THE MARINE BIOLOGICAL LABORATORY

EIGHTY-SEVENTH REPORT, FOR THE YEAR 1984—NINETY-SEVENTH YEAR

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Peterson, Mr. Raymond W.
Porter, Dr. and Mrs. Keith R.
Press, Drs. Frank and Billie
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Prosser, Dr. and Mrs. C. Ladd
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Sturtevant, Mrs. A. H.
Swanson, Dr. and Mrs. Carl P.
III. 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 hereto 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.

In Witness Whereof, we have hereunto set our hands, this twenty seventh day of February in the year eighteen hundred and eighty-eight, Alpheus Hyatt, Samuel Mills, William T. Sedgwick, Edward G. Gardiner, Charles Sedgwick Minot, William G. Farlow, William Stanford Stevens, Anna D. Phillips, Susan Mims, B. H. Van Vleck.
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)

IV. 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 meeting 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)

V. 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 ad-
journment.

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 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 annually elect a Treasurer who shall serve until his successor is selected and qualified. They shall elect a Clerk (a resident of Massachusetts) who shall serve for a term of 4 years. Eligibility for re-election shall be in accordance with the content of Article VIII(F) as applied to corporate or Board Trustees. They shall elect 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 expedient 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 Trustees, 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 Committee 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 Nominations 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, President, 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, 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 a 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.

VI. REPORT OF THE DIRECTOR

Those who do concentrated work discover quickly a useful device for resting the eyes and refreshing the power of attention: it is to look away from the job from time to time: to focus briefly at infinity. Just so I alternate now between writing this report, i.e., representing the year just past at the MBL without cataloging it (which is the purpose of the remainder of this volume), and correcting galleys for a supplementary volume of *The Biological Bulletin*, to be published in June of 1985.

Paradoxically, the close work here is this Director's Report, with its problem of representation, while the infinite focus is on the small-print page proofs, which deal with the MBL's ninety-seven year history. They are the printed versions of papers read at a meeting held on the Island of Ischia in October, 1984, the purpose of which was to examine the scientific and political histories of the MBL and the Stazione Zoologica in Naples.

If it is not overdone, this switching back and forth refreshes the powers of concentration, almost as does looking out the window over the blue expanse of Great Harbor when one has been counting autoradiographic silver grains, or preparing a squid axon. However routine or exciting, confident or threatening were individual months and years of the MBL's history, the whole sweep of it is a smooth curve that engages the eye. It is a rest from the ups and downs of a single year in retrospect.

In this Centennial year minus four (minus three at the time of publication) much more will be said about the smooth curve. Planning for 1988 will get underway; inevitably, plans for celebrations will be considered in the light of program plans for the MBL of today and tomorrow. I trust that most members of the Corporation will involve themselves. There is a great deal to be learned, not merely about MBL science of the past, and the institutional processes that generated it, but also about MBL science of the future, and what initiatives we ought to take, matching courage with the founders, in order to insure continued excellence.

*MBL science*

Literalists sometimes question my use of that adjective. "MBL." "Science," they say, "is science." "The fact that it's done at the MBL, rather than at some *Technische Hochschule*, doesn't alter the content. If it contributes to the understanding of nature, then it comes from, and belongs to, the whole of biology." I cannot disagree. But by "MBL science" I mean neither the trivial localization of hands and equipment, nor to suggest that scientific work done here is somehow distinct from the whole body of exact knowledge about the world. I mean to imply, rather, that there are particular conditions for scientific advance that occur regularly at this Laboratory, and not so regularly elsewhere. I mean that those conditions are responsible for the extraordinary impact this Laboratory and its people have had upon biomedical science, despite our small size, small wealth, and too small a public visibility. These implications were the basis of our choice of the title "MBL Science" for the magazine that is the most recent effort of our Public Information office.
A case in point lies among the papers of today's mail, which litter my desk and are the despair of the office staff. This is a clipping from the London Times, one of the press reports on recent discoveries concerning fast axonal transport. No one who has observed living things under a good microscope fails to be impressed by the rapid and directed motions made by subcellular organelles. That such transport processes are critical for normal function is most obvious in the neuron, where the products of biosynthesis in the cell body, including transmitter substances, must traverse enormous distances to reach their sites of action at the axon terminals. The fast components of organelar transport are very fast indeed: forty centimeters per day is not uncommon.

MBL scientists, like others around the world, have been observing slow and fast axonal transport for some years, and contributing to its accurate description. But the sudden advances to which the London Times refers would not have been so sudden had the contributors not been MBL people, summer and year-round, and had they not participated in the unique sharing of technology, of ideas, and of criticism that is the MBL. This sharing breaks down the barriers between laboratories, between teaching and research, between disciplines. The Times article identifies the investigators only as "of Woods Hole, Massachusetts." Other popular accounts identify them only with NIH, or with NINCDS. But they, and other contributors not mentioned in these reports, are in fact "of the Marine Biological Laboratory, Woods Hole, Massachusetts." Their abruptly newsworthy achievements represent well what is meant by "MBL science."

The news is about the clear identification of microtubules as the physical tracks over which mitochondria, vesicles of various kinds and dimensions, and probably macromolecules traverse the vast distances that separate the perinuclear cytoplasm from the axon terminals. The identification itself is important; but perhaps more important is the new information, emerging from this work, on constancy of transport speed in extruded axoplasm, on the transport of model (artificial) organelles, and on the translocator protein(s) necessary for transport to occur. There is reason to hope that the chemistry of fast axonal transport will soon be worked out, as was the chemistry of muscle contraction, because the new data place strict limits on the components, energetics, and kinetics of the process.

This work is "MBL science" for more reasons than the fact that it was done at the MBL, and on the giant axon of the Woods Hole squid. There is, first, the observational background at the light-microscope level. That required the often parallel, sometimes divergent development of video differential interference contrast microscopy in two laboratories—those of R. D. Allen, a summer investigator at the MBL, and S. Inouč, a member of the year-round scientific staff. This technology, and the long-time interest of both laboratories in particulate transport processes, were and are freely available here. Success required the unique ultrastructural expertise of T. Reese, an NIH scientist who is posted year-round at the MBL, and who has been co-Director of the MBL's Neurobiology course. Collaborating in the venture were several other MBL investigators, some of whom were attracted to the work while serving as fellows or as faculty of the course. And it required the community-wide interest in, and knowledge of, the chemistry of microtubules and other cytoskeletal elements, as represented in the work of such scientists as R. E. Stephens and the current leadership of the Physiology course.

The most recent outcome of all those interacting skills is a group of scientific papers published by Reese and his colleagues R. D. Vale, B. J. Schnapp, and M. P. Sheetz. These papers prove, by an elegant method of observing with the electron microscope (hence at appropriately high resolution) precisely the same particles and tracks that were observed functioning earlier, at lower resolution, on the screen of the video-microscope.
To set the story in such a context is not to deny credit to the authors of these last and noteworthy papers. It is, rather, to suggest how critical for the ability to do the right experiments at the right time, by the best methods, is the interactive style of MBL science. MBL science has evolved as an integrated whole: the courses; the visiting investigators who are not (for the moment) teaching; the year-round scientific staff, whether on location or permanently in the MBL's employ. Ten years into the jigsaw-puzzle of building a year-round research program to match the quality of, and relate closely to, the summer programs, year-round science is already integral to the life of the MBL. Ninety-seven years into the curious plan of eclecticism and change that characterizes the instructional program, it remains uniquely productive of important new science as well as of scientists; and it is just as closely intertwined with research as when Jacques Loeb first lectured on tropisms, "irritability," and the universality of ion effects on "protoplasm."

MBL science is definable: and it is in very good condition. There are a dozen other 1984-85 stories I might have told here, in addition to, or instead of, the one about fast axonal transport (although that one may well end as having received the most publicity). All those stories will be published and will have their impact upon biology and human health. Some of them will become known to the lay public. A few of them will be associated in the public mind with Woods Hole; and fewer yet with this particular one of the Woods Hole institutions.

We are doing much better than in the past at public relations, and therefore at fund-raising, but I do not expect "MBL" to become a household word. No matter: MBL science exists and its value is known where it counts most: among biomedical scientists. In every year since I began writing these reports, it has, by the most objective measures, grown stronger and better-integrated. Were we able to make a report to C. O. Whitman, whose idea the MBL really was, it would be a proud one. We would find it necessary, of course, to speak of urgent needs; but he would be entirely familiar with that.

Eclecticism and change

The description of a work, or a body of works, as "eclectic" tends to be pejorative, particularly in times of uncertain values. Witness today's art criticism in the context of the art market: nobody, not even the artist, has any reliable standard by which to judge the value of work. In such a case, the value is set by what the highest bidder will pay. But high bidders value novelty above all else. An artist, whose approach is said to be eclectic, therefore, doesn't make it with buyers and critics, whose sole concern—for different reasons—is novelty. But I used "eclectic," in describing the MBL courses, as praise, and in its original sense, which is that of selection; selection of what appears at any time to be best among all possible styles, methods, and approaches. Eclecticism in the training of scientists is the only way to go. And by that token there must be change. What is, or appears to be, the best science to teach in 1980 cannot be, or appear to be, best in 1985. Not in a time when the foundations of biomedical science shake a little with every other issue of Nature, or Science, or Cell.

Eclecticism and change were more evident than usual during the past year, for there were four new directorates of summer courses to be recommended by search committees, to be cajoled, and to be organized. It is a pleasure to report that the process, which is surely no less complex than finding a new Department Chairman in a university, has succeeded as MBL tradition demands, despite the rare coincidence of four changes in one year.

John Hildebrand and Tom Reese retired from co-directorship of the Neurobiology course after a five-year tenure that matched in quality and conscientiousness the lead-
ership of their predecessor, Edward Kravitz. They are replaced by Arthur Karlin, of Columbia University, whose planned changes incorporate what is new at both ends of the course's spectrum of topics: the biochemistry and molecular biology of receptors and channels, and the biophysics of electrogensis. Ron Hoy and Eduardo Macagno completed their successful co-directorship of the Neural Systems and Behavior course, and will be replaced by Darcy Kelley, also of Columbia, who will have assistance in directing the new version from Tom Carew of Yale. Harlyn Halvorson stepped down from his energetic leadership of the Microbial Ecology course, to be succeeded by Ralph Wolfe and Peter Greenberg (Illinois and Cornell, respectively). Their plan for the new version, which has been renamed "Microbiology: Molecular Aspects of Cellular Diversity," includes changes in the method of laboratory instruction and in the purposes of the program. The new thrust will be intensive laboratory training in the exploitation of microbial diversity. And finally, John David, founding director of the Biology of Parasitism course, has yielded, after a standard-setting five-year run of worldwide visibility, to Paul Englund of Johns Hopkins, assisted by Alan Sher of NIH. There is now reason to hope that a distinguished program in cellular and molecular plant biology can be initiated in 1986.

I do not mean it as self-congratulation for the MBL, but rather as honest wonder, when I say that this small place, whose name the newspapers seem never to get right (or that they ignore), accomplishes something extraordinary in every such change. To have replaced so distinguished a set of chief instructors with a new set equally strong, to have met their personal, technical, and organizational needs, and to have satisfied them on the benefits of the sacrifices they make in order to teach here, measures the true stature of this Laboratory better than any citations in the press. "The job is its own reward" is a cliché; but teaching at the MBL is the exception: it is its own reward, as any retired faculty member will testify. Still, I wish that we had some concrete process, more than "thank you," by which the MBL community might make known its gratitude to retiring faculty.

