effort, have already reached a size and level of achievement such that to single out one or two for special mention here would be impolitic. It may well be that we shall soon need a separate Annual Report on Research, in order to do justice to the accomplishments of our permanent programs. Suffice it to say that the health and quality of year-round research at MBL are no longer at issue. The issue will instead be, for the future, to control growth while still retaining a decent flexibility of operation, so that life at MBL does *not* decay to the level of that lived in many universities, where changes in space assignment are accomplished only at the expense of internecine warfare.

In the summer of 1978 research space at the Laboratory was fully occupied, except for a few rooms that fell vacant at a late hour, owing to changes of plans. For the summer of 1979 there were far more applications even than in the prior year. We have been able, at least at the time of writing, to accommodate all those whose proposed research was judged appropriate to our standards by the Research Space Committee. This was accomplished by several devices, including the use for research of rooms not formerly rented for that purpose, and a vigorous effort to encourage the sharing of space, when that would not interfere with research quality. I may say that applicants so approached by us, including Corporation members who have enjoyed a certain luxury in past summers, responded magnificently. No such suggestion for sharing failed to be received courteously and to be considered seriously.
The above is a quantitative statement, of course, about the summer research program, but the argument made earlier about population and information content applies: there is a significant and continuing increase in the demand for research space and facilities here assignable for such use, and the overall quality is rising. All indicators suggest that the trend will continue.

It is evident from the foregoing that we shall have a great deal of decision-making to do in the future as regards deployment of space and facilities. This is a challenge that we ought not to fear: far better to be in a position of making fine distinctions—however fallible peer judgments may sometimes be, and however painful rejection is—than to be unable to assign all the available space for want of good contenders.

A few sample numbers: overhead recovery from non-MBL research grants (via space charges) was $424,631 in 1977, $503,576 in 1978, and we have budgeted $562,699 for 1979. The corresponding figures for MBL-administered grants (government and private) are $251,916; $297,136; $391,766. These number do, of course, have an inflation component, and hence do not imply a proportionate increase in the absolute size of the research effort, but they do reflect a real and impressive size increment nevertheless. Were it not that the inflationary rise of operating costs easily matches them, I might be moved to call such figures "healthy."

Some losses and gains of research persons should be mentioned, although of course space limitation prohibits anything like a comprehensive listing. There was the very tragic loss of Dr. Fred Lang, of the B.U.M.P., in an automobile accident, and that must be mentioned. Two other honored and well-known Corporation members died in the course of the year: Jean Clark Dan and Lester G. Barth.

It is a personal pleasure for me and splendid news for the Laboratory that Professor Shinya Inoué, of Pennsylvania, a distinguished cell biologist and long-time Corporation member, will henceforth be in permanent residence at the MBL, and will play an important role in the planning and growth of our cell biology programs. Several additional appointments of importance have been made or are in the making. They will be announced in due course.

**Education**

As indicated earlier, every research activity at the MBL has a closely-related educational component; hence a mere catalogue of the formal courses does not convey the pervasiveness of learning and instruction that characterizes work here. As is true for research, however, a simple listing can indicate something of the scope of the program, and of changes taking place within it, for Corporation members already familiar with it.

Each of the five January courses offered in 1978 was continued in 1979: Behavior (J. Atema); Comparative Pathology of Marine Invertebrates (F. Bang); Developmental Biology (W. Vincent); Ecology (G. Woodwell); and Neurobiology (Alan Fein, together with E. F. MacNichol, Jr. and others, who carried on following the death of Fred Lang). One hundred fourteen students completed courses in the now well-established January semester, to which contributions were made by a group of distinguished teachers from around the nation, as well as from the Woods Hole resident community. The January semester is an obvious success, but its growth in future years will be small, limited by the space and facilities available for it.

Since it is clear that the January semester is to be a recurrent MBL activity, we shall be engaged during months to come in a number of management and quality control initiatives. These will bring the entire program under the same sort of continuous review, eventually, as is applied to the summer courses, possibly by the same committee of the Corporation. We will also attempt to regularize the financial arrangements, i.e.,
those governing tuition charges, reimbursements and compensation for faculty and guest speakers, and the assignment of operating costs among various cost centers of the budget. It is even now clear, however, that the January semester places no great financial burden upon the Laboratory, while yielding large benefits to the community intellectual life during what was formerly a slow month. Of course it provides invaluable educational benefits to the students, whose many letters attesting thereto are a gratifying chapter of our files.

All seven of the distinguished summer courses continued under the same directorates as in 1977, with one hundred forty-eight participants. During the year a number of searches for directorships due to become vacant in 1980 were initiated. Thomas Reese and John Hildebrand have been appointed co-directors of the Neurobiology Course to succeed Edward Kravitz. Outcomes of other searches will be announced in the summer of 1979. The excellent Microbial Ecology program has been elevated, under stimulus of the recommendations of an ad hoc committee and with approval of the Standing Committee on Instruction, to the status of a regular MBL summer course. Ably directed in 1978 and in prior years by Holger Jannasch, it will for 1979 and 1980 have Jannasch as co-director with Harlyn Halvorson, who will then continue as Instructor-in-Chief for an additional three years. A major effort is underway to provide this new course with suitable quarters in the Loeb Building by the summer of 1980.

Because of the tragic death of Mrs. Gelperin in May, 1979, Alan Gelperin will be unable to serve, at least for 1979, as director of the course on Neural Systems and Behavior. Faculty member Ronald Hoy agreed promptly and generously to step in as interim director. For this reason we anticipate a smooth operation of the relatively new offering despite the absence, hopefully a temporary one, of its energetic first director.

Active planning was begun in April, 1979, for a 1980 summer course in the Biology of Parasitism. The planning group includes, in addition to a number of MBL administrators and our own Frederik Bang, director of the January course on comparative pathology and a scholar of international reputation in the field, several accomplished members of the Harvard and Rockefeller University faculties, together with scientific officers of the Rockefeller and Edna McConnell Clark Foundations. The MBL Committee on Instruction, also represented among the planners (by Chairman Kaminer), will be concerned with detailed proposals during the summer of 1979.

The spring course in Aquatic Veterinary Medicine, a combined offering of the University of Pennsylvania, Cornell University, and three of the four Woods Hole institutions, directed energetically by Donald Abt, was offered for the second time, and with pronounced success. Interest in the program is sufficiently high to justify not only its continuation, but also expansion of the effort to include post-course research and, possibly, a number of more permanent activities centered at the MBL.

Morton Maser's program of continuing education, in the form of Short Courses, continues to merit the praise accorded it in Dr. Ebert's 1977 report. In 1978 there were eleven such courses, most of them concerned with advanced instrumentation and research technology, and featuring faculties of an exceptional expertise. Among the Instructors-in-Chief were Robert Allen, Blair Bowers, Lee Peachey, Bruce Wetzel, Russell Steere, Eduardo Macagno, Yukata Kobayashi, Patrick O'Farrell, Robert Ivarie, and Maser. A total of 157 participants came to Woods Hole in the months of March, April, May, October, November and December for these high-intensity courses. Their quality has been the subject of uniformly favorable comment, from students and faculty alike. A most enthusiastic article about them has been published in the Norelco Reporter.

Funding of all the formal educational offerings is at a high level, although as university science administrators well know, it is impossible to recover the current real
costs of advanced laboratory teaching. Nearly every summer course receives direct support from government or private grants, or from a combination of the two. Those few courses that were temporarily without directed support in 1978 have it or are very likely to have it in 1979. With reorganization of the financing and accounting for the January Semester, it will become practical to initiate an energetic program of fund-raising for that venture. Short Courses come very close to paying for themselves; indeed, they are upon a simple cash basis truly self-supporting.

This section cannot close without mention of the Boston University Marine Program, which continues as a leading opportunity, nationally, for graduate students seeking to specialize in marine biology. The MBL's pride in the Program and pleasure in its fine students and faculty is matched by opinion of the faculty and central administration at Boston University. An outstanding new appointment to the B.U.M.P. faculty has been made this year (Dr. Sidney Tamm, a cell biologist who will work with the already prominent MBL motility group). Dr. Christopher H. Price, an active investigator in the field of neurobiology, has been appointed to replace Dr. Lang.

Scientific Meetings and Conferences

Among the blessings that some of us take for granted at the MBL is the skill and efficiency with which housing and other maintenance needs of transient participants in our programs are handled. It is a task of the greatest complexity, involving not only the work of a specialized support staff, but also attention to detail, patience, and tact, coupled with a willingness to deal under pressure with many demands for exceptions to rules. All this Homer Smith does, as he has done for many years, quietly and effectively.

The more remarkable, therefore, is the rapidly increasing exploitation of our Swope Center, comprising as it does a significant additional burden of work. This is done, again, with minimum fuss, and by a support staff that would be viewed as skeletal by the management of a small motel.

In 1978, there were only two months (June and December)—and those with good reason—during which there were not significant numbers of working visitors to the MBL, residing in the Swope Center and making use of the Laboratory's facilities for one or another scientific or educational purpose. The total number of such persons reached a remarkable 2,300. Activities and institutions represented included: Massachusetts Marine Educators, St. Mary's College, Purdue University, National Marine Fisheries Service, Yale University, East Coast Nerve Net, International Symposium on the Spermatozoon, M.I.T., the University of Pennsylvania, Harvard University, Drew University, Upsala College, the Society of General Physiologists, the Marine Science Librarians, University of Maryland, Maine Audubon Society, a conference on Biomedical Applications of Limulus, Brown University, the New England Estuarine Society, Simmons College, and many others.

The value of such utilization of our facilities, quite aside from the implied financial benefits, is incalculable. All the Woods Hole institutions are beneficiaries (as is the village as a whole), and those perceived values attest to the wisdom of MBL people whose labors and gifts made the Swope Center a reality.

Once again, our problem is now one of choice among worthy competing alternatives, rather than of recruitment of users,—one of growth control, rather than of its simple encouragement. Again, I should be inclined to describe the whole phenomenon as unqualifiedly healthy. were there not the ghost of concern about inexorable inflation of operating costs, which, however carefully they are held down by means of economies, tend to alter what should be a surplus-producing function to one that may just pay for itself. The matter of costs and charges in this sphere will receive serious review in the year to come.
Management

Significant changes in management structure and technique will certainly take place in the two or three years ahead, but we have been very cautious about changes during this year of transition. Caution is demanded for more than the usual reasons of morale: most changes in management that ought to be made will cost more than current systems, but we are determined that administration shall set an example of cost-consciousness for the institution as a whole.

Francis Bowles, who has served effectively as head of the Department of Research Services, has relinquished that position in favor of an association with the Ecosystems Center, which provides him a deserved increase of opportunity to pursue his own research and technical interests. He has been replaced by Morton Maser, who adds this responsibility to his already major commitment in continuing education and in the operations of service laboratories. In recognition thereof, Maser has been named Assistant Director for Educational and Research Services, with a broad range of defined duties and responsibilities concerned with research support services, equipment space deployment, admissions, and the day-to-day operations of our formal courses. He will work closely with the Director, with the Instructors-in-Chief, and with the Committee on Instruction in an effort to bring an increase of order and predictability into what is an unnecessarily variable system of management.

All activities enumerated in earlier sections need and deserve published notice at a number of levels of specificity—from in-house posting of events schedules to journal articles and press releases. These are the purview of the Public Relations Department which, with minimal staff under the direction of Anne Camille Maher, has met the demand with honor. Among particularly useful ventures of the past year (quite aside from such public events as MBL Day) have been the appearance of a regular and timely calendar of scientific activities, and a new and greatly improved directory of personnel and programs.

Our able Controller, Edward Casey, and his competent staff continue to get things done accurately and on time, and to accomplish that miracle with a staff, space, and machinery that would be more appropriate to an institution half the size of the MBL. Some relief from the burden of work and responsibility will have to be provided for that department soon. In the meantime it is to be commended for its management of accounting and financial control functions. Among those are the duties of Joan Howard, MBL Grants and Contracts Administrator, who deals competently with a volume of government support for research and teaching that would, in better-endowed circumstances, call for an office full of people.

The Library, too, deserves commendation, for the self-effacing but highly professional style with which its services are managed and rendered to the entire community, again under circumstances of fiscal restraint. We will be announcing during the summer of 1979 a number of encouraging initiatives and gifts which, all together, will make easier the work of our Library staff and improve significantly the facilities and services offered to users.

Support

Details of Foundation, Corporate, and other support received during 1978 appear below in a separate listing. For the present it is sufficient to note that Foundation support, specifically, came to $719,142 in 1978, as compared with $763,699 in 1977. This is a good showing, considering that it was a year of management transition, requiring a certain temporary slowing of fund-raising activity. In fact gifts received early in calendar year 1979, and others in prospect, make it certain that the two-year totals for 1978 and 1979 will exceed by a large factor those obtained in any prior period of similar
length. This will, it is hoped, be the subject for considerable discussion and action beginning in the late summer of 1979. It is to be noted that the Annual Campaign yielded twice as much support in 1978 as in 1977.

Atlantic Richfield Foundation
Charles Ulrick & Josephine Bay Foundation
Charles E. Culpeper Foundation
Fred Harris Daniels Foundation, Inc.
Arthur Vining Davis Foundations
Henry L. and Grace Doherty Charitable Foundation
Eastern Associated Foundation
Exxon Corporation
Foundation for Microbiology
Walter Henry Freygang Foundation
Friendship Fund
General Electric Foundation
Gillette Charitable & Educational Foundation
Grace Foundation, Inc.
Grass Foundation
Lillia Babbitt Hyde Foundation
IBM Corporation
Edward Bangs Kelley & Elza Kelley Foundation
Henry P. Kendall Foundation
Charles A. King Trust
Josiah Macy, Jr. Foundation
NL Industries
Jessie Smith Noyes Foundation
Pfizer, Inc.
Rockefeller Foundation
Rowland Foundation, Inc.
Sandoz Foundation
Alfred P. Sloan Foundation
Seth Sprague Educational & Charitable Foundation
Surdna Foundation
UPS Foundation

Conclusion

I take the liberty, in closing, of making a personal comment. I hope to be forgiven for it, because the comment is in effect a message to Trustees, but one that ought to be proffered in print.

I have now had a sufficient opportunity to study the MBL and its operations to have some confidence in a judgment of its health. I find the Laboratory in a state of flourishing health; this by comparison with other academic and research institutions with which I have been, and in some cases remain, associated. By health I refer to the entire organism; its history, its personality, its prospects, and its physical body. Parts of the body need attention, to be sure, and some growth of the parts is urgent; but that can and will be done. There is every reason to believe that the unique and influential history of the Laboratory is predecessor to a future just as unique and of just as great an influence.

To play a role in fashioning that future, and in solving the important problems that must be solved, is a privilege. To be sure the privilege has to be paid for; the work is as taxing, physically and psychologically, as any I have ever done, and despite every
effort to the contrary I have had to slow somewhat, for a year or so, my efforts in research that I care about a great deal. I am certain now, however, of what I could not have been certain in July of 1978, when I arrived for full-time residence in Woods Hole: the job can be done. It is as important as any job it has ever been my good fortune to work at.

1. The Staff
MARINE ECOLOGY

I. Instructors

John M. Teal, Woods Hole Oceanographic Institution, co-director of course
Ivan Valiela, Boston University Marine Program, co-director of course
Charlene Van Raalte, Hampshire College

II. Assistants

Mike Petrovski, Boston University Marine Program
Christopher Van Raalte, Dalhousie University

III. Special Lecturers

Arne Jensen, University of Aarhus
Thomas Fenchel, University of Aarhus
Bruce J. Peterson, Ecosystems Center
John E. Hobblie, Ecosystems Center
James W. Porter, University of Georgia
Karen G. Porter, University of Georgia
Lauren Haury, Woods Hole Oceanographic Institution
Robert Paine, University of Washington
Joy Geiselman, Woods Hole Oceanographic Institution
Wendy Wiltse, Woods Hole Oceanographic Institution
Donald Rhoads, Yale University
Thomas Jordan, Boston University Marine Program
Richard Haedrich, Woods Hole Oceanographic Institution
John Steele, Woods Hole Oceanographic Institution
Susan Peterson, Woods Hole Oceanographic Institution
John Mason, Woods Hole Oceanographic Institution
William Odum, University of Virginia
Howard Sanders, Woods Hole Oceanographic Institution
C. A. S. Hall, Cornell University

IV. Lectures

I. Valiela
Introduction to course
J. Teal
Introduction to the oceans
C. Van Raalte
Marine ecology and Woods Hole
A. Jensen
Salt marsh vegetation in Denmark
I. Valiela
Structure and function of salt marsh ecosystems
A. Jensen
Phenology and growth of Halimione
B. Peterson
Techniques and results of phytoplankton production studies
B. Peterson
The role of plankton in the global carbon cycle
I. Valiela
Nutrient budget of a salt marsh
ANNUAL REPORT OF THE MARINE BIOLOGICAL LABORATORY

T. Fenchel  Microbial processes in estuarine sediments I
J. Hobbie  Bacteria in aquatic systems I
J. Hobbie  Bacteria in aquatic systems II
J. Porter  Life in three dimensions: open ocean vs. terrestrial ecosystems
J. Porter  Life in two dimensions: substrate-bounded marine ecosystems
J. Porter  The ecology of marine invertebrate-algal symbioses
K. Porter  Grazing and planktonic community structure
L. Haury  Patchiness in Cape Cod Bay
R. Paine  Plant-herbivore relationship in marine systems
R. Paine  Disturbance and diversity in the intertidal
J. Geiselman  Chemical defenses in marine algae
R. Paine  Higher order carnivores
W. Wiltse  Effects of the predatory snail, Polinices, on community structure
T. Fenchel  Microbial processes in estuarine sediments II
C. Van Raalte  Nitrogen fixation in salt marshes
D. Rhoads  Infaunal deposit-feeding: climax mud communities
D. Rhoads  Bioturbation and sediment binding
T. Jordan  Nitrogen budget of mussels
R. Haedrich  The nature of deep sea fishes
J. Steele  Problems with the management of marine resources
S. Peterson  Changing values in uses of salt marshes
I. Valiela  Experimental studies of salt marsh pollution
J. Mason  Distribution and behavior of Atlantic blue fin tuna
W. Odum  The ecology of mangroves
W. Odum  Detritus feeding in coastal ecosystems
W. Odum  Venice: a case study
H. Sanders  The West Falmouth oil spill
C. A. S. Hall  Environmental impact of coastal zone energy facilities
C. A. S. Hall  Models and decision making: Hudson River

EMBRYOLOGY

I. Instructors
Joan V. Ruderman, Harvard University, co-director
Tom Humphreys, University of Hawaii, co-director
Susan V. Bryant, University of California, Irvine
Gary L. Freeman, University of Texas
Cyrus Levinthal, Columbia University
Eduardo R. Macagno, Columbia University

II. Consultants
R. K. Hunt, Johns Hopkins University
J. P. Trinkaus, Yale University
J. R. Whittaker, Wistar Institute

III. Assistants
Clarissa Cheney, University of Pennsylvania
Nigel Holder, University of California, Irvine
Marc Lauffer, University of Pennsylvania
IV. Lectures

G. L. Freeman  Localization and the specification of form in development
G. L. Freeman  Localization of embryonic determinates in *Cerebratulus* eggs and early embryos
N. H. Verdouk  The origin of spatial organization in Molluscan development
M. R. Dohmen  The relationship between local surface differentiation and cytoplasmic localization
J. R. Whittaker  Localization and development in Ascidians eggs and embryos: I and II
L. Wolpert  Pattern formation in chick limb development
J. P. Trinkaus  Meroblastic development and gastrulation in *Fundulus* embryos
J. P. Trinkaus  Mechanisms of cell movement *in vivo* during gastrulation
J. V. Ruderman  Maternal mRNA and localization
T. Humphreys  The marine sponge, *Microciona prolifera* and other aggregating cell systems
T. Humphreys  The molecular organization of *M. prolifera* aggregation factor complex and its active fragments
Lan Bo Chen  Studies on intercellular fibronectin matrices
R. K. Hunt  Specification of positional information in amphibian eye development
R. K. Hunt  Positional information in neural development
C. Levintal  Three dimensional computer reconstruction of neural anatomy
E. R. Macagno  Development of synaptic connections in invertebrate visual systems
C. Levintal  Development and characterization of identified cells in isogenic fish
S. Bryant  Pattern regulation in amphibian limb regeneration: I and II
L. Jaffee  Activation and patterning of animal eggs and oocytes by steady ion currents
S. Inoué  Mitosis: Cell structural organization and mechanisms
N. deTerra  Control of cell division and morphogenesis in *Stentor*
N. B. Gilula  Gap junctions and communication between cells
N. B. Gilula  Communication in development and differentiation
P. Bryant  Pattern formation in the imaginal disks of *Drosophila*
J. Saunders  Positional signaling in chick limb bud development
N. Holder  Programmed development of the chick wing
L. Iten  Pattern regulation in chick limbs
S. Kaufman  Control of sequential commitment in *Drosophila* development
K. Kalthoff  Analysis of an anterior morphogenetic determinant in the egg of an insect, *Smitta* sp., Chironimidae
N. LeDouarin  Migration and differentiation of neural crest cells studied in avian embryos with interspecific chimeras
J. Rosenbaum  Control of flagellar protein synthesis in *Chlamydomonas*
R. Sager  Somatic cell genetics: Methodology
R. Sager  Somatic cell genetics: Application to some fundamental problems in biology
G. Stent  Neuroembryology of the leech
Y. Peng Loh  
Corticotropin and endorphin peptides. Biosynthesis and their role as intercellular messengers

N. Marcus  
Normal and aberrant phenotypes in the developing sea urchin

P. Grant, S. Sharma, C. Levintal, and R. K. Hunt  
New looks at retinal-tectal connections, a microsymposium

NEURAL SYSTEMS AND BEHAVIOR

I. Instructors

Alan Gelperin, Princeton University, director of course
James L. Gould, Princeton University
Adrianus Kalmijn, Woods Hole Oceanographic Institution
Ronald Hoy, Cornell University
David J. Prior, University of Kentucky
William Kristan, Jr., University of California, San Diego
Randolf Menzel, Free University, Berlin
Fernando Nottebohm, Rockefeller University

II. Assistants

Christina Myles, Manchester Community College
S. Reingold, Princeton University

III. Visiting Lecturer

J. Nicholls, Stanford University

IV. Special Lecturers

George Gerstein, University of Pennsylvania
Robert Capranica, Cornell University
William G. Quinn, Princeton University
Eric R. Kandel, Columbia University
Larry Cohen, Yale University
Tom Eisner, Cornell University
Donald Griffin, Rockefeller University
Michael V. L. Bennett, Albert Einstein University
Eduardo Macagno, Columbia University
Gunther Stent, University of California, Berkeley

V. Lectures

J. Gould  
Introduction to classical ethology

J. Gould  
Neuroethology of E. coli

J. Gould  
Communication in honey bees

J. Gould  
Orientation and navigation in honey bees

A. Kalmijn  
Electroreception in fish

A. Kalmijn  
Active and passive electro-orientation

A. Kalmijn  
Physics and physiology of electroreception

A. Kalmijn  
Magnetic orientation

R. Hoy  
Genetics and neurobiology of cricket song
REPORT OF THE DIRECTOR

R. HOY
- Acoustic interneurons

R. HOY
- Specificity and mechanisms of neural regeneration

D. PRIOR
- Temperature acclimation in neural systems

D. PRIOR
- Behavioral switching

D. PRIOR
- Environmental modulation of reflex pathways

J. NICHOLLS
- The leech: Sensory and motor neurons

J. NICHOLLS
- The leech: After-effects of activity

J. NICHOLLS
- The leech: Chemical and electrical transmission and quantal analysis

B. KRISTAN
- Pattern generation

B. KRISTAN
- Leech heartbeat control system

B. KRISTAN
- Leech swimming I

B. KRISTAN
- Leech swimming II

A. GELPERIN
- Neuroethology of molluscan learning

A. GELPERIN
- Serotonin and synaptic modulation

A. GELPERIN
- Comparative physiology of feeding

R. MENZEL
- Color vision in invertebrates

R. MENZEL
- Wavelength selective behavior

R. MENZEL
- Physiology of insect learning

T. EISNER
- Herbivore-plant interactions II

F. NOTTEBOHM
- Selective learning

F. NOTTEBOHM
- Evolution of vocal learning

F. NOTTEBOHM
- Origins and mechanisms of hemispheric dominance

F. NOTTEBOHM
- Birdsong, a neuroethological model

EXPERIMENTAL MARINE BOTANY
(COMPARATIVE BIOLOGY AND BIOCHEMISTRY OF ALGAE)

I. INSTRUCTORS

JEROME A. SCHIFF, Brandeis University, director of course

JAMES FIORE, Suffolk University, laboratory instructor

HARVARD LYMAN, State University of New York at Stony Brook, laboratory instructor

DAVID MAUZERALL, Rockefeller University

ROBERT TROXLER, Boston University

II. CONSULTANTS

ROBERT L. GUILLARD, Woods Hole Oceanographic Institution

FRANK A. LOEWUS, Washington State University

RALPH S. QUATRANO, Oregon State University

III. STAFF ASSOCIATES

SEYMOUR COHEN, State University of New York at Stony Brook

CATHERINE FUSSEL, Pennsylvania State University

HANS GAFFRON, Woods Hole, Massachusetts and Sanibel, Florida

ANDREW HOLOWINSKY, Brown University

IV. ASSISTANTS

JOANNE LUEBBERT, State University of New York at Stony Brook

SCOTT SCHATZ, University of Rhode Island

SHARON SUBYAK, Suffolk University
V. Special Lecturers

Vernon Ahmadjian, Clark University
Mary M. Allen, Wellesley College
Martha Berliner, Simmons College
Annette Coleman, Brown University
Franklin Fong, Texas A & M University
Jane Gibson, Cornell University
Robert L. Guillard, Woods Hole Oceanographic Institution
Peter Hepler, University of Massachusetts
Peter Heywood, Brown University
Lionel Jaffe, Purdue University
Alfred Loeblich, Harvard University
Lynn Margulis, Boston University
Eytana Padan, Hadassah Medical School
Carl Price, Rutgers University
Peter Heywood, Brown University
Joel Rosenbaum, Yale University
Wolfhardt Rudiger, University of Munich
Gregory Schmidt, Rockefeller University
James R. Sears, Southeastern Massachusetts University
Raymond E. Stephens, Marine Biological Laboratory
Arthur I. Stern, University of Massachusetts
Stan Watson, Woods Hole Oceanographic Institution
Robert Wilce, University of Massachusetts
C. L. F. Woodcock, University of Massachusetts

VI. Lectures

J. A. Schiff  Chemical Phase of Evolution; biogeochemistry
J. A. Schiff  Appearance of Oxygen
J. A. Schiff  Evolution of Protocaryotes
J. A. Schiff  Evolution of Eucaryotes & Organelles
J. A. Schiff  Evolution of Life Cycles
J. A. Schiff  Nutritional Cycles
J. A. Schiff  Metabolism of Nitrogen and Sulfur
L. Margulis  Microbial Evolution
C. L. F. Woodcock  Biology of Acetabularia
R. Troxler  Biosynthesis of Heme and Chlorophyll, Early Stages
R. Troxler  Biosynthesis of Heme and Chlorophyll, Later Stages
R. Troxler  Open Chain Tetrapyrroles
D. Mauzerall  Photochemical Principles
D. Mauzerall  Photochemistry of Photosynthesis
J. Gibson  Photosynthetic Electron Transport
A. Stern  Photophosphorylation
L. Jaffe  Development of Polarity
J. Rosenbaum  Control of Flagellar Development in Chlamydomonas
R. E. Stephens  Microtubules in Plant Development
A. Holowinsky  Wall Synthesis, Deformation and Morphogenesis in Algae
F. Fong  Phototaxis in Euglena
J. Sears  Vertical Distribution of Algae
R. Wilce  Phytogeographic Studies in the North Atlantic
J. Fiore  Life Histories of the Brown Algae
P. Hepler  Stomatal Mechanisms
M. M. Allen  Biology of Blue Green Algae (Cyanobacteria) I
REPORT OF THE DIRECTOR

S. COHEN
J. A. SCHIFF
H. LYMAN
A. HOLOWINSKY
H. LYMAN
H. LYMAN
A. LOEBLICH
J. A. SCHIFF/H. LYMAN
P. HEYWOOD
H. LYMAN
J. A. SCHIFF
A. COLEMAN
J. FIORE
R. GUILLARD
J. FIORE
C. PRICE
J. FIORE
J. FIORE
J. FIORE
A. HOLOWINSKY
STAN WATSON
M. M. ALLEN
S. COHEN
G. SCHMIDT
V. AHMADJIAN
M. BERLINER
H. LYMAN
E. PADAN
W. RÜDIGER

Polyamines
Chloroplast Development I
Chloroplast Development II and III
Circadian Rhythms
Quantitative Measurement of Cell Constituents
Pigment Methodology
Xanthophyta, Chrysophyta, Bacillariophyta
Unique Cytology and Molecular Biology of Dinoflagellates
Euglenophyta and Cryptophyta
Chloromonads
Development of Single Cells from Prasiola
Chlorophyta II: Biology of the Colonial Green Flagellates
Field and Preservation Methods
Phytoplankton Ecology I and Ecology II
Chlorophyta III, Chlorophyta IV and Chlorophyta V
Principles Affecting the Isolation of Cells and Subcellular Structures
Phaeophyta I, II, and III
Rhodophyta I, II and III
Distribution of Eastern Macroalgae
Phytochrome-Controlled Responses
Procaryotic Membranes
Biology of Blue Green Algae (Cyanobacteria) II
Cyanophages
In Vitro Synthesis and Assembly of Chloroplast Proteins
Experimental Studies of the Lichen Symbiosis
Protoplasts of Unicellular Green Algae
Algal Symbioses
Facultative anoxygenic photosynthesis in blue-green algae
Studies of phytochrome and chlorophyll synthesis

NEUROBIOLOGY

I. INSTRUCTORS

EDWARD A. KRAVITZ, Harvard Medical School, director of course
JONATHAN B. COHEN, Harvard Medical School
EDWARD J. FURSHPAN, Harvard Medical School
DAVID D. POTTER, Harvard Medical School
JOHN G. HILDEBRAND, Harvard Medical School
GERALD D. FISCHBACH, Harvard Medical School
PETER R. MACLEISH, Harvard Medical School
STORY C. LANDIS, Harvard Medical School
JOHN REESE, University of California, San Francisco Medical School
PAUL O'LAGUE, University of California, Los Angeles
THOMAS S. REESE, National Institutes of Health

II. STAFF ASSOCIATES

S. MATSUMOTO, Harvard Medical School
B. BATTELLE, National Institutes of Health
R. HARRIS-WARRICK, Harvard Medical School
M. NELSON, Harvard Medical School
ANNUAL REPORT OF THE MARINE BIOLOGICAL LABORATORY

S. GLUSMAN, Harvard Medical School
D. LANDIS, Harvard Medical School
M. RHEUBEN, Penn State University

III. Assistants

SUSAN HUTTNER, University of California, Los Angeles
J. LAFRATTA, Harvard Medical School
RUTH SIEGEL, Harvard Medical School
R. NEUBIG, Harvard Medical School
B. REESE, National Institutes of Health

IV. Symposia and Seminars

Symposium I Slow Physiological Events
S. W. KUFFLER, Harvard Medical School
R. W. TSIEN, Yale University
E. R. KANDEL, Columbia University

Symposium II Selectivity
D. PURVES, Washington University
B. G. WALLACE, Stanford University
U. J. McMahan, Stanford University
J. DIAMOND, McMaster University

Special Saturday Seminars
C. ARMSTRONG, University of Pennsylvania
T. N. WIESEL, Harvard Medical School
R. RAHAMIMOFF, Hebrew University, Israel

