The Marine Biological Laboratory

Ninety-Second Report for the Year 1989
One-Hundred and Second Year

Officers of the Corporation

Denis M. Robinson, Honorary Chairman of the Board of Trustees
Prosser Gifford, Chairman of the Board of Trustees
Harlyn O. Halvorson, President of the Corporation and Director
Robert D. Manz, Treasurer
Kathleen Dunlap, Clerk of the Corporation
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Report of the President and Director

If you spend a few hours in the stacks overlooking Eel Pond, leafing through old directors’ reports in the bound volumes of The Biological Bulletin, you might learn any number of lessons—about science in our century, about institutions and governance, about the MBL, that odd biological experiment in which scientists have tried, sometimes against long odds, to run their own institution, a seaside laboratory where they and their intellectual descendants can practice science as it ought to be practiced.

Among other things, you might notice how little some things have changed over the years at the MBL. The successes we’ve enjoyed and the problems we’ve encountered—both have remained surprisingly constant over the decades. That observation itself has periodically reappeared in the August supplement to the Bulletin, where various directors have noted how unchanging our successes have been, how eternal our needs—especially the need for better financial support.

It is interesting, and instructive, to hear a succession of directors assuring readers that the MBL is still fulfilling C. O. Whitman’s vision. For most of the 20th century, our directors have been reporting that the Laboratory still serves as a congress of American biology, still draws excellent people from excellent institutions, still spawns first-rate research and instruction, and still spans a wide range of biological interests—including emerging interests. Acknowledging that the population of American biologists has grown by orders of magnitude and a smaller percentage of the best biologists can be accommodated by any one institution, I can nonetheless report that, once again, it is still true that the MBL is hosting excellent investigators and simultaneously training some of the best young biologists, many of whom will no doubt rise to the top of their fields.

It is also interesting, and instructive, to hear directors reporting over the decades on continuing—or recurring—problems, many of which. I must also report, are still with us. Across the decades, various directors and long-range planning committees have written of our need for a larger endowment, increased support for our courses, more affordable housing for young investigators, and improved research facilities for all, including better collecting and holding facilities. Those needs are all still facing us, but here I want to address the last and foremost. Simply put, we must improve our research facilities if the MBL is to stay at the forefront of American biology.

Marine Resources Center, 1924–1989

Most immediately, we need a new Marine Resources Center to provide investigators and students with a reliable, healthy, and genetically defined supply of marine organisms.

Our current holding facility was erected in 1924; the call to improve the facility—then known as the Supply Department—began appearing in these pages 50 years ago, when the 65-year-old building was just 15 years old.

By the close of the 1930s, an ad hoc committee of the Corporation had declared the holding facilities obsolete. In 1940, Associate Director Charles Packard urged an improvement in Supply Department facilities, citing a 1939 report of the Committee on Policies and Future of the Laboratory. Sketches of a replacement structure apparently were drawn up, but the work was never done.

The current wooden building underwent modest renovations in the 1950s. By 1970, a new long-range planning committee was calling for a new Marine Resources Building. The new facility played a key role in a major proposal to the NSF. In his annual report for 1971, Director James Ebert described the need for a building “embodying environmentally controlled facilities suitable for the development of genetic strains of selected marine species and to initiate long-term
By 1976, an *ad hoc* committee on marine resources had worked with architects to design a three-story, 35,000-square-foot replacement for the old Supply Department. Director Keith Porter reported in these pages that the proposed new building would include “controlled systems for animal maintenance and an improved salt water system for uninterrupted flow during maintenance of filter beds.” The second floor would be “devoted to the culture of marine forms (involving) the long-term maintenance of young and adult organisms and the controlled propagation of organisms to provide genetic stocks and certain species that are either scarce . . . or difficult to obtain.” The top floor would be devoted to “research in genetics and the pathology of marine organisms.”

The following year, James Ebert (who had returned to direct the Laboratory) reported a move to develop a Marine Resources Center that could provide laboratory space for research and training programs in genetics, development, pathobiology and the pharmacology of marine organisms.