Change: operating departments

In no other branch of MBL functions is the need for change, as that is driven by research and teaching, so evident as within the operating Departments. However carefully planning and budgeting are done, the responsibility of Department Heads and staff is to respond promptly to program needs. Especially for the summer programs, this can decide between work accomplished and the opposite. When, as at the MBL, programs are opportunistic (in the positive sense of that word), the unforeseen must somehow be foreseen. The record of our Departments is far better than that of their equivalents in universities. This is not because we have greater financial leeway or are notably more ingenious, but because it is a real tradition here, rather than a token statement, that MBL employees (including the Director) are here to help investigators and faculty, rather than the reverse. I will cite just a few examples of operations responsiveness this past year.

Within Research Services, whose normal responsibilities and budgetary problems are better understood by the scientists than are those of other Departments, the following special initiatives had to be taken within the year: arranging for compliance in detail with newly-enacted "Right to Know" legislation, which calls for training programs, special record keeping, and new emergency measures, all concerned with hazardous materials. Organization of an Emergency Response Team, including persons qualified to administer cardiopulmonary resuscitation. Special arrangements for legal disposal of research animal carcasses. Reorganization of ordering and delivery systems for chemicals. New arrangements for collaboration with the Grants and Educational
Services Office on managing purchases, loans, and the safe, timely installation of equipment for the instructional program.

The Buildings and Grounds Department carried out its large program of routine maintenance and repairs, but it also carried out or directed the following: completion of new smoke and fire alarm systems in all MBL structures; new roofs on all Devil’s Lane cottages; insulation, weather-stripping, and painting of extensive areas in Lillie and Loeb; construction of standard plywood boxes for storage of investigator equipment; many emergency or near-emergency plumbing jobs; gutters for the Candle House roof; and a start on rehabilitation of the fume-hood exhaust systems in the Environmental Sciences Center.

The Marine Resources Department designed and placed in operation a pilot recirculating chilled seawater system. Increased monitoring of species that are heavily pressured by commercial fishing or by rising investigator demand was instituted. These species include, among others, squid, goosefish, Limulus, Solemya, Chaetopterus, and Microciona. Special equipment was created to allow a distinguished investigator, here on sabbatical leave during the winter, to maintain juvenile lobsters (for developmental neurobiology) in warm water. And in response to difficulties caused by rising demand for finfish and an inadequate building (our historic but grossly obsolete Supply House), plans were drawn up, in collaboration with the Laboratory of Marine Animal Health (Dr. L. Leibovitz in charge), for expansion of dock space, the construction and installation of large-volume holding tanks, and new experimental work on finfish maintenance. This program is expected to be operational by the summer of 1985.

The Public Information office continued its successful effort of upgrading MBL publications as to frequency, content, and graphic design. An entirely new periodical magazine, MBL Science, has replaced the old MBL Newsletter. It has been received with unusual enthusiasm, not just within the MBL community, but outside it as well. The initiative of offering daily tours of the MBL during the summer succeeded almost too well: it required a rapid response. Within a week of the program’s birth, tours were subscribed to capacity nearly every day. By the end of the 1984 summer, nearly 500 people had participated. This could not have been accomplished without the generous volunteer work of such MBL community members as Betsy Bang, Sears Crowell, Stubby and Julie Rankin, Margery Taylor, and Donald Zinn. A handsome exhibit, “Science and the Squid,” graced the Lillie lobby and brought congratulations, not only to the Public Information office, but to the writer of this Report from dozens of visitors, especially to the Friday Evening Lectures.

Eclecticism: the Board Trustees

Positively eclectic, like the system of design and leadership of MBL courses, is the selection and election of our Board Trustees. Their importance to the Laboratory has grown steadily the past five years, and I expect it so to continue. Eclectic they are if the description refers to their qualifications and personal histories. The range is from distinguished scientists, only recently recruited to management or administrative roles of international significance, to bankers, investment specialists, and economists, equally distinguished in their professions. All our Trustees are volunteers, as trustees must properly be. But the MBL’s scientist-trustees play a role that is much closer to that of the Board of Directors of a company than it is to an academic Board of Trustees.

For the MBL their role, too, has been and will continue to be vital. But as the Laboratory’s needs, international reach, and requirements for public accountability have risen, so has its need for Trusteeship in the currently understood sense: the task of representing an institution to the public, and of representing, within an institution, the views and requirements of the public. I have written elsewhere, plagiarizing statements of my former boss, President Robert Sproull of Rochester, that Trustees must
balance the present against the future. That is overwhelmingly the most important responsibility of the MBL's Board Trustees; and I am delighted to observe that they have been taking it more seriously, and executing it more effectively, each year. The task of integrating these accomplished men and women into the working life of the MBL remains, and I hope that the Corporation as a whole, as well as those of us in the Administration, can increase our efforts in that regard. It is the very least we can do for the Board Trustees, by way of thanks.

Needs

I noted earlier that the MBL's needs of today would not surprise C. O. Whitman, were he alive; he would understand perfectly that the MBL must, if it is to survive as a headlight, rather than a taillight, of biology, practice and teach the most advanced biology, no matter where it leads, no matter what biological materials are used for experimentation, and no matter how much it costs. It was Whitman who once expostulated "Good Lord, what is money for?"

The MBL has done remarkably well, upon the basis of insignificant endowment resources and a nearly impossible administrative work load for those who look after it, in holding to Whitman's principle of universality and highest quality. But as I have noted in earlier Reports, the game is much harder than in the past—harder, even, than it was in 1978. To play it effectively, we must, somehow, meet its demands, and we must meet them soon. Some of them should be met by the Centennial year. I refer to several urgencies of which most Corporation members are already aware:

A new Marine Resources Center, without which, sooner rather than later, the provision of research specimens will fall into decline, research on their laboratory culture and genetic definition will stop, and the year-round scientific program in general will be brought into disarray.

New housing, especially for students, younger investigators, and families, without which the future will be sacrificed to the past because these members of our community cannot afford commercial summer housing in a resort area.

Education endowment, needed because, despite generous and encouraging private grants in support of MBL instruction, only significant income in perpetuity will allow us the eclecticism and change in teaching that is our hallmark. I need perhaps not elaborate here upon the truth that, with the decline of advanced laboratory instruction in universities, the MBL training programs are ever more indispensable to the maintenance of national manpower in biomedical science.

Strengthening of administrative manpower and skill, to insure that the sealing-wax and shoestring that hold together our far-flung enterprise, however ingeniously applied and however unselfishly some have given up energy and even other careers to it, are replaced by proper sealants and fasteners, suited to a space-age structure.

I hope that the Corporation will join me, as the Centennial approaches, in rededication to meeting those needs. There is no reason why they can't be met: the thing is feasible; it is important for science; and it is significant for the culture. The funds are available; a tiny fraction of what is given each year for religion and pet care would do the trick. We need only the active help, the ideas, and a little of the time of everyone who knows the MBL, cares about it, and benefits from its existence.

VII. REPORT OF THE TREASURER

Last fall, feeling greatly increased pressure from business obligations, I reluctantly asked the Chairman of our Board of Trustees to seek my successor as the MBL's Treasurer. Accordingly, at their February meeting, the Trustees elected Mr. David
Currier to succeed me as Treasurer. Mr. Currier recently retired from a senior management position in Boston’s Shawmut Bank and now resides on Martha’s Vineyard. In addition to a broad managerial and financial background, Mr. Currier brings to the MBL a special knowledge of real estate and its financing. His experience should prove invaluable as the MBL continues to review its options with respect to its real property holdings and its housing needs.

As I transfer my treasury-keeping duties to my successor, I think it appropriate to summarize here a few observations about the MBL’s recent financial history and to comment on what appears to be in the offing.

Perhaps the thought will startle the reader, but my first reflection focuses on the fact that the MBL survived my tenure of office! Although this might be taken as an expression of amazement about my own capabilities (and there may be some justification for such wonderment), I mean only that my six years as Treasurer coincided with events that truly threatened the survival of all research centers dependent on federal grants and private gifts. The raging inflation of a few years ago slashed the purchasing power of resources already too limited. As this threat subsided, federal cutbacks in funding for research not only intensified the competition for federal money but also resulted in heavier pressure on private sources of funding. That the MBL survived these threats is not only a tribute to its fundamental strength but is also a very positive reflection on the fiscal leadership contributed by the MBL’s full-time management.

I have commented in previous annual reports that adversity, while vexing to be sure, also has its benefits. Coping tends to strengthen. The necessity to deal with threats to its financial well-being has made the MBL stronger than before. I cite, for example, the installation of a new, automated accounting system in 1983 which greatly accelerated the production of management reports with which to control expenditures and to track financial performance against budgets. Among its many benefits, this system has significantly reduced receivables, thereby diminishing the extent to which the MBL is extending free “credit” to our investigators’ home institutions.

The financial challenges of the recent past also prompted a review of overhead recovery. The MBL unquestionably has offered an unparalleled bargain in terms of the cost of doing research in our laboratories. Partly, this has been true because we have under-recovered legitimate overhead costs. A new overhead recovery system has been developed with input from many of the investigators who use our facilities, and now awaits final approval from the cognizant federal agency. Work at the MBL will still be a bargain, but at least we will be assured of greater recovery on all proper overhead items.

Financial white water also caused the MBL to review carefully the true cost of each of its major programs and the offsetting revenues. In this review, particular attention was directed to the MBL’s instructional programs. Heretofore, it was widely believed that our educational efforts are self-sustaining. The facts tell us otherwise. Education is a major purpose for the MBL’s existence, and so it is not reasonable to abandon these programs as a means to improve financial health. Instead, intensive efforts were directed at finding supplemental funding. I am happy to report that these efforts have been rewarding, and the gap between the costs of our educational program and revenues to support them has been significantly narrowed.

Although important steps have been taken to strengthen the MBL’s financial vitality, there is still much to be done. One matter of some disappointment to me has been our inability to recognize the reality of depreciation. This year we are again able to report a modest surplus of income over expenses. Note however, as has always been true in our financial reporting, the results for the fiscal year are reported before provision for depreciation. Ideally, we should be using an annual depreciation charge to fund a
reserve for the repair and replacement of our physical assets. Without such a reserve, we will continue to be faced with the need to seek gifts to finance remodeling and repairs.

A second disappointment has been our continuing dependence upon annual contributions and gifts for ordinary operating expenses. Increased fees, charges, and tuitions are probably not the answer, although these sources of income must continue to be adjusted for rising costs. Instead, we must look to the Second Century Campaign to add endowment and we must seek new sources of revenues. On the latter point, the possibility of increased winter utilization of our conference and housing facilities is being actively explored.

Mention of the Second Century Campaign brings me to my third disappointment, which has been the MBL’s struggle to mount a broadly based, vigorous and imaginative development program. Much of the development work continues to center excessively on our Chairman and our President/Director. In contrast to universities, hospitals, and other institutions which can look to large numbers of beneficiaries to assist with fund raising, the MBL must depend on a much smaller cadre of solicitors. Moreover, many of the persons best able to speak for the MBL are also burdened with an obligation to find money for their own research or to assist their home institutions. In this situation, it is imperative that the presently vacant position of Development Director be filled as quickly as possible with a person highly skilled in making effective use of limited fund raising resources.