Regular Seminar Series
D. D. POTTER, Harvard Medical School
J. BROWN, State University of New York at Stony Brook
A. E. STUART, Harvard Medical School
T. S. REESE, National Institutes of Health
R. LLINAS, New York University
D. GOODENOUGH, Harvard Medical School
L. JAN, Y. N. JAN, Harvard Medical School
E. MACAGNO, Columbia University
M. GUTHRIE, Commission to Combat Huntington's Disease
R. MURPHY, State University of New York Albany
J. CARTAUD, Paris
H. POLLARD, National Institutes of Health
R. HOY, Cornell University
T. SEELEY, Harvard University
J. KIRZ, State University of New York at Stony Brook

V. Lectures

J. HEUSER Structural features of nervous systems
S. LANDIS Presynaptic structure
REPORT OF THE DIRECTOR

S. Landis  Postsynaptic structure
T. Reese  Growth cones and synaptic development
G. Fischbach  Myogenesis and development of chemosensitivity
G. Fischbach  Neurogenesis (neural tube) and development of electrical excitability
N. LeDourain  The neural crest
P. MacLeish  Synapse formation: I. Early stages of transmitter release
G. Fischbach  Synapse formation: II. Organization of the postsynaptic membrane
J. Cohen  Subcellular fractionation of Torpedo electric organ
R. Neubig  Identification of neurotransmitter receptors by ligand binding
J. Cohen  Biochemical characterization of the nicotinic cholinergic receptor
J. Cartaud  Morphological studies of nicotinic cholinergic receptors and acetylcholinesterase
J. Cohen  Neurotransmitter receptors and their responses, an overview
J. Hildebrand  Introduction. Acetylcholine
J. Hildebrand  Catecholamines
E. Kravitz  GABA
M. Nelson  Neuroethology
E. Kravitz  Amines and Modulation
B. Batelle  Cyclic AMP
E. Kravitz  Peptides

PHYSIOLOGY

I. INSTRUCTORS
K. E. Van Holde, Oregon State University, director of course
Mark Mooseker, Yale University
Ray Stephens, Marine Biological Laboratory
Jay Brown, University of Virginia
John Wooley, Princeton University
Tom Baldwin, University of Illinois
F. Dahlquist, University of Oregon
Susan Astrin, Institute of Cancer Research

II. CONSULTANTS
Ruth Sager, Sidney Farber Institute for Cancer Research
Alex Rich, Massachusetts Institute of Technology

III. STAFF ASSOCIATES
Al Christopher, University of Chicago
Miriam Baldwin, University of Illinois
W. Dentler, University of Kansas
Jerre Summers, Cancer Research Institute
K. Tatchell, Oregon State University

IV. ASSISTANTS
Pat Galvin, University of Denver
David VonHippel, University of Oregon
ANNUAL REPORT OF THE MARINE BIOLOGICAL LABORATORY

V. Special Lecturers

PHIL BASSFORD, Harvard Medical School
SU CHUNG, Harvard University
NOEL DE TERRA, Haneman Hospital
H. EISENBERG, Weizmann Institute, Israel
SARAH ELGIN, Harvard University
R. GENNIS, University of Illinois
N. B. GILULA, The Rockefeller University
ALFRED GOLDBERG, Harvard Medical School
STEVE HARRISON, Harvard University
RHU CHI HUANG, Johns Hopkins University
S. INOUE, University of Pennsylvania
L. ISENBERG, Oregon State University
ROBERT JACKSON, The Rockefeller University
NICOLE LE DOUARIN, Marine Biological Laboratory
ALLAN MAXAM, Harvard University
T. POLLARD, Johns Hopkins University
HANS RIS, University of Wisconsin
JOEL ROSENBAUM, Yale University
PETER SETLOW, University of Connecticut Health Center
ALBERT SZENT-GYÖRGII, Marine Biological Laboratory
ANDREW SZENT-GYÖRGII, Brandeis University
L. TILNEY, University of Pennsylvania
ANNA MARIE WEBER, University of Pennsylvania

VI. Lectures

K. E. VAN HOLDE
Introduction to chromatin structure: Evidence from nuclease digestion and hydrodynamic studies

J. WOOLEY
Introduction to chromatin structure: evidence from electron microscopy and scattering studies

T. BALDWIN
Bioluminescence and bacterial luciferase

ANDREW SZENT-GYÖRGII
Introduction to contractile proteins

A. M. WEBER
Properties of the actin filament

M. MOOSEKER
The control of actomyosin-mediated motility in non-muscle cells

L. TILNEY
The role of actin in non-muscle motility

M. MOOSEKER
Actin-membrane association

R. STEPHENS
Microtubules, I and II

A. MAXAM
Nucleic acid chemistry and DNA sequences

W. DENTLER
Microtubule/membrane interaction in cilia and flagella

K. E. VAN HOLDE
DNA-protein interactions in the nucleosome

S. CHUNG
Characterization of the histone core complex

J. WOOLEY
Molecular architecture of the nucleosome

S. ELGIN
Chromosomal structure and function in Drosophila

L. ISENBERG
Histone-histone interaction

H. RIS
Higher order structure in chromosomes

J. BROWN
The fluid mosaic model of membrane structures

R. GENNIS
E. coli pyruvate oxidase—studies on lipid-protein interactions

T. WEGMANN
Structure and function of histocompatibility antigen on a membrane protein
REPORT OF THE DIRECTOR

P. Bassford
R. Dahlquist
R. Dahlquist
S. Inoué
N. deTerra
N. B. Ghulaa
N. B. Ghulaa
H. Eisenberg
S. Astrin
S. Astrin
J. Brown
A. Goldberg
T. Baldwin
R. Jackson
P. Setlow
R. C. Huang
N. LeDouarin
J. Rosenbaum
R. Sager
R. Sager
S. Harrison
A. Rich
Albert Szent-Györgyi

Transport and secretion in gram-negative bacteria
Lipid-protein interactions
Bacterial chemotaxis, a model sensing system
Mitosis cell structural organization and mechanisms
Control of cell division and morphogenesis in *Stentor*
Gap junctions and communication between cells
Communication in development and differentiation
Protein-DNA interactions
Control of transcription in eukaryots
Control of endogenous viral gene expression in chick embryos
Protein components of the L-cell plasma membrane
Studies on the mechanism of protein breakdown in animal and bacterial cells
Role of proteases in controlling enzyme levels
Signal peptidase and its role in the transfer of polypeptides across the RER membranes
Protein regulation during bacterial spore germination
Initiation of RNA synthesis *in vitro*
Migration and differentiation of neural crest cells studied in avian embryos with interspecific chimeras
Control of flagellar protein synthesis in chimeras
Somatic cell genetics I. methodology
Somatic cell genetics II. Application to some fundamental problems in biology
Protein flexibility and macromolecular assembly: virus structures at high resolution
Molecular structure and biological function of t-RNA
The living state

RESEARCH PROGRAM IN MICROBIAL ECOLOGY

I. Instructors

Jane A. Gibson, Cornell University
Robert E. Hungate, University of California, Davis
Holger W. Jannasch, Woods Hole Oceanographic Institution
Alex Keynan, The Hebrew University, Jerusalem
Edward R. Leadbetter, University of Connecticut, Storrs
Jeanne S. Poindexter, Public Health Research Institute, New York

II. Consultants

Harlyn O. Halvorson, Brandeis University
J. Woodland Hastings, Harvard University
Roger Y. Stanier, Institute Pasteur, Paris
Edward O. Wilson, Harvard University

III. Staff Associates

Russel L. Cuvel, Woods Hole Oceanographic Institution
Mark A. Schneider, Amherst College
Craig D. Taylor, Woods Hole Oceanographic Institution
IV. Assistant

Stephen J. Giovannoni, Boston University

V. Special Lecturers

Richard P. Blakemore, University of New Hampshire, Durham
Alasdair Cook, Cornell University
Bernard D. Davis, Harvard University
Arnold L. Demain, Massachusetts Institute of Technology
Ian Dundas, University of Bergen, Norway
John W. Farrington, Woods Hole Oceanographic Institution
Tom Fenchel, University of Aarhus, Denmark
James G. Ferry, Virginia Polytechnic Institute, Blacksburg
Joel C. Goldman, Woods Hole Oceanographic Institution
Everett P. Greenberg, Harvard University
Harlyn O. Halvorson, Brandeis University
J. Woodland Hastings, Harvard University
Etana Padan, The Hebrew University, Jerusalem
Antonio H. Romano, University of Connecticut, Storrs
E. G. Ruby, Harvard University
Ivan Valiela, Marine Biological Laboratory
John B. Waterbury, Woods Hole Oceanographic Institution

VI. Lectures

H. W. Jannasch  Introduction to microbial ecology I and II
H. W. Jannasch  Continuous culture of microorganisms
H. W. Jannasch  Continuous culture in microbial ecology
H. W. Jannasch  Practice of the chemostat
H. W. Jannasch  Experiments in deep sea microbiology
J. A. Gibson  The photosynthetic bacteria I and II
J. A. Gibson  Uptake measurements in microbial ecology
J. A. Gibson  Nutrient uptake in cyanobacteria
J. A. Gibson  Survival of prokaryotes: envelope changes
E. R. Leadbetter  Ways of making a living: anaerobes
E. R. Leadbetter  Ways of making a living: aerobes
E. R. Leadbetter  Microbial attack on hydrocarbons
E. R. Leadbetter  Survival of procaryotes: ecological aspects
E. R. Leadbetter  Microbiology of the tooth surface
R. E. Hungate  Analysis of a microbial ecosystem
R. E. Hungate  Cultivation of anaerobes
R. E. Hungate  The rumen as an ecosystem I and II
J. S. Poindexter  The bacterial prostheca: occurrence, structure and possible function
J. S. Poindexter  The bacterial prostheca: developmental studies
J. S. Poindexter  Survival of prokaryotes: the vegetative cell
A. Keynan  Introduction to the light emitting bacteria II
A. Keynan  Experimentation with bacterial bioluminescence
A. Keynan  Survival of prokaryotes: the endospore
C. D. Taylor  The biology of methane formation
C. D. Taylor  The ecology of methane formation
C. D. Taylor  The effect of pressure on bacterial growth
R. L. Cuvel  Psychrophilic bacteria
REPORT OF THE DIRECTOR

R. P. BLAKEMORE  Magnetotactic bacteria
B. D. DAVIS  Mechanism of protein secretion across membranes
A. COOK  Microbial degradation of pesticides
A. L. DEMAIN  Do antibiotics have a function in natural populations of microorganisms?
I. DUNDAS  Halophilic bacteria
J. W. FARRINGTON  Biochemistry of methane in oceanic environments
T. FENCHEL  Microbial transformations in sediments I and II
J. G. FERRY  The biology of sulfate reduction
J. G. FERRY  Sulfate reduction in marshes and estuaries
J. C. GOLDMAN  Continuous culture of algae
E. P. GREENBERG  The Spirochaetes
H. O. HALVORSON  Survival of prokaryotes: molecular aspects
J. W. HASTINGS  Introduction to the light emitting bacteria I
E. PADAN  Anoxic photosynthesis in cyanobacteria
A. H. ROMANO  The biology of Sphaerotilus
E. G. RUBY  Taxonomy and distribution of luminous bacteria
I. VALIELA  The Sippewisset marsh
J. B. WATERBURY  Marine cyanobacteria

YEAR-ROUND PROGRAMS

1978

BOSTON UNIVERSITY MARINE PROGRAM

The Staff

ARTHUR HUMES, Boston University Marine Program, director
JELLE ATEMA, Boston University Marine Program
BJÖRN GANNING, University of Stockholm, Sweden
STJEPKO GOLUBIC, Boston University
C. K. GOVIND, University of Toronto
FREDERICK LANG, Boston University Marine Program
CHARLES LENT, Brown University
IVAN VALIELA, Boston University

THE ECOSYSTEMS CENTER

GEORGE M. WOODWELL, director
JOHN E. HOBBLIE, senior scientist; DANIEL B. BOTKIN, associate scientist; FRANCIS P. BOWLES, JERRY M. MELILLO, BRUCE J. PETERSON, assistant scientists; RICHARD H. BURKOWS, senior fellow; JOHN T. FINN, postdoctoral fellow; ERENE V. PECAN, assistant to the director and research associate; MARY LOUISE MONTGOMERY, assistant to the director; RICHARD A. HOUGHTON, PAUL A. STEUDLER, research associates; WILLIAM J. BEHRENS, JOANNE CLARK, COLLEEN M. CAVANAUGH, KEITH N. ESIBLEMAN, JOHN V. HELFRICH, VOYTEK KIJOWSKI, FREDERICK LIPSCHULTZ, KATHERINE C. PARSONS, DAVID S. SCHIMEL, JEFFREY B. SHELKEY, HEDY SLADOVICH, research associates; PAUL DETWILER, graduate research fellow; JAMES T. MORRIS, WILLIAM B. BOWDEN, JAMES P. REED, graduate research assistants; MICHELLE DIONNE, graduate assistant; GREGG DIONNE, LAWRENCE HOBBIE, ANN LEWANDOWSKI, ANDREA R. TURNER, laboratory assistants; MARK WHITE, technician; JOAN M. UPTON, secretary; NANCY L. CAMPBELL, JEANNE FERRARI, FRANCES A. SEYMORE, typists.
ANNUAL REPORT OF THE MARINE BIOLOGICAL LABORATORY

JANUARY COURSES 1978

BEHAVIOR

(Offered Jointly by Boston University Marine Program and the Marine Biological Laboratory)

I. INSTRUCTORS

JELLE ATEMA, Boston University, director of course
ADRIANUS KALMIJN, Woods Hole Oceanographic Institute
TERRY CROW, Marine Biological Laboratory
TONY SWAIN, Boston University
VINCENT DETHIER, University of Massachusetts
ROBERT BARLOW, Syracuse University
MARGARET NELSON, Harvard University
BEHRUS JAHAN-PARWAR, The Worcester Institute
IZJA LEDERHENDLER, Marine Biological Laboratory
TERRY CROW, Marine Biological Laboratory
TONY SWAIN, Boston University
VINCENT DEATHIER, University of Massachusetts
ROBERT BARLOW, Syracuse University
MARGARET NELSON, Harvard University
BEHRUS JAHAN-PARWAR, The Worcester Institute
IZJA LEDERHENDLER, Marine Biological Laboratory
TERRY CROW, Marine Biological Laboratory

II. LECTURES

J. ATEMA Introduction
J. ATEMA Sensory physiology and behavior
J. ATEMA Chemo- and mechanoreceptors
A. KALMIJN Electroreception with and without electric organs
J. ATEMA Evolution of chemical senses
A. KALMIJN Electroreception: the detection of inanimate electric fields
A. KALMIJN The physics and physiology of electroreception
T. CROW Statistical considerations in the design of behavioral experiments
A. KALMIJN Electroreception: more questions with or without answers
V. DETHIER Insect taste: Food discrimination in plant-feeding insects
T. SWAIN Chemical compounds in plants affecting insect herbivores
V. DETHIER What chemosensory neurons tell the brain
REPORT OF THE DIRECTOR

The eye and the brain
Vision and *Limulus*: a multidisciplinary analysis
Introduction to neural control of behavior
Hissing and social behavior in cockroaches
Chemosensory behavior in the seahare, *Aplysia*
Social behavior in *Aplysia*
The burial alarm response and olfaction in the mud snail
Ecology, domestication and the behavior of dogs: some principles and their application to present-day problems of men, wolves, and dogs
The domestic dog today: Training and tracking
Catfish social behavior data analysis
Introduction to biological rhythms
Biological rhythms in shore dwelling animals
Human rhythms
Introduction to bird migration
Orientation and infra-sound
Pleiotropism and the nature of the W-Locus in the mouse
Selected topics in biomathematics
Sperm whale acoustic behavior
Annual change in songs of Humpback whales
Group composition and stability of coastal bottlenose porpoises
Introduction to social behavior in birds
Acoustic and visual signals in redwing blackbirds
Migration of green turtles
Introduction to pheromones
Mammalian pheromones
Predator-prey relations in Antarctic bird communities
Ecology of the reindeer culture
The generation of immunologic diversity: Phylogenists vs. Ontogenists
Social organization in Chimpanzees
Social organization in Macaques
Primate intelligence
Social behavior and rhythms in marine fishes as related to environmental factors
Social behavior of insects
Termite communication and social behavior
Social behavior and pheromones in lobsters
The European Ethologists as seen by an American Psychologist
Behavior assays in pollution research
Territories and social behavior of lobster fishermen
Bio-medical telemetry in behavioral studies
Associative training in a nudibranch mollusc *Hermissenda*
Neural substrates of associative training in *Hermissenda*

DEVELOPMENTAL BIOLOGY

I. INSTRUCTORS

Walter S. Vincent, University of Delaware, director of course
Nancy H. Marcus, Woods Hole Oceanographic Institution
II. Assistant

David Moss, University of Delaware

III. Special Lecturers

Eugene Bell, Massachusetts Institute of Technology
David Francis, University of Delaware
Harlyn Halvorson, Brandeis University
Arthur Humes, Boston University Marine Program
Hans Lauffer, University of Connecticut
Dolores Schendel, Sloan-Kettering Institute
Richard Tasca, University of Delaware

IV. Lectures

<table>
<thead>
<tr>
<th>Name</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>W. S. Vincent</td>
<td>Introduction to course</td>
</tr>
<tr>
<td>W. S. Vincent</td>
<td>Gametogenesis I, II, and III</td>
</tr>
<tr>
<td>N. H. Marcus</td>
<td>Differentiation and development of sea urchins in laboratory culture I and II</td>
</tr>
<tr>
<td>W. Massover</td>
<td>Comparative oogenesis I</td>
</tr>
<tr>
<td>W. Massover</td>
<td>Maturation and ovulation I and II</td>
</tr>
<tr>
<td>W. Massover</td>
<td>Vitellogenesis</td>
</tr>
<tr>
<td>S. Inoué</td>
<td>Spicule development in sea urchins I and II</td>
</tr>
<tr>
<td>S. Inoué</td>
<td>Techniques of phase and polarizing microscopy</td>
</tr>
<tr>
<td>S. Inoué</td>
<td>Experimental analysis of spindle structure I</td>
</tr>
<tr>
<td>S. Inoué</td>
<td>Experimental analysis of mitosis</td>
</tr>
<tr>
<td>J. D. Ebert</td>
<td>Ionic regulation of embryonic induction, differentiation in growth</td>
</tr>
<tr>
<td>R. Miller</td>
<td>Gamete activation I and II</td>
</tr>
<tr>
<td>W. S. Vincent</td>
<td>Principles and practices of cell fractionation and gradient analysis I</td>
</tr>
<tr>
<td>R. Miller</td>
<td>Fertilization I and II</td>
</tr>
<tr>
<td>M. D. Maser</td>
<td>Techniques and demonstration of electron microscopy</td>
</tr>
<tr>
<td>K. T. Edds</td>
<td>Cleavage and control of cell divisions I and II</td>
</tr>
<tr>
<td>W. S. Vincent</td>
<td>Principals and practice of gradient analysis II</td>
</tr>
<tr>
<td>E. Russell</td>
<td>Pleiotropism and the nature of the W-locus in mice</td>
</tr>
<tr>
<td>K. T. Edds</td>
<td>The role of microfilaments in cell division</td>
</tr>
<tr>
<td>W. S. Vincent</td>
<td>Processing of eucaryotic transcripts</td>
</tr>
<tr>
<td>W. S. Vincent</td>
<td>Sequence conservation in ribosomal RNA</td>
</tr>
<tr>
<td>S. Gerbi</td>
<td>DNA sequence organization on eucaryotic genomes I and II</td>
</tr>
<tr>
<td>H. Lauffer</td>
<td>Analysis of gene activity in Chironomus development</td>
</tr>
<tr>
<td>H. Lauffer</td>
<td>Specific message isolation and identification in Chironomus</td>
</tr>
<tr>
<td>J. Collier</td>
<td>Normal development of Spiralia</td>
</tr>
</tbody>
</table>
REPORT OF THE DIRECTOR

J. Collier
Experimental analysis of the development of spiralian
J. Collier
Molecular biology of spiralian development I and II
E. Anderson
Early embryogenesis in mammals
A. Silverstein
The generation of immunologic diversity: phylogenists
R. E. Stephens
Chemistry and structure of microtubules
R. E. Stephens
Morphogenesis of cilia
H. O. Halvorson
New techniques in approaching developmental problems
J. D. Ebert
Birth defects: Biological and ethical considerations
W. S. Vincent
The politics of the recombinant DNA controversy
N. H. Marcus
Phenotypic plasticity in marine invertebrates
Albert Szent-Györgyi
Protein, ascorbic acid and cancer

ECOLOGY

I. Instructors

George M. Woodwell, The Ecosystems Center, director of course
Daniel B. Botkin, The Ecosystems Center
John E. Hobble, The Ecosystems Center
Jerry M. Melillo, The Ecosystems Center

II. Special Lecturers

S. H. Berwick, Yale
Kenneth O. Emery, Woods Hole Oceanographic Institution
T. Fenchel, University of Aarhus, Denmark
C. A. S. Hall, Cornell University
Holger W. Jannasch, Woods Hole Oceanographic Institution
Marilyn J. Jordan, The Ecosystems Center
Thomas E. Lovejoy, World Wildlife Fund
Bruce J. Peterson, The Ecosystems Center
G. Rowe, Woods Hole Oceanographic Institution
J. H. Ryther, Woods Hole Oceanographic Institution
Howard L. Sanders, Woods Hole Oceanographic Institution
Lawrence B. Slobodkin, State University of New York at Stony Brook
Frederick E. Smith, Harvard University
J. Steele, Woods Hole Oceanographic Institution
Ivan Valieia, Boston University

III. Lectures

G. M. Woodwell Structure of the biosphere I and II
H. Sanders Natural communities and evolutionary strategies I and II
L. Slobodkin Evolution: The development of species
L. Slobodkin Group selection: The development of communities
K. O. Emery Geological factors: Continental drift
G. M. Woodwell Climatic factors: The vegetation of the earth
G. Rowe The oceans: Distribution of primary production
G. Rowe The oceans: Secondary production
G. M. Woodwell Primary production and the metabolism of the earth
G. M. Woodwell The world carbon budget: The predominance of forests
J. E. Hobble The world carbon budget: The role of oceans
J. E. Hobble Primary productivity in aquatic systems I and II
C. A. S. Hall   Secondary productivity I and II
S. H. Berwick   Biogeography I and II
D. B. Botkin    Succession and stability I and II
G. M. Woodwell  Nutrients and communities I and II
H. W. Jannasch  The microbiology of S-transformations I and II
B. J. Peterson  Nutrient limitation in aquatic ecosystems
B. J. Peterson  Phosphorus cycle of the ocean
J. M. Melillo    Nutrient cycling in forested basins I and II
I. Valiela       Nutrient cycling in a salt marsh
G. M. Woodwell  Ecosystems, energy and world politics
T. E. Lovejoy    Endangered species
J. H. Ryther     Oceanic productivity
J. Steele        The North Sea fishery I and II
S. B. Peterson  Northwest Atlantic fishery I and II
K. O. Emery      Mineral resources of the deep sea and international politics
F. E. Smith      Urban ecology I and II
M. J. Jordan     Ecological effects of toxins
G. M. Woodwell  Biotic impoverishment and the threshold dilemma: A major challenge for science and government

NEUROBIOLOGY

(Offered jointly by Boston University Marine Program and the Marine Biological Laboratory)

I. INSTRUCTORS

Alan Fein, Marine Biological Laboratory, director of course
Frederick Lang, Boston University Marine Program, director of course
Edward F. MacNichol, Jr., Marine Biological Laboratory, laboratory director

II. SPECIAL LECTURERS

William J. Adelman, NIH-NINCDS, Woods Hole
Daniel L. Alkon, NIH-NINCDS, Woods Hole
Jelle Atema, Boston University Marine Program
Robert Barlow, Syracuse University
Thomas Carew, Columbia University
Melvin Cohen, Yale University
Vincent G. Dethier, University of Massachusetts
Frederick Dodge, Rockefeller University and IBM Watson Labs
Eric Frank, Harvard Medical School
Donald Frazier, University of Kentucky
Alfredo Gorio, The Rockefeller University
Rami Grossman, NIH-NINCDS
Adrianus Kalmijn, Woods Hole Oceanographic Institution
Ehud Kaplan, Rockefeller University
Charles Lent, State University of New York at Stony Brook
Simon LeVay, Harvard Medical School
Douglas S. Riggs, Hampshire College
Elizabeth S. Russell, The Jackson Laboratory
Arthur Silverstein, Johns Hopkins University
III. Lectures

A. Fein  
Cell permeability and the plasma membrane

S. LeVay  
Microscopic anatomy of the nervous system

J. Atema  
Evolution of chemical senses

M. Cohen  
Evolution of neuron structure and function

A. Kalmijn  
Physics and physiology of electoreception

A. Fein  
The resting membrane potential

A. Fein  
Cable properties of neurons

A. Fein  
Action potentials

A. Fein  
Saltatory conduction in myelinated axons

W. Adelman  
Neuronal currents, channels, spaces and clefts

V. Dethier  
What chemosensory neurons tell the brain

R. Barlow  
The eye and the brain

R. Barlow  
Vision in Limulus: a multidisciplinary analysis

F. Dodge  
A horseshoe crab-eye view of Great Harbor

E. Kaplan  
Receptor properties of Limulus lateral eye in situ

F. Lang  
Synaptic transmission—The soups vs. the sparks

F. Lang  
Mechanisms of transmitter release

F. Lang  
Ionic basis of synaptic potentials

A. Fein  
Role of intracellular Ca++ and Na++ in adaptation of Limulus photoreceptors

F. Lang  
Quantal release

F. Lang  
Excitation-secretion coupling

E. Russell  
Pleiotropism and the nature of the W-locus in the mouse

F. Lang  
Origin and fate of synaptic vesicles

F. Lang  
Neurotrophic influences

A. Gorio  
Intracellular recording of synaptic potentials

D. Riggs  
Pleasures and pitfalls of biological modeling

A. Gorio  
Acetylcholine compartments in the mouse diaphragm

A. Gorio  
The mode of action of black widow spider venom

L. Marshall  
Factors influencing reinnervation of skeletal muscle

D. Riggs  
The steady-state behavior of biological feedback systems

E. Frank  
 Formation of nerve-muscle synapses in tissue culture

D. Riggs  
Fitting straight lines when both X and Y are subject to error

F. Lang  
Developmental neuroethology: Physiological basis for changes in fight and flight behavior during growth of the lobster

D. Frazier  
Putative transmitters in vertebrate respiratory neurons

A. Silverstein  
The generation of immunologic diversity: Phylogenists vs. ontogenists

E. Kravitz  
Three neurohormones in the lobster: Studies on the cellular localization, release and physiological actions of octopamine, serotonin, and dopamine

C. Lent  
Organizational and neural properties of leech CNS

R. Grossman  
Conduction of action potentials along nonhomogenous axons

T. Carew  
The utility of the marine mollusc Aplysia for the cellular analysis of behavior

C. Lent  
Cellular studies of amine neurons in leech

D. Alkon  
Associative training in a nudibranch mollusc, Hermissenda

D. Alkon  
Neural substrates of associative training in Hermissenda
COMPARATIVE PATHOLOGY OF MARINE INVERTEBRATES

I. INSTRUCTORS

FREDERICK B. BANG, Johns Hopkins University
BETSY BANG, Johns Hopkins University
JACK LEVIN, Johns Hopkins University
ROBERT PRENDERGAST, Johns Hopkins University
C. AUSTIN FARLEY, National Marine Fisheries Service at Oxford, Maryland
KENNETH EDDS, Marine Biological Laboratory
JACK MARCHALONIS, Frederick Cancer Research Center
CAROL REINISCH, Sydney Farber Cancer Research Institute in Boston

II. LECTURES

F. B. BANG  Cellular clumping in seastars, hermit crabs, and clotting factors in Carcinus
J. LEVIN  Extracellular clotting
J. LEVIN  Limulus and endotoxin
J. LEVIN  Comparison of invertebrates and vertebrates
B. G. BANG  Evolution of mucociliary system
B. G. BANG  Sipunculus and urn cells
F. B. BANG  Comparative aspects of mucociliary systems
K. EDDS  Inflammations of Invertebrates
C. A. FARLEY  Normal Anatomy of the Oyster
C. A. FARLEY  Pathology of the Oyster
C. A. FARLEY  Infectious Diseases in the Oyster
C. A. FARLEY  Tumors in Oysters
C. A. FARLEY  Virus Diseases in Oysters
F. B. BANG  Specific Bacteriological and Virus Diseases of crabs and lobsters
J. PEARCE  Pathological pollution aspects of ecology
C. REINISCH  Tumors and regeneration
C. REINISCH  Recognition in invertebrates
R. PRENDERGAST  Starfish factor—effects in vertebrates
F. B. BANG  Elements of immune response—Sipunculus, stars
R. PRENDERGAST  Introduction to the vertebrate immune response
J. MARCHALONIS  Agglutinins and antibodies
J. MARCHALONIS  The evolution of the immune response

LABORATORY OF BIOPHYSICS, NINCDS–NIH

WILLIAM J. ADELMAN, JR., chief of the laboratory and head, section on neural membranes
DANIEL L. ALKON, head, section on neural systems
ALAN J. HODGE senior scientist; JAY WELLS, research physiologist; DAVID E. GOLDMAN, guest worker; TERRY CROW, staff fellow; IZIA LEDERHENDLER, ROBERT J. FRENCH, MITSUO TABATA, visiting fellows; JONATHAN SHOUKIMAS, THOMAS JERUSSI, LEON SHIMAN, IPA fellows; JOSEPH NEARY, biochemist; RICHARD WALTZ, mathematician/programmer; CLYDE TYNDALE, electronics specialist; RUTHANNE MUELLER, research technician; JUNE HARRIGAN, mariculturist

LABORATORY OF SENSORY PHYSIOLOGY

EDWARD F. MACKNICHOL JR., director
ALAN FEIN, associate scientist and deputy director; FERENC I. HÁROSI, associate
REPORT OF THE DIRECTOR

scientist; ETE Z. SZUTS, assistant scientist; BARBARA ANN COLLINS, senior research associate; D. WESLEY CORSON, postdoctoral fellow; JOSEPH LEVINE, graduate student, Harvard University; KATHLEEN FRENCH, graduate student, Boston University Marine Program; STEVEN L. GOODMAN, research assistant; MENACHEM HANANI, National Institutes of Health; THEODORE P. WILLIAMS, Florida State University; YVETTE KUNZ RAMSAY, University of Dublin; LEO E. LIPETZ, Ohio State University; PAUL WITKOVSKY, GUIDO HASSIN, State University of New York at Stony Brook, visiting scientists.

NATIONAL FOUNDATION FOR CANCER RESEARCH

ALBERT SZENT-GYÖRGYI, Director
JANE A. MCLAUGHLIN; PETER R. C. GASCOYNE; RICHARD MEANY; T. JOHN LEWIS, Professor, University College of North Wales; RONALD PETHIC, Lecturer, University College of North Wales; PAUL ELVIN, Graduate Student, Brunel University, Uxbridge, England; JOSHUA SELIG, part-time glassware cleaner.