In 1979, planning for the new facility continued when the building was included as a central component in the Second Century Fund Campaign. A detailed feasibility study had been carried out by 1983, and in his 1985 director’s report Paul Gross discussed the Laboratory’s needs with his usual eloquence: “I noted earlier,” Gross wrote, “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, no matter how much money it costs.”

First among the urgencies Gross called to the Corporation’s attention, if the MBL was to remain a headlight of biology: “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 program in general will be brought into disarray.”

In 1987, a Committee on Long Range Goals, chaired by Gerald Fischbach, offered to the Trustees, among other recommendations, this by-now-familiar caution: “The dilapidated Marine Resources Building, constructed in 1924 and last renovated significantly after the 1953 hurricane, will soon undermine the MBL’s position as a national center for studies of marine organisms.”

Finally, our proposal for a Marine Biomedical Institute for Advanced Studies (MBIAS), compiled in our centennial year of 1988, includes a 32,000-square-foot building for the year-round breeding and maintenance of important marine species. The proposal identifies a state-of-the-art Marine Resources Center as an absolutely essential feature of any marine institute that seeks to play a major role in our national biomedical research effort.

I offer this historical tour of directors’ reports and planning committee findings to remind the Corporation that the logic for building a new Marine Resources Center is compelling.

In the last two years, we have made much progress toward the necessary building, but much hard work remains. We have to raise more construction funds. We have to have additional discussions with the local community and officials. And we have to do more careful analyses of how we will cover the new facility’s operating costs. These tasks are now before us; as I write this report, in the spring of 1990, much of the administrative staff and many Trustees and friends of the Laboratory are wrestling with these difficult matters.

But while there is much work left to be done before the long-awaited Marine Resources Center is up and operating, let me remind you that it is closer now than it has ever been before. By the end of 1988, the Trustees had approved the idea within the larger MBIAS proposal, which also includes building a new laboratory building. And the federal government had responded with a $2.2 million appropriation toward planning and construction of the two buildings. Additionally, Congress voted and President Reagan signed an authorization for such funds as necessary for construction of the MBIAS. The authorization, of course, does not guarantee full funding, but it does signal Congress’ approval and allows us to go back for additional appropriations in subsequent years with some reasonable hope of success.

In 1989, we were awarded some of those additional funds in the form of a $2 million appropriation. We now have raised $4.2 million toward the planning and construction of MBIAS facilities. We proceeded in 1989 to draw up plans for the new Marine Resources Center. (Simultaneously, we were making plans for the Advanced Studies Laboratory.)

In planning the Marine Resources Center, we worked with the Falmouth Town Planner, the Building Commissioner, and other department heads of Falmouth town government. In August of 1989, we put models on display in Swope for MBL Trustees and Corporation members. Throughout the year, we shared our building plans with various local groups, including
the Conservation Commission, the Falmouth Chamber of Commerce, the Falmouth Historical Society, the Woods Hole Community Association, and our own Falmouth and Woods Hole Advisory Committees. In December, we formally applied to the town for a building permit. (The permit was approved 5 January 1990.) At the close of 1989, we can entertain realistic hopes that this important building will become a reality before too many more directors' reports are filed.

Research

Research in 1989 proceeded along some established MBL lines and in some new directions, as well. The Ecosystems Center had an outstanding year, financially as well as in the field and press. Among the many papers that appeared from the Ecosystems group, one particularly widely read paper on methane uptake in temporal forests appeared in Nature and was promptly reported by a bevy of journalists. That paper suggested a link between acid rain and the greenhouse effect, a finding that caught the attention of ecologists around the world. On an administrative note, Dr. Jerry Melillo was promoted to co-director of the Ecosystems Center. He now shares leadership for that dynamic group with Dr. John Hobbie, who returned in 1989 from a sabbatical year in Sweden.

Dr. Mitchell L. Sogin's new Center for Molecular Evolution arrived in the spring of 1989. Dr. Sogin is also the director of our Workshop on Molecular Evolution, which was held for the second time in 1989.