Looking ahead to the years immediately before us, the MBL must deal with several issues of significant financial import. We have dealt cautiously with our holdings of undeveloped real estate situated in a popular community where raw land commands premium prices. It has been tempting to consider the conversion of this unproductive asset into an income-producing asset, either through development or by sale and subsequent reinvestment. On the other hand, carrying costs for the land are low and its rate of appreciation in value has at least equaled, and probably exceeded, the rate of growth expected from securities investments. My personal inclination has been to treat our undeveloped real estate as a reserve against the possibility that financial threats even greater than those recently seen might jeopardize the MBL’s ability to fulfill its purposes. However, the policy questions related to our real estate holdings are of substantial significance and should be revisited with regularity.

Intertwined with our real estate policy is the matter of housing. Clearly, steps must be taken to assure access to the MBL by young scientists and students. The rising cost and diminished availability of housing in the Woods Hole area will effectively preclude many young talents from taking advantage of the MBL’s offerings unless we find practical solutions. The solutions will be expensive but necessary.

Lastly, I cite the Marine Resources Center as a project with subtle financial implications which may be overshadowed by the challenge of finding funds for its construction. As I became better acquainted with the MBL’s history during my tenure as Treasurer, I developed an appreciation for what was required to make the MBL “work” as a viable research and educational center at various points in time. For today’s needs, the proposed Marine Resources Center is a vital ingredient in the mix of capabilities and facilities required for continued viability. If the MBL doesn’t “work” as an organic whole containing within it all the functionality needed by its users, it also doesn’t “work” financially. In this sense, the Marine Resources Center is as important to your Treasurer as it is to MBL scientists.

I close my report with a word of appreciation to the many persons who have made my association with the MBL a stimulating, enjoyable experience. A special thanks goes to John Speer, Controller, who not only manages the MBL’s financial affairs with great skill and dedication, but also has made the Treasurer look good.
To the Trustees of
Marine Biological Laboratory
Woods Hole, Massachusetts

We have examined the balance sheet of Marine Biological Laboratory as of December 31, 1984 and the related statements of current funds revenue and expenses and changes in fund balances for the year then ended. Our examination was made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. We previously examined and reported upon the financial statements of the Laboratory for the year ended December 31, 1983, which condensed statements are presented for comparative purposes only.

In our opinion, the financial statements referred to above present fairly the financial position of Marine Biological Laboratory at December 31, 1984 and its current funds revenue and expenses and the changes in fund balances for the year then ended in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Boston, Massachusetts
April 29, 1985
## MARINE BIOLOGICAL LABORATORY

### BALANCE SHEETS

December 31, 1984 and 1983

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash and savings deposits</td>
<td>$214,449</td>
<td>$88,099</td>
<td>Accounts payable and accrued expenses</td>
<td>$273,973</td>
<td>$360,758</td>
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<td>Money market securities (Note F)</td>
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<td>550,000</td>
<td>Deferred income</td>
<td>95,519</td>
<td>62,857</td>
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<td>Accounts receivable, net of allowance for</td>
<td>278,529</td>
<td>209,470</td>
<td>Total current liabilities</td>
<td>369,492</td>
<td>423,615</td>
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<td>uncollectible accounts</td>
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<td></td>
<td>Current unrestricted funds</td>
<td>13,952</td>
<td>149,161</td>
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<tr>
<td>Receivables due for costs incurred on grants</td>
<td>395,788</td>
<td>500,872</td>
<td>Current restricted funds:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and contracts</td>
<td>14,855</td>
<td>8,031</td>
<td>Unexpended grants</td>
<td>410,210</td>
<td>86,114</td>
</tr>
<tr>
<td>Other assets</td>
<td></td>
<td></td>
<td>Unexpended gifts</td>
<td>305,837</td>
<td>355,649</td>
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<tr>
<td>Total current assets</td>
<td>1,728,621</td>
<td>1,356,472</td>
<td>Unexpended income of endowment funds</td>
<td>18,736</td>
<td>43,178</td>
</tr>
<tr>
<td>Investments, at cost (Note F)</td>
<td>8,020,168</td>
<td>7,340,392</td>
<td>Endowment funds:</td>
<td>734,783</td>
<td>484,941</td>
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<tr>
<td>Land, buildings and equipment (Note C)</td>
<td>17,436,604</td>
<td>17,196,770</td>
<td>Unrestricted purposes</td>
<td>1,771,188</td>
<td>1,716,309</td>
</tr>
<tr>
<td>Less accumulated depreciation</td>
<td>6,090,140</td>
<td>5,633,746</td>
<td>Restricted purposes</td>
<td>1,432,604</td>
<td>750,434</td>
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<tr>
<td></td>
<td>11,346,464</td>
<td>11,563,024</td>
<td>Quasi-endowment funds:</td>
<td>3,203,792</td>
<td>2,466,743</td>
</tr>
<tr>
<td>Total assets</td>
<td>$21,095,253</td>
<td>$20,259,888</td>
<td>Unrestricted purposes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Restricted purposes</td>
<td>2,692,957</td>
<td>2,752,141</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>3,713,295</td>
<td>3,617,760</td>
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<tr>
<td>Plant funds:</td>
<td></td>
<td></td>
<td>Retirement fund balance (Note D)</td>
<td>1,607,727</td>
<td>1,409,658</td>
</tr>
<tr>
<td>Unrestricted</td>
<td></td>
<td></td>
<td>Total liabilities and fund balances</td>
<td>$21,095,253</td>
<td>$20,259,888</td>
</tr>
<tr>
<td>Restricted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11,346,464</td>
<td>11,489,019</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>105,748</td>
<td>218,991</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11,452,212</td>
<td>11,708,010</td>
</tr>
</tbody>
</table>

The accompanying notes are an integral part of the financial statements.
# Marine Biological Laboratory

## Statements of Current Funds Revenue and Expenses

for the years ended December 31, 1984 and 1983

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Grant reimbursement of direct costs:</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>Research</td>
<td>$492,309</td>
<td>$428,535</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recovery of indirect costs related to research and instruction:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer program</td>
<td>1,572,260</td>
<td>1,342,117</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year-round program</td>
<td>29,453</td>
<td>52,298</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support activities:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dormitory</td>
<td>497,263</td>
<td>434,686</td>
<td>247,685</td>
<td>182,217</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dining Hall</td>
<td>242,404</td>
<td>247,687</td>
<td></td>
<td></td>
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<tr>
<td>Library</td>
<td>227,551</td>
<td>184,325</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Biological Bulletin</td>
<td>112,134</td>
<td>96,703</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Research services</td>
<td>400,284</td>
<td>353,051</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine resources</td>
<td>165,000</td>
<td>96,104</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>472</td>
<td>(5,786)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Total support activities</td>
<td>1,645,108</td>
<td>1,406,770</td>
<td>261,257</td>
<td>92,501</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment income</td>
<td>278,250</td>
<td>232,145</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4,223,286</td>
<td>3,843,822</td>
<td>5,130,867</td>
<td>4,059,716</td>
<td>9,354,153</td>
<td>7,903,538</td>
</tr>
<tr>
<td>Amalgamation of quasi-endowment fund balance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gifts</td>
<td>92,693</td>
<td>257,067</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miscellaneous revenue</td>
<td>78,082</td>
<td>91,559</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total revenue</td>
<td>4,223,286</td>
<td>3,843,822</td>
<td>5,130,867</td>
<td>4,059,716</td>
<td>9,354,153</td>
<td>7,903,538</td>
</tr>
</tbody>
</table>

## Expenses

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction</td>
<td>71,038</td>
<td>55,274</td>
<td>787,063</td>
<td>777,994</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td></td>
<td></td>
<td>4,220,462</td>
<td>3,196,866</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scholarships and stipends</td>
<td></td>
<td></td>
<td>190,280</td>
<td>195,714</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support activities:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dormitory</td>
<td>254,695</td>
<td>209,176</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Dining Hall</td>
<td>245,141</td>
<td>235,149</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td>440,548</td>
<td>323,660</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological Bulletin</td>
<td>158,127</td>
<td>120,822</td>
<td></td>
<td></td>
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<tr>
<td>Research services</td>
<td>635,897</td>
<td>543,422</td>
<td></td>
<td></td>
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<tr>
<td>Marine resources</td>
<td>325,660</td>
<td>271,224</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administration</td>
<td>979,045</td>
<td>959,831</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Plant operation</td>
<td>976,605</td>
<td>903,729</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td>11,537</td>
<td>3,516</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total support activities</td>
<td>4,015,718</td>
<td>3,567,013</td>
<td>31,855</td>
<td>79,847</td>
<td>4,047,573</td>
<td>3,646,860</td>
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<tr>
<td>Total expenses</td>
<td>4,096,756</td>
<td>3,622,287</td>
<td>5,229,660</td>
<td>4,250,421</td>
<td>9,316,416</td>
<td>7,872,708</td>
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<tr>
<td>Excess (deficit) of revenue over expenses</td>
<td>$37,737</td>
<td>$46,808</td>
<td></td>
<td></td>
<td></td>
<td></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, 1984 and 1983

<table>
<thead>
<tr>
<th>Current Restricted Funds</th>
<th>Endowment Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Unrestricted Fund</strong></td>
<td><strong>Unexpended Grants</strong></td>
</tr>
<tr>
<td>Balances at beginning of year</td>
<td>$149,161</td>
</tr>
</tbody>
</table>

**Increases:**

- Unrestricted current funds revenue: 3,852,343
- Grants for research: 5,280,084
- Grants for instruction: 329,829
- Gifts: 92,693
- Investment income: 283,312
- Realized net gains on sale of investments: 5,801
- Addition to retirement fund: 246,691
- Tuition: 54,879

**Decreases:**

- Instruction, research and support activities: (4,185,549)
- Indirect costs: (4,363,128)
- Payments to pensioners: (310,542)
- Depreciation: (271,133)
- Realized net gain (loss) on disposal of real estate investment: 626,695

**Net change in fund balances before transfers:**

- $37,737
- $324,096
- $(6,887)
- $(24,442)
- $54,879
- $626,695

**Transfers to (from) fund balances:**

- Acquisition of fixed assets: $(172,946)
- Other: $(42,925)

**Balances at end of year:**

<table>
<thead>
<tr>
<th><strong>Current Restricted Fund</strong></th>
<th><strong>Unexpended Grants</strong></th>
<th><strong>Unexpended Gifts</strong></th>
<th><strong>Unexpended Income of Endowment Funds</strong></th>
<th><strong>Endowment Funds</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition of fixed assets</td>
<td>$(172,946)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>$(42,925)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balances at end of year</td>
<td>$13,952</td>
<td>$410,210</td>
<td>$305,837</td>
<td>$1,771,188</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$18,736</td>
<td>$1,432,604</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, 1984 and 1983

<table>
<thead>
<tr>
<th>Quasi-Endowment Funds</th>
<th>Plant Funds</th>
<th>1984 Total</th>
<th>1983 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unrestricted</td>
<td>Restricted</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Balances at beginning of year</td>
<td>$ 865,619</td>
<td>$2,752,141</td>
<td>$11,489,019</td>
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<td>Increases:</td>
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<td></td>
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</tr>
<tr>
<td>Unrestricted current funds revenue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grants for research</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grants for instruction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gifts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Realized net gains on sale of investments</td>
<td>138,739</td>
<td></td>
<td>126,880</td>
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<tr>
<td>Addition to retirement fund</td>
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<td></td>
</tr>
<tr>
<td>Tuition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreases:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruction, research and support activities</td>
<td>(186,064)</td>
<td></td>
<td>(6,300)</td>
</tr>
<tr>
<td>Indirect costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payments to pensioners</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Realized net gain (loss) on disposal of real estate investment</td>
<td>15,980</td>
<td></td>
<td>(456,394)</td>
</tr>
<tr>
<td>Net change in fund balances before transfers</td>
<td>154,719</td>
<td>(59,184)</td>
<td>(456,394)</td>
</tr>
<tr>
<td>Transfers to (from) fund balances:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acquisition of fixed assets</td>
<td>313,839</td>
<td></td>
<td>(140,893)</td>
</tr>
<tr>
<td>Other</td>
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<td></td>
<td>(12,550)</td>
</tr>
<tr>
<td>Balances at end of year</td>
<td>$1,020,338</td>
<td>$2,692,957</td>
<td>$11,346,464</td>
</tr>
</tbody>
</table>
NOTES TO FINANCIAL STATEMENTS

A. Purpose of the Laboratory:
The purpose of Marine Biological Laboratory (the “Laboratory”) is to establish and maintain a laboratory or station for scientific study and investigations, and a school for instruction in biology and nature history.