INDEPENDENT YEAR-ROUND PROGRAMS

RAYMOND STEPHENS, principal investigator
MELANIE PRATT; MARY E. PORTER
SHINYA INOUÉ, principal investigator
ANDREW EISEN; MARK B. FIEBEN
KENNETH EDDS, principal investigator
NORMAN R. JARVIS
ERIC BALL, principal investigator
D. EUGENE COPELAND, principal investigator
JUDITH GRASSLE, principal investigator
FERN BIRTWISTLE; CYNTHIA LANYON-DUNCAN; LINDA PHILBIN-MUNSON
RUTH D. TURNER, principal investigator
CARL J. BERG; GREGORY A. TRACEY
ROBERT RICE, principal investigator
PRISCILLA ROSLANSKY; SUSAN M. HOUGHTON; REBECCA LASH
ERIC KANDEL, principal investigator
CARL J. BERG; THOMAS CAPO; SUSAN PERRITT
KEITH R. PORTER, principal investigator
RANDOLPH H. BYERS; MARK MCNIVEN
LEWIS TILNEY, principal investigator
LAURINDA A. JAFFE

YEAR-IN-SCIENCE

1977–1978

The Year-in-Science program at the MBL is for advanced undergraduates and beginning graduate students. For undergraduates the program is equivalent to a university honors program; for beginning graduate students it is designed to accommodate those who require the staff and special facilities of the laboratory in support of their research. Students join staff of the MBL in a variety of studies, participate in courses at
the Woods Hole Oceanographic Institution, the Boston University Marine Program, and in regularly scheduled seminars with staff of The Ecosystems Center and others at the MBL.

The Staff
George M. Woodwell, director, The Ecosystems Center
Daniel B. Botkin, associate scientist
Francis P. Bowles, assistant scientist
John E. Hobbs, senior scientist
Jerry M. Melillo, assistant scientist
Bruce J. Peterson, assistant scientist

The Laboratory Staff
(Including all whose services began or ended during the year)
Homer P. Smith, General Manager
Lucena J. Barth, Director of Admissions
Francis P. Bowles, Coordinator of Research Services
Edward G. Casey, Controller
Jane Fessenden, Librarian
A. Robert Gunning, Superintendent, Buildings and Grounds
Lewis M. Lawday, Assistant Manager, Department of Marine Resources
Karlene Lukovitz, Assistant Editor, The Biological Bulletin
Anne C. Maher, Public Relations Officer
Morton D. Maser, Coordinator of Continuing Education
Laurie A. Morse, Assistant Editor, The Biological Bulletin
Wesley N. Tiffney, Curator, Gray Museum
John J. Valois, Manager, Department of Marine Resources
George M. Woodwell, Director, The Ecosystems Center

Education Office
Esther M. Browne
Pamela V. Sawdo

Director's Office
Maureen M. Morris

Public Relations Office
Fern P. Callis
Denice Wye
R. Ann Perry

General Manager's Office
Florence S. Butz
Elaine C. Crocker

Controller's Office
Ruth B. Campbell
Doris C. Davis
Nancy L. Ellis
Joan E. Howard

Suzanne J. Semino
Laurel Swain
Anne S. Williams
REPORT OF THE DIRECTOR

LIBRARY

Judith A. Ashmore
Rebecca J. Bailey
Nancy M. Capuano
Lynne A. Doelling
David J. Fitzgerald
Charlotte F. Frank

Joan H. Grice
E. Lenora Joseph
Holly E. Karalekas
Laurel Swain
M. Ann White
Denice Wye

BUILDINGS AND GROUNDS

Lee E. Bourgoin
Madeline H. Broderick
Timothy Clinton
Francis J. Coppola
Joseph E. Donohoe
Glenn R. Enos
Charles K. Fuglister
Elizabeth J. Geggatt
Richard E. Geggatt, Jr.
Roberto G. Gibbons
Roger W. Hobbs, Jr.
Thomas N. Kleindinst
Elisabeth Kuil
Donald B. Lehy
Ralph H. Lewis
Sophia Lewis
William M. Lochhead
Daniel Loewus

Richard A. Lovering
Alan G. Lunn
John B. MacLeod
John E. Maurer
Stephen A. Mills
Morgan Moore
Susan Nickerson
Simone St. Jean
Clayton Sears
Glenn I. Shear
Gilbert F. Silvia
Merilyn A. Smart
Christopher Stone
Jane E. Sylvia
Frederick Thrasher
Frederick Ward
Ralph Whitman
William Whittaker

DEPARTMENT OF MARINE RESOURCES

Edward G. Enos, Jr.
Joyce Enos
Robert M. Hebdon
Howard Lane
Mark Munson

John Ryther, Jr.
Eugene Tassinari
Bruno Trapasso
John Varao

RESEARCH SERVICES

Julie A. Andrade
Thomas R. Anthony
Franklin D. Barnes
John S. Barnes
Cathy A. Carrington
Carol A. Eberhard
Linda M. Golder

Robert J. Golder
Andrew Hodgdon
David Juers
Lowell V. Martin
Joan Peters-Gilmartin
Frank E. Sylvia

2. Investigators; Research Fellowships; Students

Independent Investigators, 1978

Adejuwon, Christopher A., Research Fellow, The Population Council, The Rockefeller University
Armstrong, Clay M., Professor of Physiology, University of Pennsylvania
ARMSTRONG, Peter B., Associate Professor of Zoology, University of California

ARNOLD, John M., Professor, University of Hawaii, Kewalo Marine Laboratory

ASTIN, Susan M., Assistant Member, The Institute for Cancer Research

BAIB, Richard S., Research Fellow, Albert Einstein College of Medicine

BALDWIN, Thomas O., Assistant Professor of Biochemistry, University of Illinois, Urbana

BANG, Frederik B., Professor of Pathobiology, The Johns Hopkins School of Hygiene and Public Health

BANG, Betsy G.

BARLOW, Robert B., Professor, Syracuse University

BAUK, G. Eric, University of Minnesota

BAUMGOLD, Jesse, Staff Fellow, NIMH, National Institutes of Health

BEAUGE, Luis A., Associate Professor of Biophysics, University of Maryland, School of Medicine

BEGENISCH, Ted, Assistant Professor of Physiology, University of Rochester

BELL, Eugene, Professor, Massachusetts Institute of Technology

BENNETT, Michael V. L., Division of Cellular Neurobiology, Albert Einstein College of Medicine

BISHOP, Stephen H., Associate Professor, Iowa State University

BORGESE, Thomas A., Associate Professor of Biology, Herbert H. Lehman College, The City University of New York

BRINLEY, Floyd J., Jr., Professor, Department of Physiology, University of Maryland, School of Medicine

BRODICK, Malcolm S., Assistant Professor of Physiology and Biophysics, University of Texas, Medical Branch

BROWN, Jay C., Associate Professor, University of Virginia, School of Medicine

BROWN, Joel E., Professor of Physiology and Biophysics, State University of New York at Stony Brook

BRYANT, Susan V., Associate Professor, University of California, Irvine

BURDICK, Carolyn J., Associate Professor of Biology, Brooklyn College, The City University of New York

BURGER, Max M., Chairman of the Biocenter, University of Basel, Switzerland

BURKART, Werner R., Postdoctoral Research Fellow, Biocenter, University of Basel, Switzerland

BURNS, Roy Gordon, Lecturer, Imperial College of Science and Technology, London, England

CASADAY, George B., Postdoctoral Fellow, Cornell University

CHANG, Donald C., Assistant Professor, Baylor College of Medicine

CHAPPELL, Richard L., Associate Professor, Hunter College, The City University of New York

CHUNG, Su-yun, Research Fellow, Harvard University

COHEN, Jonathan B., Assistant Professor of Pharmacology, Harvard Medical School

COHEN, Lawrence B., Associate Professor, Yale University, School of Medicine

COHEN, Seymour S., Professor, State University of New York at Stony Brook

COHEN, William D., Associate Professor of Biological Sciences, Hunter College, The City University of New York

COOPERSTEIN, Sherwin J., Professor of Anatomy, University of Connecticut

CRANDALL, Edward D., Assistant Professor of Physiology and Medicine, University of Pennsylvania, School of Medicine

DAHLQUIST, Frederick W., Associate Professor, University of Oregon

DAVIS, Edward M., Postdoctoral Fellow, Department of Biology, Yale University

DENTLER, William L., Assistant Professor, University of Kansas

DE TERRA, Noel, Research Associate Professor of Anatomy, Hahnemann Medical College

DE WEER, Paul, Associate Professor of Physiology and Biophysics, Washington University, School of Medicine

DIPOLO, Reinaldo, Associate Investigator, Instituto Venezolano de Investigaciones Científicas, Venezuela

DOWLING, John E., Professor of Biology, Harvard University

DU BOIS, Arthur B., Director, The John B. Pierce Foundation Laboratory

DUNHAM, Philip B., Professor of Biology, Syracuse University

EATON, Douglas C., Assistant Professor of Physiology and Biophysics, University of Texas, Medical Branch

ECKBERG, William R., Graduate Assistant Professor, Howard University
EDWARDS, DONALD H., JR., Postdoctoral Fellow, Stanford University
EHRENSTEIN, GERALD, Research Physicist, National Institutes of Health
EISNER, THOMAS, Jacob Gould Schurman Professor of Biology, Cornell University
EILLSON REBECCA P., Postdoctoral Fellow, The Population Council, The Rockefeller University
ERBER, JOACHIM, Assistant Professor, Institut fur Tierphysiologie, Freien Universitat, Berlin, Germany
ESUMI, HIROYASU, Research Associate, National Cancer Center Research Institute, Japan
FAIN, GORDON L., Assistant Professor of Ophthalmology, University of California at Los Angeles
FARMANFAMAIAN, A., Professor of Physiology, Rutgers University
FENCHIL, TOM M., Professor of Ecology, University of Aarhus, Denmark
FIORE, JAMES, Associate Professor of Biology, Suffolk University
FISCHBACH, GERALD, Professor, Harvard Medical School
FISHMAN, HARVEY M., Professor of Physiology and Biophysics, University of Texas, Medical Branch at Galveston
FLAVIN, MARTIN, National Institutes of Health
FLETCHER, DONALD J., Postdoctoral Fellow, Emory University
FOELMEISTER, JURGEN, Lecturer, University of Minnesota
FREEMAN, GARY, Associate Professor of Zoology, University of Texas, Austin
FURSHIAN, EDWIN J., Professor of Neurobiology, Harvard Medical School
FUSSELL, CATHERINE P., Associate Professor, Pennsylvania State University
GAINER, HAROLD, Head, Section of Functional Neurochemistry, National Institutes of Health
GELPERIN, ALAN, Associate Professor of Biology, Princeton University
GIBSON, JANE, Associate Professor of Biochemistry, Molecular and Cell Biology, Cornell University
GILBERT, DANIEL L., Research Physiologist, National Institutes of Health
GLANTZ, RAYMON M., Associate Professor of Biology, Rice University
GLUSMAN, SILVIO, Research Associate, Harvard Medical School
GOLDSMITH, PAUL K., Biologist, National Institutes of Health
GOULD, JAMES L., Assistant Professor, Princeton University
GOULD, ROBERT M., Senior Research Scientist, Institute for Basic Research in Mental Retardation, New York
GREENBAUM, ELIAS, Research Scientist, Corporate Research Laboratory, Union Carbide Corporation
GROSCH, DANIEL S., Professor of Genetics, North Carolina State University
GROSSMAN, ALBERT, Professor, New York University Medical School
GURTMAN, RITA, Professor of Biology, Brooklyn College, The City University of New York
HALVORSON, HARLYN O., Director, Rosenbattel Center, and Professor of Biology, Brandeis University
HARDEING, CLIFFORD V., Professor and Director of Research, Kresge Eye Institute of Wayne State University
HARRIS-WARRICK, RONALD, Postdoctoral Fellow, Harvard Medical School
HASHEMERYER, AUDREY E. V., Professor of Biology, Hunter College, The City University of New York
HEPLER, PETER K., Associate Professor of Botany, University of Massachusetts, Amherst
HILDEBRAND, JOHN G., Associate Professor of Neurobiology, Harvard Medical School
HOLDER, NIGEL, Postdoctoral Research Associate, University of California, Irvine
HOLOWINSKY, ANDREW W., Associate Professor of Biology, Brown University
HOSKINS, FRANCIS, Illinois Institute of Technology
HOY, RONALD R., Associate Professor of Neurobiology and Behavior, Cornell University
HUMPHREYS, SUSIE, Assistant Researcher, University of Hawaii
HUMPHREYS, TOM, Professor of Biochemistry, University of Hawaii
HUNGATE, ROBERT E., Emeritus Professor of Bacteriology, University of California, Davis
HUNT, R. KEVIN, Assistant Professor of Biophysics, The Johns Hopkins University
II, ICHIO, Research Associate, Department of Biology, University of Virginia
JACOB, MICHELE, Postdoctoral Fellow, Columbia University
JAFFE, LIONEL, Professor of Biology, Purdue University
JAN, LILY YEE, Instructor in Neurobiology, Harvard Medical School
JAN, YUH NUNG, Research Fellow in Neurobiology, Harvard Medical School
LYMAN, HOLGER W., Course Director, Woods Hole Oceanographic Institution
JANNASCH, RONALD W., Assistant Professor of Zoology, University of Texas, Austin
JOHNSTON, DANIEL, Assistant Professor, Baylor College of Medicine
JOYNER, RONALD W., Assistant Professor, Department of Physiology, University of Iowa
KAMER, BENJAMIN, Professor and Chairman, Boston University School of Medicine
KAPLAN, EHUD, Assistant Professor, The Rockefeller University
KENDALL, BRIAN, Postdoctoral Fellow, Washington University Medical School
KEYNAN, A., Professor of Biology, Hebrew University of Jerusalem, Israel
KIRCH, GLENN E., Postdoctoral Fellow, Northwestern University
KLINN, RICHARD P., Research Fellow, Harvard University
KLEIN, SAMUEL S., Senior Scientist, Biomedical Division, The Population Council
KRATZ, EDWARD A., Professor of Neurobiology, Harvard Medical School
KRISTAN, WILLIAM B., JR., Assistant Professor of Biology, University of California, San Diego
KUFFER, STEPHEN W., John Franklin Enders University Professor, Harvard Medical School
KUHNS, WILLIAM J., Professor, University of North Carolina
KUND-NASAY, Yvette, University College, Ireland
KUSANO, KIYOSHI, Professor, Illinois Institute of Technology
LANDIS, JOHN, Instructor, Harvard Medical School
LANDOWNE, DAVID, Associate Professor, University of Miami
LASEK, RAYMOND J., Associate Professor, Case Western Reserve University
LASH, JAMES W., Professor of Anatomy, School of Medicine, University of Pennsylvania
LAUFER, HANS, Professor of Biology, University of Connecticut
LEADBETTER, E. R., Executive Officer, University of Connecticut
LIPETZ, LEO E., Professor, Ohio State University
LIPICKY, RAYMOND J., Professor of Pharmacology and Medicine, Director of Clinical Pharmacy, University of Cincinnati
LISMAN, JOHN E., Assistant Professor of Biology, Brandeis University
LINALIS, R., Professor and Chairman, Department of Physiology and Biophysics, New York University Medical Center
LOESCHENSTEIN, W. R., Professor and Chairman of the Department of Physiology and Biophysics, University of Miami, School of Medicine
LOFFIELD, ROBERT B., Professor of Biochemistry, Chairman, University of New Mexico, School of Medicine
LOH, Y.-PENG, Senior Staff Fellow, National Institutes of Health
LORAND, L., Professor of Biochemistry and Molecular Biology, Northwestern University
LORAND, JOYCE BRUNER
LUX, HANS DIETER, Head, Neurophysiological Laboratory, Max Planck Institute of Psychiatry, Germany
LYMAN, HARVARD, Associate Professor, Biology Department, State University of New York at Stony Brook
MACAGNO, E. R., Assistant Professor, Columbia University
MACLEAN, PETER R., Postdoctoral Fellow, Harvard Medical School
MARCUS, TAKUSHI, Postdoctoral Fellow, The Population Council, The Rockefeller University
MASTROIANNI, LUIGI, JR., Professor and Chairman, Department of Obstetrics and Gynecology, University of Pennsylvania, School of Medicine
MATHES, RITA W., Senior Research Associate, Hunter College, The City University of New York
MATSUMOTO, STEVEN G., Postdoctoral Research Fellow, Harvard University Medical School
MAZER, D., Professor, The Rockefeller University
MEEDEL, THOMAS H., Postdoctoral Trainee, The Wistar Institute
MEINS, DENNIS, Postdoctoral Research Associate, Scarborough College, University of Toronto, Canada
MENZEL, RANDOLF, Professor, Freien Universitat, Berlin, Germany
MESTRAS, J., Professor and Director of the Electron Microscopy Unit, University of Ottawa, Faculty of Medicine, Canada
METZ, CHARLES B., Professor, University of Miami
MILLER, RICHARD S., Professor, Yale University
MITCHELL, RALPH, Gordon McKay Professor of Applied Biology, Harvard University
MOORE, JOHN W., Professor of Physiology, Duke University
MOORE, L. E., Professor, University of Texas, Medical Branch
MOOSERKER, MARK S., Research Fellow, Harvard Medical School
MULLINS, L. J., Professor of Biophysics and Chairman, University of Maryland, School of Medicine
MYLES, CHRISTINA JO, Assistant Professor of Life Science, Manchester Community College
NAGANO, TOSHIKO, Professor and Chairman of the Department of Anatomy, Chiba University, School of Medicine, Japan
NAGEL, RONALD L., Associate Professor of Medicine, Albert Einstein College of Medicine
NAKAJIMA, SHIGEHIRO, Professor, Purdue University
NAKATSUI, NORIO, Research Associate, Massachusetts Institute of Technology
NARAHASHI, TOSHIKO, Professor and Chairman, Northwestern University
NEARY, JOSEPH T., Staff Scientist, Laboratory of Biophysics
NELSON, MARGARET C., Research Fellow in Neurobiology, Harvard Medical School
NICHOLS, JOHN, Professor of Neurobiology, Stanford University, School of Medicine
NICOLI, MIRIAM Z., National Institutes of Health Postdoctoral Fellow, University of Illinois
NISCIA, SANTO V., Assistant Professor of Obstetrics, Gynecology, and Pathology, University of Pennsylvania
NOE, BRYAN D., Assistant Professor of Anatomy, Emory University
NOTTEBOHM, FERNANDO, Professor, The Rockefeller University
OBRAID, ANA LIA, Postdoctoral Research Associate, University of Pennsylvania, Medical School
OERTEL, DONATA, Postdoctoral Research Fellow, Harvard Medical School
OHEI, SHINPEI, Associate Professor, State University of New York at Buffalo
O’LAGUE, PAUL H., Assistant Professor, University of California, Los Angeles
ORNBERG, RICHARD L., Postdoctoral Research Associate, National Institutes of Health
OVADIA, MICHAEL, Postdoctoral Fellow, University of Pennsylvania, School of Medicine
OXFORD, GERRY S., Assistant Professor of Physiology, University of North Carolina
PANT, HARISH C., Senior Staff Fellow, National Institutes of Health
PAPPAS, GEORGE D., Professor and Head of Anatomy, University of Illinois, College of Medicine
PARMENTIER, JAMES L., Medical Research Assistant Professor, Duke University
PERSON, PHILIP, Medical Investigator, Veteran’s Administration Hospital
PEETHIG, RONALD, Lecturer, University of Wales, Bangor, United Kingdom
PICHON, YVES, Maitre de Recherche, Centre National de la Recherche Scientifique, Paris, France
PIERCE, SIDNEY K., Associate Professor of Zoology, University of Maryland
POINDexter, JEANNE S., Associate, Public Health Research Institute of New York
POHLAND, HARVEY B., Senior Investigator and Medical Officer, National Institutes of Health
POTTER, DAVID D., Harvard Medical School
POUSSART, DENIS, Professor, Université Laval, Quebec, Canada
POZNANSKY, MARK, Associate Professor of Physiology, University of Alberta, Canada
PRENDERGAST, ROBERT A., Associate Professor, The Johns Hopkins University, School of Medicine
PRICE PHILIP, Postdoctoral Fellow, The Rockefeller University
PRIOR, DAVID J., Assistant Professor, University of Kentucky
PRUSCH, ROBERT D., Assistant Professor of Biology, Brown University
QUGLEY, JAMES P., Associate Professor of Microbiology and Immunology, State University of New York, Downstate Medical Center, Brooklyn
RAMON, FIDEL, Assistant Professor, Duke University
REINHUN, LIONEL I., Professor of Biology, University of Virginia
REES, THOMAS S., Head, Section on Functional Neuroanatomy, National Institutes of Health
REINGOLD, STEPHEN C., Postdoctoral Research Fellow, Princeton University
REQUENA, JAIME, Assistant Investigator, Centro de Biofísica Y Bioquímica, Caracas, Venezuela
REYNOLDS, GEORGE T., Professor of Physics, Princeton University
REUEBEN, MARY B., Assistant Professor, Pennsylvania State University
RICKLES, FREDERICK R., Veteran’s Administration Hospital and University of Connecticut Health Center
ripps, HARRIS, Professor of Ophthalmology and Physiology, New York University, School of Medicine
ROSE, BIRGIT, Research Associate Professor, University of Miami, School of Medicine
46 ANNUAL REPORT OF THE MARINE BIOLOGICAL LABORATORY

ROSENKRANZ, HERBERT S., Professor and Chairman, Department of Microbiology, New York Medical College
RUDERMAN, JOAN V., Assistant Professor, Department of Anatomy, Harvard Medical School
RUSHFORTH, NORMAN B., Professor and Chairman, Department of Biology, Case Western Reserve University
RUSSELL, JOHN M., Assistant Professor, University of Texas, Medical Branch
RUSSELL-HUNTER, W. D., Professor of Zoology, Syracuse University
SAGER, RUTH, Professor, Harvard Medical School
SCARPA, ANTONIO, Associate Professor of Biochemistry and Biophysics, University of Pennsylvania
SCHACHER, SAMUEL, Research Associate, Columbia University College of Physicians and Surgeons
SCHIFF, JEROME A., Professor of Biology and Director of the Institute for Photobiology of Cells and Organelles, Brandeis University
SCHUEL, HERBERT, Associate Professor of Anatomy, State University of New York at Buffalo
SCHUETZ, ALLEN W., Professor, Department of Population Dynamics, The Johns Hopkins University
SEALOCK, ROBERT W., Assistant Professor, University of North Carolina at Chapel Hill
SEGAL, SHEL Don J., Vice President and Director, Biomedical Division, The Population Council
SEJNOWSKI, TERRANCE J., Research Fellow, Princeton University
SEYAMA, ISSHI, Associate Professor, Hiroshima University, Japan
SHARNOFF, MARK, Professor of Physics, University of Delaware
SHIELDS, DENNIS, Assistant Professor of Anatomy, Albert Einstein College of Medicine
SHRIVASTAV, BRIJ B., Medical Research Assistant Professor, Duke University
SIMMONS, ROBERT M., Lecturer, University College, London, England
SIMPSON, TRACY L., Professor, Department of Biology, University of Hartford
SMITH, JANIE E., Biologist, National Institutes of Health
SPECK, WILLIAM T., Associate Professor of Pediatrics, Case Western Reserve University
SPIEGEL, EVELYN, Research Associate Professor, Dartmouth College
SPIEGEL, MELVIN, Professor of Biology, Dartmouth College
SPRAY, DAVID, Assistant Professor, Albert Einstein College of Medicine
SPIRA, MICHA E., Professor, Albert Einstein College of Medicine
STETTEN, MARJorie R., Biochemist, NIA, National Institutes of Health
STOKES, DARREL R., Assistant Professor of Biology, Emory University
STRACHER, ALFRED, Professor and Chairman, Department of Biochemistry, State University of New York, Downstate Medical Center
STUART, ANN E., Assistant Professor, Harvard Medical School
STUNKARD HORACE W., Research Associate, American Museum of Natural History
SUGIMORI, MUTSUyuki, Research Assistant Professor, New York University Medical Center
SUMMERS, JESSE W., Member, Institute for Cancer Research
SUMMERS, ROBERT G., Associate Professor of Anatomy, State University of New York at Buffalo
SUSSEwIN, ABRAHAM J., Research Fellow, Albert Einstein College of Medicine, Yeshiva University
SZENT-GYöRGyi, ANDREW G., Chairman, Department of Biology, Brandeis University
SZENTKIRALY-SZENT-GYöRGyi, EVA M., Research Associate, Brandeis University
TABATA, MITSUO, Research Fellow, Laboratory of Biophysics
TAMM, SIDNEY, Associate Scientist, University of Wisconsin
TAMM, SIGNEHL, Research Associate, University of Wisconsin
TASAKI, Ichiji, Chief, Laboratory of Neurobiology, NIH, National Institutes of Health
TENeICK, ROBERT E., Associate Professor of Pharmacology, Northwestern University
TERAKAWA, SUSUMU, Visiting Associate, National Institutes of Health
TIFFERT, TERESA, Assistant Professor, Department of Physiology, University of Maryland, School of Medicine
TRINKAUS, J. P., Professor of Biology, Yale University
TROLL, WALTER, Professor of Environmental Medicine, New York University Medical Center
Troxler, ROBERT F., Associate Professor of Biochemistry, Boston University, School of Medicine
Tweedell, KENYON S., Professor, University of Notre Dame
Tytell, MICHAEL, Postdoctoral Fellow, Case Western Reserve University, School of Medicine
Van Holde, K. E., Professor, Oregon State University
Van RAALTE, CHARLENE, Instructor, Hampshire College
REPORT OF THE DIRECTOR

VINCENT, WALTER S., Professor of Cell and Molecular Biology, University of Delaware, School of Life and Health Sciences
WAGNER, RICHARD W., Postdoctoral Fellow, University of Miami, School of Medicine
WATERS ROBERT S., Postdoctoral Fellow, The Rockefeller University
WAXMAN, STEPHEN G., Associate Professor of Neurology, Harvard Medical School
WEBER, ANNAMarie, University of Pennsylvania, School of Medicine
WEISSMANN, GERALD, Professor of Medicine, New York University Medical Center
WITTAKER, J. RICHARD, Associate Professor, The Wistar Institute
WIERCINSKI, FLOYD J., Professor, Department of Biology, Northeastern Illinois University
WILLIAMS, T. P., Professor of Biological Sciences, Florida State University
WILSON, DARCY B., Professor of Pathology, University of Pennsylvania, School of Medicine
WOLF, DON P., Associate Research Professor, University of Pennsylvania, School of Medicine
WOOLEY, JOHN C., Research Fellow in Biochemistry, Harvard University
WORCESTER, ANNE V., Postdoctoral Associate, Department of Ophthalmology, Columbia University
WU, CHAU H., Assistant Professor of Pharmacology, Northwestern University
YEH, JAY Z., Assistant Professor, Northwestern University
ZIGMAN, SEYMOUR, Professor of Ophthalmology and Biochemistry, University of Rochester, School of Medicine and Dentistry
ZIRKIN, BARRY R., Associate Professor, Division of Reproductive Biology, The Johns Hopkins University

Lillie Fellow, 1978

LE DOURIN, NICOLE, Centre National de la Recherche Scientifique, Institut D'Embryologie, France

Alexander Forbes Lecturer, 1978

KRJJEVIC, KRESIMIR, Department of Research in Anaesthesia, McIntyre Medical Sciences Building, Canada

Rand Fellow, 1978

MENZEL, RANDOLF, Institut für Tierphysiologie, Freien Universitat, Berlin, West Germany

Grass Fellows, 1978

ASHCROFT, FRANCES M., Grass Foundation Fellow, Department of Zoology, Cambridge University, United Kingdom
DAY, JOHN W., Albert Einstein College of Medicine
EDWARDS, DONALD H., Postdoctoral Fellow, Stanford University
FRAZIER, DONALD, Professor, University of Kentucky, School of Medicine
GOLDBERG, MARK T., Grass Fellow, Memorial University of Newfoundland, Canada
LUND, ALBERT E., Postdoctoral Fellow, Northwestern University Medical School
MEYER, DAVID J., Grass Fellow, Health Sciences Center, State University of New York at Stony Brook
NASS, MENASCHE M., Research Fellow in Biology, California Institute of Technology
PELLMAR, TERRY, Research Fellow, National Naval Medical Center, Bethesda
QUANDT, FREDERICK N., Postdoctoral Fellow, University of California, Los Angeles
SATTERLIE, RICHARD A., Grass Fellow, University of California, Santa Barbara
SCOTT, SUE A., Postdoctoral Fellow, Carnegie Institution of Washington
SULLIVAN, ROBERT E., Postdoctoral Fellow, University of Hawaii at Manoa
WATSON, WINSOR H., III, Research Associate, University of Massachusetts
ZOTTOLI, STEVEN J., Research Scientist II, Research Institute on Alcoholism

Macy Scholars, 1978

ARMSTRONG, EARLENE, Assistant Professor, University of Maryland
HILL, ANITA V., Assistant Professor of Biology, Grambling State University
Hogan, James C., Jr., Department of Anatomy, Howard University College of Medicine
Howze, Gwendolyn B., Assistant Professor, Texas Southern University
Ivins, M. Sue, Associate Professor, Natural Sciences, Dillard University
Porter, Charles W., Associate Professor of Biology, San Jose State University
Walker, Dorothy G., Associate Professor, Howard University

**Summer Research Scholarships, 1978**

(Steps Toward Independence)

Armett-Kibel, Christine, Assistant Professor of Biology, University of Massachusetts
Bourne, George B., Assistant Professor, The University of Calgary, Canada
Chung, Sc-Yun, Research Fellow in Chemistry, Harvard University
Fujikawa, Keiji, Assistant Professor of Anatomy, Harvard Medical School
Hoffman, Richard J., Assistant Professor of Biological Sciences, University of Pittsburgh
Hufnagel, L. Assistant Professor of Microbiology, University of Rhode Island
Kass-Simon, M. Assistant Professor of Zoology, University of Rhode Island
Langford, George M., Assistant Professor of Anatomy, Howard University, College of Medicine
Lewis, Larry M., Assistant Professor of Biology, Millersville State College
O'Melia, Anne F., Assistant Professor of Biochemistry, Louisiana State University Medical Center
Rudy, Bernardo, Assistant Professor of Physiology, Eastern Pennsylvania Psychiatric Institute
Salzberg, Brian, Assistant Professor of Physiology, University of Pennsylvania
Treistman, Steven N., Assistant Professor of Biology, Bryn Mawr College
Young, Lily Y., Assistant Professor of Environmental Microbiology, Stanford University

**Research Assistants, 1978**

Anderson, David J., The Rockefeller University
Anstrom, John, State University of New York at Buffalo
Antonellis, Blenda, University of Rochester School of Medicine
Arvan, Peter, Yale University
Augustine, George J., Jr., University of Maryland
Barnes, Edward S., Columbia University
Batra, Ranjan, Institute for Sensory Research, Syracuse University
Beerman, Amy, Swarthmore College
Bennett, Holly V. L., The Albert Einstein College of Medicine
Bodick, Neil, Columbia University
Bosler, Robert B., Harvard University Medical School
Boyle, Mary B., Yale University
Brandon, Christopher, Baylor College of Medicine
Bush, James, Rutgers College
Byers, H. Randolph, Harvard Medical School
Calle, Paul, University of Pennsylvania
Capco, David George, University of Texas
Chang, Yue-Wah Steven, Baylor College of Medicine
Chelmsky, Daniel, University of Oregon
Cheney, Clarissa M., University of Toronto
Cohen, Richard, Hunter College
Colucci, Barbara Ann, Herbert H. Lehman College, The City University of New York
Crawford, William, University of Hawaii
Critz, Anne McElroy, University of Pennsylvania
Croop, Robert, University of Pennsylvania
Dahl, Robert F., Princeton University
Dandekar, Pramila, State University of New York at Buffalo
Davidson, Dorothy E., University of Delaware
Drake, Peter F., Bryn Mawr College
Eagle, Jane S., University of Connecticut Health Center
Eigner, E. Ann, University of New Mexico School of Medicine
Falkow, Stephen, New York University, School of Medicine
REPORT OF THE DIRECTOR