Dr. Robert E. Palazzo opened a year-round laboratory to study the biochemical regulation of cellular events during meiosis and mitosis. Before receiving his current five-year grant, Dr. Palazzo worked at the MBL as a summer investigator in Dr. Lionel Rebhun's University of Virginia laboratory.

In 1989 we concluded a new five-year financial agreement with Boston University on the Boston University Marine Program. The new agreement, which coincided with BUMP's twentieth anniversary at the MBL, is the first long-term agreement we've reached with BU, and it establishes a more reliable base from which all parties can make their plans about space and resources.

The University of Pennsylvania made a dramatic new commitment to the Laboratory of Marine Animal Health with the establishment of a chair for the new director of that laboratory. Dr. Donald Abt, a veteran MBL scientist and University of Pennsylvania marine epidemiologist, took on leadership of the lab and assumed the Robert R. Marshak Term Professorship of Aquatic Medicine and Pathology.

Together with the Woods Hole Oceanographic Institution, we opened a new facility for molecular biology, including nucleic acid analysis, gene sequencing, and recombinant DNA work. Technical manager for the facility is Dr. Richard Ridge.

The re-initiated Steps Fellowship program provided support for seven junior faculty member investigators in 1989. This important program helps bring new generations of biologists to the MBL at a time when the laboratory can have the most beneficial effect on their careers.

Instruction

The demand for MBL summer courses was high in 1989; we had a 39% increase in applicants over 1988. This year also marked the second successful year for two August courses, Methods in Computational Neuroscience and Workshop on Molecular Evolution, about which we are very enthusiastic.

Certain long-standing problems in our $1.7 million educational enterprise must soon be faced by the Corporation. Most fundamentally, where will we get the funds to continue operating at our present level? We should note that the MBL is not alone in being hit by cuts in educational grants. Nor are we alone in having to answer tough questions put forth by review committees about the value of advanced training at our site. Simultaneously, we are facing the prospect of changing priorities by corporations and foundations that have funded MBL courses in the past.

I believe that we must turn to the university graduate programs that depend on the MBL for advanced training to help us stabilize our federal funding for training and, at the same time, ask them to pay more of the costs of sending their students to the MBL. Simultaneously, we must begin to build an endowment for all MBL courses. This initially will take the form of course-specific endowment funds contributed by course alumni.

Other major questions concern the direction and organization of the courses. I hope Corporation members will work with us to define the priorities and seek the support to continue what is still a superb educational program at the MBL.

The Zeiss School of Microscopy opened at the MBL in November. One of our own Trustees, Dr. Dieter Blennemann, president of Carl Zeiss, Inc., is responsible for establishing the new school, which offers week-long courses in microscopy for Zeiss personnel and for other
Zeiss School of Microscopy director Philip Presley with student.

academic and industrial users of sophisticated microscopy. Zeiss representative Philip Presley serves as director of the new school.

In a non-traditional educational venture, we hosted our first ELDERHOSTEL session in 1989. ELDERHOSTEL programs are week-long courses for adults 60-years-old and older. Three additional sessions are planned for winter months in 1990.

We also hosted or participated in a number of programs for high school students. With Simon's Rock of Bard College, we hosted an NSF-funded summer research experience for young scholars. The program brought 30 tenth and eleventh grade students to the MBL in August for internships in ecological and environmental science. Our own Futures in Science (FiS) program continued with four Falmouth High School students participating in 1988-1989 and six in 1989-90. Futures in Science is funded and administered by the MBL Associates.

In the summer of 1989, we joined with a consortium of other science institutions, businesses, and local educators to form the Woods Hole Science and Technology Education Partnership. Still in the planning stages at the close of the year, this partnership is an effort to develop science programs and activities for local high school students.

Library

We have made exciting progress in upgrading our library services, as Director of Library Planning Catherine Norton describes in her library report. MBL scientists can now access a host of databases and tools through OSIS, the library's on-line scientific information system. We are putting in place a village-wide network to link scientists' in-lab computers to the library. Through the network, individual scientists will also be linked to each other and to the outside world. This modernization of library services is the result of recent gifts and grants from the A. W. Mellon Foundation, the Bay Foundation, and the Howard Hughes Medical Institute.