B. 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 specified activities or objectives. 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 donor or grantor 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 or other purposes. Unrestricted current funds are reported as revenue when earned.

Endowment funds are subject to restrictions requiring that the principal be invested with income available for use for restricted or unrestricted purposes by the Laboratory. Quasi-endowment funds have been established by the Laboratory for the same purposes as endowment funds; however, the principal of these funds may be expended for various restricted and unrestricted purposes.

Reclassifications

The financial statements for 1984 reflect certain changes in classification of revenue, expenses, and changes in fund balances. Similar reclassifications have been made to amounts previously reported in order to provide consistency of the financial statements.

Investments

Investments purchased by the Laboratory are carried at cost. Investments donated to the Laboratory are carried at fair market value at the date of the gift. For determination of gain or loss upon disposal of investments, cost is determined based on the average cost 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 their proportionate share at market value adjusted for the cost of any additions or disposals.

C. Land, Buildings and Equipment:

Following is a summary of the unrestricted plant fund assets:

<table>
<thead>
<tr>
<th></th>
<th>1984</th>
<th>1983</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>$ 689,660</td>
<td>$ 763,660</td>
</tr>
<tr>
<td>Buildings</td>
<td>14,772,449</td>
<td>14,480,320</td>
</tr>
<tr>
<td>Equipment</td>
<td>1,974,495</td>
<td>1,952,790</td>
</tr>
<tr>
<td></td>
<td>17,436,604</td>
<td>17,196,770</td>
</tr>
<tr>
<td>Less accumulated depreciation</td>
<td>6,090,140</td>
<td>5,633,746</td>
</tr>
<tr>
<td></td>
<td>$11,346,464</td>
<td>$11,563,024</td>
</tr>
</tbody>
</table>

Depreciation is computed using the straight-line method over estimated useful lives of fixed assets.
D. 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. During 1984, the Laboratory changed its actuarial method used to determine pension cost from the aggregate cost method to the projected unit credit method. This change resulted in a decrease of $22,275 in the minimum contribution level. The Laboratory also revised certain actuarial assumptions to better reflect experience, which resulted in an additional decrease of $26,280 in the minimum contribution level.

The Laboratory’s policy is to fund pension costs accrued, as determined under the projected unit credit method. The actuarially determined pension expense charged to operations in 1984 was $105,328. As of the latest valuation date, based on benefit information at December 31, 1983, the actuarial present values of vested and nonvested benefits, assuming an investment rate of return of 7%, were approximately $986,737 and $30,229, respectively. At December 31, 1984, net assets of the plan available for benefits were approximately $1,680,562.

In addition, the Laboratory has a pension plan funded by contributions to the Teachers Insurance and Annuity Association.

E. Pledges and Grants:

As of December 31, 1984 and 1983, the following amounts remain to be received on gifts and grants for specific research and instruction programs, and are expected to be received as follows:

<table>
<thead>
<tr>
<th>December 31, 1984</th>
<th>December 31, 1983</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unrestricted</td>
<td>Restricted</td>
</tr>
<tr>
<td>1984</td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>$5,000</td>
</tr>
<tr>
<td>1986</td>
<td>5,000</td>
</tr>
<tr>
<td>1987</td>
<td>—</td>
</tr>
<tr>
<td><strong>$10,000</strong></td>
<td><strong>$22,651</strong></td>
</tr>
</tbody>
</table>

In February 1979, the Laboratory initiated the MBL Second Century Fund, a phased effort, to secure $23,000,000 in support of capital rehabilitation, new construction, and endowment funds. As of December 31, 1984, the Laboratory has received pledges related to this effort of approximately $5,923,358, of which a substantial portion has been collected.
F. Investments:

The following is a summary of the cost and market value of investments at December 31, 1984 and 1983 and the related investment income and disposition of investment income for the years ended December 31, 1984 and 1983.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Endowment, Quasi-Endowment, and Pension</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. Government securities</td>
<td>2,422,701</td>
<td>2,352,911</td>
<td>2,405,964</td>
<td>2,275,449</td>
<td>272,442</td>
<td>206,041</td>
</tr>
<tr>
<td>Corporate fixed income obligations</td>
<td>749,926</td>
<td>397,871</td>
<td>707,678</td>
<td>348,713</td>
<td>47,570</td>
<td>32,836</td>
</tr>
<tr>
<td>Common stocks</td>
<td>4,073,866</td>
<td>4,165,295</td>
<td>4,977,757</td>
<td>5,522,238</td>
<td>203,158</td>
<td>208,454</td>
</tr>
<tr>
<td>Preferred stock</td>
<td>12,549</td>
<td></td>
<td>22,940</td>
<td></td>
<td>1,798</td>
<td></td>
</tr>
<tr>
<td>Money market securities</td>
<td>745,377</td>
<td>406,766</td>
<td>745,377</td>
<td>406,766</td>
<td>82,636</td>
<td>48,522</td>
</tr>
<tr>
<td>Real estate</td>
<td>15,749</td>
<td>17,549</td>
<td>15,749</td>
<td>17,549</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>8,020,168</td>
<td>7,340,392</td>
<td>8,875,465</td>
<td>8,570,715</td>
<td>607,604</td>
<td>495,853</td>
</tr>
<tr>
<td>Less custodian fees</td>
<td></td>
<td></td>
<td>(32,331)</td>
<td>(30,282)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Unrestricted Current Fund</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Money market securities</td>
<td>825,000</td>
<td>550,000</td>
<td>825,000</td>
<td>550,000</td>
<td>43,392</td>
<td>40,265</td>
</tr>
<tr>
<td><strong>Total investments</strong></td>
<td>8,845,168</td>
<td>7,890,392</td>
<td>9,700,465</td>
<td>9,120,715</td>
<td>618,665</td>
<td>505,836</td>
</tr>
</tbody>
</table>

Disposition of investment income:

- Restricted for current use:
  - Utilized in current operations
  - Available for future operations

- Total restricted current and quasi-endowment funds

- Retirement fund

- Unrestricted—utilized in current operations

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Restricted for current use:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utilized in current operations</td>
<td>261,257</td>
<td>92,501</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available for future operations</td>
<td>(9,065)</td>
<td>113,441</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total restricted current and quasi-endowment funds</strong></td>
<td>252,192</td>
<td>205,942</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retirement fund</td>
<td>88,223</td>
<td>67,749</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unrestricted—utilized in current operations</td>
<td>278,250</td>
<td>232,145</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Total** | 575,273 | 465,571 | 618,665 | 505,836 |                       |                       |
At December 31, 1984 and 1983 the following summarizes the participation of the various funds in the investment pool:

<table>
<thead>
<tr>
<th>Fund</th>
<th>1984</th>
<th>1983</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unexpended income of endowment</td>
<td>18,736</td>
<td>43,178</td>
</tr>
<tr>
<td>Unrestricted endowment</td>
<td>1,771,188</td>
<td>1,716,309</td>
</tr>
<tr>
<td>Restricted endowment</td>
<td>1,287,561</td>
<td>682,475</td>
</tr>
<tr>
<td>Unrestricted quasi-endowment</td>
<td>1,077,988</td>
<td>846,880</td>
</tr>
<tr>
<td>Restricted quasi-endowment</td>
<td>2,364,407</td>
<td>2,788,073</td>
</tr>
<tr>
<td>Retirement</td>
<td>1,500,288</td>
<td>1,263,477</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$8,020,168</strong></td>
<td><strong>$7,340,392</strong></td>
</tr>
</tbody>
</table>

G. **Interfund Borrowings:**

Interfund balances at December 31 are as follows:

<table>
<thead>
<tr>
<th>Fund</th>
<th>1984</th>
<th>1983</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due to retirement fund</td>
<td>$(105,328)</td>
<td>$(140,825)</td>
</tr>
<tr>
<td>Due to plant funds</td>
<td>(105,748)</td>
<td>(218,891)</td>
</tr>
<tr>
<td>Due to endowment funds</td>
<td>(500,000)</td>
<td></td>
</tr>
<tr>
<td>Due from (to) quasi-endowment</td>
<td>103,365</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$(607,711)</strong></td>
<td><strong>$0</strong></td>
</tr>
</tbody>
</table>
VIII. REPORT OF THE LIBRARIAN

The 10th Annual Meeting of the International Association of Marine Science Libraries and Information Centers was held in Woods Hole in October. Over 120 participants attended the three-day sessions which featured 30 speakers, four workshops, a Cape Cod Clam Bake, and a Whale Watch. The subject of one of the discussions was the Use Survey conducted by the MBL through funding provided by the Rockefeller Foundation, and coordinated by Catherine Norton, Assistant Librarian.

The survey covered a ten-month period in 1983, March through the end of December. This was not a random sample which is a method used in most surveys; usage was studied by checking ALL journals used EVERY day for ten months. In January of 1984 staff members worked through all four stacks counting each volume that had been marked during the survey, and those numbers, combined with the numbers removed from the single issues that were used in the Reading Rooms, were fed into a computer. The total verified count showed that the collection was referred to 115,048 times.

The results in brief: 53% of the 4765 journal titles held by the Library were used during this time period. 76% of total usage involved the years 1980 through 1983. Use of periodicals by years of publication broke down as follows:

<table>
<thead>
<tr>
<th>Year Range</th>
<th>Usage Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980 through 1983</td>
<td>86,962</td>
</tr>
<tr>
<td>1961 through 1979</td>
<td>21,955</td>
</tr>
<tr>
<td>1941 through 1960</td>
<td>3,325</td>
</tr>
<tr>
<td>1901 through 1940</td>
<td>2,142</td>
</tr>
<tr>
<td>Pre 1900</td>
<td>624</td>
</tr>
</tbody>
</table>

Two studies were made to determine the depth of the collection: both studies used citation analysis. The first study examined the citations of several hundred articles published by both MBL and WHOI scientists and the second study involved citations from two Doctoral Dissertations. A PhD thesis on sedimentology by a WHOI student cited 89 journals covering the years 1914–1983. The Library owns 77 of them. The MBL thesis on invertebrate taxonomy cited 369 titles covering the years 1785–1982. The Library owns 336 of them.

More detailed reports will be published in the near future but for general interest we are listing the titles that were used 200 or more times during this period. It should be noted that this is what was used during ten months of a 96-year history. It would be most interesting to make the same study in 1994.