FIELD, NANCY, Wesleyan University
FINE, ALAN, University of Pennsylvania
FINKEL, TOREN, University of Pennsylvania School of Medicine
FITZ, WILLIAM K., University of California, Santa Barbara
FLEMING, JUDY, University of Colorado
FRIZZELL, KAREN L., University of Massachusetts
GALVIN, PATRIC N., University of Colorado at Denver
GILLY, WILLIAM F., University of Pennsylvania
GLICKSMAN, MARCIE, Brown University
GONCALVES, MARK A., University of Colorado
GORDON, DORIA, Oberlin College
GREEN, JEFFREY D., State University of New York at Buffalo
GREENWALT, DALE, Iowa State University
GREGA, DEBRA S., University of Kentucky
GRUPP, STEPHEN, University of Cincinnati
HARRIS, ANDREW L., The Albert Einstein College of Medicine
HARRIS, VICKI KAY, Emory University
HEINRICHS, STEFAN
HENRY, JONATHAN J., University of Hawaii
HERLANDS, LOUIS, Yale University
HERSCH, STEVEN M., Boston University
HOB, SIMON MING HUNG, University of Toronto, Canada
HOLMES, DON J., Washington University Medical School
HOWARD, LOUISA, Dartmouth College
HURST, TERRY W., University of Texas, Medical Branch
HUSE, WILLIAM, Albert Einstein College of Medicine
HUTTNER, SUSANNE, University of California, Los Angeles
HYLANDER, BONNIE, State University of New York at Buffalo
IMHOF, RUTH, Biozentrum University of Basel, Switzerland
JAEGGER, RICHARD R., Hunter College, The City University of New York
JANUS, TODD J., Northwestern University
JASLOVE, STEWART, Duke University Medical Center
Jimenez, Ramon J., University of Guadalajara, Mexico
JUMBLATT, James E., University of Basel, Switzerland
KATAYAMA, ROBERT N., University of Pennsylvania
KENDALL, DEBRA A., Northwestern University
KIEHART, DANIEL P., University of Pennsylvania
KIRK, MARK D., Rice University
KOUMJIAN, LAUREN, Mount Holyoke College
LAUFER, MARC R., University of Pennsylvania
LEIBOWITZ, DAVID H., Columbia University
LESHN, SARAH, Yale University
LEVINTHAL, ADAM
LEWIS, STEPHEN, University of Cincinnati
LITTLEFIELD, PETER, University of Maryland
LIVINGSTONE, M. S., Harvard Medical School
LUEBBERT, JO ANN, State University of New York at Stony Brook
LUTZINGER, KARL M., Columbia University
MADSEN, J. ELLEN
MEEDEL, THOMAS H., The Wistar Institute
MEYER, MICHAEL A., University of North Carolina at Chapel Hill
MIR, FRANCOISE, University of Basel, Switzerland
MONTANARO, GEORGE D., University of Iowa
MORELLO, ROBERT S., University of Rochester
MORGAN, CHARLES R., Emory University
MORGAN, GINA, Howard University
MORRIS, JAMES R., Case Western Reserve University
NARAHASHI, TAKO, Northwestern University
50  ANNUAL REPORT OF THE MARINE BIOLOGICAL LABORATORY

NECMES, NICHOLAS, Columbia University
NEMHAUSER, IRIS, Hunter College, The City University of New York
NEUBIG, RICHARD R., Harvard Medical School
PELLEY, CHIQUITA, University of Oregon
PORTER, MARY E., University of Pennsylvania
RAMOS, TALIA, The Johns Hopkins University School of Hygiene and Public Health
REDMANN, GREG A., University of Texas Medical Branch
REISS, PAUL, University of Maryland
RENDER, JO ANN, University of Texas, Austin
RHO, JAI-HYON, The Johns Hopkins University
ROBERTSON, LOLA E., American Museum of Natural History
ROLLINS, SHARON, Cornell University
ROSENKRANZ, PNINA, Princeton University
ROSMAN, GARY, New York University
RUMER, NINA, University of Delaware
SAMSON, DOUGLAS A., The Johns Hopkins School of Hygiene and Public Health
SAUNDERS, MARY J., University of Massachusetts
SCARBOROUGH, ANN, Louisiana State University
SCHENCK, KATHLEEN, Princeton University
SCHMIDT, JEFF, University of California, Los Angeles
SCHMIDT, MADELYN R., Harvard Medical School
SCHNEIDER, MARK ALAN, Amherst College
SCRUGGS, VIRGINIA
SHURE, MICHAEL S., Yale University
SIEGEL, RUTH E., Harvard Medical School
SIMON, SANFORD, New York University Medical Center
SOCI, ROBIN R., Rutgers, The State University of New Jersey
SOLOMON, DENNIS J., Massachusetts Institute of Technology
SOLWAY, ALAN, Wayne State University, School of Medicine
STAMLER, JOHN F., University of Iowa
STEELE, JOY ANN, University of Alberta, Canada
STICH, THOMAS J., University of Maryland
SUBYAK, SHARON E., Suffolk University
SUN, KYUNGSUN, Columbia University
SWAN, MICHAEL C., University of California, Los Angeles
SWENSON, RANDOLPH P., University of Pennsylvania
TALIAN, JOHN, Carnegie-Mellon University
TAYLOR, CHRISTOPHER E., The Johns Hopkins School of Hygiene and Public Health
TIMPE, LESLIE C., Harvard Medical School
TRAVIS, MARK A., Greenville College
TYNER, EMILY M., Vassar College
VON HIPPEL, DAVID F.
WALDROP, BRIAN, Rice University
WALTON, KERRY, New York University Medical Center
WAREN, MARY K., University of Maryland
WEKKS, JANIS C., University of California, San Diego
WEISS, KEVIN, University of Pittsburgh
WESTERFIELD, MONTE, Max Planck Institute fur Psychiatrie, Germany
WHEATLEY, RICHARD, Columbia University
WICK, SUSAN M., University of Massachusetts
WILLIAMS, CAROLYN H., Emory University
WILLIAMS-ARNOLD, LOIS D., University of Hawaii
WOBLINGER, HAROLD M., University of Toronto, Canada
YONEMOTO, WES, University of Hawaii
YULO, TERESA, University of Rochester School of Medicine and Dentistry
ZAKEVICIUS, JANE, New York University School of Medicine
ZUKOWSKI, ANTHONY J., University of Hawaii
REPORT OF THE DIRECTOR 51

Library Readers 1978

ADELBEG, EDWARD A., Professor of Human Genetics, Yale University
ALLEN, NINA STRONGREN, Assistant Professor, Dartmouth College
ALLEN, ROBERT DAY, Professor and Chairman, Dartmouth College
ANDERSON, EVERETT, Professor of Anatomy and Associate Director, Laboratory of Human
Reproduction and Reproductive Biology, Harvard University Medical School
BARN, CHARLES P., Biophysicist, General Electric Company
BOURNE, DONALD, Marine Research Inc.
CANDELS, GRAZIELA C., Professor, University of Puerto Rico
CARRIERE, RITA, Assistant Professor, State University of New York, Downstate Medical Center
CHILD, FRANK M., Professor of Biology, Trinity College
CLIFORD, SISTER MARIA D., Professor of Biology, College of Mount St. Joseph on the Ohio
COLE, KENNETH S., Research Biophysicist Emeritus, National Institutes of Health
CONDOURIS, GEORGE A., Professor and Chairman, New Jersey Medical School
COPELAND, DONALD EUGENE, Professor of Biology, Tulane University
CORNWELL, ANNE CHRISTAKE, Assistant Professor of Ophthalmology, Montefiore Hospital and
Medical Center
COUCH, ERNEST F., Associate Professor of Biology, Texas Christian University
DAVIS, BERNARD D., Professor, Harvard Medical School
DEHN, PAULA F., Graduate Assistant, University of Southern Florida
DETTBARN, WOLF-D., Professor of Pharmacology, Vanderbilt University, School of Medicine
DUDLEY, PATRICIA L., Professor of Biological Sciences, Barnard College, Columbia University
DUNDAS, JAN, Associate Professor, University of Bergen, Norway
EBERT, JAMES D., President, Carnegie Institute of Washington
EDDS, LOUISE L., Associate Professor, Zoology and Microbiology, Ohio University
ELDER, HOWARD A., Professor of Medicine, Albert Einstein College of Medicine
EISEN, HERMAN N., Professor of Immunology, Massachusetts Institute of Technology
ENGEL, SOL, WALTER, University of Pennsylvania
FISCHMAN, DONALD A., Professor and Chairman, State University of New York, Downstate
Medical Center
FISHER, SAUL H., Clinical Professor of Psychiatry, New York University, School of Medicine
FRANZINI-ARMSTRONG, CLARA, Associate Professor of Anatomy, University of Pennsylvania
GABRIEL, MORDECAI L., Professor of Biology, Brooklyn College, City University of New York
GAGNE, GERARD D., Doctoral Candidate, University of Maine, Orono
GALATZER-LEVY, ROBERT M., Lecturer, Associate Attending Psychiatrist, University of Chicago
and Michael Reese Hospital
GOLDSCHN, ROBERT D., Professor of Biological Sciences, Carnegie-Mellon University
GOLDSTEIN, MOISE H., Jr., Professor, The Johns Hopkins University
GOODSMITH, ESTHER M., Associate Professor, Oakland University, Rochester
GOULD, STEPHEN JAY, Professor of Geology, Harvard University
GRANT, PHILIP, Professor of Biology, University of Oregon
HAUBRICH, ROBERT, Professor of Biology, Denison University
HANLEY, CATHERINE, National Eye Institute, National Institutes of Health
HILLMAN, PETER, Associate Professor, The Hebrew University of Jerusalem, Israel
HINCH, GERTRUDE W., Associate Professor, University of Florida
HODGEY, J. A., Lecturer, The Hebrew University of Jerusalem, Israel
HUBERMAN, MICHAEL H., Intern—Internal Medicine and Pre-doctoral Fellow, New York Uni
cersity
HUTTNER, ROBERT J., Assistant Professor, Columbia University, School of Dentistry
HUNTER, R. DOUGLAS, Assistant Professor of Biological Sciences, Oakland University, Rochester
ILAN, JOSEPH, Professor, Case Western Reserve University, School of Medicine
INOUYE, SADAYUKI, Assistant Professor, McGill University, Canada
IRELAND, LEONARD, Associate, Bermuda Biological Station
ISENBERG, IRVIN, Professor of Biophysics, Oregon State University
ISSELBACHER, KURT J., Mallinckrodt Professor of Medicine, Chief of the Gastrointestinal Unit,
Harvard Medical School and Massachusetts General Hospital
ISSIDORIDES, MARIETTA R., Research Professor in the Department of Psychiatry, University of
Athens, Medical School, Greece
JAVITT, NORMAN B., Professor of Medicine, Head, Division of Gastroenterology, Cornell University Medical College

JOHNSON, WILLIAM H., Professor of Biology, Rensselaer Polytechnic Institute

KALLENBACH, JANE C., Professor of Biological Sciences, Mount Holyoke College

KARUSH, FRED, Professor of Microbiology, University of Pennsylvania, School of Medicine

KEAN, EDWARD L., Associate Professor, Case Western Reserve University

KESSEY, JOHN P., Author

KIRSHENBAUM, DONALD M., Associate Professor, State University of New York, Downstate Medical Center

KLEIN, MORTON, Professor of Microbiology, Temple University Medical School

KOBAYASHI, MAKOTO, Professor of Physiology, Hiroshima University, Japan

KOGUT, MARGOT, Lecturer, King's College, London, England

KRNIJEVIC, K., Professor and Director, Department of Anaesthesia Research, McGill University, Montreal, Canada

LADERMAN, AIMLEE, Doctoral Candidate, State University of New York at Binghamton

LAZAROW, JANE K., Senior Research Analyst, Minnesota Department of Health

LE DOURIN, NICOLE, Professeur, Directeur de l'Institut d'Embryologie du C. N. R. S. et du College de France, Centre National de la Recherche Scientifique

LEFEVRE, MARIAN E., Associate Scientist, Medical Department, Brookhaven National Laboratory

LEIGHTON, JOSEPH, Professor and Chairman, Department of Pathology, Medical College of Pennsylvania

LEVITAN, HERBERT, Associate Professor, University of Maryland, College Park

LIEBERMAN, MICHAEL W., Associate Professor of Pathology, Washington University, School of Medicine, St. Louis

LINCK, RICHARD W., Assistant Professor, Harvard Medical School

LINEAWEAVER, THOMAS H., III, Author

LUX, HANS DEITER, Max Planck Institute of Psychiatry, Germany

MARSLAND, DOUGLAS, Research Professor Emeritus, New York University

MASLAND, RICHARD H., Assistant Professor of Physiology

MITCHELL, JAMES B., Associate Professor of Biology, Moravian College

MIZELL, MERLE, Professor of Biology, Tulane University

MORELL, FRANK, Professor of Neurology, Rush Medical College

NEWBURY, THOMAS, Assistant Professor, University of Hawaii

OJAKIAN, GEORGE, Assistant Professor, State University of New York, Downstate Medical Center

PALMER, JOHN D., Chairman and Professor of the Zoology Department, University of Massachusetts, Amherst

PEARLMEN, ALAN L., Associate Professor of Physiology and Neurology, Washington University, School of Medicine

PLOCKE, DONALD J., Associate Professor and Chairman of Biology, Boston College

ROSENBAUM, JOEL L., Professor of Biology, Yale University

ROSENBERG, EVELYN, Professor, Jersey City State College

SALMON, EDWARD D., Assistant Professor, Zoology Department, University of North Carolina, Chapel Hill

SANGER, JOSEPH W., Associate Professor, University of Pennsylvania

SAUNDERS, JOHN W., Professor, State University of New York at Albany

SCHELINGER, WALThER R., Professor and Chairman, Department of Microbiology, Rutgers Medical School, College of Medicine and Dentistry of New Jersey

SCOTT, GEORGE T., Professor of Biology, Oberlin College

SHEMIN, DAVID, Professor and Chairman, Department of Biochemistry and Molecular Biology, Northwestern University

SHEPRO, DAVID, Professor, Boston University

SMITH, MICHAEL A., Research Associate, Hunter College, The City University of New York

SONENBLICK, B. P., Professor Emeritus, Rutgers, The State University of New Jersey

SPECTOR, ABRAHAM, Professor of Ophthalmic Biochemistry, Department of Ophthalmology, Columbia University

SUGDEN, BILL, Assistant Professor, University of Wisconsin

SZAMER, R. BRUCE, Assistant Professor, Harvard Medical School

TRAGER, WILLIAM, Professor, The Rockefeller University
REPORT OF THE DIRECTOR

WAINIO, WALTER, Professor and Chairman, Department of Biochemistry, Rutgers College, Rutgers, The State University of New Jersey
WAKSMAN, BYRON H., Professor of Pathology, Yale University
WEBB, H. MARQUETTE, Professor of Biological Sciences, Goucher College
WEISS, LEON, Chairman, Department of Animal Biology; Professor of Cell Biology, University of Pennsylvania, School of Veterinary Medicine
WHEELER, GEORGE E., Professor of Biology, Brooklyn College, Biology Department
WITTENBERG, JONATHAN B., Professor of Physiology, Albert Einstein College of Medicine
WOLF, JASON, Associate Professor, Wesleyan University
YNTEMA, C. L., Professor Emeritus, Upstate Medical Center, State University of New York
ZACKS, SUMNER I., Professor and Chairman, Section of Pathology, Brown University; Pathologist-in-Chief, Laboratory Director, The Miriam Hospital

Students, 1978

All students listed completed the formal course programs. Asterisk indicates those completing post-course research programs.

Summer Programs 1978

MARINE ECOLOGY

*BAXTER, MOLLY
BRONSON, BECKY
CHEN, CELIA Y.
*COPLEY, NANCY JEANETTE
*DAY, MARGARET ELISABETH
DEMUTH, ROBERT EMERSON
DONN, THEODORE E., JR.
*FAGAN, JOANNE
FREDERICQ, SUZANNE
*JENSEN, CYNTHIA LUND

KATZ, LAWRENCE C.
*KIRCHMAN, DAVID LOUIS
LECHLEITNER, RICHARD A.
*MOGAN, ARTHUR
*RIETSMA, CAROL S.
ROSANSKY, LOUISE
SILBERHORN, ERIC MARTIN
SKINNER, CAROL ANN
*TALBERT, JEAN E.

EMBRYOLOGY

ANDERSON, KATHRYN VIRGINIA
BROWN, KENNETH MICHAEL
CHILTON, BEVERLY SUE
EDWARDS, MARY KAYE
FLASTER, MURRAY S.
GIBSON, BARBARA LOUISE
GUIDICE, GEORGE J., JR.
JOHNSON, THOMAS EUGENE
KORNHER, JOHN STEPHEN
KOSOPSKY, BARRY EVAN
LANDZIEBERG, JOEL SERGE
MARUSICH, MICHAEL F.
MILLER, CAROL LYNN

MUNEOKA, KEN
RICE, DOUGLAS
SALIK, JANE ANNE
SANDRIDGE, PAUL TIMOTHY
SCHULZ, STEPHANIE
SZARO, BEN GREGORY
TANSEY, TERESE R.
WANEK, NANCY LYNN
WATANABE, MICHIO
WEHRMAKER, ALFRED
WISE, LAWRENCE DAVID
YOUNG, NEVIN DALE YOUNG

NEURAL SYSTEMS AND BEHAVIOR

*BLEISCH, WILLIAM VIRGIL
CONDON, TIMOTHY
COQUELIN, ARTHUR
DAVID, WILLIAM S.
EPEL, DEBRA LYNN
FURBISH, DEAN RUSSELL
HOLZ, GEORGE G., III

HURLBERT, ANYA
HURWITZ, JODIE LINDA
JAVITT, DANIEL C.
KWADA, JOHN
*LEFFY, DANIEL JONATHAN
MARCOTTE, RONALD R.
MCMANUS, MARY ELLEN
ANNUAL REPORT OF THE MARINE BIOLOGICAL LABORATORY

MEHLER, Bruce Leo
*MILLER, Mark W.
MOISEFF, Andrew
OLSON, Leah M.
ORR, Dominic Ping-Yim
*READY, Neal Edward
ROSE, Barry
*ROSE, Robert D.
ROSELLI, Charles Eugene

SCHESSEL, David
SCHILDBERGER, Klaus
*SCHMITT, Brian C.
*SOLON, Michael H.
TANELIAN, Darrell Lee
TOMPKINS, Laurie
*TREVARROW, William W.
TURNER, Jeffrey Scott
WEI, Aguan Daniel

EXPERIMENTAL MARINE BOTANY

ASHENDORF, Debra S.
BERENBERG, Cathy Jo
BOCZAR, Barbara A.
*DOLYAK, Barbara Lorraine
DUNLAP, Julie J.
FAVREAU, Mitchell R.
FITTER, Mindy Sue

*Graves, Joseph L., Jr.
JOHNSON, Patricia A.
KAUFMAN, Lon
MONAR, Kenneth
PEARCE, Robert Elliott
SHELINE, Jonathan Lee
WHITTAKER, Carla J.

NEUROBIOLOGY

DODD, Jane
FUKADA, Keiko
GARCIA-ARRARAS, Jose E.
LEMOS, Jose Ramon
MARCEY, David James
PINE, Jerome

ROOF, Dorothy J.
SCHNEIDERMAN, Anne M.
SEJNOWSKI, Terrence J.
STOCKBRIDGE, Norman Lander
THOMAS, William Eric
YODLOWSKI, Marilyn L.

PHYSIOLOGY

BALE, Alan Howard
*BECKWITH, Kirk D.
BEHER, Michael Gary
CARMAN, Alice Blanche
CHANG, Jane
*COLLINS, Elizabeth T.
*COLLINS, Mary
COOPER, John A.
*CUTLER, Miriam Ruth
*DAYTON, Andrew Imrie
*GERSHON, Nahum David
*GRIFO, James Anthony
HINTZE, T.
JAFFE, Laurinda Ann
LIEBER, Michael R.
MARQUEZ-Sterling, Numa R.
MATTSON, Joan Crawford
*McCARTHY, Robert Alan

*MULHOLLAND, Joyce I.
*OTTER, Timothy
*PICKETT, Cecil
*PINE, Richard Ira
*PROFFITT, John Houston
*RAUSCH, Steven
*REBERS, John Eric
*ROBINSON, Margaret S.
*SELICK, Harold E.
*SHAHIN, Roberta D.
SULLIVAN, Charles Henry, II
*SULLIVAN, Susan Jean
*SUPRENANT, Kathy Ann
*TRAVIS, Jeffrey L.
*WOOD, Steven Chenault
*WU, Chao-ting
*WYBAN, James Allen

MICROBIAL ECOLOGY

*AMY, Penny S.
*BELLAS, Christine Marie
*GOLDBAMB, David Scott
GRAHAM, Julia Bell
*KASTER, Allan Gerard

PASTER, Bruce Jay
POTRIKUS, Catherine J.
REED, William Michael
SISCOE, Peggy Jean
WARD, Bess B.
REPORT OF THE DIRECTOR

January Programs 1978

BEHAVIOR

ASHKENAS, Linda R.  
BENT, Janine E.  
BROWN, Adolf Maximilian  
BRYANT, Bruce P.  
CLARK, Stephen J.  
DERBY, Charles Dorsett  
DUWALDT, Sarah  
ELGIN, Randall Hull  
HERNANDEZ, Teresa  
JONES, Maurice, Jr.  
MILLER, Deborah Lynn  
OBIN, Martin S.  
POETHKE, David John  
RAGLAND, Harry Craig  
STRATTON, Andrea Wood  
WILLIAMS, Isabelle P.  
WOODBURY, Patrick B.

DEVELOPMENTAL BIOLOGY

BARBACCI, Joseph J., Jr.  
BRODELL, George Kline  
BRYAR, Betsy A.  
BURKE, Daniel J.  
EVARTS, Jonathan Harold  
FORD, William C.  
GILLESPIE, Laura Lee  
GOLD, Albert Mark  
GUSTAFSON, Kirk Robert  
HOLCOMB, Cherie  
HOWELL, Margaret A.  
McGOMSEY, William Claywell  
McMANUS, Geraldine A.  
MANNING, Michael Scott  
MILANI, Susan  
PATTERSON, Nancy  
PERRY, Gail E.  
RHEINHART, Mary Ellen  
RIDDLELL, Deborah Christie  
SMILEY, Laura Ellen  
TOTH, Leslie Ellen  
TURNBULL, Sarah W.  
VOWELL, Joanna Lynn

ECOLOGY

ABOYA, Ellen Gwen  
BEHL, Ann  
BERGANTZ, James M.  
BIXLER, Robert P.  
COUPARD, Michele  
DEPELTEAU, Audrey Marie  
DETWILER, Ralph Paul  
FARRELL, Thomas A.  
FELDMAN, Ira Robert  
GREENE, George D.  
GROFF, Joseph Matthew  
HOCHBERG, Ann Patricia  
KELLEY, Julia Crocker  
KELLOGG, Dean Lundt, Jr.  
LARSON, Wendelin Mae  
LAWRENCE, Viki Ann  
LEAMAN, Danna Jo  
MACFARLANE, Linda Louise  
MACWHORTER, Susan E.  
MCGOWAN, Michael F.  
NAUGHTON, Darlene A.  
PERFETTI, Patricia Ann  
STEELE, Pamela Curtis  
THEBY, Janet Elaine  
WALKER, Sharon Leslie

NEUROBIOLOGY

AABY, Trygve Gene  
APATAOFF, Brian R.  
BAGGOTT, Brian Burke  
BODENSTEIN, Lawrence E.  
CARR, Catherine Emily  
CHU, Ka Hou  
DILLSAVER, Margaret  
DOLBER, Paul Christian  
GARBER, Nancy D.  
HABER, Michele A.  
HEINEKE, Eric Wayne  
HIGGINS, Gerald Arthur  
JAMES, Demetria Elizabeth  
KENT, Karla S.  
KRASNOW, Mark Alan  
LOPEZ, Jose R.  
MACHLIS, Lee Ellen  
MORNAY, Sharon Marie  
MOULTON, John Freeman, III  
OOGONOWSKI, Michael M.  
STEINBERG, Alan B.  
VALENTICH, John D.  
VERRETT, Joyce M.  
WEINBERG, Bradley Adam  
RIND, Jeff  
SLADOVICH, Hedy E.  
FEIGENBAUM, David L.
ANNUAL REPORT OF THE MARINE BIOLOGICAL LABORATORY

COMPARATIVE PATHOLOGY OF MARINE INVERTEBRATES

Burns, Cary DeWitt
Cardenosa, Gilda
Carlson, George A.
Chorney, Michael J.
Cooper, Keith Raymond
Couch, David Robert
Deakins, Lynn Wheeler
Goldberg, Harry R.
Gulka, Gary J.
Heatfield, Barry Mark
Keller, Thomas Earl
Kevy, Bruce Alan
Logue, Maureen Denise
Lombardi, Rosemarie
Miller, Timothy K.
Mulvey, Margaret E.
Newman, Michael C.
Seiffert, Ronald A.
Sonstegard, Ronald A.
Sypek, Joseph P.
Wallace, James L.
Yeaton, Robin L. W.

BOSTON UNIVERSITY MARINE PROGRAM

Aaronson Rebecca
Ashkenas, Linda
Besse, Sheila
Botero, Leonor
Bryant, Bruce
Buchbaum, Robert
Cole, James
Cole, Timothy
Cushman, Mary
Davis, Cabell
Derby, Charles
Dojiri, Masahiro
Dourdeville, Theodore
Duncan, Thomas
Eder, Susan
Eisen, Judith
Fabrizio, Mary
Foreman, Kenneth
French, Kathleen
Giblin, Anne
Gibson, Daniel
Hill, Russell
Howes, Brian
Jordan, Thomas
Kent, Karla
Kipp Katrina
Kolba, Clifford
Koumjan, Lauren
Langbauer, William
MacIeek, Nancy
Ogonowski, Mark
Pascoe, Natalie
Piotrowski, Michael
Poole, Alan
Reid, Robert
Walshall, Walter
Werne, Christine
Wier, Susan
Williams, Isabelle
Wilson, John

YEAR-IN-SCIENCE

Spring 1978
William B. Bowden
Sarah M. Mills
James T. Morris
James P. Reed
Mark N. White

Summer 1978
William B. Bowden
Amy Friedlander
Richard Grant
James T. Morris
James P. Reed
Mark N. White

Winter 1978
William B. Bowden
Michael S. Manning
Charles P. McLaugherty
James T. Morris
James L. Olds
James P. Reed

3. Scholarships, 1978

Bio Club:
Mary Ellen McManus

Gary H. Calkins:
Dominic Orr
Robert Rose

Lucretia Crocker:
Barbara Boczar
David Kirchman

Arthur Klorfein:
William Bleisch
Daniel Levy
REPORT OF THE DIRECTOR

TOSHIO NAGANO
NEAL READY
ROBERT ROSE
CHRISTOPHER TAYLOR

Josiah Macy, Jr.:  

**January**  
SHARON MORNAY  
JOYCE VERRETT  
WILLIAM FORD  
MARGARET HOWELL

**Summer**  
Cecil Pickett  
Patricia Chask  
Carol Bagnell  
Patricia Johnson  
William Thomas  
Joseph Graves, Jr.  
Paul Sandridge  
Carla Whittaker

Society of General Physiologists:  
JOHN COOPER  
MIRIAM CUTLER  
ANDREW DAYTON


<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Investigators—Total</strong></td>
<td>508</td>
<td>511</td>
<td>535</td>
<td>501</td>
<td>522</td>
</tr>
<tr>
<td>Independent</td>
<td>302</td>
<td>301</td>
<td>312</td>
<td>280</td>
<td>268</td>
</tr>
<tr>
<td>Library Readers</td>
<td>75</td>
<td>81</td>
<td>93</td>
<td>82</td>
<td>106</td>
</tr>
<tr>
<td>Research Assistants</td>
<td>131</td>
<td>129</td>
<td>130</td>
<td>139</td>
<td>148</td>
</tr>
<tr>
<td><strong>Students—Total</strong></td>
<td>158</td>
<td>212</td>
<td>249</td>
<td>212</td>
<td>250</td>
</tr>
<tr>
<td><strong>Summer Courses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ecology</td>
<td>14</td>
<td>18</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embryology</td>
<td>21</td>
<td>24</td>
<td>24</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Experimental Invertebrate Zoology</td>
<td>30</td>
<td>34</td>
<td>36</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Experimental Marine Botany</td>
<td>11</td>
<td>14</td>
<td>16</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>Marine Ecology</td>
<td></td>
<td></td>
<td></td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>Neural Systems and Behavior</td>
<td></td>
<td></td>
<td></td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Neurobiology</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Physiology</td>
<td>40</td>
<td>33</td>
<td>41</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td><strong>January Courses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavior</td>
<td>17</td>
<td>17</td>
<td>20</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Biosphere</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparative Pathology of Marine Invertebrates</td>
<td></td>
<td></td>
<td></td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Developmental Biology</td>
<td>30</td>
<td>20</td>
<td>32</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>Ecology</td>
<td></td>
<td></td>
<td></td>
<td>29</td>
<td>17</td>
</tr>
<tr>
<td>Neurobiology</td>
<td>23</td>
<td>24</td>
<td>22</td>
<td>22</td>
<td>27</td>
</tr>
<tr>
<td><strong>Trainees—Total</strong></td>
<td>41</td>
<td>31</td>
<td>9</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total Attendance</strong></td>
<td>707</td>
<td>754</td>
<td>793</td>
<td>723</td>
<td>783</td>
</tr>
<tr>
<td>Less persons represented in two categories</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

5. Institutions Represented, 1978

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Albert Einstein College of Medicine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Museum of Natural History</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amherst College</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baylor College</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boston College</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boston University</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boston University School of Medicine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brandeis University</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Brookhaven National Laboratory
Brooklyn College, The City University of New York
Brown University
Bryn Mawr College
California Institute of Technology
California, University of, Davis
California, University of, Irvine
California, University of, Los Angeles
California, University of, San Diego
California, University of, Santa Barbara
Carnegie Institution of Washington
Carnegie-Mellon University
Case Western Reserve University
Case Western Reserve University, Medical School
Chicago, University of
Cincinnati, University of
College of Mount St. Joseph on the Ohio
Colorado, University of
Columbia University
Columbia University, College of Physicians and Surgeons
Columbia University, School of Dentistry
Connecticut, University of
Connecticut, University of, Health Center
Cornell University
Cornell University Medical College
Dartmouth College
Delaware, University of
Denison University
Dillard University
Duke University
Duke University Medical Center
Eastern Pennsylvania Psychiatric Institute
Emory University
Florida, University of
Florida State University
General Electric Company
Goucher College
Gambing State University
Grass Foundation
Greenville College
Hahnemann Medical College
Hampshire College
Hartford, University of
Harvard Medical School
Harvard University
Hawaii, University of
Herbert Lehman College, The City University of New York
Howard University
Howard University, College of Medicine
Hunter College, The City University of New York
Illinois, University of
Illinois, University of, College of Medicine
Illinois Institute of Technology
Institute for Basic Research in Mental Retardation
Institute for Cancer Research, The
Iowa, University of
Iowa State University
Jersey City State College
John B. Pierce Foundation Laboratory
Johns Hopkins University, The
Johns Hopkins University, The School of Hygiene
Johns Hopkins University, The School of Medicine
Kansas, University of
Kent State University
Kentucky, University of
Kresge Eye Institute
Laboratory of Biophysics, NINCDS-NIH
Louisiana State University
Louisiana State University Medical Center
Maine, University of, Orono
Manchester Community College
Maryland, University of
Maryland, University of, School of Medicine
Massachusetts, University of
Massachusetts General Hospital
Massachusetts Institute of Technology
Miami, University of
Miami, University of, School of Medicine
Millersville State College
Minnesota Department of Health
Minnesota, University of
Miriam Hospital, The
Mount Holyoke College
Montefiore Hospital & Medical Center
Moravian College
National Institute of Mental Health, NIH
National Naval Medical Center
New Jersey Medical School
New Mexico, University of, School of Medicine
New York University
New York University Medical Center
New York University School of Medicine
North Carolina, University of, at Chapel Hill
North Carolina State University, Raleigh
Northeastern Illinois University
Northwestern University
Notre Dame, University of
Oakland University
Oberlin College
Ohio State University
Ohio University
Oregon, University of
Oregon State University
Pennsylvania, University of, School of Medicine
Pennsylvania, University of, School of Veterinary Medicine
Pennsylvania State University
Pittsburgh, University of
Population Council, The
REPORT OF THE DIRECTOR

Princeton University
Public Health Research Institute of The City of New York, Inc.
Purdue University
Michael Reese Hospital
Rensselaer Polytechnic Institute
Research Institute on Alcoholism
Rhode Island, University of
Rice University
Rochester, University of
Rochester, University of, School of Medicine & Dentistry
Rockefeller University, The
Rush Medical College
Rutgers—The State University of New Jersey
Rutgers University Medical School
San Jose State University
South Florida, University of
Stanford University
Stanford University School of Medicine
State University of New York, Downstate Medical Center
State University of New York, Upstate Medical Center
State University of New York at Albany
State University of New York at Binghamton
State University of New York at Buffalo
State University of New York at Stony Brook
Suffolk University
Swarthmore College
Syracuse University
Temple University Medical School
Texas Christian University
Texas Southern University
Texas, University of, Austin
Texas, University of, Medical Branch
Trinity College
Tulane University
Union Carbide Corporation
Vanderbilt University
Vassar College
Veterans' Administration Hospital, Brooklyn
Virginia, University of
Virginia, University of, School of Medicine
Washington University School of Medicine
Wayne State University
Wesleyan University
Wisconsin, University of
Wistar Institute
Woods Hole Oceanographic Institution
Yale University
Yale University School of Medicine
Yeshiva University

FOREIGN INSTITUTIONS REPRESENTED, 1978

Aarhus, University of, Denmark
Athens, University of, Medical School, Greece
Basel, The University of, Biocenter, Switzerland
Bergen, University of, Norway
Bermuda Biological Station
Calgary, University of, Canada
Cambridge, University of, England, U.K.
Centre National de la Recherche Scientifique, France
Centro de Biofisica Y Bioquimica, Caracas, Venezuela
Chiba University, Japan
College de France, Paris, France
Free University, Berlin, Germany
Guadalajara, University of, Mexico
Hebrew University, The, of Jerusalem, Israel
Hiroshima University, Japan
Instituto Venezolano de Investigaciones, Venezuela
Laval, Université, Canada
Max Planck Institute for Psychiatry, Munich, West Germany
Memorial University of Newfoundland, Canada
National Cancer Center Research Institute, Japan
North Wales, University of, Wales, U.K.
Ottawa, University of, Canada
Puerto Rico, University of
Toronto, University of, Canada
University College, University of Dublin, Ireland
Wales, University of, Bangor, U.K.