Governance

Governance is another subject that echoes through past directors' reports. Changes in the Board of
Trustees, new planning and oversight committees—the MBL seems to be always in the process of trying to figure out how a truly democratic laboratory can govern itself. In 1989, we continued to strengthen our corporate and foundation representation on the Board of Trustees. Two lay Trustees—now officially known as At-Large Trustees—served with distinction on the 1989 Executive Committee. D. Thomas Trigg and Irving W. Rabb, both Trustees of the class of 1990, brought a new level of business sophistication and financial acumen to the Executive Committee.

The Year-Round Scientific Forum continued to be active in 1989. A four-member Council of Year-Round Scientists, elected by Forum members, worked to further define issues and implement ideas raised by Forum members. The Council is advisory to the director. The 1989 Council addressed the issues such as office space for year-round scientists, hiring and promotions policies, grievances procedures, and the need to recruit new young year-round scientists. Council members in 1989 included Drs. Jelle Atema, Anne Giblin, Felix Strumwasser, and Ete Szuts. In May, Drs. Lionel Jaffe and Gus Shaver replaced Drs. Giblin and Szuts.

**Personnel**

In the autumn of 1989, a group of employees of the Laboratory asked the National Labor Relations Board to supervise an election to determine whether Local 767 of the Hospital Workers Union would represent MBL maintenance, clerical, and some technical employees for the purposes of collective bargaining. The Executive Committee directed the administration to carry out an informational campaign, in order that MBL employees would be able to make an informed decision on this important question. The election was scheduled for February of 1990. The events of 1989 provided the occasion for management self-evaluation and for some needed training of supervisors. At the close of 1989, I felt that whatever the outcome of the election, our management team was better off for having undergone a fairly rigorous evaluation and training.

**The Biological Bulletin**

Dr. Michael J. Greenberg began a five-year term as editor of *The Biological Bulletin* in August, succeeding Dr. Charles B. Metz, who served in that post for many years. Dr. Greenberg is a long-time MBL Corporation member, a former course director, and a veteran of the *Bulletin*’s editorial board. Upon accepting the editorship, he announced a series of initiatives to increase the *Bulletin*’s visibility and appeal to contributors and subscribers, including the use of color and glossy covers and a new Research Notes section in *Nature* format. He also established *The Biological Bulletin Board*, a periodic newsletter.

**National Association of Marine Laboratories**

In the autumn of 1989, we joined with about 40 other coastal laboratories to form the National Association of Marine Laboratories (NAML). The association was born out of a growing sense that marine and freshwater labs need to work together on common problems, including the limited pool of federal money available for marine programs, facilities, and training. I was chosen to serve for the next two years as president of the association, and MBL year-round scientist Dr. Alan Kuzirian was elected secretary/treasurer (those appointments will go into effect in 1990).

The new association will officially begin operations 1 July 1990, but by the close of 1989 a NAML delegation was preparing to travel to Washington to make a presentation to NIH directors on the use of marine animals as models in biomedical research.

**The Falmouth Forum**

Finally, in a combined educational and community outreach effort, a group of volunteers established a winter Friday lecture series titled The Falmouth Forum. Supported in part by the MBL Associates, The Falmouth Forum was designed to bring first-rate lectures and panel discussions to the MBL and Cape Cod communities. The Forum began in November with *Boston Globe* science columnist Chet Raymo giving a presentation on “the soul of science.” In December, Falmouth physician E. Langdon Burwell led a panel discussion on America’s health care system. The initial presentations were well attended and well reviewed by local audiences.