Journal Use Study at the MBL Journals Used 200 or More Times During the 10-Month Period 04/83–01/84

<table>
<thead>
<tr>
<th>Journal Title</th>
<th>Usage Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURE</td>
<td>2938</td>
</tr>
<tr>
<td>SCIENCE</td>
<td>1709</td>
</tr>
<tr>
<td>PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES</td>
<td>1681</td>
</tr>
<tr>
<td>SCIENCE CITATION INDEX</td>
<td>1517</td>
</tr>
<tr>
<td>BIOCHIMICA ET BIOPHYSICA ACTA</td>
<td>1267</td>
</tr>
<tr>
<td>BIOLOGICAL ABSTRACTS</td>
<td>1146</td>
</tr>
<tr>
<td>JOURNAL OF CELL BIOLOGY</td>
<td>1131</td>
</tr>
<tr>
<td>MARINE BIOLOGY</td>
<td>1091</td>
</tr>
<tr>
<td>JOURNAL OF BIOLOGICAL CHEMISTRY</td>
<td>1044</td>
</tr>
<tr>
<td>BIOLOGICAL BULLETIN, THE</td>
<td>1014</td>
</tr>
<tr>
<td>CURRENT CONTENTS: LIFE SCIENCES</td>
<td>1000</td>
</tr>
<tr>
<td>SCIENCE 83</td>
<td>975</td>
</tr>
<tr>
<td>JOURNAL OF PHYSIOLOGY</td>
<td>935</td>
</tr>
<tr>
<td>DEEP SEA RESEARCH</td>
<td>920</td>
</tr>
<tr>
<td>Journal Title</td>
<td>Page</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>DEVELOPMENTAL BIOLOGY</td>
<td>812</td>
</tr>
<tr>
<td>CELL</td>
<td>793</td>
</tr>
<tr>
<td>JOURNAL OF GEOPHYSICAL RESEARCH</td>
<td>773</td>
</tr>
<tr>
<td>JOURNAL OF EXPERIMENTAL MARINE BIOLOGY AND ECOLOGY</td>
<td>719</td>
</tr>
<tr>
<td>COMPARATIVE BIOCHEMISTRY AND PHYSIOLOGY</td>
<td>700</td>
</tr>
<tr>
<td>NEW SCIENTIST</td>
<td>696</td>
</tr>
<tr>
<td>BRAIN RESEARCH</td>
<td>692</td>
</tr>
<tr>
<td>NEW ENGLAND JOURNAL OF MEDICINE</td>
<td>654</td>
</tr>
<tr>
<td>MARINE ECOLOGY—PROGRESS SERIES</td>
<td>624</td>
</tr>
<tr>
<td>LIMNOLOGY AND OCEANOLOGY</td>
<td>612</td>
</tr>
<tr>
<td>EXPERIMENTAL CELL RESEARCH</td>
<td>569</td>
</tr>
<tr>
<td>BIOCHEMISTRY</td>
<td>564</td>
</tr>
<tr>
<td>BIOCHEMICAL PHARMACOLOGY</td>
<td>559</td>
</tr>
<tr>
<td>LANCET</td>
<td>559</td>
</tr>
<tr>
<td>JOURNAL OF COMPARATIVE PHYSIOLOGY</td>
<td>528</td>
</tr>
<tr>
<td>INDEX MEDICUS</td>
<td>498</td>
</tr>
<tr>
<td>JOURNAL OF MOLECULAR BIOLOGY</td>
<td>476</td>
</tr>
<tr>
<td>JOURNAL OF GENERAL PHYSIOLOGY</td>
<td>465</td>
</tr>
<tr>
<td>JOURNAL OF THE MARINE BIO ASSOC OF THE UK</td>
<td>458</td>
</tr>
<tr>
<td>PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON</td>
<td>454</td>
</tr>
<tr>
<td>SCIENCE NEWS</td>
<td>452</td>
</tr>
<tr>
<td>EARTH AND PLANETARY SCIENCE LETTERS</td>
<td>438</td>
</tr>
<tr>
<td>ESTUARINE, COASTAL AND SHELF SCIENCE</td>
<td>433</td>
</tr>
<tr>
<td>SCIENTIFIC AMERICAN</td>
<td>422</td>
</tr>
<tr>
<td>CELL AND TISSUE RESEARCH</td>
<td>421</td>
</tr>
<tr>
<td>JOURNAL OF MEMBRANE BIOLOGY</td>
<td>413</td>
</tr>
<tr>
<td>FEBS LETTERS</td>
<td>408</td>
</tr>
<tr>
<td>AMERICAN NATURALIST</td>
<td>407</td>
</tr>
<tr>
<td>JOURNAL OF COMPARATIVE NEUROLOGY</td>
<td>406</td>
</tr>
<tr>
<td>AQUACULTURE</td>
<td>401</td>
</tr>
<tr>
<td>COMPTEES RENDUS DES SEANCES DE L'ACADEMIE DES SCIENCE</td>
<td>399</td>
</tr>
<tr>
<td>JOURNAL OF MARINE RESEARCH</td>
<td>394</td>
</tr>
<tr>
<td>ANALYTICAL BIOCHEMISTRY</td>
<td>392</td>
</tr>
<tr>
<td>BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATION</td>
<td>382</td>
</tr>
<tr>
<td>PHILOSOPHICAL TRANS OF THE ROYAL SOC OF LONDON</td>
<td>381</td>
</tr>
<tr>
<td>JOURNAL OF EXPERIMENTAL ZOOLOGY</td>
<td>377</td>
</tr>
<tr>
<td>JOURNAL OF NEUROSCIENCE</td>
<td>370</td>
</tr>
<tr>
<td>CHEMICAL ABSTRACTS</td>
<td>369</td>
</tr>
<tr>
<td>CANADIAN JOURNAL OF FISHERIES AND AQUATIC SCIENCE</td>
<td>365</td>
</tr>
<tr>
<td>GEOCHIMICA ET COSMOCHIMICA ACTA</td>
<td>362</td>
</tr>
<tr>
<td>ECONOMIST (THE)</td>
<td>356</td>
</tr>
<tr>
<td>BIOPHYSICAL JOURNAL</td>
<td>354</td>
</tr>
<tr>
<td>CURRENT CONTENTS; AGRICULTURE, BIOLOGY AND ENVIRONMENT</td>
<td>348</td>
</tr>
<tr>
<td>BIOCHEMICAL JOURNAL</td>
<td>339</td>
</tr>
<tr>
<td>JOURNAL OF FLUID MECHANICS</td>
<td>337</td>
</tr>
<tr>
<td>EUROPEAN JOURNAL OF BIOCHEMISTRY</td>
<td>332</td>
</tr>
<tr>
<td>INTERDISCIPLINARY SCIENCE REVIEWS</td>
<td>317</td>
</tr>
<tr>
<td>ENVIRONMENTAL SCIENCE AND TECHNOLOGY</td>
<td>311</td>
</tr>
<tr>
<td>JOURNAL OF THEORETICAL BIOLOGY</td>
<td>307</td>
</tr>
<tr>
<td>OECOLOGIA</td>
<td>305</td>
</tr>
<tr>
<td>LIFE SCIENCES</td>
<td>304</td>
</tr>
<tr>
<td>OCEANIC ABSTRACTS</td>
<td>303</td>
</tr>
<tr>
<td>MARINE POLLUTION BULLETIN</td>
<td>299</td>
</tr>
<tr>
<td>JOURNAL OF CHROMATOGRAPHY</td>
<td>294</td>
</tr>
<tr>
<td>TRENDS IN BIOCHEMICAL SCIENCES</td>
<td>293</td>
</tr>
<tr>
<td>HYDROBIOLOGIA</td>
<td>291</td>
</tr>
<tr>
<td>JOURNAL OF MORPHOLOGY</td>
<td>290</td>
</tr>
</tbody>
</table>
IX. EDUCATIONAL PROGRAMS

SUMMER

Biology of Parasitism

Course director

DAVID, JOHN R., Harvard School of Public Health/Harvard Medical School

Other faculty, staff, and lecturers

COLLEY, DANIEL, Vanderbilt University
CROSS, GEORGE, Rockefeller University
DAVID, PETER, Institut Pasteur, France
DAVID, ROBERTA, Harvard Medical School
PEARSON, DOUGLAS, Harvard Medical School
GITLER, CARLOS, Weizmann Institute, Israel
HARN, DONALD, Harvard Medical School
JUNGERY, MICHELE, Harvard School of Public Health
LANDFAR, SCOTT, Harvard School of Public Health
Pereira, Mierca, Tufts University School of Medicine
PERKINS, MARGARET, Rockefeller University
ROSSIGNOL, PHILIPPE, Harvard School of Public Health
SHERMAN, IRWIN, University of California, Riverside
SPIELMAN, ANDREW, Harvard School of Public Health
WANG, C. C., University of California
WIRTH, DYANN, Harvard School of Public Health

Students

CAMPBELL, JAMES R., U. S. Naval Medical Reserve Unit, Djakarta, Indonesia
CORREA BELTRAN, DOLORES, Instituto Investigacion Biomedicas, Universidad Nacional Autonoma de Mexico, Mexico
GOODMAN, GAY, University of Pennsylvania
GROGL, MAX, Wake Forest University
HUSAIN, RABIA, NIH
IDIKIO, HALLIDAY A., Memorial University of Newfoundland, St. John, Newfoundland, Canada
JAHNGEN, EDWIN G. E., University of Lowell
JERRERS, GALE WATANABE, Louisiana State University
Joseph, Jeffrey T., Harvard Medical School
MILLER, SAMUEL I., Massachusetts General Hospital
PALOMO, ADOLFO MARTINEZ, National Polytechnical Institute, Mexico
POMPUTIUS, WILLIAM F., III, Case Western Reserve Medical School
RODRIGUES, MAURICIO MARTINS, University of Rio de Janeiro, Brazil
SIM, BETTY KIM LEE, Institute for Medical Research, Malaysia
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EMBRYOLOGY

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STILLWELL, JOSEPH, Earlham College
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HYNES, THOMAS, Harvard University
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MCKNIGHT, CRAIG E., University of Pennsylvania
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GOVIND, C. K., University of Toronto, Ontario, Canada
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SHORT COURSES

ANALYTICAL AND QUANTITATIVE LIGHT MICROSCOPY

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AND WHOLE MOUNTS

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McCANN, PATRICIA, Medical College of Ohio
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ROGERS, JOSEPH, University of Massachusetts Medical School
SAWADA, GERIANNE, The Upjohn Company
SCHWAL, RALPH, Colorado State University
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*SOBASKI, MICHAEL, Columbus, Ohio
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WICK, ROBERT, Photonic Microscopy

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NUTTALL, ALFRED L., University of Michigan
O’NEIL, ROGER G., University of Texas Medical School
SHIRLEY, JEANNE, Cedars-Sinai Medical Center
SMITH, THOMAS G., Jr., NIH
VEITH, GEORGE M., Washington University

PROTEIN ANALYSIS BY POLYACRYLAMIDE GEL ELECTROPHORESIS

Course director

STEPHENS, RAYMOND E., Marine Biological Laboratory/Boston University

Other faculty, staff, and lecturers

GOOD, MICHAEL, Marine Biological Laboratory
KIEHART, DANIEL, Harvard University
MARLER, JENNIFER, Yale University
METZ, EDWARD, Boston University
WARREN, LISA, Marine Biological Laboratory