6. FRIDAY EVENING LECTURES, 1978

June 30

J. RICHARD WHITTAKER............ Egg cytoplasmic determinants of tissue differentiation
The Wistar Institute
July 7

**Beatrice Mintz**.................. Putting mutant genes into mice
Institute for Cancer Research
Ninetieth Anniversary Lecture

July 13

Thursday

**Kresimir Krnjevic**.............. Intraneuronal factors that influence excitability
McGill University 1) Regulation of neuronal firing by internal Ca$^{2+}$
Alexander Forbes Lecturer
at the MBL

July 14

**Kresimir Krnjevic**.............. 2) Intracellular actions of synaptic transmitters

July 21

**Daniel Mazia**.................. Mitotic centers
University of California, Berkeley

July 28

**Robert H. Burris**.............. Omnipresent N$_2$—how organisms convert it to NH$_3$
University of Wisconsin

August 4

**Stephen Jay Gould**............. Ontogeny and phylogeny
Harvard University

August 11

**Harris Ripps**................... A ray of light on night blindness
New York University
Medical Center

August 18

**Robert H. Whittaker**......... Theory of species diversity
Cornell University

August 25

**Daniel Alkon**.................. A neural basis for associative learning
Laboratory of Biophysics,
NINCDS, at the MBL
REPORT OF THE DIRECTOR

7. MEMBERS OF THE CORPORATION, 1978
Including Action of 1978 Annual Meeting

Life Members

ADOLPH, Dr. Edward F., University of Rochester, School of Medicine and Dentistry, Rochester, New York 14627

BEAM, Dr. Harold W., Department of Zoology, State University of Iowa, Iowa City, Iowa 52240

BEHRE, Dr. Ellinor H., Black Mountain, North Carolina 28711

BERTHOLF, Dr. Lloyd M., 307 Phoenix Ave., Bloomington, Illinois 61701

BOLD, Dr. Harold C., Department of Botany, University of Texas, Austin, Texas 78712

BRIDGMAN, Dr. A. Josephine, 715 Kirk Rd., Decatur, Georgia 30030

BROWN, Dr. Dugald E. S., Cape Haze, Box 426, Placida, Florida 33946

BURDICK, Dr. C. LALOR, The LALOR Foundation, 4400 Lancaster Pike, Wilmington, Delaware 19805

CARPENTER, Dr. Russell L., 60 Lake St., Winchester, Massachusetts 01890

CHASE, Dr. Aurin, Professor of Biology, Emeritus, Princeton University, Princeton, New Jersey 08540

CLARKE, Dr. George L., 44 Juniper Road, Belmont, Massachusetts 02178

CLEMENT, Dr. Anthony C., Department of Biology, Emory University, Atlanta, Georgia 30322

COLE, Dr. Kenneth S., 2404 Loring Street, San Diego, California 92109

COLOWIN, Dr. Arthur L., 320 Woodcrest Rd., Key Biscayne, Florida 33149

COLOWIN, Dr. Laura H., 320 Woodcrest Rd., Key Biscayne, Florida 33149

COSTELLO, Dr. HELEN M., Morgan Rd., Woods Hole, Massachusetts 02543

CROUSE, Dr. HELEN V., Institute of Molecular Biophysics, Florida State University, Tallahassee, Florida 32306

DILLER, Dr. Irene C., 2417 Fairhill Avenue, Glenside, Pennsylvania 19038

DILLER, Dr. William F., 2417 Fairhill Avenue, Glenside, Pennsylvania 19038

ELLIOIT, Dr. Alfred M., P.O. Box 564, Woods Hole, Massachusetts 02543

FERGUSON, Dr. James K. W., 56 Clarkson St., Thornhill, Ontario, Canada

FISCHER, Dr. Ernst, 3110 Manor Drive, Richmond, Virginia 23230

FRIES, Dr. Erik F. B., 3870 Leafy Way, Miami, Florida 33133

GAFFRON, Dr. Hans, P.O. Box 308, Sanibel, Florida 33959

GALTSSOFF, Dr. Paul S., National Marine Fisheries Service, Woods Hole, Massachusetts 02543

GRAY, Dr. Irving E., Department of Zoology, Duke University, Durham, North Carolina 27701

GRUNDfest, Dr. Harry, Department of Neurology, Columbia University, College of Physicians and Surgeons, New York, New York 10032

HAMBURGER, Dr. Viktor, Department of Zoology, Washington University, St. Louis, Missouri 63130

HAMILTON, Dr. Howard L., Department of Biology, University of Virginia, Charlottesville, Virginia 22901

HARTLINE, Dr. H. Keffer, The Rockefeller University, New York, New York, 10021

HIBBARD, Dr. Hope, 143 E. College St., Apt. 309, Oberlin, Ohio 44074
 Hisaw, Dr. F. L., 5925 S. W. Plymouth Drive, Corvallis, Oregon 97330
 Hollaender, Dr. Alexander, Associated University, Inc., 1717 Massachusetts Ave., N. W., Washington, D. C. 20036
 Hughes-Schrader, Dr. Sally, Department of Zoology, Duke University, Durham, North Carolina 27706
 Irving, Dr. Laurence, University of Alaska, College, Alaska 99701
 Johnson, Dr. Frank H., Department of Biology, Princeton University, Princeton, New Jersey 08540
 Kaan, Dr. Helen, 62 Locust St., Apt. 244, Falmouth, Massachusetts 02540
 Kahler, Robert, P. O. Box 423, Woods Hole, Massachusetts 02543
 Kille, Dr. Frank R., 500 Osceola Ave., Winter Park, Florida 32789
 Kleinholz, Dr. Lewis, Department of Biology, Reed College, Portland, Oregon 97202
 Lynn, Dr. W. Gardner, Department of Biology, Catholic University of America, Washington, D. C. 20017
 Magruder, Dr. Samuel R., 270 Cedar Lane, Paducah, Kentucky 42001
 Malone, Dr. E. P., 6610 North 11th Street, Philadelphia, Pennsylvania 19126
 Manwell, Dr. Reginald D., Department of Biology, Syracuse University, Syracuse, New York 13210
 Marsland, Dr. Douglas, 3523 Loquat Ave., Miami, Florida 33133
 Miller, Dr. James A., Department of Anatomy, Tulane University, New Orleans, Louisiana 70112
 Milne, Dr. Lorus J., Department of Zoology, University of New Hampshire, Durham, New Hampshire 03824
 Moul, Dr. E. T., 42 F. R. Lillie Rd., Woods Hole, Massachusetts 02543
 Nicoll, Dr. Paul A., 6636 E. Street Rd. 46, Bloomington, Indiana 47401
 Page, Dr. Irving H., Cleveland Clinic, Euclid at E. 93rd Street, Cleveland, Ohio 44106
 Plough, Dr. Harold H., 31 Middle Street, Amherst, Massachusetts 01002
 Pollister, Dr. A. W., Box 23, Dixfield, Maine 04224
 Pond, Samuel E., P. O. Box 63, E. Winthrop, Maine 04343
 Porter, Dr. H. C., University of Pennsylvania, Philadelphia, Pennsylvania 19174
 Przyt, Dr. Margaret McD., 21 McCouns Lane, Oyster Bay, New York 11771
 Reznikoff, Dr. Paul, 11 Brooks Rd., Woods Hole, Massachusetts 02543
 Richards, Dr. A. Glenn, Department of Entomology, University of Minnesota, St. Paul, Minnesota 55101
 Richards, Dr. Oscar W., Pacific University, Forest Grove, Oregon 97116
 Scharrer, Dr. Berta, Department of Anatomy, Albert Einstein College of Medicine, 1300 Morris Pkwy., New York, New York 10461
 Schmitt, Dr. F. O., 165 Allen Dale St., Jamaica Plain, New York 02130
 Severinghaus, Dr. Aura E., 375 West 250th Street, New York, New York 10071
 Shemin, Dr. David, Department of Biochemistry and Molecular Biology, Northwestern University, Evanston, Illinois 60201
 Sichel, Dr. Elsa K., 4 Whitman Rd., Woods Hole, Massachusetts 02543
 Smith, Dr. Dietrich C., 216 Oak Forest Ave., Catonsville, Maryland 21228
 Sonneborn, Dr. T. M., Department of Zoology, Indiana University, Bloomington, Indiana 47401
REPORT OF THE DIRECTOR

SPEIDEL, DR. CARL C., 1873 Field Road, Charlottesville, Virginia 22903
STEINBACH, DR. H. BURR, one Bell Tower Lane, Woods Hole, Massachusetts 02543
STRAUS, DR. W. L., JR., Department of Anatomy, The Johns Hopkins University Medical School, Baltimore, Maryland 21205
STUNKARD, DR. HORACE W., American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024
TAYLOR, DR. W. RANDOLPH, Department of Botany, University of Michigan, Ann Arbor, Michigan 48109
TEWINKEL, DR. LOIS E., 4 Sanderson Ave., Northampton, Massachusetts 01060
WALD, DR. GEORGE, Higgins Professor of Biology, Emeritus, Harvard University, Cambridge, Massachusetts 02138
WALLACE, DR. LOUISE B., 359 Lytton Ave., Palo Alto, California 94301
WARREN, DR. HERBERT S., % Leland C. Warren, 721 Conshohocken State Road, Penn Valley, Pennsylvania 19072
WEISS, DR. PAUL, The Rockefeller University, 66th St. and York Ave., New York, New York 10016
WHITING, DR. ANNA R., Woods Hole, Massachusetts 02543
WICHTERMAN, DR. RALPH, 31 Buzzards Bay Ave., Woods Hole, Massachusetts 02543
YOUNG, DR. D. B., Main Street, North Hanover, Massachusetts 02357
ZORNZOLI, DR. ANITA, Department of Biology, Vassar College, Poughkeepsie, New York 12601

Regular Members

ABBOTT, DR. MARIE B., High Street, Coventry, Connecticut 06238
ACHE, DR. BARRY W., Department of Biological Sciences, Florida Atlantic University, Boca Raton, Florida 33432
ACHESON, DR. GEORGE H., 25 Quissett Ave., Woods Hole, Massachusetts 02543
ADELBerg, DR. EDWARD A., Department of Microbiology, Yale University Medical School, New Haven, Connecticut 06510
AFZELIUS, DR. BJORN, Wenner-Gren Institute, University of Stockholm, Stockholm, Sweden
ALKON, DR. DANIEL, Laboratory of Biophysics, Marine Biological Laboratory, Woods Hole, Massachusetts 02543
ALLEN, DR. GARLAND E., Biology Department, Washington University, St. Louis, Missouri 63130
ALLEN, DR. NINA S., Department of Biology, Dartmouth College, Hanover, New Hampshire 03755
ALLEN, DR. ROBERT D., Chairman, Department of Biology, Dartmouth College, Hanover, New Hampshire 03755
ALSCHER, DR. RUTH, Department of Biology, Manhattanville College, Purchase, New York 10577
AMATNIEK, ERNEST, 4797 Boston Post Rd., Pelham Manor, New York 10803
ANDERSON, DR. EVERETT, Department of Anatomy and Laboratories of Human Reproductive Biology, Harvard Medical School, Boston, Massachusetts 02115
ANDERSON, DR. J. M., Division of Biological Sciences, Emerson Hall, Cornell University, Ithaca, New York 14853

ARMSTRONG, DR. CLAY M., Department of Physiology, University of Pennsylvania, School of Medicine, Philadelphia, Pennsylvania 19174

ARMSTRONG, DR. PETER B., Department of Zoology, University of California, Davis, California 95616

ARMSTRONG, DR. PHILLIP B., 51 Elliot Place, Rutherford, New Jersey 07070

ARNOLD, DR. JOHN MILLER, Kewolo Marine Lab., Pacific Biomedical Research Center, 41 Ahui St., Honolulu, Hawaii 96813

ARNOLD, DR. WILLIAM A., Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830

ATEMA, DR. JELLE, 9 Millfield St., Woods Hole, Massachusetts 02543

ATWOOD, DR. KIMBALL C., 100 Haven Ave., Apt. 21-E, New York, New York 10032

AUSTIN, DR. MARY L., 506½ North Indiana Avenue, Bloomington, Indiana 47401

BACON, ROBERT, Church Street, Woods Hole, Massachusetts 02543

Baldwin, Dr. Thomas O., Department of Biochemistry, University of Illinois, Urbana, Illinois 61801

Ball, Dr. Eric G., P.O. Box 406, Falmouth, Massachusetts 02541

Bang, Dr. Betsy, Johns Hopkins University, School of Hygiene and Public Health, Baltimore, Maryland 21205

Bang, Dr. F. B., Department of Pathobiology, The Johns Hopkins University School of Hygiene, Baltimore, Maryland 21205

Barker, Dr. Jeffery L., Bldg. 36, Room 2002, National Institutes of Health, Bethesda, Maryland 20014

Barlow, Dr. Robert B., Jr., Institute for Sensory Research, Syracuse University, Merrill Lane, Syracuse, New York 13210

Bartell, Dr. Clelmer K., Department of Biological Sciences, Louisiana State University, New Orleans, Louisiana 70113

Bart, Dr. Lucena J., Marine Biological Laboratory, Woods Hole, Massachusetts 02543

Bartlett, Dr. James H., Department of Physics, University of Alabama, P.O. Box 1921, University, Alabama 35486

Bauer, Dr. G. Eric, Department of Anatomy, University of Minnesota, Minneapolis, Minnesota 55414

Beaute, Dr. Luis Alberto, Department of Biophysics, University of Maryland School of Medicine, 660 W. Redwood St., Baltimore, Maryland 21201

Beck, Dr. L. V., Department of Pharmacology, Indiana University, School of Experimental Medicine, Bloomington, Indiana 47401

Bell, Dr. Eugene, Department of Biology, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

Bennett, Dr. Michael V. L., Department of Neuroscience, Albert Einstein College of Medicine, 1300 Morris Park Ave., New York, New York 10461

Bennett, Dr. Miriam F., Department of Biology, Colby College, Waterville, Maine 04901

Berg, Dr. Carl J., Jr., Marine Biological Laboratory, Woods Hole, Massachusetts 02543
BERMAN, DR. MONES, National Institutes of Health, Theoretical Biology NCI, Bldg. 10, 4B56, Bethesda, Maryland 20014
BERNARD, GARY D., Department of Ophthalmology and Visual Science, Yale University, 333 Cedar St., New Haven, Connecticut 06510
BERNE, DR. ROBERT W., University of Virginia School of Medicine, Charlottesville, Virginia 22903
BERNHEIMER, DR. ALAN W., New York University College of Medicine, New York, New York 10016
BIGGERS, DR. JOHN DENNIS, Department of Physiology, Harvard Medical School, 25 Shattuck St., Boston, Massachusetts 02115
BISHOP, DR. DAVID W., Department of Physiology, Medical College of Ohio, P.O. Box 6190, Toledo, Ohio 43614
BISHOP, DR. STEPHEN H., Department of Zoology, Iowa State University, Ames, Iowa 50010
BLAUSTEIN, MORDECAI P., Department of Physiology and Biophysics, Washington University School of Medicine, St. Louis, Missouri 63110
BLUM, DR. HAROLD F., 612 E. Durham St., Philadelphia, Pennsylvania 19119
BODIAN, DR. DAVID, Department of Otolaryngology, The Johns Hopkins University, Traylor Building, Room 424, 1721 Madison St., Baltimore, Maryland 21205
BOETTGER, DR. EDWARD G., Department of Zoology, University of Connecticut, Storrs, Connecticut 06268
BOOLOOTIAN, DR. RICHARD A., President, Science Software System, Inc., 11899 West Pico Blvd., Los Angeles, California 90064
BOREI, DR. HANS G., Department of Zoology, University of Pennsylvania, Philadelphia, Pennsylvania 19174
BORGESI, DR. THOMAS A., Department of Biology, Lehman College, City University of New York, Bronx, New York 10468
BORISY, DR. GARY G., Laboratory of Molecular Biology, University of Wisconsin, Madison, Wisconsin 53715
BOSCH, DR. HERMAN F., % F. Taylor, Box 147, South Berwick, Maine 03908
BOTKIN, DR. DANIEL B., Wilson Center, Smithsonian Institution, Washington, D. C. 20560
BOWEN, DR. VAUGHN T., Woods Hole Oceanographic Institution, Redfield Bldg. 3–32, Woods Hole, Massachusetts 02543
BOWLES, DR. FRANCIS P., Marine Biological Laboratory, Woods Hole, Massachusetts 02543
BRANDT, DR. PHILIP WILLIAMS, Department of Anatomy, Columbia University, College of Physicians and Surgeons, New York, New York 10032
BRINLEY, DR. F. J., JR., Department of Physiology, University of Maryland School of Medicine, Baltimore, Maryland 21201
BRODERICK, DR. MALCOLM S., Department of Physiology and Biophysics, University of Texas Medical Branch, Galveston, Texas 77550
BROOKS, DR. MATILDA M., Department of Physiology, University of California, Berkeley, California 94720
BROWN, DR. FRANK A., JR., Department of Biological Sciences, Northwestern University, Evanston, Illinois 60201
BROWN, Dr. Joel E., Department of Physiology and Biophysics, Bldg. E, State University of New York at Stony Brook, Stony Brook, New York 11794
BUCK, Dr. John B., Laboratory of Physical Biology, National Institutes of Health, Bethesda, Maryland 20014
BURBANCK, Dr. Madeleine Palmer, Box 15134, Atlanta, Georgia 30333
BURBANCK, Dr. William D., Box 15134, Atlanta, Georgia 30333
BURDICK, Dr. Carolyn J., Department of Biology, Brooklyn College, Brooklyn, New York 11210
BURGER, Dr. Max M., Department of Biochemistry, University of Basel, CH. 4056-Klingelbergstrasse 70, Basel, Switzerland
BUCK, Dr. Albert J., Department of Biology, University of Dayton, Dayton, Ohio 45469
BURK, Dr. Arthur H., Department of Biological Sciences, Simon Fraser University, Burnaby, British Columbia, Canada V5A 1S6
CANDIDAS, Dr. Graciela C., Department of Biology, University of Puerto Rico, Rio Piedras, Puerto Rico 00931
CARLSON, Dr. Francis D., Department of Biophysics, The Johns Hopkins University, Baltimore, Maryland 21218
CASE, Dr. James F., Department of Biological Sciences, University of California, Santa Barbara, California 93106
CASSIDY, Rev. Joseph, O.P., Department of Biological Sciences, Northwestern University, Evanston, Illinois 60201
CEBRA, Dr. John J., Department of Biology, The Johns Hopkins University, Baltimore, Maryland 21218
CHAET, Dr. Alfred B., University of West Florida, Pensacola, Florida 32504
CHAMBERS, Dr. Edward L., Department of Physiology and Biophysics, University of Miami School of Medicine, P.O. Box 52087, Biscayne Annex, Miami, Florida 33152
CHAPPELL, Dr. Richard L., Department of Biological Sciences, Hunter College, The City University of New York, New York, New York 10021
CHAUNCEY, Dr. Howard H., 30 Falmouth St., Wellesley Hills, Massachusetts 02181
CHENEY, Dr. Ralph H., 11 Park Street, Woods Hole, Massachusetts 02543
CHILD, Dr. Frank M., Department of Biology, Trinity College, Hartford, Connecticut 06106
CITKOWITZ, Dr. Elena, 410 Livingston St., New Haven, Connecticut 06511
CLARK, Dr. A. M., Department of Biological Sciences, University of Delaware, Newark, Delaware 19711
CLARK, Dr. Eloise E., National Science Foundation, 1800 G Street, Washington, D. C. 20550
CLARK, Hays, Executive Vice-President, Avon Products, Inc., 9 West 57th Street, New York, New York 10019
CLARK, Dr. Wallis H., Aquaculture Program, College of Agricultural and Environmental Sciences, 228 Mark Hall, University of California, Davis, California 95616
CLAUSE, Dr. Philippa, Primate Center, Capital Court, Madison, Wisconsin, 53706
CLAYTON, DR. RODERICK K., Section of Genetics, Development and Physiology, Cornell University, Ithaca, New York 14850
CLOWES, DR. GEORGE H. A., JR., The Cancer Research Institute, 194 Pilgrim Road, Boston, Massachusetts 02215
CLUTTER, DR. MARY, Developmental Biology Program, National Science Foundation, Washington, D. C. 20550
COBB, DR. JEWEL P., Dean, Douglass College, New Brunswick, New Jersey 08903
COHEN, DR. ADOLPH I., Department of Ophthalmology, Washington University, School of Medicine, 660 S. Euclid Ave., St. Louis, Missouri 63110
COHEN, DR. LAWRENCE B., Department of Physiology, Yale University, 333 Cedar St., New Haven, Connecticut 06510
COHEN, DR. SEYMOUR S., Department of Pharmacological Science, State University of New York at Stony Brook, Stony Brook, New York 11790
COHEN, DR. WILLIAM D., Hunter College, New York, New York 10021
COLLIER, DR. JACK R., Department of Biology, Brooklyn College, Brooklyn, New York 11210
COOPERSTEIN, DR. SHERWIN J., University of Connecticut, School of Medicine, Farmington Ave., Farmington, Connecticut 06032
CORLIS, DR. JOHN O., Department of Zoology, University of Maryland, College Park, Maryland 20742
CORNELL, DR. NEAL W., 1914 Marthas Rd., Alexandria, Virginia 22307
CORNMAN, DR. IVOR, Townfield, Port Royal, Virginia 22535
COUCH, DR. ERNEST F., Department of Biology, Texas Christian University, Fort Worth, Texas 76110
CRANE, JOHN O., 315 West 106th Street, New York, New York 10025
CREMER-BARTELS, DR. GERTRUD, Universitats Augenklinik, 44 Munster, West Germany
Crippa, Dr. Marco, Department de Biologie animale, Embryologie Moleculaire, 154 route de Malagnou, CH-1224, Chene-Bougeries, Geneve, Switzerland
CROWELL, DR. SEARS, Department of Zoology, Indiana University, Bloomington, Indiana 47401
DAIGNAULT, ALEXANDER T., W. R. Grace Co., 1114 Avenue of the Americas, New York, New York 10036
DAN, DR. KATSUMA, Professor Emeritus, Tokyo Metropolitan University, Meguro-ku, Tokyo, Japan
DANIELLI, DR. JAMES F., Life Sciences Department, Worcester Polytechnic Institute, Worcester, Massachusetts 01609
DAVIS, DR. BERNARD D., Bacterial Physiology Unit, Harvard Medical School, 25 Shattuck Street, Boston, Massachusetts 02115
DAW, DR. NIGEL W., 78 Aberdeen Pl., Clayton, Missouri 63105
DEGROOF, DR. ROBERT C., Department of Pharmacology, Thomas Jefferson University, 1020 Locust St., Philadelphia, Pennsylvania 19174
DEHAAN, DR. ROBERT L., Department of Anatomy, Emory University, Atlanta, Georgia 30322
DELANEY, DR. LOUIS E., The Jackson Laboratory, Bar Harbor, Maine 04609
DEPHILLIPS, DR. HENRY A., JR., Department of Chemistry, Trinity College, Hartford, Connecticut 06106
DETTBARN, DR. WOLF-DIETRICH, Department of Pharmacology, Vanderbilt University, School of Medicine, Nashville, Tennessee 37217
DEWEER, DR. PAUL J., Department of Physiology, Washington University, School of Medicine, St. Louis, Missouri 63110
DISCHE, DR. ZACHARIAS, Columbia University, Eye Institute, 630 W. 165th Street, New York, New York 10032
DIXON, DR. KEITH E., School of Biological Sciences, Flinders University, Bedford Park, South Australia
DOWDALL, DR. MICHAEL J., Max Planck-Institut für Biophysikalische Chemie, D-3400 Gottingen, West Germany
DOWLING, DR. JOHN E., Biological Laboratories, Harvard University, 16 Divinity Avenue, Cambridge, Massachusetts 02138
DRESDEN, DR. MARC H., Department of Biochemistry, Baylor College of Medicine, Houston, Texas 77025
DUDLEY, DR. PATRICIA L., Department of Biological Sciences, Barnard College, Columbia University, New York, New York 10027
DUNHAM, DR. PHILIP B., Department of Biology, Syracuse University, Syracuse, New York 13210
EBERT, DR. JAMES DAVID, Carnegie Institution of Washington, 1530 P Street, Northwest, Washington, D. C. 20008
ECKBERG, DR. WILLIAM R., Department of Zoology, Howard University, Washington, D. C. 20059
ECKERT, DR. ROGER O., Department of Zoology, University of California, Los Angeles, California 90024
EDDS, DR. KENNETH T., Box 348, Woods Hole, Massachusetts 02543
EDDS, DR. LOUISE, College of Osteopathic Medicine, Grosvenor Hall, Ohio University, Athens, Ohio 45701
EDER, DR. HOWARD A., Albert Einstein College of Medicine, New York, New York 10461
EDWARDS, DR. CHARLES, Department of Biological Sciences, State University of New York at Albany, Albany, New York 12203
EGYÜD, DR. LASZLO G., The Sonntag Institute For Cancer Research, Boston College, Chestnut Hill, Massachusetts 02167
EHRENSTEIN, DR. GERALD, National Institutes of Health, Bethesda, Maryland 20014
EICHEL, DR. HERBERT J., Department of Biological Chemistry, Hahnemann Medical College, Philadelphia, Pennsylvania 19174
EISEN, DR. ARTHUR Z., Division of Dermatology, Washington University, School of Medicine, St. Louis, Missouri 63110
ELDER, DR. HUGH Y., Institute of Physiology, University of Glasgow, Glasgow, Scotland, U. K.
ELLIOTT, DR. GERALD F., The Open University Research Unit, Foxcombe Hall, Berkeley Road, Boar Hill, Oxford, England, U. K.
EPEL, DR. DAVID, Hopkins Marine Station, Pacific Grove, California 93950
EPSTEIN, DR. HERMAN T., Department of Biology, Brandeis University, Waltham, Massachusetts 02154
ERULKAR, DR. SOLOMON D., Department of Pharmacology, University of Pennsylvania Medical School, Philadelphia, Pennsylvania 19174
ESSNER, DR. EDWARD S., Kresge Eye Institute, Wayne State University, School of Medicine, 540 E. Canfield Ave, Detroit, Michigan 48201

ETIENNE, DR. EARL M., Department of Anatomy, Harvard Medical School, Boston, Massachusetts 02115

FAILLA, DR. PATRICIA M., Office of the Director, Argonne National Laboratory, Argonne, Illinois 60439

FARMANFARMAIAN, DR. ALLAHVERDI, Department of Physiology and Biochemistry, Rutgers University, New Brunswick, New Jersey 08903

FAUST, DR. ROBERT GILBERT, Department of Physiology, University of North Carolina, Medical School, Chapel Hill, North Carolina 27514

FAWCETT, DR. D. W., Department of Anatomy, Harvard Medical School, Boston, Massachusetts 02115

FEIN, DR. ALAN, Marine Biological Laboratory, Woods Hole, Massachusetts 02543

FERGUSON, DR. F. P., National Institute of General Medical Sciences, National Institutes of Health, Bethesda, Maryland 20014

FESSENDEN, JANE, Librarian, Marine Biological Laboratory, Woods Hole, Massachusetts 02543

FISCHBACH, DR. GERALD, Department of Pharmacology, Harvard Medical School, 25 Shattuck St., Boston, Massachusetts 02115

FISHER, DR. J. M., Department of Biochemistry, University of Toronto, Toronto, Ontario, Canada

FISHMAN, DR. HARVEY M., Department of Physiology, University of Texas, Medical Branch, Galveston, Texas 77550

FISHMAN, DR. LOUIS, 143 North Grove Street, Valley Stream, New York 11580

FLANAGAN, DENNIS, Editor, Scientific American, 415 Madison St., New York, New York 10017

FOX, DR. MAURICE S., Department of Biology, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

FRAENKEL, DR. GOTTFRID S., Department of Entomology, University of Illinois, Urbana, Illinois 61801

FRANZINI, DR. CLARA, Department of Biology G-5, University of Pennsylvania, School of Medicine, Philadelphia, Pennsylvania 19174

FRAZIER, DR. DONALD T., Department of Physiology and Biophysics, University of Kentucky, School of Medicine, Lexington, Kentucky 40507

FREEMAN, DR. ALLAN R., Professor and Chairman, Department of Physiology, Temple University School of Medicine, 3420 N. Broad St., Philadelphia, Pennsylvania 19140

FREEMAN, DR. GARY L., Department of Zoology, University of Texas, Austin, Texas 78710

FRENCH, DR. ROBERT J., 17 Quissett Ave., Woods Hole, Massachusetts 02543

FREYGANG, DR. WALTER J., JR., 6247 29th Street, N. W., Washington, D. C. 20015

FULTON, DR. CHANDLER M., Department of Biology, Brandeis University, Waltham, Massachusetts 02154