—Harlyn O. Halvorson
Report of the Treasurer

The year 1989 was a challenging yet successful one for your Laboratory. In the aggregate our fund balances increased from $21.4 to $24.1 million. This growth was due primarily to gifts to endowment and the excellent investment performance of our endowment funds. In addition to the growth in our fund balances, we received a large installment of funds from the Hughes gift. The unspent balance of those funds is now recorded as "deferred support" on the balance sheet. That $4.5 million dollars of deferred support assures the continued strength of the Laboratory's educational program for the next 6 years.

Our current unrestricted fund ended the year with an excess of revenues over expenses of $129,321, of which $78,692 is from the Housing Auxiliary Fund. We were able to make a modest contribution to the Housing Repairs and Replacement Reserve of $49,144.

The significant events and financial trends evident in 1989 are as follows.

Debt refinancing

In October we refinanced our mortgage note with the Falmouth National Bank with tax-exempt bonds issued by the Massachusetts Industrial Finance Agency (MIFA). This should significantly reduce the carrying cost of the debt on the Memorial Circle cottages and allow us to more adequately provide funds for the repair and replacement needs of our housing stock. This benefit comes with the additional obligations of maintaining a sound financial course and adequate financial reserves and imposes on us an externally monitored requirement for continued financial discipline.

Expanding research base

In 1989 the financial base of MBL-sponsored research rose by 25%—from $3.9 to $5.0 million—continuing a trend begun the previous year. This is a positive and healthy development for the Laboratory. The increase is in large part attributable to the continued scientific success of the Ecosystems Center and to the establishment of the Molecular Evolution Laboratory.

Private gift support

As we negotiated the refinancing of our debt, we again recognized how critical private and foundation gifts and grants are to the financing of the Laboratory's science. While our record is impressive, it points to the continuing challenge we face: renewed and continued private support is vital to our scientific and financial future.

Course support

Although we effectively managed our course budgets for 1989, funding problems loom in the future. Federal funding of instruction is diminishing, reflecting a major shift in funding emphasis and a continued general pressure on the federal budget for science. In 1990 we are experiencing a significant drop from the level of federal support of 1989. Even with multi-year support from the Hughes and MacArthur foundations, this decline in federal support will require serious decisions about course expenditures and future financing.

Planning for new construction

The year 1989 marked the beginning of the preconstruction phase of the new construction projects. Approximately $580,000 of planning and architectural expenses were incurred. We are required by accounting rules to capitalize these expenditures in the anticipation of future construction. We have instituted a Long-Range Financial Planning Committee of the Trustees to evaluate the financial plans for the Marine Resources Center and the Advanced Studies Laboratory. The
Committee will examine the feasibility of plans for financing the construction and the operations of the proposed new buildings. Building the financial support for these new endeavors is a major fund raising and management challenge for the entire MBL community.

The Trustees have asked the Long-Range Financial Planning Committee not to limit themselves to issues connected with the proposed new construction program, but to consider all questions related to the continued financial strength of the Laboratory.

The input of this Committee will strengthen the ability of your administration to plan for and manage the challenging task of maintaining the Laboratory's position at the center of biological science in America.

—Robert D. Manz
REPORT OF INDEPENDENT ACCOUNTANTS

To the Trustees of
Marine Biological Laboratory
Woods Hole, Massachusetts

We have audited the accompanying balance sheet of Marine Biological Laboratory as of December 31, 1989, and the related statement of support, revenues, expenses and changes in fund balances for the year then ended. We previously examined and reported upon the financial statements of the Laboratory for the year ended December 13, 1988, which condensed statements are presented for comparative purposes only. These financial statements are the responsibility of the Laboratory's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Marine Biological Laboratory at December 31, 1989, and its support, revenues, expenses and changes in fund balances for the year then ended in conformity with generally accepted accounting principles.

As disclosed in Note L to the financial statements, the Laboratory changed its method of accounting for current restricted funds in 1989.