Students

ABRAHAMSON, JULIE K., University of North Dakota
ALEXANDER, R. WAYNE, Brigham & Women’s Hospital
DROUIN, JEANNE, Ottawa General Hospital, Ottawa, Canada
FARAH, JOHN MITCHELL, Jr., National Institutes of Health
GOUDSMIT, ESTHER M., Oakland University
HALUSKA, FRANK G., University of Pennsylvania
HOFFMAN, ROBERT W., NIH
KEAN, EDWARD, L., Case Western Reserve University
KIRK, DAVID, Huntington Medical Research Institute
MEHTA, BIPIN, M., Sloan-Kettering Institute for Cancer Research
NEUTRA, MARIAN R., Harvard Medical School
PARHAD, IRMA M., Johns Hopkins Hospital
RABE, CAROLYN S., National Institute on Alcohol Abuse and Alcoholism
REED, CHRISTOPHER G., Dartmouth College
RENEGAR, RANDALL H., East Carolina University
ROSENHEIMER, JULIE L., University of Wisconsin
SCHNAPP, BRUCE J., Marine Biological Laboratory
SIEGEL, BENJAMIN V., Oregon Health Sciences University

QUANTITATIVE ANALYSIS OF ELECTRON MICROGRAPHS

Course director

PEACHEY, LEE D., University of Pennsylvania
Other faculty, staff, and lecturers

BUSCHMANN, ROBERT J., Veterans Administration
COWAN, DIANE F., Boston University Marine Program
HASELGROVE, JOHN C., Johnson Research Foundation
PALMER, LARRY A., University of Pennsylvania

Students

BEHAN, MARY, University of Wisconsin
COTCHAN, THEODORE, Ethicon, Inc.
CUKIERSKI, MATTHEW J., SUNY, Buffalo
FOSTER, ROBERT E., U. S. Army Medical Research Institute of Chemical Defense
FRIEDMAN, MARC M., Georgetown University
GAIK, GERALDINE C., Loyola University of Chicago
GARRETSON, LEON T., University of Texas Medical School
KENNEY, LINDA J., University of Pennsylvania
McMILLAN, PAUL N., Rhode Island Hospital
PARHAD, IRMA M., Johns Hopkins Hospital
PEREZ, MARIA, Cornell University Medical College
PINDZOLA, RONDA R., U. S. Army Medical Research Institute of Chemical Defense
ROTH, THOMAS F., University of Maryland
SHEINVOLD, FRANCES L., University of Miami
SORRELL, J. MICHAEL, University of Pennsylvania
WALROND, JOHN P., NINCDS/NIH
WASHINGTON, SHAWN, Medical College of Pennsylvania

SMALL COMPUTERS IN BIOLOGY AND MEDICINE

Course director

PALMER, LARRY, University of Pennsylvania

Other faculty, staff, and lecturers

COWAN, DIANE F., Boston University Marine Program
HASELGROVE, JOHN C., Johnson Research Foundation
JONES, JUDSON P., University of Pennsylvania
PEACHEY, LEE D., University of Pennsylvania

Students

BARD, FREDERIQUE, University of Pennsylvania
BRETT, ROGER S., SUNY, Stony Brook
DISTEFANO, PETER S., Washington University Medical School
ECKERT, BARRY S., SUNY, Buffalo
ENGLING, WILLIAM, University of Oklahoma
FERGUSON, DONALD G., University of Pennsylvania
GALL, KENNETH J., United States Army Medical Research Institute of Civil Defense
KOCHE, GEORGE, Damon Biotech, Inc.
ROTHMAN, STEVEN, Washington University School of Medicine
STONE, SUSAN, New York University Medical Center
YIP, HENRY K., Washington University

X. RESEARCH AND TRAINING PROGRAMS

SUMMER

PRINCIPAL INVESTIGATORS

ALLEN, NINA STRÖMGREN, Wake Forest University
ALLEN, ROBERT DAY, Dartmouth College
Anderson, Peter A. V., Whitney Marine Laboratory
Armstrong, Clay, University of Pennsylvania
Armstrong, Peter B., University of California, Davis
Augustine, George, University of Southern California
Bacigalupo, Juan, Universidad de Chile, Chile
Baker, Harriet, Cornell Medical School
Barlow, Robert B., Syracuse University
Beauge, Luis, Instituto de Investigacion Medica, Argentina
Begenisich, Theodore B., University of Rochester Medical Center
Bennett, Michael V. L., Albert Einstein College of Medicine
 Bodzynick, David, Wesleyan University
Borgese, Thomas A., Herbert Lehman College, City University of New York
Boron, Walter F., Yale University School of Medicine
Boyer, Barbara C., Union College
Brady, Scott T., Case Western Reserve University
Brehm, Paul, Tufts University School of Medicine
Brodwick, Malcolm S., University of Texas Medical Branch
Brown, Joel E., Washington University School of Medicine
Burdick, Carolyn J., Brooklyn College
Burger, Max M., Biozentrum of the University of Basel, Switzerland
Cariello Lucio, Stanzione Zoologica, Naples, Italy
Chang, Donald C., Baylor College of Medicine
Chappell, Richard L., Hunter College
Charlton, Milton P., University of Toronto, Canada
Cohen, Lawrence B., Yale University School of Medicine
Cohen, William D., Hunter College
Cooperstein, Sherwin J., University of Connecticut Health Center
Costello, Walter J., Ohio University
Dentler, William L., University of Kansas
De Weer, Paul, Washington University School of Medicine
Disterhoft, John F., Northwestern University Medical School
Dowling, John E., The Biological Laboratories, Harvard University
Dunham, Philip, Syracuse University
Edds, Kenneth T., University of Buffalo School of Medicine
Fishman, Harvey M., University of Texas Medical Branch
Franzini-Armstrong, Clara, University of Pennsylvania
Gilbert, Daniel L., NIH
Giuditta, Antonio, International Institute of Genetics and Biophysics, Naples Italy
Gould, Robert M., Institute for Basic Research in Developmental Disabilities
Govind, C. K., University of Toronto, Canada
Graf, Werner M., Rockefeller University
Grass, Mary, The Grass Foundation
Graubard, Katherine, University of Washington
Grinvald, Amiram, Weizmann Institute of Science, Rehovot, Israel
Harrington, John P., University of Alaska
Hastings, Kenneth E. M., University of Virginia
Hepler, Peter K., University of Massachusetts, Amherst
Highstein, Stephen M., Washington University School of Medicine
Hill, Robert B., University of Rhode Island
Horn, Lyle W., Temple University
Hoskin, Francis C. G., Illinois Institute of Technology
Josephson, Robert K., University of California, Irvine
Kaminer, Benjamin, Boston University School of Medicine
Landowne, David, University of Miami
Langford, George M., University of North Carolina School of Medicine
Lasek, Raymond J., Case Western Reserve University
Lauber, Hans, University of Connecticut
LEVIN, JACK, Veterans Administration Hospital
LEVIS, RICHARD A., Rush Medical School
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LISMAN, JOHN, Brandeis University
LILNAS, RODOLFO, New York University Medical Center
LOEWENSTEIN, WERNER R., University of Miami
LONGO, FRANK J., University of Iowa
MAGLOTT, DONNA R., Howard University
MANDEL, GAIL, Tufts University
MATTESON, DONALD R., University of Pennsylvania
MELLON, D. FOREST, University of Virginia
METUZALS, JANIS, University of Ottawa, Canada
MOORE, GORDON, University of Michigan
MOORE, JOHN W., Duke University Medical Center
MULLINS, L. J., University of Maryland, Baltimore
NARAHASHI, TOSHIO, Northwestern University Medical School
NELSON, LEONARD, Medical College of Ohio
NOE, BRYAN D., Emory University
OXFORD, GERALD S., University of North Carolina
PALEVITZ, BARRY A., University of Georgia
PAPPAS, GEORGE D., University of Illinois, Chicago
PRATT, MELANIE M., University of Miami School of Medicine
PUMPLIN, DAVID W., University of Maryland School of Medicine
QUIGLEY, JAMES P., SUNY, Downstate Medical Center
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SEGAL, SHELDON J., Rockefeller Foundation
SHEETZ, MICHAEL P., University of Connecticut Health Center
SILVER, ROBERT BENJAMIN, University of Chicago Medical School
SISKEN, JESSE E., University of Kentucky
SJODIN, RAYMOND A., University of Maryland, Baltimore
SLOBODA, ROGER, Dartmouth College
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SZENT-GYÖRGYI, ANDREW G., Brandeis University
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RESEARCH AND TRAINING PROGRAMS

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INOUÉ, SADAYUKI, McGill University
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KALTENBACH, JANE C., Mount Holyoke College
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LEIGHTON, JOSEPH, Medical College of Pennsylvania
LESTER, HENRY A., California Institute of Technology
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OLINS, DONALD E., University of Tennessee, Oak Ridge
PARESEGIAN, ANDRIAN, NIH
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RICE, ROBERT, Carnegie Mellon University
ROTH, JAY S., University of Connecticut
ROWLAND, LEWIS P., Neurological Institute, New York
RUSHFORTH, NORMAN B., Case Western Reserve University
RUSSELL-HUNTER, W. D., Syracuse University
SALMON, EDWARD D., University of North Carolina
SAUNDERS, JOHN W., SUNY, Albany
SCHER, STEPHEN R., Cambridge Hospital
SCHUEL, HERBERT, SUNY, Buffalo
SCHWARTZ, MARTIN, University of Maryland, Baltimore
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SHERIDAN, WILLIAM F., University of North Dakota
SHERMAN, IRWIN W., University of California
SHRIFTMAN, MOLLIE STARR, North Nassau Mental Health Center
SIWICKI, KATHLEEN, Harvard University
SONNENBLICK, BENJAMIN, Rutgers University
SPECTOR, ABRAHAM, Columbia University
STEPHEN, MICHAEL J., Rutgers University
STEPHENS, RAY, Marine Biological Laboratory
STUNKARD, HORACE W., American Museum of Natural History
TASHIRO, JAY, Kenyon College
TAYLOR, LANSING D., Carnegie Mellon University
TRAGER, LILLIAN, University of Wisconsin, Parkside
TRAGER, WILLIAM, Rockefeller University
TWEEDELL, KENYON S., University of Notre Dame
VAN HOLDE, K. E., Oregon State University
WAGNER, ROBERT R., University of Virginia
WAINIO, WALTER, Rutgers University
WANGH, LAWRENCE J., Brandeis University
WARKEN, LEONARD, The Wistar Institute
WEBB, MARGARET, Marine Biological Laboratory
WHEELER, GEORGE E., Brooklyn College
WICHTERMAN, RALPH, Marine Biological Laboratory
WILBER, CHARLES G., Colorado State University
WITTERNBERG, BEATRICE, Albert Einstein College of Medicine
WITTERNBERG, JONATHAN, Albert Einstein College of Medicine
WOLKEN, JEROME, Carnegie Mellon Institute
WORTHINGTON, C. R., Carnegie Mellon Institute
YOW, F., Kenyon College
ZACKS, SUMNER, The Miriam Hospital, Rhode Island
ZIMMERMAN, MORRIS, Merck, Sharp & Dohme Research Laboratory
ZUAZAGA, CONCHITA, University of Puerto Rico
OTHER RESEARCH PERSONNEL