FURSHPAN, DR. EDWIN J., Department of Neurophysiology, Harvard Medical School, Boston, Massachusetts 02115
FUSELER, DR. JOHN W., Department of Cell Biology, 5323 Harry Hines Blvd., University of Texas Medical Branch, Dallas, Texas 75235
FYE, DR. PAUL M., Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543
GABRIEL, DR. MORDECAI L., Department of Biology, Brooklyn College, Brooklyn, New York 11210
GAINER, DR. HAROLD, Head, Section of Functional Neurochemistry, National Institutes of Health, Bldg. 36, Rm. 2A21, Bethesda, Maryland 20014
GALL, DR., JOSEPH G., Department of Biology, Yale University, New Haven, Connecticut 06520
GELFANT, DR. SEYMOUR, Department of Dermatology, Medical College of Georgia, Augusta, Georgia 30904
GELPERIN, DR. ALAN, Department of Biology, Princeton University, Princeton, New Jersey 08540
GIBBS, DR. MARTIN, Institute for Photobiology of Cells and Organelles, Brandeis University, Waltham, Massachusetts 02154
GIBSON, DR. A. JANE, Wing Hall, Cornell University, Ithaca, New York 14850
GIFFORD, DR. PROSSER, Dean, Amherst College, Amherst, Massachusetts 01002
GILBERT, DR. DANIEL L., Laboratory of Biophysics, NINCDS, National Institutes of Health, Building 36, Room 2A29, Bethesda, Maryland 20014
GILMAN, DR. LAUREN C., Department of Biology, Box 249118, University of Miami, Coral Gables, Florida 33124
GIUDICE, DR. GIOVANNI, University of Palermo, Via Archirafi 22, Palermo, Italy
GLUSMAN, DR. MURRAY, Department of Clinical Psychiatry, Columbia University, 722 W. 168th St., New York, New York 10032
GOLDEN, WILLIAM T., 40 Wall Street, New York, New York 10005
GOLDMAN, DAVID E., 63 Loop Rd., Falmouth, Massachusetts 02540
GOLDSMITH, DR. MARY H. M., Department of Biology, Kline Biology Tower, Yale University, New Haven, Connecticut 06520
GOLDSMITH, DR. TIMOTHY H., Department of Biology, Yale University, New Haven, Connecticut 06520
GOLSTEIN, DR. MOISE H., JR., 506 Traylor Bldg., The Johns Hopkins University, School of Medicine, 720 Rutland Ave., Baltimore, Maryland 21205
GOOCH, DR. JAMES L., Department of Biology, Juniata College, Huntingdon, Pennsylvania 16652
GOODCHILD, DR. CHAUNCEY G., Department of Biology, Emory University, Atlanta, Georgia 30322
GOODMAN, DR. LESLEY JEAN, Department of Zoology and Comparative Physiology, Queen Mary College, Mile End Rd., London, E1 4 NS, England, U. K.
GOOTSCHALL, DR. GERTRUDE Y., 315 East 68th Street, Apartment 9M, New York, New York 10021
GOUDSMIT, DR. ESTHER M., Department of Biology, Oakland University, Rochester, Michigan 48063
GOULD, DR. STEPHEN J., Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts 02138
Graham, Dr. Herbert, 36 Wilson Road, Woods Hole, Massachusetts 02543
Grant, Dr. Phillip, Department of Biology, University of Oregon, Eugene, Oregon 97403
Grass, Albert, The Grass Foundation, 77 Reservoir Road, Quincy, Massachusetts 02170
Grass, Ellen R., The Grass Foundation, 77 Reservoir Road, Quincy, Massachusetts 02170
Grassle, Dr. Judith P., Marine Biological Laboratory, Woods Hole, Massachusetts 02543
Green, Dr. James W., Department of Physiology, Rutgers University, New Brunswick, New Jersey 08903
Green, Dr. Jonathan P., Department of Biology, Reed College, Portland, Oregon 97202
Greenberg, Dr. Michael J., Department of Biological Sciences, Florida State University, Tallahassee, Florida 32306
Gregg, Dr. James H., Department of Zoology, University of Florida, Gainesville, Florida 32601
Grief, Dr. Roger L., Department of Physiology, Cornell University Medical College, New York, New York 10021
Griffin, Dr. Donald R., The Rockefeller University, 66th Street and York Avenue, New York, New York 10021
Grosch, Dr. Daniel S., Department of Genetics, Gardner Hall, North Carolina State University, Raleigh, North Carolina 27607
Gross, Dr. Paul R., President and Director, Marine Biological Laboratory, Woods Hole, Massachusetts, 02543
Grossman, Dr. Albert, New York University Medical School, New York, New York 10016
Gunning, Mr. A. Robert, 377 Hatchville Road, Hatchville, Massachusetts 02536
Guttman, Dr. Rita, Department of Biology, Brooklyn College, Brooklyn, New York 11210
Gwilliam, Dr. G. F., Department of Biology, Reed College, Portland, Oregon 97202
Hall, Dr. Zack W., Department of Physiology, University of California, San Francisco, California 94143
Halvorson, Dr. Harlyn O., Rosenstiel Basic Medical Sciences Research Center, Brandeis University, Waltham, Massachusetts 02154
Hanna, Dr. Robert B., State University of New York, College of Environmental Science and Forestry, Syracuse, New York 13210
Harding, Dr. Clifford V., Jr., Professor and Director of Research, Kresge Eye Institute, Wayne State University, School of Medicine, 540 E. Canfield, Detroit, Michigan 48201
Harosi, Dr. Ferenc I., Marine Biological Laboratory, Woods Hole, Massachusetts 02543
Harrigan, Dr. June F., Marine Biological Laboratory, Woods Hole, Massachusetts 02543
Harrington, Dr. Glenn W., Department of Microbiology, University of
Missouri, School of Dentistry, 650 E. 25th Street, Kansas City, Missouri 64108

HASCHEMEYER, DR. AUDREY E. V., Department of Biological Sciences, Hunter College, 965 Park Avenue, New York, New York 10021

HASTINGS, DR. J. WOODLAND, The Biological Laboratories, Harvard University, Cambridge, Massachusetts 02138

HAXO, DR. FRANCIS T., Department of Marine Biology, Scripps Institution of Oceanography, University of California, La Jolla, California 92038

HAYASHI, DR. TERU, 3100 S. Michigan, Chicago, Illinois 60616

HAYES, DR. RAYMOND L., JR., Department of Anatomy, School of Medicine, Morehouse College, Atlanta, Georgia 30314

HENLEY, DR. CATHERINE, 5225 Pooks Hill Road, Apt. 1120 North, Bethesda, Maryland 20014

HERNODON, DR. WALTER R., 506 Andy Holt Tower, University of Tennessee, Knoxville, Tennessee 37916

HERVEY, JOHN P., Box 85, Penzance Road, Woods Hole, Massachusetts 02543

HESLER, DR. ANITA Y., 5795 Waverly Avenue, La Jolla, California 92037

HEUSER, DR. JOHN, Department of Physiology, School of Medicine, University of California, San Francisco, California 94143

HIATT, DR. HOWARD H., Office of the Dean, Harvard School of Public Health, 677 Huntington Ave., Boston, Massachusetts 02115

HIGHSTEIN, DR. STEPHEN M., Division of Cellular Neurobiology, Albert Einstein College of Medicine, 1300 Morris Park Avenue, Bronx, New York 10461

HILL, DR. ROBERT H., Department of Zoology, University of Rhode Island, Kingston, Rhode Island 02881

HILLMAN, DR. PETER, Department of Biology, Hebrew University, Jerusalem, Israel

HINEGARDNER, DR. RALPH T., Division of Natural Sciences, University of California, Santa Cruz, California 95060

HINSCH, DR. GERTRUDE W., Department of Biology, University of South Florida, Tampa, Florida 33620

HOBBIE, DR. JOHN E., The Ecosystems Center, Marine Biological Laboratory, Woods Hole, Massachusetts 02543

HODGE, DR. ALAN J., Marine Biological Laboratory, Woods Hole, Massachusetts 02543

HODGE, DR. CHARLES, IV, P. O. Box 4095, Philadelphia, Pennsylvania 19118

HOFFMAN, DR. JOSEPH, Department of Physiology, Yale University School of Medicine, New Haven, Connecticut 06515

HOFFMANN, DR. RICHARD J., Department of Biological Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania 15260

HOLLYFIELD, DR. JOE C., Baylor School of Medicine, Texas Medical Center, Houston, Texas 77030

HOLTZMAN, DR. ERIC, Department of Biological Sciences, Columbia University, New York, New York 10027

HOLZ, DR. GEORGE G., JR., Department of Microbiology, State University of New York, Upstate Medical Center, Syracuse, New York 13210

HOSKIN, DR. FRANCIS C. G., Department of Biology, Illinois Institute of Technology, Chicago, Illinois 60616
REPORT OF THE DIRECTOR

HOUSTON, HOWARD, Preston Avenue, Meriden, Connecticut 06450
HUBBARD, DR. RUTH, The Biological Laboratories, Harvard University, Cambridge, Massachusetts 02138
HUMES, DR. ARTHUR G., Boston University Marine Program, Marine Biological Laboratory, Woods Hole, Massachusetts 02543
HUMMON, DR. WILLIAM D., Department of Biology, Ohio University, Athens, Ohio 45701
HUMPHREYS, DR. SUSIE HUNT, University of Hawaii, Pacific Biomedical Research Center, 41 Ahui St., Honolulu, Hawaii 96813
HUMPHREYS, DR. TOY D., University of Hawaii, Pacific Biomedical Research Center, 41 Ahui St., Honolulu, Hawaii 96813
HUNTER, DR. BRUCE, Administrative Office, Tulane University, New Orleans, Louisiana 70118
HUNTER, DR. R. DOUGLAS, Department of Biological Sciences, Oakland University, Rochester, Michigan 48063
HUNZIKER, H. E., Main St., Falmouth, Massachusetts 02540
HURWITZ, DR. CHARLES, Basic Science Research Laboratory, VA Hospital, Albany, New York 12208
HURWITZ, DR. JERARD, Department of Molecular Biology, Albert Einstein College of Medicine, 1300 Morris Park Avenue, Bronx, New York 10461
HUXLEY, DR. HUGH E., Medical Research Council, Laboratory of Molecular Biology, Cambridge, England, U. K.
HYDE, DR. BEAL B., Department of Botany, University of Vermont, Burlington, Vermont 05401
ILAN, DR. JOSEPH, Department of Anatomy, Case Western Reserve University, School of Medicine, Cleveland, Ohio 44106
INOUE, DR. SADAYUKI, Department of Pathology, Pathology Institute, McGill University, 3775 University Street, Montreal 112, Quebec, Canada
INOUE, DR. SHINYA, 217 Leidy Lab Building, Department of Biology, University of Pennsylvania, 38 and Hamilton Walk, Philadelphia, Pennsylvania 19174
ISENBERG, DR. IRVING, Department of Biochemistry and Biophysics, Oregon State University, Corvallis, Oregon 97331
ISSELBACKER, DR. KURT J., Massachusetts General Hospital, Boston, Massachusetts 02114
IZZARD, DR. COLIN S., Department of Biological Sciences, State University of New York at Albany, Albany, New York 12207
JACOBSON, DR. ANTONE G., Department of Zoology, University of Texas, Austin, Texas 78712
JAFFEE, DR. LIONEL, Department of Biology, Purdue University, Lafayette, Indiana 47907
JAHAN-PARWAR, DR. BEHAUS, Worcester Foundation for Experimental Biology, 222 Maple Avenue, Shrewsbury, Massachusetts 01545
JANNAUCH, DR. HOLGER W., Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543
JEFFERY, DR. WILLIAM R., Department of Zoology, University of Texas, Austin, Texas 78712
JENNER, DR. CHARLES E., Department of Zoology, University of North Carolina, Chapel Hill, North Carolina 27514
JONES, DR. MEREDITH L., Division of Worms, Museum of Natural History, Smithsonian Institution, Washington, D. C. 20550
JONES, DR. RAYMOND F., Department of Biology, State University of New York at Stony Brook, Stony Brook, New York 11753
JOSEPHSON, DR. R. K., School of Biological Sciences, University of California, Irvine, California 92717
JOYNER, DR. RONALD W., Department of Physiology, University of Iowa, Iowa City, Iowa 52242
JUNQUEIRA, DR. LUZ CARLOS, Department Histologia, Instituto Ciencias Biomedicas, C.P. 4365, Sao Paulo, Brazil
KABAT, DR. E. A., Department of Microbiology, Columbia University, College of Physicians and Surgeons, 630 W. 168th St., New York, New York 10032
KAFATOS, DR. FOTIS C., The Biological Laboratories, Harvard University, 16 Divinity Avenue, Cambridge, Massachusetts 02138
KAJI, DR. AKIRA, Department of Microbiology, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania 19174
KALEY, DR. GABOR, Department of Physiology, Basic Sciences Building, New York Medical College, Valhalla, New York 10595
KALTENBACH, DR. JANE, 139 Cold Hill, Granby, Massachusetts 01033
KAMNER, DR. BENJAMIN, Department of Physiology, Boston University School of Medicine, 80 E. Concord St., Boston, Massachusetts 02118
KAMMER, DR. ANN E., Division of Biology, Kansas State University, Manhattan, Kansas 66502
KANE, DR. ROBERT E., Pacific Biomedical Research Center, 41 Ahui Street, University of Hawaii, Honolulu, Hawaii 96813
KANESHIRO, DR. EDNA S., Department of Biological Sciences, University of Cincinnati, Cincinnati, Ohio 45221
KARAKASHIAN, DR. STEPHEN J., 165 West 91st Street, Apt. 16-F, New York, New York 10024
KARUSH, DR. FRED, Department of Microbiology, University of Pennsylvania, School of Medicine, Philadelphia, Pennsylvania 19174
KATZ, DR. GEORGE M., Department of Neurology, Columbia University, College of Physicians and Surgeons, 630 West 168th Street, New York, New York 10032
KEAN, DR. EDWARD L., Departments of Biochemistry and Ophthalmology, Case Western Reserve University, Cleveland, Ohio 44101
KEMP, DR. NORMAN E., Department of Zoology, University of Michigan, Ann Arbor, Michigan 48104
KENDALL, MR. JOHN P., One Boston Place, Boston, Massachusetts 02108
KEOSIAN, DR. JOHN, P. O. Box 193, Woods Hole, Massachusetts 02543
KETCHUM, DR. BOSTWICK H., P. O. Box 32, Woods Hole, Massachusetts 02543
KEYNAN, DR. ALEXANDER, Vice President, Hebrew University, Jerusalem, Israel
KING, DR. THOMAS J., Program Director, Division of Cancer Research, Resources and Center, National Institutes of Health, Bldg. 31, Room 10A03, Bethesda, Maryland 20014
Kingsbury, Dr. John M., Department of Botany, Cornell University, Ithaca, New York 14850
Kirschbaum, Dr. Donald, Department of Biochemistry, College of Medicine, State University of New York, 450 Clarkson Avenue, Brooklyn, New York 11203
Klein, Dr. Morton, Department of Microbiology, Temple University, Philadelphia, Pennsylvania 19122
Klotz, Dr. I. M., Department of Chemistry, Northwestern University, Evanston, Illinois 60201
Kohler, Dr. Kurt, Biologische Institut der Universitat Stuttgart, D-7, Stuttgart 60, Ulmer Str. 227, West Germany
Koide, Dr. Samuel S., Population Council, The Rockefeller University, 66th St. and York Ave., New York, New York 10021
Koningsberg, Dr. Irwin R., Department of Biology, Gilmer Hall, University of Virginia, Charlottesville, Virginia 22903
Kosower, Dr. Edward M., Department of Chemistry, University of California, San Diego, La Jolla, California 92039
Krahl, Dr. M. E., 2783 West Casas Circle, Tucson, Arizona 85704
Krane, Dr. Stephen M., Massachusetts General Hospital, Boston, Massachusetts 02114
Krassner, Dr. Stuart Mitchell, Department of Developmental and Cell Biology, University of California, Irvine, California 92717
Krauss, Dr. Robert, Dean, School of Science, Oregon State University, Corvallis, Oregon 97331
Krautz, Dr. Edward A., Department of Neurobiology, Harvard Medical School, 25 Shattuck St., Boston, Massachusetts 02115
Kriebel, Dr. Mahlon E., Department of Physiology, State University of New York, Upstate Medical Center, Syracuse, New York 13210
Krieg, Dr. Wendell J. S., 1236 Hinman, Evanston, Illinois 60602
Krupa, Dr. Paul L., Department of Biology, The City College of New York, 139th St. and Convent Avenue, New York, New York 10031
Kuffler, Dr. Stephen W., Department of Neurophysiology, Harvard Medical School, Boston, Massachusetts 02115
Kusano, Dr. Kiyoshi, Department of Biology, Illinois Institute of Technology, 3300 South Federal Street, Chicago, Illinois 60616
Lamarche, Dr. Paul H., 593 Eddy St., Providence, Rhode Island 02903
Lancefield, Dr. Rebecca C., The Rockefeller University, 1230 York Ave., New York, New York 10021
Landis, Dr. Dennis, Department of Neurology, Massachusetts General Hospital, Boston, Massachusetts 02114
Landowne, Dr. David, Department of Physiology, University of Miami, Miami, Florida 33124
Langford, Dr. George M., Department of Anatomy, Howard University, College of Medicine, Washington, D. C. 20059
Lash, Dr. James W., Department of Anatomy, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania 19174
Laster, Dr. Leonard, President, Health Services Center, University of Oregon, Portland, Oregon 97201
LAUFFER, Dr. Hans, Biological Sciences Group U-42, University of Connecticut, Storrs, Connecticut 06268

LAUFFER, Dr. Max A., Department of Biophysics, University of Pittsburgh, Pittsburgh, Pennsylvania 15260

LAWRENCE, E. Swift, Box 228, West Falmouth, Massachusetts 02574

LAZAROW, Jane, 221 Woodlawn Avenue, St. Paul, Minnesota 55105

LEADBETTER, Dr. Edward R., Biological Sciences Group U-42 University of Connecticut, Storrs, Connecticut 06268

LEAK, Dr. Lee Virn, Department of Anatomy, Howard University, College of Medicine, Washington, D. C. 20059

LECAR, Dr. Harold, Laboratory of Biophysics, National Institute of Neurological Diseases and Stroke, National Institutes of Health, Bethesda, Maryland 20014

LEDERBERG, Dr. Joshua, President, The Rockefeller University, New York, New York 10021

LEE, Dr. John J., Department of Biology, City College of the City University of New York, Convent Avenue and 138th Street, New York, New York 10031

LEFEVRE, Dr. Paul G., Department of Physiology, Health Sciences Center, East Campus, State University of New York at Stony Brook, Stony Brook, New York 11794

LEANSTON, Dr. Joseph, Department of Pathology, Medical College of Pennsylvania, 3300 Henry Ave., Philadelphia, Pennsylvania 19129

LENHER, Dr. Samuel, Box 1573, Vineyard Haven, Massachusetts 02568

LERMAN, Dr. Sidney, Laboratory for Ophthalmic Research, Emory University, Atlanta, Georgia 30322

LENNER, Dr. Aaron B., Yale Medical School, New Haven, Connecticut 06510

LEVIN, Dr. Jack, Hematology Division, The Johns Hopkins Hospital, Baltimore, Maryland 21205

LEVIN, Dr. Rachmiel, 2024 Canyon Road, Arcadia, California 91006

LEVINthal, Dr. Cyrus, Department of Biological Sciences, 908 Schermerhorn Hall, Columbia University, New York, New York 10027

LEVITAN, Dr. Herbert, Department of Zoology, University of Maryland, College Park, Maryland 20742

LEWIN, Dr. Ralph A., Scripps Institution of Oceanography, La Jolla, California 92037

LING, Dr. Gilbert, 307 Berkeley Road, Merion, Pennsylvania 19066

LINSKENS, Dr. H. P., Department of Botany, University of Driehuizerweg 200, Nijmegen, The Netherlands

LIPICKY, Dr. Raymond J., Department of Pharmacology, College of Medicine, University of Cincinnati, 231 Bethesda Avenue, Cincinnati, Ohio 45267

LITTLE, Dr. E. P., 216 Highland Street, West Newton, Massachusetts 02158

LIUZZI, Dr. Anthony, Department of Radiological Sciences, University of Lowell, Lowell, Massachusetts 01854

Llinas, Dr. Rodolfo R., Department of Physiology and Biophysics, New York University Medical Center, 550 First Ave., New York, New York 10016

LOEWENSTEIN, Dr. Werner R., Department of Physiology and Biophysics, University of Miami, School of Medicine, P. O. Box 520875, Miami, Florida 33152
REPORT OF THE DIRECTOR

LOEWUS, DR. FRANK A., Department of Agricultural Chemistry, Washington State University, Pullman, Washington 99164

LOFFIELD, DR. ROBERT B., Department of Biochemistry, University of New Mexico Medical School, 900 Stanford N. E., Albuquerque, New Mexico 87106

LONDON, DR. IRVING M., 16-512, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

LONGO, DR. FRANK J., Department of Anatomy, University of Iowa, Iowa City, Iowa 52442

LORAND, DR. LASZLO, Attn: Mrs. P. Velasco, Department of Biochemistry and Molecular Biology, Northwestern University, Evanston, Illinois 60201

LURIA, DR. SALVADOR E., Department of Biology, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

LYNCH, DR. CLARA J., 4800 Filmore Avenue, Alexandria, Virginia 22311

MACNICHOL, DR. EDWARD F., JR., Marine Biological Laboratory, Woods Hole, Massachusetts 02543

MAHLER, DR. HENRY R., Department of Biochemistry, Indiana University, Bloomington, Indiana 47401

MALKIEL, DR. SAUL, Sidney Farber Cancer Center, 35 Binney Street, Boston, Massachusetts 02115

MANALIS, DR. RICHARD S., Department of Physiology, University of Cincinnati, College of Medicine, Eden and Bethesda Aves., Cincinnati, Ohio 45267

MAGNUM, DR. CHARLOTTE P., Department of Biology, College of William and Mary, Williamsburg, Virginia 23185

MARKS, DR. PAUL A., Columbia University College of Physicians and Surgeons, 630 West 168th Street, New York, New York 10032

MARSH, DR. JULIAN B., Department of Biochemistry and Physiology, Medical College of Pennsylvania, 3300 Henry Ave., Philadelphia, Pennsylvania 19129

MARUO, DR. TAKESHI, The Population Council, The Rockefeller University, 1230 York Avenue, New York, New York 10021

MASER, DR. MORTON, The Marine Biological Laboratory, Woods Hole, Massachusetts, 02543

MASTROIANNI, DR. LUIGI, JR., Department of Obstetrics and Gynecology, Hospital of the University of Pennsylvania, 3400 Spruce St., Philadelphia, Pennsylvania 19174

MATHews, DR. RITA W., Hunter College, Box 1075, 695 Park Ave, New York, New York 10021

MAUTNER, DR. HENRY G., Department of Biochemistry and Pharmacology, Tufts University School of Medicine, 136 Harrison Avenue, Boston, Massachusetts 02111

MAUZERALL, DR. DAVID, The Rockefeller University, 66th Street and York Avenue, New York, New York 10021

MAXWELL, DR. ARTHUR, Provost, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543

MAZIA, DR. DANIEL, Department of Zoology, University of California, Berkeley, California 94720

McCANN, DR. FRANCES, Department of Physiology, Dartmouth Medical School, Hanover, New Hampshire 03755
ANNUAL REPORT OF THE MARINE BIOLOGICAL LABORATORY

McCloskey, Dr. Lawrence R., Department of Biology, Walla Walla College, College Place, Washington 99324
McLaughlin, Jane A., P. O. Box 187, Woods Hole, Massachusetts 02543
McMahon, Dr. Robert F., Department of Biology, University of Texas, Arlington, Texas 76019
McReynolds, Dr. John S., Department of Physiology, University of Michigan, Ann Arbor, Michigan 48104
Meinkoth, Dr. Norman A., Department of Biology, Swarthmore College, Swarthmore, Pennsylvania 19081
Mellon, Dr. DeForest, Jr., Department of Biology, University of Virginia, Charlottesville, Virginia 22903
Metz, Dr. C. B., Institute of Molecular Evolution, University of Miami, 521 Anastasia St., Coral Gables, Florida 33134
Middlebrook, Dr. Robert, 86 Station Road, Burley-In-Wharfdale, West Yorks, England, U. K.
Milkman, Dr. Roger D., Department of Zoology, University of Iowa, Iowa City, Iowa 52242
Mills, Dr. Eric Leonard, Institute of Oceanography, Dalhousie University, Halifax, Nova Scotia, Canada
Mills, Robert, 56 Worcester Ct., Falmouth, Massachusetts 02540
Mitchell, Dr. Ralph, Pierce Hall, Harvard University, Cambridge, Massachusetts 02138
Mizell, Dr. Merle, Department of Biology, Tulane University, New Orleans, Louisiana 70118
Monroy, Dr. Alberto, Stazione Zoologica, Villa Communale, Napoli, Italy
Montroll, Dr. Eliott W., Institute for Fundamental Studies, Department of Physics, University of Rochester, Rochester, New York 14627
Moore, Dr. John A., Department of Biology, University of California, Riverside, California 92502
Moore, Dr. John W., Department of Physiology, Duke University Medical Center, Durham, North Carolina 27706
Moore, Dr. Lee E., Department of Physiology and Biophysics, University of Texas Medical Branch, Galveston, Texas 77550
Moran, Dr. Joseph F., Jr., 23 Foxwood Drive, RR#1, Eastham, Massachusetts 02642
Morin, Dr. James G., Department of Biology, University of California, Los Angeles, California 90024
Morrell, Dr. Frank, Department of Neurological Sciences, Rush Medical Center, 1753 W. Congress Pkwy., Chicago, Illinois 60612
Morrill, Dr. John B., Jr., Division of Natural Sciences, New College, Sarasota, Florida 33580
Morse, Dr. Richard Stetson, 193 Winding River Road, Wellesley, Massachusetts 02181
Morse, Robert W., Associate Director, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543
Moscona, Dr. A. A., Department of Zoology, University of Chicago, Chicago, Illinois 60627
Mote, Dr. Michael I., Department of Biology, Temple University, Philadelphia, Pennsylvania 19122
Mountain, Dr. Isabel M., Brookfield Pl., Pleasantville, New York 10570
Mullen, George, Belknap and McLain, 650 Pleasant Street, Watertown, Massachusetts, 02172
Musacchia, Dr. Xavier J., Graduate School, University of Louisville, Louisville, Kentucky 40208
Nabrit, Dr. S. M., 686 Beckwith Street S. W., Atlanta, Georgia 30314
Nace, Dr. Paul Foley, 5 Bowditch Rd., Woods Hole, Massachusetts 02543
Nachmansohn, Dr. David, Department of Neurology, Columbia University,
College of Physicians and Surgeons, New York, New York 10032
Nakajima, Dr. Shigejiro, Department of Biological Sciences, Purdue University,
West Lafayette, Indiana 47907
Nakajima, Dr. Yosuko, Department of Biological Sciences, Purdue University,
West Lafayette, Indiana 47907
Narahashi, Dr. Toshiro, Department of Pharmacology, Northwestern University Medical Center, 303 E. Chicago Ave., Chicago, Illinois 60611
Nasatir, Dr. Maimon, Department of Biology, University of Toledo, Toledo, Ohio 43606
Nelson, Dr. Leonard, Department of Physiology, Medical College of Ohio at Toledo, Toledo, Ohio 43699
Nicholls, Dr. John Graham, Department of Neurobiology, Stanford University, Stanford, California 94305
Nicosia, Dr. Santo V., School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania 19174
Nielsen, Dr. Jennifer B. K., Waksman Institute for Microbiology, Rutgers University, Piscataway, New Jersey 08854
Noe, Dr. Bryan D., Department of Anatomy, Emory University, Atlanta, Georgia 30345
Novikoff, Dr. Alex B., Department of Pathology, Albert Einstein College of Medicine, Bronx, New York 10461
Ochoa, Dr. Severo, 530 East 72nd Street, New York, New York 10021
Odum, Dr. Eugene, Department of Zoology, University of Georgia, Athens, Georgia 30601
Oertel, Dr. Donata, Department of Neurophysiology, University of Wisconsin, Madison, Wisconsin 53706
O'Herron, Jonathan, Lazard Freres and Company, 1 Rockefeller Plaza, New York, New York 10020
Olson, Dr. John M., Department of Biology, Brookhaven National Laboratory, Upton, New York 11973
Oschman, Dr. James L., Marine Biological Laboratory, Woods Hole, Massachusetts 02543
Oxford, Dr. Gerry S., Department of Physiology, University of North Carolina, Chapel Hill, North Carolina 27514
Palmer, Dr. John D., Department of Zoology, University of Massachusetts, Amherst, Massachusetts 01002
Palti, Dr. Yoram, Head, Department of Biophysics, University of Maryland, Baltimore, Maryland 21201
PAPPAS, Dr. George D., Department of Anatomy, University of Chicago, College of Medicine, 1853 W. Polk St., P. O. Box 6998, Chicago, Illinois 60612
PARDEE, Dr. Arthur B., Department of Pharmacology, Harvard Medical School, Boston, Massachusetts 02115
PARDY, Dr. ROSEVELT L., School of Life Sciences, University of Nebraska, Lincoln, Nebraska 68588
PASSANO, Dr. LEONARD M., Department of Zoology, University of Wisconsin, Madison, Wisconsin 53706
PEARLMAN, Dr. ALAN L., Department of Physiology, Washington University School of Medicine, St. Louis, Missouri 63110
PERKINS, Dr. C. D., National Academy of Engineering, 2101 Constitution Ave., N. W., Washington, D. C. 20418
PERSON, Dr. Philip, Special Dental Research Program, Veteran's Administration Hospital, Brooklyn, New York 11219
PETTIBONE, Dr. MARIAN H., Division of Worms, W-213, Smithsonian Institution, Washington, D. C. 20560
PFOHL, Dr. RONALD J., Department of Zoology, Miami University, Oxford, Ohio 45056
PHILPOTT, Dr. Delbert E., MASA Ames Research Center, Moffett Field, California 94035
PIERCE, Dr. Sidney K., Jr., Department of Zoology, University of Maryland, College Park, Maryland 20740
PINTO, Dr. LAWRENCE, Department of Biological Sciences, Purdue University, West Lafayette, Indiana 47907
POLLARD, Dr. HARVEY B., National Institutes of Health, F. Bldg. 10, Rm. 10B17, Bethesda, Maryland 20014
POLLARD, Dr. THOMAS D., Department of Cell Biology and Anatomy, School of Medicine, Johns Hopkins University, Baltimore, Maryland 21205
POLLOCK, Dr. LEELAND W., Department of Zoology, Drew University, Madison, New Jersey 07940
PORTER, Dr. BEVERLY H., 14433 Taos Court, Wheaton, Maryland 20906
PORTER, Dr. KEITH R., 748 11th Street, Boulder, Colorado 80302
POTTER, Dr. DAVID, Department of Neurobiology, Harvard Medical School, Boston, Massachusetts 02115
POTTER, Dr. H. DAVID, Center for Neural Sciences, Indiana University, Bloomington, Indiana 47401
POTTS, Dr. WILLIAM T., Department of Biology, University of Lancaster, Lancaster, England, U. K.
POUSSART, Dr. DENIS, Department of Electrical Engineering, Université Laval, Quebec, Canada
PRENDERGAST, Dr. ROBERT A., Department of Pathology and Ophthalmology, The Johns Hopkins University School of Medicine, Baltimore, Maryland 21205
PRICE, Dr. CARL A., Waksman Institute of Microbiology, Rutgers University, P.O. Box 759, Piscataway, New Jersey 08854
PRICE, Dr. CHRISTOPHER H., Marine Biomedical Institute, University of Texas, Galveston, Texas 77550
REPORT OF THE DIRECTOR

PRIOR, DR. DAVID JAMES, Department of Biological Sciences, University of Kentucky, Lexington, Kentucky 40506
PROSSER, DR. C. LADD, Department of Physiology and Biophysics, Burrill Hall 524, University of Illinois, Urbana, Illinois 61801
PROVASOLI, DR. LUIGI, Haskins Laboratories, 165 Prospect Street, New Haven, Connecticut 06520
PRUSCH, DR. ROBERT D., Division of Biomedical Sciences, Brown University, Providence, Rhode Island 02904
PRZYBYLSKI, DR. RONALD J., Department of Anatomy, Case Western Reserve University, Cleveland, Ohio 44101
RABIN, DR. HARVEY, Box 239, Braddock Heights, Maryland 21714
RAMON, DR. FIDEL, Duke University Medical Center, Durham, North Carolina 27706
RANKIN, DR. JOHN S., Box 97, Ashford, Connecticut 06278
Ranzi, DR. SILVIO, Department of Zoology, University of Milan, Via Celonia 10, Milan, Italy
RATNER, DR. SARAH, Department of Biochemistry, The Public Health Research Institute, 455 First Avenue, New York, New York 10016
REBHUN, DR. LIONEL I., Department of Biology, Gilmer Hall, University of Virginia, Charlottesville, Virginia 22901
REDGAN, DR. JOHN R., Department of Biological Sciences, Oakland University, Rochester, Michigan 48063
REDFIELD, DR. ALFRED C., Maury Lane, Woods Hole, Massachusetts 02543
REESE, DR. THOMAS S., Head, Section on Functional Neuroanatomy, National Institutes of Health, Bethesda, Maryland 20014
REINER, DR. JOHN M., Department of Biochemistry, Albany Medical College of Union University, Albany, New York 12208
REINISCH, DR. CAROL L., Department of Tumor Immunology, Sidney Farber Cancer Institute, 44 Binney St., Boston, Massachusetts 02511
RENN, DR. CHARLES E., Route 2, Hampstead, Maryland 21074
REUBEN, DR. JOHN P., Department of Neurology, Columbia University, College of Physicians and Surgeons, New York, New York 10032
REYNOLD, DR. GEORGE THOMAS, Department of Physics, Princeton University, Princeton, New Jersey 08540
RICE, DR. ROBERT VERNON, Marine Biological Laboratory, Woods Hole, Massachusetts 02543
RICKLES, DR. FREDERICK R., University of Connecticut, School of Medicine, Newington, Connecticut 06111
RIPPS, DR. HARRIS, Department of Ophthalmology, New York University, School of Medicine, 550 First Ave., New York, New York 10016
ROBERTS, DR. JOHN L., Department of Zoology, University of Massachusetts, Amherst, Massachusetts 01002
ROBINSON, DR. DENIS M., 19 Orlando Avenue, Arlington, Massachusetts 02174
ROCKSTEIN, DR. MORRIS, Department of Physiology, University of Miami School of Medicine, P. O. Box 975, Biscayne Annex, Miami, Florida 33152
RONKIN, DR. RAPHAEL E., 3212 McKinley St., N. W., Washington, D. C. 20015
ROSE, DR. BIRGIT, Department of Physiology, University of Miami School of Medicine, Miami, Florida 33152
ROSE, DR. S. MERYL, 34 High St., Woods Hole, Massachusetts 02543
ROSENBAUM, DR. JOEL I., Kline Biology Tower, Yale University, New Haven, Connecticut 06510
ROSENBERG, DR. EVELYN K., Jersey City State College, Jersey City, New Jersey 07305
ROSENBERG, DR. PHILLIP, Division of Pharmacology, University of Connecticut, School of Pharmacy, Storrs, Connecticut 06268
ROSENBLUTH, DR. JACK, Department of Physiology, New York University, School of Medicine, 550 First Avenue, New York, New York 10016
ROSENBLUTH, RAJA, 3380 West 5th Avenue, Vancouver, British Columbia, Canada V6R 1R7
ROSENKRANZ, DR. HERBERT S., Department of Microbiology, New York Medical College, Valhalla, New York 10595
ROSLANSKY, DR. JOHN, 26 Albatross, Woods Hole, Massachusetts 02543
ROSLANSKY, DR. PRISCILLA F., Box 208, Woods Hole, Massachusetts 02543
ROSS, DR. WILLIAM N., Department of Neurobiology, Harvard Medical School, Boston, Massachusetts 02115
Roth, Dr. Jay S., Division of Biological Sciences, Section of Biochemistry and Biophysics, University of Connecticut, Storrs, Connecticut 06268
ROWE, Miss DOROTHY, 88 Chesnut St. Boston, Massachusetts 02165
ROWLAND, DR. LEWIS P., Department of Neurology, Columbia University, College of Physicians and Surgeons, 630 W. 168th St., New York, New York 10032
RUBINOW, DR. SOL I., Department of Biomathematics, Cornell University, Medical College, New York, New York 10012
RUDERMAN, DR. JOAN V., Department of Anatomy, Harvard Medical School, Boston, Massachusetts 02115
RUSHFORTH, DR. NORMAN B., Department of Biology, Case Western Reserve University, Cleveland, Ohio 44106
RUSSELL, DR. JOHN M., Department of Biophysics, University of Texas, Medical Branch, Galveston, Texas 77550
RUSSELL-HUNTER, DR. W. D., Department of Biology, Lyman Hall, Syracuse University, Syracuse, New York 13210
RUSTAD, DR. RONALD C., Department of Radiology, Case Western Reserve University, Cleveland, Ohio 44106
RYTHER, DR. JOHN H., Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543
SAGER, DR. RUTH, Sidney Farber Cancer Center, 44 Binney St., Boston, Massachusetts 02115
SALMON, DR. EDWARD D., Department of Zoology, University of North Carolina, Chapel Hill, North Carolina 27514
SALZBERG, DR. BRIAN M., Department of Physiology, University of Pennsylvania, 4010 Locust St., Philadelphia, Pennsylvania 19174
SANDERS, DR. HOWARD L., Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543
Sato, DR. HIDEMI, Sugashima Marine Biological Laboratory, Nagoya University, Sugashima-cho, Toba-shi, Mie-ken, 517, Japan
SAUNDERS, DR. JOHN W., JR., Department of Biological Sciences, State University of New York at Albany, Albany, New York 12222
SAZ, DR. ARTHUR KENNETH, Department of Microbiology, Georgetown University Medical and Dental Schools, 3900 Reservoir Road, N. W., Washington, D. C. 20051
SCHACHMAN, DR. HOWARD K., Department of Molecular Biology, University of California, Berkeley, California 94720
SCHIFF, DR. JEROME A., Institute for Photobiology of Cells and Organelles, Brandeis University, Waltham, Massachusetts 02154
SCHLEISINGER, DR. R. WALTER, Department of Microbiology, Rutgers Medical School, P. O. Box 101, Piscataway, New Jersey 08854
SCHMEER, SISTER, ARLINE C., American Cancer Research Center and Hospital, 6401 W. Colfax Ave., Denver, Colorado 80214
SCHNEIDERMAN, DR. HOWARD A., Center for Pathobiology, School of Biological Sciences, University of California, Irvine, California 92717
SCHOLANDER, DR. P. F., Scripps Institution of Oceanography, La Jolla, California 92037
SCHOFF, DR. THOMAS J. M., Department of the Geophysical Sciences, University of Chicago, 5734 S. Ellis Avenue, Chicago, Illinois 60637
SCHOTTÉ, DR. OSCAR E., Department of Biology, Amherst College, Amherst, Massachusetts 01002
SCHUEL, DR. HERBERT, Department of Anatomical Sciences, State University of New York, Buffalo, New York 14214
SCHUETZ, DR. ALLEN WALTER, The Johns Hopkins University School of Hygiene and Public Health, Baltimore, Maryland 21205
SCHWARTZ, DR. TOBIAS L., Biological Sciences Group, University of Connecticut, Storrs, Connecticut 06268
SCOTT, DR. ALLAN C., 1 Nudd St., Waterville, Maine 04901
SCOTT, DR. GEORGE T., Department of Biology, Oberlin College, Oberlin, Ohio 44074
SEARS, DR. MARY, Box 152, Woods Hole, Massachusetts 02543
SEGAL, DR. SHELDON J., Director, Population Division, The Rockefeller Foundation, 1133 Avenue of the Americas, New York, New York 10036
SEIGER, DR. HOWARD H., McCollum-Pratt Institute, The Johns Hopkins University, Baltimore, Maryland 21218
SELMAN, DR. KELLY, Department of Anatomy, College of Medicine, University of Florida, Gainesville, Florida 32601
SENFT, DR. JOSEPH P., Organic Gardening and Farming Research Center, Box 323, Kutztown, Pennsylvania 19530
SHANKLIN, DR. DOUGLAS R., P. O. Box 1267, Gainesville, Florida 32602
SHAPIRO, DR. HERBERT, 6025 North 13th Street, Philadelphia, Pennsylvania 19141
SHAVER, DR. JOHN R., Department of Zoology, Michigan State University, East Lansing, Michigan 48823
SHEPHERD, DR. DAVID C., P. O. Box 44, Woods Hole, Massachusetts 02543
SHEPRO, DR. DAVID, Department of Biology, Boston University, 2 Cumington Street, Boston, Massachusetts 02215
SHERMAN, Dr. I. W., Division of Life Sciences, University of California, Riverside, California 92502
SHILO, Dr. Moshe, Head, Department of Microbiological Chemistry, Hebrew University, Jerusalem, Israel
SIEGEL, Dr. IRWIN M., Department of Ophthalmology, New York University Medical Center, 550 First Avenue, New York, New York 10016
SIEGELMAN, Dr. HAROLD W., Department of Biology, Brookhaven National Laboratory, Upton, New York 11973
SIMON, Dr. ERIC J., New York University Medical School, 550 First Avenue, New York, New York 10016
SJORDIN, Dr. RAYMOND A., Department of Biophysics, University of Maryland School of Medicine, Baltimore, Maryland 21201
SKINNER, Dr. DOROTHY M., Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830
SLOBODKIN, Dr. LAWRENCE B., Department of Biology, State University of New York at Stony Brook, Stony Brook, New York 11790
SMITH, HOMER P., General Manager, Marine Biological Laboratory, Woods Hole, Massachusetts 02543
SMITH, Dr. MICHAEL A., Marine Biological Laboratory, Woods Hole, Massachusetts 02543
SMITH, PAUL FERRIS, Church Street, Woods Hole, Massachusetts 02543
SMITH, Dr. RALPH I., Department of Zoology, University of California, Berkeley, California 94720
SONNENBLICK, Dr. B. P., Department of Zoology and Physiology, Rutgers University, 195 University Avenue, Newark, New Jersey 07102
SORENSON, Dr. ALBERT L., Department of Physiology, Albert Einstein College of Medicine, 1300 Morris Park Ave., Bronx, New York 10461
SORENSON, Dr. MARTHA M., Department of Neurology, Columbia University, College of Physicians and Surgeons, New York, New York 10032
SPECK, Dr. WILLIAM T., Department of Pediatrics, Case Western Reserve University, Cleveland, Ohio 44106
SPECTOR, Dr. A., Black Bldg., Rm. 1516, Columbia University, College of Physicians and Surgeons, New York, New York 10032
SPIEGEL, Dr. EVELYN, Department of Biological Sciences, Dartmouth College, Hanover, New Hampshire 03755
SPIEGEL, Dr. MELVIN, Department of Biological Sciences, Dartmouth College, Hanover, New Hampshire 03755
SPIRITES, Dr. MORRIS ALBERT, Veterans' Administration Hospital, 1061 Perdido Street, New Orleans, Louisiana 70112
SPRAY, Dr. DAVID C., Department of Neuroscience, Albert Einstein College of Medicine, Bronx, New York 10461
STARZAK, Dr. MICHAEL E., Department of Chemistry, State University of New York, Binghamton, New York 13901
STEINBERG, Dr. MALCOLM S., Department of Biology, Princeton University, Princeton, New Jersey 08540
STEINHARDT, Dr. JACINTO, 306 Reiss Bldg., Georgetown University, Washington, D. C. 20007
STEPHENS, Dr. GROVER C., School of Biological Sciences, University of California, Irvine, California 92717
Stephens, Dr. Raymond E., Marine Biological Laboratory, Woods Hole, Massachusetts 02543
Stetten, Dr. Marjorie R., National Institutes of Health, Bldg. 10, 9B-02, Bethesda, Maryland 20014
Stokes, Dr. Darrell R., Department of Biology, Emory University, Atlanta, Georgia 30322
Stracher, Dr. Alfred, State University of New York, Downstate Medical Center, 450 Clarkson Avenue, Brooklyn, New York 11203
Strehler, Dr. Bernard I., 2310 N. Laguna Circle Dr., Agoura, California 91301
Stretton, Dr. Anthony O. W., Department of Zoology, University of Wisconsin, Madison, Wisconsin 53706
Stuart, Dr. Ann E., Department of Neurobiology, Harvard Medical School, 25 Shattuck St., Boston, Massachusetts 02115
Summers, Dr. William C., Huxley College, Western Washington State College, Bellingham, Washington 98225
Sussman, Dr. Maurice, Department of Life Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania 15260
Swope, Dr. Gerard, Jr., Blinn Road, Box 345, Croton-on-Hudson, New York 10520
Szabó, Dr. George, Harvard School of Dental Medicine, 188 Longwood Avenue, Boston, Massachusetts 02115
Szamier, Dr. Robert Bruce, Harvard Medical School, Berman-Gund Laboratory, Eye and Ear Infirmary, 243 Charles Street, Boston, Massachusetts 02114
Szent-Györgyi, Dr. Albert, Institute for Muscle Research, Marine Biological Laboratory, Woods Hole, Massachusetts 02543
Szent-Györgyi, Dr. Andrew G., Department of Biology, Brandeis University, Waltham, Massachusetts 02154
Takashima, Dr. Shiro, Department of Bioengineering, University of Pennsylvania, Philadelphia, Pennsylvania 19174
Tanzer, Dr. Marvin L., Department of Biochemistry, Box G, University of Connecticut, School of Medicine, Farmington, Connecticut 06032
Tasaki, Dr. Ichijo, Laboratory of Neurobiology, National Institute of Mental Health, National Institutes of Health, Bethesda, Maryland 20014
Taylor, Dr. Douglas L., The Biological Laboratories, Harvard University, Cambridge, Massachusetts 02138
Taylor, Dr. Robert E., Laboratory of Biophysics, National Institute of Neurological Diseases and Stroke, National Institutes of Health, Bethesda, Maryland 20014
Taylor, Dr. W. Rowland, 1540 Northbourne Rd., Baltimore, Maryland 21239
Telffer, Dr. William H., Department of Biology, University of Pennsylvania, Philadelphia, Pennsylvania 19174
deTerra, Dr. Noel, Department of Anatomy, Hahnemann Medical College, 230 N. Broad St., Philadelphia, Pennsylvania 19102
Thordike, W. Nicholas, Wellington Management Company, 28 State St., Boston, Massachusetts 02109
Tiffany, Dr. Wesley N., 226 Edge Hill Rd., Sharon, Massachusetts 02067
Trager, Dr. William, The Rockefeller University, 66th Street and York Avenue, New York, New York 10021
Travis, Dr. D. M., Department of Pharmacology, University of Florida, Gainesville, Florida 32601
Travis, Dr. Dorothy F., 733 Sligo Ave., Apt. 503, Silver Spring, Maryland 20910
Trinkaus, Dr. J. Philip, Osborn Zoological Laboratories, Department of Zoology, Yale University, New Haven, Connecticut 06510
Troll, Dr. Walter, Department of Environmental Medicine, New York University, College of Medicine, New York, New York 10016
Troxler, Dr. Robert F., Department of Biochemistry, Boston University School of Medicine, 80 E. Concord St., Boston, Massachusetts 02118
Turner, Dr. Ruth D., Mollusk Department, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts 02138
Tweedell, Dr. Kenyon S., Department of Biology, University of Notre Dame, Notre Dame, Indiana 46656
Uretz, Dr. Robert B., Division of Biological Sciences, University of Chicago, 950 E. 59th St., Box 417, Chicago, Illinois 60637
Valiela, Dr. Ivan, Boston University Marine Program, Marine Biological Laboratory, Woods Hole, Massachusetts 02543
Valois, John, Marine Biological Laboratory, Woods Hole, Massachusetts 02543
Van Holde, Dr. KensaL Edward, Department of Biochemistry and Biophysics, Oregon State University, Corvallis, Oregon 97331
Viliee, Dr. Claude A., Department of Biological Chemistry, Harvard Medical School, Boston, Massachusetts 02115
Vincent, Dr. Walter S., Chairman, Department of Biological Sciences, University of Delaware, Newark, Delaware 19711
Wainio, Dr. W. W., Bureau of Biological Research, Rutgers University, New Brunswick, New Jersey 08901
Waksman, Dr. Bryon, Department of Pathology, Yale University, New Haven, Connecticut 06510
Walker, Dr. Charles A., 3113 Shamrock South, Tallahasee, Florida 32303
Wall, Dr. Betty J., Marine Biological Laboratory, Woods Hole, Massachusetts 02543
Wallace, Dr. Robin A., P. O. Box Y., Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830
Wang, Dr. A., Bedford Road, Lincoln, Massachusetts 01773
Warner, Dr. Robert C., Department of Molecular and Cell Biology, University of California, Irvine, California 92717
Warren, Dr. Leonard, Department of Therapeutic Research, Anatomy-Chemistry Bldg., Rm. 337, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania 19174
Waterman, Dr. T. H., 610 Kline Biology Tower, Yale University, New Haven, Connecticut 06520
Watson, Dr. Stanley Wayne, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543
Webb, Dr. H. Marguerite, Department of Biological Sciences, Goucher College, Towson, Maryland 21204
Weber, Dr. Annemarie, Department of Biochemistry, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania 19174
Webster, Dr. Ferris, Associate Director for Research, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543
REPORT OF THE DIRECTOR

WEIDNER, DR. EARL, Department of Zoology and Physiology, Louisiana State University, Baton Rouge, Louisiana 70803

WEISS, DR. LEON P., Department of Animal Biology, University of Pennsylvania, School of Veterinary Medicine, Philadelphia, Pennsylvania 19174

WEISSMANN, DR. GERALD, Professor of Medicine, New York University, 550 First Avenue, New York, New York 10016

WERMAN, DR. ROBERT, Department of Zoology, Hebrew University, Jerusalem, Israel

WHITTAKER, DR. J. RICHARD, Wistar Institute for Anatomy and Biology, 36th Street at Spruce, Philadelphia, Pennsylvania 19174

WIERCINSKI, DR. FLOYD J., Department of Biology, Northeastern Illinois University, Chicago, Illinois 60625

WIGLEY, DR. ROLAND L., National Marine Fisheries Service, Woods Hole, Massachusetts 02543

WILBER, DR. C. G., Chairman, Department of Zoology, Colorado State University, Fort Collins, Colorado 80521

WILSON, DR. DARCY B., Department of Pathology, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania 19174

WILSON, DR. EDWARD O., Department of Zoology, Harvard University, Cambridge, Massachusetts 02138

WILSON, DR. T. HASTINGS, Department of Physiology, Harvard Medical School, Boston, Massachusetts 02115

WILSON, DR. WALTER L., Department of Biology, Oakland University, Rochester, Michigan 48063

WITKOVSKY, DR. PAUL, Department of Anatomical Sciences, Health Science Center, State University of New York at Stony Brook, Stony Brook, New York 11794

WITTENBERG, DR. JONATHAN B., Department of Physiology and Biochemistry, Albert Einstein College of Medicine, New York, New York 10461

WOELKERLING, DR. WILLIAM J., Department of Botany, Latrobe University, Bundoora, Victoria, Australia 3083

WOLF, DR. DON P., University of Pennsylvania, School of Medicine, 314 Medical Labs 6/3, Philadelphia, Pennsylvania 19174

WOODWELL, DR. GEORGE M., Director, The Ecosystems Center, Marine Biological Laboratory, Woods Hole, Massachusetts 02543

WYTTEBACH, DR. CHARLES R., Department of Physiology and Cell Biology, University of Kansas, Lawrence, Kansas 66045

YNTEMA, DR. C. L., Department of Anatomy, State University of New York, Upstate Medical Center, Syracuse, New York 13210

YOUNG, DR. DAVID K., Department of the Navy, NORDA, Code 334, NSTL Station, Missouri 35929

YPHANTIS, DR. DAVID A., Department of Biochemistry and Biophysics, University of Connecticut, Storrs, Connecticut 06268

ZIGMAN, DR. SEYMOUR, University of Rochester School of Medicine and Dentistry, 260 Crittenden Boulevard, Rochester, New York 14620

ZIMMERMAN, DR. A. M., Department of Zoology, University of Toronto, Toronto 5, Ontario, Canada

ZWEIFACH, DR. BENJAMIN W., % Ames, University of California, San Diego, La Jolla, California 92037
Associate Members

Abelson, Dr. and Mrs. Philip H.
Acheson, Dr. and Mrs. George
Ackroyd, Dr. and Mrs. Frederick W.
Adelberg, Dr. and Mrs. Edward A.
Adelman, Dr. and Mrs. William J.
Ahearn, Mr. and Mrs. David C.
Allen, Miss Camilla K.
Allen, Mrs. A. D.
Allen, Mrs. Robert D.
Amerson, Mrs. William R.
Armstrong, Dr. Philip
Armstrong, Dr. and Mrs. Samuel C.
Arnold, Dr. and Mrs. John
Atwood, Dr. and Mrs. Kimball C.
Bacon, Mr. Robert
Ball, Dr. and Mrs. Eric G.
Ballantine, Dr. and Mrs. H. T., Jr.
Bang, Dr. and Mrs. Frederick B.
Banks, Mrs. and Mrs. W. L.
Barrows, Mrs. Albert W.
Bennett, Mrs. George F.
Bennett, Dr. and Mrs. Michael V. L.
Bernstein, Mr. and Mrs. Herman
Bernheimer, Dr. Alan W.
Bigelow, Mrs. Robert
Blackburn, Dr. and Mrs. George L.
Bodeen, Mr. and Mrs. George H.
Boettger, Dr. and Mrs. Edward G.
Bolton, Mr. and Mrs. Thomas C.
Borgesee, Mrs. Thomas A.
Botkin, Dr. Daniel B.
Bowles, Mr. and Mrs. Francis P.
Bradley, Dr. and Mrs. Charles C.
Bronson, Mr. and Mrs. Samuel C.
Brown, Dr. and Mrs. Dugald E. S.
Brown, Dr. and Mrs. F. A., Jr.
Brown, Dr. and Mrs. Thornton
Buck, Mrs. John B.
Buffington, Mrs. Alice H.
Buffington, Mrs. George
Burger, Dr. and Mrs. Max M.
Burrrough, Mrs. Arnold H.
Burt, Mr. and Mrs. Charles E.
Butler, Mr. and Mrs. Rhett W.
Butler, Mrs. E. G.
Calkins, Mr. and Mrs. G. N., Jr.
Campbell, Mr. and Mrs. Worthington, Jr.
Carlson, Dr. and Mrs. Francis
Carlton, Mr. and Mrs. Winslow G.
Cashman, Mr. and Mrs. Eugene R.
Chambers, Dr. and Mrs. Edward L.
Cheney, Dr. Ralph H.
Claff, Mr. and Mrs. Mark
Clark, Dr. and Mrs. Arnold M.
Clark, Mr. and Mrs. Hays
Clark, Mrs. James McC.
Clark, Dr. and Mrs. Leonard B.
Clark, Mr. and Mrs. W. Van Alan
Clement, Dr. and Mrs. A. C.
Clowes Fund, Inc.
Clowes, Mr. Allen W.
Clowes, Dr. and Mrs. G. H. A., Jr.
Cohen, Dr. and Mrs. Seymour
Connell, Mr. and Mrs. W. J.
Cooper, Mr. and Mrs. John H., Jr.
Copeland, Mrs. D. Eugene
Copeland, Mr. and Mrs. Preston S.
Costello, Mrs. Donald P.
Cramer, Mr. and Mrs. Ian D. W.
Crane, Mr. John
Crane, Josephine Foundation
Crane, Mrs. W. Carey
Cross, Mr. and Mrs. Norman C.
Crossley, Mr. and Mrs. Archibald M.
Crowell, Dr. and Mrs. Sears
Curtis, Dr. and Mrs. W. D.
Daignault, Mr. and Mrs. A. T.
Daniels, Mr. and Mrs. Bruce G.
Daniels, Mrs. F. Harold
Day, Mr. and Mrs. Pomeroy
DuBois, Dr. and Mrs. A. B.
Dunkerley, Mr. and Mrs. Gordon H.
DuPont, Mr. A. Felix, Jr.
Dyer, Mr. and Mrs. Arnold W.
Eastman, Mr. and Mrs. Charles E.
Ebert, Dr. and Mrs. James D.
Egloff, Dr. and Mrs. F. R. L.
Elliott, Mrs. Alfred M.
Elsmith, Mrs. Dorothy O.
Epel, Mrs. David
Evans, Mr. and Mrs. Dudley
Ewing, Dr. and Mrs. Gifford C. 
Fenno, Mrs. Edward N. 
Ferguson, Dr. and Mrs. J. J., Jr. 
Fine, Dr. and Mrs. Jacob 
Firestone, Mr. and Mrs. Edwin 
Fisher, Mrs. B. C. 
Fisher, Mr. Frederick S., III 
Fisher, Dr. and Mrs. Saul H. 
Francis, Mr. and Mrs. Lewis W., Jr. 
Fries, Dr. and Mrs. E. F. B. 
Fuller, Mr. and Mrs. Bennett B. 
Fye, Dr. and Mrs. Paul M. 
Gabriel, Dr. and Mrs. Mordecai L. 
Gaiser, Dr. and Mrs. David W. 
Garfield, Miss Eleanor 
Garrey, Dr. and Mrs. Walter 
Gellis, Dr. and Mrs. Sydney 
German, Dr. and Mrs. James L., III 
Gifford, Mr. and Mrs. John A. 
Gifford, Dr. and Mrs. Prosser 
Gilbert, Dr. and Mrs. Daniel L. 
Gildea, Dr. Margaret C. L. 
Gillette, Mr. and Mrs. Robert S. 
Glass, Dr. and Mrs. H. Bentley 
Glazebrook, Mrs. James R. 
Glusman, Dr. and Mrs. Murray 
Goldman, Dr. and Mrs. Allen S. 
Goldring, Dr. Irene P. 
Goldstein, Mrs. Moise H., Jr. 
Grant, Dr. and Mrs. Philip 
Grassle, Mr. and Mrs. J. K. 
Green, Miss Gladys M. 
Greene, Mr. and Mrs. William C. 
Greer, Mr. and Mrs. W. H., Jr. 
Greif, Dr. and Mrs. Roger L. 
Grosch, Dr. and Mrs. Daniel S. 
Gross, Mrs. Paul R. 
Gruson, Mrs. Martha 
Gunning, Mr. and Mrs. Robert 
Halvorson, Dr. and Mrs. Harlyn O. 
Handler, Dr. and Mrs. Philip 
Harvey, Dr. and Mrs. Edmund N., Jr. 
Harvey, Dr. and Mrs. Richard B. 
Haskins, Mrs. Caryl P. 
Hassett, Dr. and Mrs. Charles 
Hastings, Mrs. J. Woodland 
Hawkins, Mr. Richard H. III 
Heffron, Dr. and Mrs. Roderick 

Henley, Dr. Catherine 
Hiam, Mr. and Mrs. E. W. 
Hiatt, Dr. and Mrs. Howard 
Hibbard, Miss Hope 
Hill, Mrs. Samuel E. 
Hilsinger, Mr. and Mrs. Arthur 
Hirschfeld, Mrs. Nathan B. 
Hobie, Dr. and Mrs. John 
Hocker, Mr. and Mrs. Lon 
Hopkins, Mrs. Hoyt S. 
Horwitz, Dr. and Mrs. Norman H. 
Hough, Mrs. George A., Jr. 
Houston, Mr. and Mrs. Howard E. 
Huettner, Dr. and Mrs. Robert 
Hunziker, Mr. and Mrs. Herbert E. 
Hutchinson, Mr. and Mrs. John 
Hynes, Mrs. Nicole E. 
Inoué, Mrs. Shinya 
Ireland, Mrs. Herbert A. 
Issokson, Mr. and Mrs. Israel 
Ivens, Dr. Sue 
Janney, Mrs. Wistar 
Jewett, G. F., Foundation 
Jewett, Mr. and Mrs. G. F., Jr. 
Jones, Mr. and Mrs. Dewitt, III 
Jordan, Dr. and Mrs. Edwin P. 
Kaan, Dr. Helen W. 
Kahler, Mr. and Mrs. George A. 
Kahler, Mrs. Robert W. 
Kaighn, Dr. Morris E. 
Kaminer, Mrs. Benjamin 
Karush, Dr. and Mrs. Fred 
Keith, Mr. Jean R. 
Kesosian, Mrs. Jessie 
Kien, Mr. and Mrs. Pieter 
Kingwell, The Rev. and Mrs. Wilbur J. 
Kinnard, Mr. and Mrs. L. R. 
Kivy, Dr. and Mrs. Peter 
Koelsch, Mr. and Mrs. Herbert 
Kohn, Dr. and Mrs. Henry I. 
Koller, Dr. and Mrs. Lewis R. 
Kris, Dr. and Mrs. Anton O. 
Kuffler, Mrs. Stephen W. 
Laderman, Mr. and Mrs. Ezra 
Lash, Dr. and Mrs. James 
Laster, Dr. and Mrs. Leonard 
Lauffer, Dr. and Mrs. Hans 
Lawrence, Mr. Frederick V.
LOEB, MRS. LUCY B.
LENNER, MR. AND MRS. SAMUEL
LEVINE, DR. AND MRS. RACHMIEL
LEVENDAL, MS. MONIKA MEYER
LEWIS, MR. T. HOHN
LILLIE, MRS. KARL C.
LILLY, MR. AND MRS. JOSIAH K., III
LOBB, PROF. JOHN
LOEB, MRS. ROBERT F.
LONG, MRS. G. C.
LORAND, MRS. LASZLO
LOWENGARD, MRS. JOSEPH
LOWE, DR. AND MRS. CHARLES W.
Luria, DR. AND MRS. S. E.
MACKY, MR. AND MRS. WILLIAM K.
MACLEISH, MRS. WILLIAM
MACNARY, MR. B. GLENN
MACNICHOL, DR. AND MRS. EDWARD F., JR.
MAHER, MISS ANNE CAMILLE
MARKS, DR. AND MRS. PAUL A.
MARSLAND, DR. AND MRS. DOUGLAS
MARTYNA, MR. AND MRS. JOSEPH
MARVIN, DR. DOROTHY H.
MAUSER, DR. AND MRS. MORTON
MASTROIANNI, DR. AND MRS. L., JR.
MATHER, MR. AND MRS. FRANK J., III
MATTHIessen, MR. AND MRS. G. C.
MAVOR, MRS. JAMES W., SR.
MCCUSKER, MR. AND MRS. PAUL T.
MCELROY, MRS. NELLA W.
MCGILICUDDY, DR. AND MRS. J. J.
MCLANE, MRS. T. THORNE
MEIGS, MR. AND MRS. ARTHUR
MEIGS, DR. AND MRS. J. WISTER
MELILLO, DR. AND MRS. JERRY
THE MELLON FOUNDATION
METZ, MRS. CHARLES B.
MEYERS, MR. AND MRS. RICHARD
MILLER, DR. DANIEL A.
MIXTER, MR. AND MRS. W. J., JR.
MONTGOMERY, DR. AND MRS. CHARLES H.
MOORE, MRS. JOHN W.
MORSE, MR. AND MRS. CHARLES L., JR.
MORSE, MR. AND MRS. RICHARD S.
MOSES, MR. AND MRS. GEORGE L.
MOUL, MRS. EDWIN T.
NEUBERGER, MRS. HARRY H.
NEWTON, C. H., BUILDERS, INC.
NEWTON, MISS HELEN K.
NICHOLS, MRS. GEORGE
NICKERSON, MR. AND MRS. FRANK L.
NORMAN, MR. AND MRS. ANDREW E.
NORMANDIE FOUNDATION
O'HERRON, MR. AND MRS. JONATHAN
OLMSTED, MR. AND MRS. CHRISTOPHER
ORTINS, MR. ARMAND
PAPAS, DR. AND MRS. GEORGE D.
PARK, MR. AND MRS. FRANKLIN A.
PARK, MR. AND MRS. MALCOLM S.
PARMENTIER, MISS CAROLYN L.
PARMENTIER, MR. GEORGE L.
PATTEN, MRS. BRADLEY M.
PECAN, MS. ERENE V.
PENDERGAST, MRS. CLAUDIA
PENDELTON, DR. AND MRS. MURRAY E.
PENNINGTON, MISS ANNE H.
PERKINS, MR. AND MRS. COURTLAND D.
PERSO, DR. AND MRS. PHILIP
PETERSON, MR. AND MRS. E. GUNNAR
PETERSON, MR. AND MRS. JOEL
PHILIPPE, MR. AND MRS. PIERRE
PORTER, DR. AND MRS. KEITH R.
PROSSER, MRS. C. LADD
PUTNAM, MR. ALLAN RAY
PUTNAM, MR. AND MRS. W. A., III
RATCLIFFE, MR. THOMAS G., JR.
RAYMOND, DR. AND MRS. SAMUEL
READ, MS. LEE
REDFIELD, DR. AND MRS. ALFRED C.
RENEK, MR. AND MRS. MORRIS
REYNOLDS, DR. AND MRS. GEORGE
REYNOLDS, MR. AND MRS. JAMES T.
REZNIKOFF, DR. AND MRS. PAUL
RIGGS, MR. AND MRS. LAWRAISON, III
RIINA, MR. AND MRS. JOHN R.
ROBB, MS. ALISON A.
ROBERTSON, MRS. C. STUART
ROBERTSON, DR. AND MRS. C. W.
ROBINSON, DR. AND MRS. DENIS M.
ROGERS, MRS. JULIAN
ROOT, MRS. WALTER S.
ROSS, MRS. JOHN
ROWE, MRS. WILLIAM S.
REPORT OF THE TREASURER