AGOSTINI, MARK, Williams College
ANDRADE, RODRIGO, Yale Medical School
ARHEM, PETER, Karolinska Institute, Sweden
ARNOLD, JOHN, University of Hawaii
BAKER, ROBERT, New York University Medical Center
BAUER, G. ERIC, University of Minnesota
BAY, CYNTHIA, Syracuse University
BETCHAKU, TEIICHI, Yale University School of Medicine
BOOKMAN, RICHARD J., University of Pennsylvania
BOWLES, ELIZABETH, Wake Forest University
BOYLE, RICHARD, Washington University School of Medicine
BREITWEISER, GERDA E., University of Texas Medical Branch
BRUNKEN, WILLIAM, New York University Medical Center
BURNS, ANDREW, Dartmouth College
BYRNE, PAUL M., National Institute of Mental Health/NIH
CAPUTO, CARLO, National Institute of Mental Health/NIH
CARIELLO, LUCIO, Stazione Zoologica, Naples, Italy
CARROLL, WILLIAM T., Syracuse University
CHOI, CAROL, Illinois Institute of Technology
CHOW, ROBERT H., University of Pennsylvania
CLAPIN, D. F., University of Ottawa, Canada
COHEN, ROCHELLE S., University of Illinois at Chicago
CORONADO, ROBERTO, University of North Carolina
DAOLIANG, CHEM, University of Miami School of Medicine
DAVIS, RALPH E., University of North Carolina
DAWSON, JILL, Imperial College, England, U. K.
DEFOUR, MONIQUE, Hunter College
DESIMONE, DOUGLAS, Dartmouth College
DIEFE, RICHARD, SUNY, Downstate Medical Center
DUNLAP, KATHLEEN, School of Medicine, Tufts University
EATON, DOUGLAS C., University of Texas Medical Branch
EHINGER, BERNDT E. J., University of Lund, Sweden
EHRLICH, BARBARA, Albert Einstein College of Medicine
EISENBERG, ROBERT S., Rush Medical College
EISENMAN, GEORGE, University of California, Los Angeles
ESTUS, STEVEN, Rainbow Babies and Children’s Hospital
FATH, KARL, Case Western Reserve University
FEINMAN, RICHARD, SUNY, Downstate Medical Center
FELDMAN, SUSAN C., New Jersey Medical School
FINK, RACHEL, Yale University
FISHER, GREGORY W., University of Virginia
FONG, CHARLES N., University of Toronto, Canada
FORT, EDWARD, University of Texas Medical Branch
FRAGE, A. MICHAEL, University of Texas Medical Branch
FRANK, DOROTHY, Rainbow Babies and Children’s Hospital
FRENCH, ROBERT, University of Maryland
GADSBY, DAVID C., Rockefeller University
GAINER, HAROLD, NIH
GALBRAITH, JAMES, University of Pennsylvania
GALLANT, PAUL, National Institute of Alcohol Abuse and Alcoholism/NIH
GEORGE, EDWIN, Case Western Reserve University
RESEARCH AND TRAINING PROGRAMS

Prior, David, University of Kentucky
Quigley, Michael, University of Virginia
Renninger, George H., University of Guelph, Ontario, Canada
Renuen, J., IDEA
Ringer, Steven, Rainbow Babies and Children's Hospital
Rittenhouse, Susan, Brigham and Women's Hospital
Rose, Birgit, University of Miami School of Medicine
Rossner, Michael, Princeton University
Ruano-Arroyo, Gualberto, Yale University School of Medicine
Rubin, Leon J., Washington University School of Medicine
Saez, J., Albert Einstein College of Medicine
Sanger, Jean M., University of Pennsylvania School of Medicine
Sano, Kyoshi, National Institute for Basic Biology, Japan
Sato, Eimei, Rockefeller Foundation
Scharm, Vrehi, Biozentrum of the University of Basel, Switzerland
Schmidt, Anne W., Wesleyan University
Selman, Kelly, University of Florida
Shirai, Hiroko, National Institute for Basic Biology, Japan
Sibley, David, Louisiana State University
So, Frederick, University of Iowa
Steele, Roderic, NIH
Stephens, Philip, Villanova University
Stern, Jeffrey, Rockefeller University
Stimer, Joseph, University of California, Los Angeles
Stockbridge, Norman, New York Medical College
Suprenant, Katherine, University of Kansas
Szentkiraly-Szent-Györgyi, Eva M., Brandeis University
Takeda, Kenneth, Institut Pasteur, France
Tanguy, Joelle, Ecole Normale Superieure, France
Tiffert, Teresa, University of Maryland, Baltimore
Torres, Rafael, University of California, Los Angeles
Ueno, Hiromi, Rockefeller University
Vale, Ronald, Stanford University
Vassort, Guy, University of Paris—Sud, Orsay, France
Versalis, V., Albert Einstein College of Medicine
Vogel, Stephen, Northwestern University Medical School
Vosshall, Leslie, Syracuse University
Walton, Kerry, New York University Medical Center
Walton, Alan J., Open University, England, U. K.
Wang, Gung Kuo, Harvard University
Weiss, Gerald, Northwestern University Medical School
White, William E., JR., Chemical Research and Development Center, University of Munich, FRG
Whittebuy, Jose, University of Cayetano Heredia, Peru
Young, John, Rockefeller University
Zakevicius, Jane, New York University School of Medicine
Zecevic, Dejan, Yale University School of Medicine
Zimmerberg, Joshua, NIH
Zuagaga, Conchita, University of Puerto Rico
Zwiebel, Lawrence, University of Michigan

YEAR-ROUND PROGRAMS

BOSTON UNIVERSITY MARINE PROGRAM (BUMP)

Director

Whittaker, J. Richard
Staff (of Boston University unless otherwise indicated)

ALLEN, SARAH
ATEMA, JELLE
COWAN, DIANE
CROWTHER, ROBERT
HAHN, DOROTHY
HUMES, ARTHUR G.
LEBLANC, JOHN
LOESCHER, JANE
MEEDEL, THOMAS
METZ, EDWARD
NAKAMURA, SHOGO, University of Tokyo, Japan
SCHWALBE, KAREN
TAMM, SIDNEY L.
TAYLOR, MARGE
VALIELA, IVAN
VAN ETTEN, RICHARD
VOIGHT, RAINER, University of Gottingen, Denmark

Graduate students

ALBER, MERRYL
BANTA, GARY
BARSHAW, DIANA
BRYANT, DONALD
BRYDEN, CYNTHIA
BUCHSBAUM, ROBERT
CARACO, NINA
CHU, KEVIN
COSTA, JOSEPH
COULTER, DOUGLAS
ELLIS, SARAH
FERME, PAOLA
FOREMAN, KENNETH
FROMHERZ, SUSAN
FUJITA, RODNEY
GLICK, STEPHEN
GODDARD, KATE
GOEHRINGER, DALE
HANDRICH, LINDA
HETTENBACH, GAIL
JOHNSON, BRUCE
LAVALLI, KARI
MERCURO, KIM
MERRILL, CARL
MOSS, ANTHONY
PAYNE, MICHAEL
POOLE, ALAN
TAMSE, ARMANDO
TOTT, THOMAS
WEBB, JACQUELINE
WHITE, DAVID
WILSON, JOHN
WOOD, SUSAN

Undergraduates

ADELMAN, BETH
BARON, LINDA
BERGER, TINA
GUARNAGIA, SHEILA
KOSAKOWSKI, MARK
KOTTLER, BEN
DRYAZI, CONSTANT, Clark University
KUNKLE, JOHN, Hampshire College
LOFREDO, JOSEPH
MCPIEHE, DIANE
OSTROW, BRUCE
POTCHINSKY, MERLE, Brandeis
WIDGIRDA, MARY

Visiting Investigators

COGSWELL, CHARLOTTE, University of Connecticut
D’AVANZO, CHARLENE, Hampshire College
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Peoples’ Republic of China
DEVELOPMENTAL AND REPRODUCTIVE BIOLOGY LABORATORY

Director

GROSS, PAUL R.

LABORATORY OF BIOPHYSICS

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ADELMAN, WILLIAM J., JR.

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Section on Neural Membranes

CLAY, JOHN R.
FÖHLMIEISTER, JURGEN F., University of Minnesota
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MARTIN, DOROTHY L.
MÜLLER, RUTHANNE, Marine Biological Laboratory
RICE, ROBERT V., Carnegie Mellon University
STANLEY, ELIS F.
TYNDALE, CLYDE L., Marine Biological Laboratory
WALTZ, RICHARD B., Marine Biological Laboratory

Section on Neural Systems

ALKON, DANIEL L., Chief
ACOSTA-URQUIDI, JUAN
COULTER, DOUGLAS, Boston University
DISTERHOFT, JOHN, Northwestern University Medical School
FORMAN, ROBIN
HARRIGAN, JUNE, Marine Biological Laboratory
KUBOTA, MICHIHORI
KUZIRIAN, ALAN M.
KUZIRIAN, JEANNE
LEDERHENDLER, IZIA, Marine Biological Laboratory
LEIGHTON, STEPHEN, Biomedical Engineering and Instrumentation Branch, NIH
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NAITO, SHIGETAKA
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LABORATORY OF CARL J. BERG, JR.

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BERG, CARL J., JR.

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Orr, KATHERINE S.

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WARD, JACK, Division of Fisheries, Government of Bermuda
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CHARLES, ANN
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SAKAMOTO, HIDEKI
SMOLOWITZ, ROXANNE

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FARLEY, AUSTIN, National Marine Fisheries Service

LABORATORY OF D. EUGENE COPELAND

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COPELAND, D. EUGENE

LABORATORY OF HOWARD HUGHES MEDICAL INSTITUTE

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VIELE, DANIEL P.

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MEEDEL, THOMAS H.
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MIYAMOTO, DAVID, Seton Hall University
WU, SHAN-CHIN, Institute of Oceanology, Peoples' Republic of China

LABORATORY OF JUDITH P. GRASSLE

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GRASSLE, JUDITH P.

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GELFMAN, CECILIA E.
GOLDE, HELEN, Carleton College
MILLS, SUSAN W.
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LABORATORY OF MARINE ANIMAL HEALTH

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HEYER, GAIL, University of Pennsylvania
JOHNSON, MICHAEL, University of Ohio
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OSOFSKY, NORMAN, Cornell University
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SCHOTT, EDWARD F., Cornell University
SEWELL, AMY T., Cornell University
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LABORATORY OF NOEL DE TERRA

Director
DE TERRA, NOEL

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FUJUROTANI, KENKICHI
HAROSI, FERENC I.
OLESZKO-SZUTS, SUSAN
PAYNE, RICHARD
REID, MARTHA
SZUTS, ETZ.

Visiting investigators

CORNWALL, CARTER, Boston University School of Medicine
LEVINE, JOSEPH S., Boston College
LIPETZ, LEO, Ohio State University
MAKINO, CLINT, Florida State University
MANSFIELD, RICHARD, Boston University School of Medicine
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WIDDER, EDITH A., University of California, Santa Barbara
ZIMMERMAN, WILLIAM, Amherst College

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LUTZ, DOUGLAS, University of Pennsylvania
WOODWARD, BERTHA M.
Visiting investigators

WEISENBERG, RICHARD, Temple University

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MICHAUD, JAYNE
MURPHY, JOHN C., Marine Biological Laboratory
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O'CONNELL, MAUREEN F.
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SHEETZ, MICHAEL P., University of Connecticut
SCHNAPP, BRUCE J.
VALE, RONALD D., Stanford University
WALROND, JOHN P.
WISGIRDA, MARY, Marine Biological Laboratory

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MEANY, RICHARD A.
PETHIG, RONALD, University College of North Wales, U. K.

Student

PRICE, JONATHAN A., University College of North Wales, U. K.