Rubin, Dr. Joseph
Rugh, Mrs. Roberts
Russell, Mr. and Mrs. Henry D.
Ryder, Mr. and Mrs. Francis C.
Saunders, Dr. and Mrs. John W.
Saunders, Mrs. Lawrence
Savery, Mr. Robert
Sawyer, Mr. and Mrs. John E.
Schlesinger, Mrs. R. Walter
Scott, Mrs. George T.
Scott, Mrs. Norman
Sears, Mr. and Mrs. Harold B.
Segal, Dr. and Mrs. Sheldon
Shapiro, Mrs. Harriet S.
Sheinin, Dr. and Mrs. David
Sheprow, Dr. and Mrs. David
Sherman, Dr. and Mrs. Irwin
Simkins, Mrs. Willard S.
Slater, Mr. David
Smith, Mr. and Mrs. Dietrich C.
Smith, Mrs. Homer P.
Smith, Mr. and Mrs. Robert I.
Smith, Mr. VanDorn C.
Snider, Mr. Eliot
Sonnebend, Mr. and Mrs. Paul
Stracher, Dr. and Mrs. Alfred
Steinbach, Dr. and Mrs. H. B.
Stetten, Dr. and Mrs. Dewitt, Jr.
Stone, Dr. and Mrs. William
Stuart, Ann
Stunkard, Dr. Horace
Swanson, Dr. and Mrs. Carl P.
Swope, Mr. and Mrs. Gerard L.
Swope, Mr. and Mrs. Gerard, Jr.
Swope, Miss Henrietta H.
Tanner, Dr. and Mrs. Harvey A.
Tartakoff, Dr. Helen
Taylor, Dr. and Mrs. W. Randolph
Tietje, Mr. and Mrs. Emil D., Jr.
Tittler, Mrs. Sylvia
Todd, Mr. and Mrs. Gordon F.
Tolkan, Mr. and Mrs. Norman N.
Tomkins, Mrs. B. A.
Trager, Mrs. William
Troll, Dr. and Mrs. Walter
Tully, Mr. and Mrs. Gordon F.
Valois, Mr. and Mrs. John
Veeder, Mrs. Ronald A.
Vincent, Mrs. Walter S.
Waksman, Dr. and Mrs. Bryon H.
Ware, Mr. and Mrs. J. Lindsay
Warren, Dr. and Mrs. Shields
Watt, Mr. and Mrs. John B.
Weisberg, Mr. and Mrs. Alfred M.
Wengren, Mr. Richard
Wexler, Robert H. Foundation
Wheatley, Dr. Marjorie A.
Wheeler, Dr. and Mrs. Paul S.
Wheeler, Dr. and Mrs. Ralph E.
Whitney, Mr. and Mrs. Geoffrey G., Jr.
Wichterman, Dr. and Mrs. Ralph
Wickersham, Mr. and Mrs. A. A.
Tilney
Wickersham, Mrs. James H., Jr.
Wilhelm, Dr. Hazel S.
Wilson, Mr. and Mrs. Robert E., Jr.
Witmer, Dr. and Mrs. Enos E.
Wolfsohn, Mr. and Mrs. Wolfe
Woodwell, Mrs. George
Yntema, Dr. and Mrs. Wolfe
Zinn, Dr. and Mrs. Chester L.
Zwill, Mrs. Edgar

VI. REPORT OF THE LIBRARIAN

This year we received some relief in the crowded stack area. Dr. Gross approved the purchase of 300 additional metal shelves to be added to the top stack in the wing. This stack was not filled to capacity when originally built, so we were able to fit nine banks of shelving along each side and five banks at the back without crowding the Reserve Desks on the top floor. This new shelf space will hold approximately three years' growth in journal acquisitions. Before the end of that period we expect to have additional space in the Lillie Building made available to the Library.

Relief for Library salaries was also achieved this year. Specific MBL employee salaries were presented to the Members of the Board and Executive Com-
mittee. The result was increased salaries for many, somewhat comparable to those at the Woods Hole Oceanographic Institution.

A thorough inventory of the book section revealed a total of 25,000 volumes. When added to the journal collection, the complete volume count is now 180,000.

For this annual printed record, I would like to include a part of the preface of Dr. Stephen J. Gould's new book, "Ontogeny and Phylogeny," Harvard University Press, 1977:

"... and, above all, to an institution that has its own humanity and seems to me more an organism than a place—the Library of the Marine Biological Laboratory at Woods Hole. Where else would an idiosyncratic worker like me find a library open all the time, free from the rules and bureaucracy that stifle scholarship and "protect" books only by guarding them from use. It is an anomaly in a suspicious and anonymous age. May it survive as it is, despite all the improbabilities."

VII. REPORT OF THE TREASURER

I am pleased to report that the Marine Biological Laboratory made progress in 1978 in reducing its operating deficit. In 1978, the operating loss was $35,454, a reduction from $85,414 in 1977. Operating results excluded approximately $282,000 of depreciation charges recorded in each year.

Total revenues in 1978 amounted to $2,502,077, an increase of $420,583 over the prior year. The principal sources of the increased revenues were higher tuition as the result of expanded programs and increased overhead recovery due to a 5% increase in the overhead rate, coupled with increased year-round occupancy. In addition, unrestricted gifts increased by almost $100,000.

Total 1978 expenses amounted to $2,537,531, an increase of $370,623 over 1977. This increase was principally due to performing critical plant repairs which had been deferred in prior years for budgetary reasons, expansion of the Continuing Education programs begun in late 1977, the addition of two new course offerings, and a significant increase in the volume of the Chemical Room. Of this $2,537,531, recurring operating expenses represented $2,418,697, an increase of $251,789, or 12%, over 1977. In our report last year, we mentioned that our 1978 budget anticipated that such expenses would increase only 5% from the 1977 level. This unanticipated and unfavorable variation in the expense budget is mainly attributable to the additional Continuing Education course offerings and greater volume in the Chemical Room—both of which generated additional offsetting revenues.

Investment income amounted to $341,846 in 1978, an increase of 6% over 1977. Total investments at December 31, 1978 were valued at $5,605,947 at market and $5,739,745 at cost. The return, as a percentage of average market value, was 6.2%.

As was mentioned to you last year, methods of improving the rate of return on investments were to be examined during 1978. Accordingly, based on the recommendation of the Investment Committee, the Executive Committee, at its February 1979 meeting, appointed Standish, Ayer & Wood, Inc. of Boston to be the investment advisor for all of the Laboratory's investment portfolios.

We have budgeted in 1979 for a further reduction in the operating deficit and our objective for 1980 is to record a modest surplus.
The following is a statement of the auditors:

To the Trustees of Marine Biological Laboratory, Woods Hole, Massachusetts:

We have examined the balance sheets of Marine Biological Laboratory as of December 31, 1978 and 1977, and the related statements of current funds revenues, expenditures, and other changes and changes in fund balances for the years then ended. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included confirmation from the custodians of securities owned at December 31, 1978 and 1977, and such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

As more fully described in Note B to the financial statements, the Laboratory excludes certain costs of buildings and equipment from the balance sheet. In our opinion, generally accepted accounting principles require that such costs be included as investment in plant in the financial statements.

In our opinion, except for the effects on the financial statements of the matter discussed in the preceding paragraph, the aforementioned financial statements present fairly the financial position of Marine Biological Laboratory at December 31, 1978 and 1977, and its current funds revenues, expenditures and other changes and the changes in fund balances for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

Our examinations were made primarily for the purpose of rendering an opinion on the basic financial statements (pages 94 to 99, inclusive), taken as a whole. The summary of investments (page 102) although not considered necessary for a fair presentation of the financial position at December 31, 1978 and 1977, current fund revenues, expenditures and other changes, and the changes in fund balances for the years then ended in accordance with generally accepted accounting principles, is presented primarily for purposes of supplementary analysis. This additional information has been subjected to the audit procedures applied in the examination of the basic financial statements and, in our opinion, is fairly stated in all material respects in relation to the basic financial statements taken as a whole.

Boston, Massachusetts
March 30, 1979

Coopers & Lybrand
### Balance Sheets

#### December 31, 1978 and 1977

**Assets**

<table>
<thead>
<tr>
<th></th>
<th>1978</th>
<th>1977</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Funds:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unrestricted:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash, including deposits at interest</td>
<td>$382,396</td>
<td>$517,513</td>
</tr>
<tr>
<td>Accounts receivable, net of allowance for uncollectible accounts of $4,500 in 1978 and $12,955 in 1977</td>
<td>$699,708</td>
<td>$540,743</td>
</tr>
<tr>
<td>Other assets</td>
<td>$15,367</td>
<td>$15,996</td>
</tr>
<tr>
<td>Due to restricted current funds</td>
<td>(278,075)</td>
<td>(294,485)</td>
</tr>
<tr>
<td>Due from invested funds</td>
<td>103,248</td>
<td>105,133</td>
</tr>
<tr>
<td>Total unrestricted</td>
<td>$922,644</td>
<td>$884,900</td>
</tr>
<tr>
<td>Restricted:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>$18,973</td>
<td>$87,013</td>
</tr>
<tr>
<td>Investments, at cost; market value: 1978—$1,297,551; 1977—$1,118,917 (Note A, Schedule I)</td>
<td>$1,297,530</td>
<td>$1,112,683</td>
</tr>
<tr>
<td>Due from unrestricted current fund</td>
<td>278,075</td>
<td>294,485</td>
</tr>
<tr>
<td>Due from invested funds</td>
<td>260,967</td>
<td>173,191</td>
</tr>
<tr>
<td>Total restricted</td>
<td>$1,855,545</td>
<td>$1,667,372</td>
</tr>
<tr>
<td>Total current funds</td>
<td>$2,778,189</td>
<td>$2,552,272</td>
</tr>
<tr>
<td><strong>Invested Funds:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>$6,982</td>
<td>$102,031</td>
</tr>
<tr>
<td>Investments, at cost; market value: 1978—$3,950,184; 1977—$3,799,434 (Note A, Schedule I)</td>
<td>$4,084,003</td>
<td>$3,822,798</td>
</tr>
<tr>
<td>Due to unrestricted current fund</td>
<td>(103,248)</td>
<td>(105,133)</td>
</tr>
<tr>
<td>Due to restricted current funds</td>
<td>(260,967)</td>
<td>(173,191)</td>
</tr>
<tr>
<td>Total invested funds</td>
<td>$3,726,770</td>
<td>$3,646,505</td>
</tr>
<tr>
<td><strong>Plant Fund:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land, buildings and equipment at cost (Note B)</td>
<td>$12,421,929</td>
<td>$12,374,587</td>
</tr>
<tr>
<td>Less accumulated depreciation</td>
<td>$4,060,407</td>
<td>$3,778,545</td>
</tr>
<tr>
<td>Total plant fund</td>
<td>$8,361,522</td>
<td>$8,596,042</td>
</tr>
</tbody>
</table>

The accompanying notes are an integral part of the financial statements.
REPORT OF THE TREASURER

MARINE BIOLOGICAL LABORATORY

Balance Sheets

December 31, 1978 and 1977

<table>
<thead>
<tr>
<th>Liabilities and Fund Balances</th>
<th>1978</th>
<th>1977</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Funds:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unrestricted:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts payable and accrued expenses</td>
<td>$316,657</td>
<td>$195,418</td>
</tr>
<tr>
<td>Deferred income</td>
<td>61,432</td>
<td>62,131</td>
</tr>
<tr>
<td>Fund balance</td>
<td>544,555</td>
<td>627,351</td>
</tr>
<tr>
<td>Total unrestricted</td>
<td>$922,644</td>
<td>884,900</td>
</tr>
<tr>
<td><strong>Restricted:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fund balances:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unexpended gifts and grants</td>
<td>1,777,677</td>
<td>1,597,841</td>
</tr>
<tr>
<td>Unexpended income of endowment funds</td>
<td>77,868</td>
<td>69,531</td>
</tr>
<tr>
<td>Total restricted</td>
<td>1,855,545</td>
<td>1,667,372</td>
</tr>
<tr>
<td>Total current funds</td>
<td>$2,778,189</td>
<td>$2,552,272</td>
</tr>
<tr>
<td><strong>Invested Funds:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endowment funds</td>
<td>2,174,027</td>
<td>2,172,160</td>
</tr>
<tr>
<td>Quasi-endowment funds</td>
<td>934,143</td>
<td>934,143</td>
</tr>
<tr>
<td>Retirement fund (Note C)</td>
<td>618,600</td>
<td>540,202</td>
</tr>
<tr>
<td>Total invested funds</td>
<td>$3,726,770</td>
<td>$3,646,505</td>
</tr>
<tr>
<td><strong>Plant Fund:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invested in plant</td>
<td>$8,361,522</td>
<td>8,596,042</td>
</tr>
<tr>
<td>Total plant fund</td>
<td>$8,361,522</td>
<td>8,596,042</td>
</tr>
</tbody>
</table>

The accompanying notes are an integral part of the financial statements.
MARINE BIOLOGICAL LABORATORY

STATEMENTS OF CURRENT FUNDS REVENUES, EXPENDITURES, AND OTHER CHANGES
for the years ended December 31, 1978 and 1977

<table>
<thead>
<tr>
<th></th>
<th>Unrestricted</th>
<th></th>
<th>Restricted</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruction:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuition</td>
<td>$ 236,391</td>
<td>$ 164,495</td>
<td>$ 43,100</td>
<td>$ 35,200</td>
<td>$ 279,491</td>
<td>$ 199,695</td>
</tr>
<tr>
<td>Grants and contracts:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>7,360</td>
<td>7,468</td>
<td>215,759</td>
<td>128,197</td>
<td>223,119</td>
<td>135,665</td>
</tr>
<tr>
<td>Private</td>
<td></td>
<td></td>
<td>70,446</td>
<td>33,258</td>
<td>70,446</td>
<td>33,258</td>
</tr>
<tr>
<td>Research:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory rentals</td>
<td>503,576</td>
<td>424,631</td>
<td></td>
<td></td>
<td>503,576</td>
<td>424,631</td>
</tr>
<tr>
<td>Grants and contracts:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>206,741</td>
<td>166,970</td>
<td>861,515</td>
<td>646,497</td>
<td>1,068,256</td>
<td>813,467</td>
</tr>
<tr>
<td>Private</td>
<td>90,550</td>
<td>84,917</td>
<td>390,692</td>
<td>457,896</td>
<td>481,242</td>
<td>542,813</td>
</tr>
<tr>
<td>Dining Hall</td>
<td>157,270</td>
<td>134,454</td>
<td></td>
<td></td>
<td>157,270</td>
<td>134,454</td>
</tr>
<tr>
<td>Library</td>
<td>135,028</td>
<td>126,652</td>
<td></td>
<td></td>
<td>135,028</td>
<td>126,652</td>
</tr>
<tr>
<td>Biological Bulletin</td>
<td>86,171</td>
<td>85,430</td>
<td></td>
<td></td>
<td>86,171</td>
<td>85,430</td>
</tr>
<tr>
<td>Support departments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Services</td>
<td>187,741</td>
<td>142,420</td>
<td></td>
<td></td>
<td>187,741</td>
<td>142,420</td>
</tr>
<tr>
<td>Marine resources</td>
<td>79,822</td>
<td>85,131</td>
<td></td>
<td></td>
<td>79,822</td>
<td>85,131</td>
</tr>
<tr>
<td>Investment income</td>
<td>159,703</td>
<td>158,361</td>
<td>41,417</td>
<td>39,359</td>
<td>201,120</td>
<td>197,720</td>
</tr>
<tr>
<td>Gifts</td>
<td>240,563</td>
<td>158,850</td>
<td>132,864</td>
<td>101,013</td>
<td>373,427</td>
<td>259,863</td>
</tr>
<tr>
<td>Other</td>
<td>91,141</td>
<td>56,430</td>
<td></td>
<td></td>
<td>91,141</td>
<td>56,430</td>
</tr>
<tr>
<td>Total revenues</td>
<td>2,502,077</td>
<td>2,081,494</td>
<td>1,755,793</td>
<td>1,441,420</td>
<td>4,257,870</td>
<td>3,522,914</td>
</tr>
</tbody>
</table>

ANNUAL REPORT OF THE MARINE BIOLOGICAL LABORATORY
### Operating expenditures:

<table>
<thead>
<tr>
<th>Service</th>
<th>Unrestricted</th>
<th>Restricted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction</td>
<td>194,993</td>
<td>123,037</td>
<td>414,580</td>
</tr>
<tr>
<td>Research</td>
<td>3,813</td>
<td>1,386</td>
<td>216,958</td>
</tr>
<tr>
<td>Scholarships and stipends</td>
<td>135,769</td>
<td>140,358</td>
<td>135,769</td>
</tr>
<tr>
<td>Dormitory</td>
<td>149,249</td>
<td>130,349</td>
<td>149,249</td>
</tr>
<tr>
<td>Library</td>
<td>235,401</td>
<td>208,149</td>
<td>258,158</td>
</tr>
<tr>
<td>Biological Bulletin</td>
<td>87,273</td>
<td>77,165</td>
<td>87,273</td>
</tr>
<tr>
<td>Support departments:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research services</td>
<td>354,485</td>
<td>305,847</td>
<td>379,885</td>
</tr>
<tr>
<td>Marine resources</td>
<td>218,794</td>
<td>216,278</td>
<td>218,828</td>
</tr>
<tr>
<td>Administration</td>
<td>514,004</td>
<td>462,479</td>
<td>518,467</td>
</tr>
<tr>
<td>Plant operation</td>
<td>643,550</td>
<td>501,860</td>
<td>645,713</td>
</tr>
<tr>
<td><strong>Total expenditures</strong></td>
<td><strong>2,537,531</strong></td>
<td><strong>2,166,908</strong></td>
<td><strong>4,293,324</strong></td>
</tr>
<tr>
<td>Excess of expenditures over revenues</td>
<td>(35,454)</td>
<td>(85,414)</td>
<td></td>
</tr>
</tbody>
</table>

### Transfers and additions:

<table>
<thead>
<tr>
<th>Description</th>
<th>Unrestricted</th>
<th>Restricted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excess of restricted gifts, grants and investment income received over amounts expended</td>
<td>3,000</td>
<td>188,173</td>
<td>188,173</td>
</tr>
<tr>
<td>From plant fund—proceeds of sale of plant assets</td>
<td>(47,342)</td>
<td>335,469</td>
<td>(47,342)</td>
</tr>
<tr>
<td>To plant fund—donated unrestricted real estate</td>
<td></td>
<td>188,173</td>
<td>188,173</td>
</tr>
<tr>
<td>From quasi-endowment fund</td>
<td>300</td>
<td>99,834</td>
<td>300</td>
</tr>
<tr>
<td><strong>Net transfers and additions</strong></td>
<td><strong>(47,342)</strong></td>
<td><strong>338,469</strong></td>
<td><strong>140,831</strong></td>
</tr>
<tr>
<td>Net increase (decrease) in fund balances</td>
<td>$ (82,796)</td>
<td>$ 253,055</td>
<td>$ 105,377</td>
</tr>
</tbody>
</table>

The accompanying notes are an integral part of the financial statements.
## MARINE BIOLOGICAL LABORATORY

### Statements of Changes in Fund Balances
for the years ended December 31, 1978 and 1977

<table>
<thead>
<tr>
<th></th>
<th>1977 Current Funds</th>
<th></th>
<th>1977 Invested Funds</th>
<th></th>
<th>1977 Plant Fund</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unrestricted</td>
<td>Restricted</td>
<td>Endowment</td>
<td>Endowment</td>
<td>Retirement</td>
</tr>
<tr>
<td>Balances at December 31, 1976</td>
<td>$374,296</td>
<td>$1,567,538</td>
<td>$2,147,067</td>
<td>$1,260,509</td>
<td>$488,245</td>
</tr>
<tr>
<td>Increases:</td>
<td></td>
<td></td>
<td>25,093</td>
<td>9,103</td>
<td>20,966</td>
</tr>
<tr>
<td>Unrestricted current fund revenues</td>
<td>2,081,494</td>
<td></td>
<td>1,622,821</td>
<td></td>
<td>29,000</td>
</tr>
<tr>
<td>Grants and gifts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Realized net gains on sale of investments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proceeds of sale of equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Addition to pension fund</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50,150</td>
</tr>
<tr>
<td>Decreases:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruction, research and general expenditures</td>
<td>(2,166,908)</td>
<td>(1,441,420)</td>
<td>(259,355)</td>
<td></td>
<td>(19,159)</td>
</tr>
<tr>
<td>Indirect costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(281,291)</td>
</tr>
<tr>
<td>Payments to pensioners</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfers—additions (deductions):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proceeds of sale of equipment</td>
<td>3,000</td>
<td></td>
<td></td>
<td></td>
<td>(3,000)</td>
</tr>
<tr>
<td>Transfer to current funds</td>
<td>335,469</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balances at December 31, 1977</td>
<td>627,351</td>
<td>1,667,372</td>
<td>2,172,160</td>
<td>934,143</td>
<td>540,202</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8,596,042</td>
</tr>
</tbody>
</table>
### REPORT OF THE TREASURER

#### Plant Fund

<table>
<thead>
<tr>
<th></th>
<th>Invested Funds</th>
<th>Quasi-</th>
<th>Endowment</th>
<th>Retirement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increase:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unrestricted current fund revenue</td>
<td>2,582,077</td>
<td></td>
<td>1,867</td>
<td></td>
</tr>
<tr>
<td>Restricted current fund revenue</td>
<td>2,582,077</td>
<td></td>
<td>1,867</td>
<td></td>
</tr>
<tr>
<td>Realized net gains on sale of investments</td>
<td>150,130</td>
<td>43,100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment income</td>
<td>(2,853,531)</td>
<td>(1,255,703)</td>
<td>(384,651)</td>
<td></td>
</tr>
<tr>
<td>Addition to pension fund</td>
<td>32,013</td>
<td>65,573</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuition</td>
<td>81,253</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Decrease:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruction, research and general expenditures</td>
<td>(47,342)</td>
<td>(47,342)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect costs</td>
<td>(2,317,143)</td>
<td>(2,317,143)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payments to pensioners</td>
<td>5,567</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer—additions (deductions):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer to plant fund</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Balances at December 31, 1978:</strong></td>
<td></td>
<td></td>
<td></td>
<td>$8,861,532</td>
</tr>
</tbody>
</table>

The accompanying notes are an integral part of the financial statements.
MARINE BIOLOGICAL LABORATORY

NOTES TO FINANCIAL STATEMENTS

A. Significant Accounting Policies:

Basis of Presentation—Fund Accounting

In order to ensure observance of limitations and restrictions placed on the use of resources available to the Laboratory, the accounts of the Laboratory are maintained in accordance with the principles of “fund accounting.” This is the procedure by which resources are classified into separate funds in accordance with activities or objectives specified. In the accompanying financial statements, funds that have similar characteristics have been combined.

Externally restricted funds may only be utilized in accordance with the purposes established by the source of such funds. However, the Laboratory retains full control over the utilization of unrestricted funds. Restricted gifts, grants, and other restricted resources are accounted for in the appropriate restricted funds. Restricted current funds are reported as revenue when expended for current operating purposes. Unrestricted revenue is reported as revenue in the unrestricted current fund when received.

Endowment funds are subject to restrictions requiring that the principal be invested and only the income utilized. Quasi-endowment funds have been established by the Laboratory for the same purposes as endowment funds, however, any portion of these funds may be expended.

Investments

Investments purchased by the Laboratory are carried at cost. Investments donated to the Laboratory are carried at fair market value at date received. For determination of gain or loss upon disposal, cost is determined based on the specific identification method.

Investment Income and Distribution

The Laboratory follows the accrual basis of accounting except that investment income is recorded on a cash basis. The difference between such basis and the accrual basis does not have a material effect on the determination of investment income earned on a year-to-year basis.

Investment income includes income from the investments of specific funds and from the pooled investment account. Income from the pooled investment account is distributed to the participating funds on the basis of the market value at the beginning of the quarter, adjusted for the cost of any additions or dispositions during the quarter.

Indirect Cost Recovery

The Laboratory recovers indirect costs by charging occupants of laboratory space fees based on a negotiated fixed indirect cost rate for the period the space was occupied. When actual rates are subsequently determined, the difference is reflected in the next negotiated fixed rate.
B. Land, Buildings and Equipment:

Following is a summary of the plant fund assets:

<table>
<thead>
<tr>
<th>Classification</th>
<th>1978</th>
<th>1977</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>$639,693</td>
<td>$639,693</td>
</tr>
<tr>
<td>Buildings</td>
<td>10,190,430</td>
<td>10,143,088</td>
</tr>
<tr>
<td>Equipment</td>
<td>1,591,806</td>
<td>1,591,806</td>
</tr>
<tr>
<td></td>
<td>12,421,929</td>
<td>12,374,587</td>
</tr>
<tr>
<td>Less accumulated depreciation</td>
<td>4,060,407</td>
<td>3,778,545</td>
</tr>
<tr>
<td></td>
<td>$8,361,522</td>
<td>$8,596,042</td>
</tr>
</tbody>
</table>

The original cost of land, buildings and related initial furnishing equipment is capitalized when the assets are acquired. The cost of subsequent additions and purchases, repairs and remodeling is expensed when incurred. Equipment and remodeling expenditures amounted to approximately $125,000 and $110,000 in 1978 and 1977, respectively.

Depreciation is computed using the straight-line method over estimated useful lives of 40 years for buildings and 20 years for equipment.

C. Retirement Fund:

The Laboratory has a noncontributory pension plan for substantially all full-time employees which complies with the requirements of the Employee Retirement Income Security Act of 1974. The actuarially determined pension expenses charged to operations in 1978 and 1977 were $76,374 and $64,277, respectively. The Laboratory's policy is to fund pension costs accrued.

D. Pledges and Grants:

As of December 31, 1978 and 1977, the following amounts remain to be received from previous gifts and grants for specific research and instruction programs, and are expected to be received as follows:

<table>
<thead>
<tr>
<th></th>
<th>1978</th>
<th>1977</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>$2,196,201</td>
<td>$1,697,486</td>
</tr>
<tr>
<td>1979</td>
<td>28,000</td>
<td>115,000</td>
</tr>
<tr>
<td>1980</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$2,224,201</td>
<td>$1,812,486</td>
</tr>
</tbody>
</table>
### Schedule I

#### Marine Biological Laboratory

#### Summary of Investments

December 31, 1978 and 1977

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U. S. Government securities</td>
<td>$610,661</td>
<td>$444,638</td>
<td>$594,205</td>
<td>$448,295</td>
<td>$35,718</td>
<td>$40,923</td>
</tr>
<tr>
<td>Corporate bonds</td>
<td>689,185</td>
<td>770,012</td>
<td>583,572</td>
<td>676,789</td>
<td>42,969</td>
<td>48,681</td>
</tr>
<tr>
<td>Common stocks</td>
<td>2,080,664</td>
<td>2,080,655</td>
<td>2,123,631</td>
<td>2,189,492</td>
<td>131,333</td>
<td>125,462</td>
</tr>
<tr>
<td>Commercial paper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preferred stocks</td>
<td>83,032</td>
<td>83,032</td>
<td>54,548</td>
<td>61,072</td>
<td>3,654</td>
<td>4,468</td>
</tr>
<tr>
<td>Units in combined pension fund</td>
<td>602,912</td>
<td>426,912</td>
<td>576,679</td>
<td>406,237</td>
<td>33,114</td>
<td>9,394</td>
</tr>
<tr>
<td>Real estate</td>
<td>17,549</td>
<td>17,549</td>
<td>17,549 (1)</td>
<td>17,549 (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$4,084,003</td>
<td>$3,822,798</td>
<td>$3,950,184</td>
<td>$3,799,434</td>
<td>246,788</td>
<td>239,918</td>
</tr>
<tr>
<td>Less custodian fees</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Restricted Funds:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U. S. Government securities</td>
<td>1,297,530</td>
<td>1,112,683</td>
<td>1,297,551</td>
<td>1,118,917</td>
<td>90,082</td>
<td>86,748</td>
</tr>
</tbody>
</table>
**Current Unrestricted Funds:**

- Earned on corporate savings account .... 
- Net investment income .... 

**Disposition of investment income:**

<table>
<thead>
<tr>
<th>Restricted for current use:</th>
<th>19,843</th>
<th>7,084</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research</td>
<td>102,538</td>
<td>95,789</td>
</tr>
<tr>
<td>Scholarships</td>
<td>25,715</td>
<td>25,289</td>
</tr>
<tr>
<td>Library</td>
<td>21,877</td>
<td>21,510</td>
</tr>
</tbody>
</table>

| Retirement fund            | 150,130 (2) | 142,588 (2) |
| Unrestricted—utilized in current operations | 32,013 | 20,966 |
|                            | 159,703 | 158,551 |

| Total                      | $341,846 | $321,915 |

(1) At cost.
(2) $41,417 in 1978 and $39,359 in 1977 was utilized in current restricted operations.