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SHIPLEY, ALAN
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BJORKMAN, THOMAS, Cornell University
BOWLES, ELIZABETH, Wake Forest University
DEMAREST, JEFFERY, University of California
FIELDS, CYNTHIA, University of Colorado
KATZ, URI, Technician, Israel Institute of Technology, Haifa, Israel
KUNKEL, JOSEPH, University of Massachusetts
MACHEN, TERENCE, University of California
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HOBBIE, JOHN E. (as of 2/1/84)

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DE MARY, MASON
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MERKEL, SUSAN M.
MONTGOMERY, ELLYN
MONTGOMERY, MARY LOUISE
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RASK, SUSAN
ROSSI, MARY ANN
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SEMINO, SUZANNE J.
SHAVER, CAIUS R.
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STONE, THOMAS
TURNER, ANDREA R.
WHITE, DAVID

Trainees
CAVANAUGH, COLLEEN A., Harvard University
NADELHOFER, KNUTE, University of Wisconsin
RUDNICK, DAVID, University of Rhode Island

Visiting investigator
LUTHER, GEORGE, Kean College of New Jersey

XI. HONORS

FRIDAY EVENING LECTURES

NELSON, GEORGE S., Liverpool School of Tropical Medicine, 29 June, “Wild Animals as Hosts of Human Disease in Africa”
GAINER, HAROLD, National Institutes of Health, 6 July, Lang Lecture, “The Brain as a Secretory Organ: the Endocrine Neuron”
HILLE, BERTIL, University of Washington, 19, 20 July, Forbes Lectures, I. “Ionic Channels of
Excitable Cells: Fitness, Diversity and Evolution;” II. “Ionic Channels are Gated Macromolecular Pores”

MCLAREN, ANNE, MRC Mammalian Development Unit, University College, London, 27 July, “The Human Embryo: Landmarks in a Continuum”

EHINGER, BERNDT, University of Lund, 3 August, “Retinal Circuitry from an Ophthalmologist’s Viewpoint”

ALTMAN, SIDNEY, Yale University, 10 August, “A Novel Catalytic Role for RNA”

KENNEDY, DONALD, Stanford University, 17 August, “Let’s You and Him Fight: Government Policies and the Cost of Doing Research”

STEPHENS, RAY, Marine Biological Laboratory, 24 August, “The Tubulins: Building Blocks for Microtubules of Varied Function”

MAY, ROBERT, Princeton University, 31 August, “How to Host a Parasite and Other Ecological Lessons”

ASSOCIATES’ LECTURE

ROBINSON, DENIS, 18 August, “The Preparation of Young Minds”

SPECIAL LECTURE

WALD, GEORGE, Harvard University, 11 July, “Life and Mind in the Universe”

STEPS TOWARD INDEPENDENCE FELLOWS

AUGUSTINE, GEORGE, University of Southern California

BODZNICK, DAVID, Wesleyan University

BREHM, PAUL, Tufts University School of Medicine

MANDEL, GAIL, Harvard Medical School

MATTESON, RICK, University of Pennsylvania

MOORE, GORDON, University of Michigan

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SAUNDERS, MARY JANE, Louisiana State University

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ZACKROFF, ROBERT V., Northwestern University Medical School

BIOLOGY CLUB OF NEW YORK

PALAZZO, ROBERT E., Wayne State University

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JARAMILLO, EDUARDO, University of New Hampshire

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YAN, HONG-YOUNG, University of Texas, Austin
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L. V. HEILBRUNN
S. O. MAST
E. WITSCHI

Recipients:

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TAYLOR, MARK A., Purdue University

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SOLC, CHARLES K., Yale University School of Medicine
ZACKSON, SAUL L., Princeton University

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WHITE, ELIZABETH M., University of Rochester

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GAMBI, MARIA C., Stazione Zoologica, Naples, Italy
HUI-LING, CHIANG, Harvard University
JARAMILLO, EDUARDO, University of New Hampshire
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SAMPSON, ELIZABETH R., University of Massachusetts, Amherst

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LASTA, CARLOS A., Instituto Nacional de Investigacion y Desarrollo Pesquero, Argentina
LUNECKE, KARIN, Universita de Ecologia y Evolucion, Chile
PASCUAL, MIGUEL A., Instituto de Biologia Marina y Pesquera, Argentina
TORO, LIGIA G. CALDAZA, Universidad Autonoma Metropolitana—Iztapalapa, Mexico

XII. INSTITUTIONS REPRESENTED

U. S. A.

Academy of Natural Sciences of Philadelphia
Alaska, University of
Albert Einstein College of Medicine
American Museum of Natural History
Amherst College
M. D. Anderson Hospital and Tumor Institute
Arizona, University of
Atlantex and Zieler Instrument Corporation
Babson College
Baylor College of Medicine
Bell Laboratories
Benedict Estuarine Research Laboratory
Benedict Marine Laboratory of Philadelphia Academy
Bigelow Laboratories
Black Butte Coal Company
Boston University
Boston University Medical School
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Brigham and Women's Hospital
Brookhaven National Laboratory
Brooklyn College
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Bryn Mawr College
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California State University, Northridge
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California, University of, Berkeley
California, University of, Davis
California, University of, Irvine
California, University of, La Jolla
California, University of, Los Angeles
California, University of, Los Angeles, Medical School
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California, University of, San Francisco
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Carleton College
Carnegie Institution of Washington
Carnegie Mellon Institute
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Cedars-Sinai Medical Center
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Chicago, University of, Medical School
Cincinnati, University of, College of Medicine
City of Hope Medical Center
Clark University
Cold Spring Harbor Laboratory
Colorado State University
Colorado, University of
Colorado Video
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Connecticut, University of, Health Center
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Harbor Branch Foundation, Inc.
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Harvard University School of Public Health
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Illinois Institute of Technology
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Illinois, University of, College of Medicine
Illinois, University of, Medical Center
Imperial College
Indiana University
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Institute for Marine and Aquarium Studies
Instrumentation Marketing Corporation
Interactive Video Systems
International Business Machines
Iowa, University of
Jackson Laboratories
Johns Hopkins Hospital
Johns Hopkins University
Johnson Research Foundation
Kansas State University
Kansas, University of
Kean College of New Jersey
Kentucky, University of
Kenyon College
Kresge Eye Institute
Landmark College, South Carolina
Leitz, E. Inc.
Louisiana State University
Lowell, University of
<table>
<thead>
<tr>
<th>Institution Name</th>
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<tr>
<td>Loyola University of Chicago</td>
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<td>META Systems, Inc.</td>
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<td>Maine, University of</td>
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<td>Marine Biomedical Institute</td>
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<td>Marlboro College, Vermont</td>
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<td>Mental Health Research Institute of Michigan</td>
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<td>Merck, Sharp and Dohme Research Laboratories</td>
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<td>Millhauser Laboratory</td>
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<td>Millsaps College, Mississippi</td>
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<td>Miriam Hospital</td>
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<td>Moravian College, Pennsylvania</td>
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<td>Mystic Marinelife Aquarium</td>
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<td>National Eye Institute/NIH</td>
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<td>National Foundation for Cancer Research</td>
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<td>National Institute for Basic Biology</td>
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<td>National Institute of Aging/NIH</td>
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<td>National Institute of Alcohol Abuse and Alcoholism/NIH</td>
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<td>National Institute of Mental Health/NIH</td>
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<td>National Institutes of Health</td>
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<td>National Institute of Neurological and Communicative Disorders and Stroke/NIH</td>
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<td>National Marine Fisheries Service</td>
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<td>Naylor Dana Institute for Disease Prevention</td>
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<td>Nebraska, University of</td>
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<td>Neurological Research Institute, New York</td>
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<td>New Hampshire, University of</td>
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<td>New Jersey Medical School</td>
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<td>New York Institute for Basic Research in Mental Retardation</td>
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<td>New York Medical College</td>
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<td>New York State Department of Public Health</td>
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<td>North Carolina, University of, School of Medicine</td>
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<td>North Nassau Mental Health Center</td>
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<td>Northwestern University Medical School</td>
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<td>Ohio, Medical College of</td>
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<td>Ohio, University of Oklahoma</td>
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<td>Oklahoma, University of Olympus Corporation of America</td>
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<td>Oregon State University</td>
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<td>PMI-Strang Clinic</td>
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<td>Photonic Microscopy</td>
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<td>Pomona College</td>
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<td>Population Council, New York</td>
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<td>Princeton University</td>
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<td>Public Health Research Institute</td>
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<td>Puget Sound, University of</td>
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<td>Purdue University</td>
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<td>Rainbow Babies and Children’s Hospital</td>
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<td>Ramsey Medical Center</td>
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<td>A. O. Reichert</td>
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<td>R. J. Reynolds Tobacco Company</td>
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<td>Rhode Island Hospital</td>
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<td>Rhode Island, University of</td>
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<td>Rochester, University of</td>
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<td>Rochester, University of, Medical Center</td>
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<td>Rochester, University of, School of Medicine and Dentistry</td>
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</tbody>
</table>
Rockefeller Foundation
Rockefeller University
Rush College of Nursing and Graduate College
Rush Medical School
Rutgers University
Saint Peter's College
Salk Institute for Biological Studies
San Diego State University
Scripps Clinic–Research Institute
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United States Navy Djakarta, Indonesia
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Virginia, University of
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Washington University
Washington, University of
Washington University School of Medicine
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Free University of Berlin, West Germany
Genetisches Institut, West Germany
Glasgow, University of, Scotland, U. K.
Gottingen, University of, Denmark
Guelph, University of, Canada
Hebrew University, Israel
Imperial College, England, U. K.
Institut Pasteur, France
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Instituto de Biologia Marina y Pesquera, Argentina
Instituto de Investigaciones Biomedicas, Mexico
Instituto de Investigaciones Biomedicas, Universidad Nacional Autonoma de Mexico, Mexico
Instituto de Investigacion Medica, Argentina
Instituto Nacional de Investigacion Desarrollo Pesquera, Argentina
Instituto Oceanografico, Venezuela
Instituto Venezolano de Investigaciones Cientificas, Venezuela
International Institute of Genetics and Biophysics, Italy
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Karolinska Institute, Sweden
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Kitasto University School of Medicine, Japan
Liverpool School of Tropical Medicine, England, U. K.
Lund, University of, Sweden
Max Planck Institut fur Cell Biologie, Heidelberg, West Germany
McGill University, Canada
McMaster University, Canada
Memorial University of Newfoundland, Canada
Montreal Neurological Institute, Canada
Montreal, Universite de, Canada
Munich, University of, Chemical Research and Development Center, FRG
National Institute for Basic Biology, Japan
Odense University, Denmark
Open University, England, U. K.
Ottawa, University of, Canada
Oxford, University of, England, U. K.
Paris, University of, France
Paris—Sud, University of, Orsay, France
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Puerto Rico, University of, Puerto Rico
Rio de Janeiro, University of, Brazil
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Societe Atlantique de Mariculture, France
Stazione Zoologica, Naples, Italy
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Tjarno Marine Biological Laboratory, Sweden
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Tokyo, University of, Japan
Toronto, University of, Canada
Toyama University, Japan
Umea, University of, Sweden
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Universita de Ecologia y Evolucion, Chile
Universite Laval, Quebec, Canada
University College of North Wales, U. K.
University Sains Malaysia, Malaysia
Utrecht, University of, Netherlands
Weizmann Institute of Science, Israel
Wollongong, University of, Australia
Xiamen Fisheries College, Fujian, Peoples’ Republic of China
Zoologishes Institute, Zurich, Switzerland

XIII. LABORATORY SUPPORT STAFF
Including Persons Who joined or Left the Staff During 1984

Biological Bulletin

METZ, CHARLES B., Editor
CLAPP, PAMELA L.

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LEHY, DONALD B., Superintendent
ANDERSON, LEWIS B.
AVERETT, JUDITH
BALDIC, DAVID
BOURGOIN, LEE
BRODERICK, MADELINE
CARINI, ROBERT J.

MOUNTFORD, REBECCA J.

COLLINS, PAUL J.
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