Our audit was conducted for the purpose of forming an opinion on the basic financial statements taken as a whole. The supplemental schedules of support, revenues, expense and changes in fund balances for current funds (Schedule I), endowment funds (Schedule II) and plant funds (Schedule III) as of December 31, 1989, are presented for purposes of additional analysis and are not a required part of the basic financial statements. Such information has been subjected to the auditing procedures applied in the audit of the basic financial statements and, in our opinion, is fairly stated, in all material respects, in relation to the basic financial statements taken as a whole.
# MARINE BIOLOGICAL LABORATORY

## BALANCE SHEETS

December 31, 1989  
(with comparative totals for 1988)

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Cash and savings deposits</td>
<td>$496,014</td>
<td>$199,970</td>
<td>Current portion of long-term debt</td>
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<td>Money market securities (Notes B and H)</td>
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<td>1,750,000</td>
<td>Accounts payable and accrued expenses</td>
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<td>Accounts receivable, net of allowance for uncollectible accounts</td>
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<td>576,355</td>
<td>Deferred income</td>
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<td>116,345</td>
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<td>Receivables due for costs incurred on grants and contracts</td>
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<td>836,608</td>
<td>Total current liabilities</td>
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<td>676,872</td>
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<td>Other assets</td>
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<td>50,370</td>
<td>Mortgage and notes payable (Note G)</td>
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<td>Total current assets</td>
<td>3,113,414</td>
<td>3,413,303</td>
<td>Deferred support (Note L)</td>
<td>4,480,222</td>
<td>2,951,662</td>
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<td>Investments, at market (Notes B and H)</td>
<td>15,971,459</td>
<td>11,401,121</td>
<td>Annuities payable (Note B)</td>
<td>105,355</td>
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<td>Deposits with trustees (Note G)</td>
<td>133,000</td>
<td>—</td>
<td>Total liabilities</td>
<td>7,049,758</td>
<td>4,784,023</td>
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<td>Land, buildings and equipment (Notes B and C)</td>
<td>20,869,811</td>
<td>19,682,987</td>
<td>Current unrestricted fund balances</td>
<td>21,030</td>
<td>13,275</td>
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<td>Less accumulated depreciation</td>
<td>(8,858,047)</td>
<td>(8,268,927)</td>
<td>Endowment funds:</td>
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<tr>
<td>Total assets</td>
<td>$31,229,637</td>
<td>$26,228,484</td>
<td>Quasi-endowment unrestricted</td>
<td>426,982</td>
<td>409,997</td>
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<td>Endowment, income for restricted purposes</td>
<td>4,804,006</td>
<td>3,595,974</td>
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<td>Quasi-endowment restricted</td>
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<td></td>
<td>Endowment, income for unrestricted purposes</td>
<td>3,234,878</td>
<td>2,850,409</td>
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<td></td>
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<td></td>
<td>Total liabilities and fund balances</td>
<td>$31,229,637</td>
<td>$26,228,484</td>
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</tbody>
</table>

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

**STATEMENT OF SUPPORT, REVENUES, EXPENSES AND CHANGES IN FUND BALANCES**

for the year ended December 31, 1989
(with comparative totals for 1988)

<table>
<thead>
<tr>
<th>Current Funds</th>
<th>Endowment Funds</th>
<th>Plant Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unrestricted</td>
<td>Restricted</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>$5,245,497</td>
<td>$574,821</td>
<td>$5,820,318</td>
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<tr>
<td>$2,948,406</td>
<td>440,562</td>
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<tr>
<td>Tuition</td>
<td></td>
<td>440,562</td>
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<tr>
<td>Support activities:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dormitories</td>
<td>869,768</td>
<td>869,768</td>
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<tr>
<td>Dining hall</td>
<td>632,463</td>
<td>632,463</td>
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<tr>
<td>Library</td>
<td>249,128</td>
<td>249,128</td>
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<tr>
<td><em>Biological Bulletin</em></td>
<td>188,681</td>
<td>188,681</td>
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<tr>
<td>Research services</td>
<td>494,287</td>
<td>494,287</td>
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<tr>
<td>Marine resources</td>
<td>141,143</td>
<td>141,143</td>
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<tr>
<td>Investment income</td>
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<td>499,929</td>
<td>942,951</td>
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<td></td>
<td>5,951,148</td>
<td>6,185,988</td>
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<tr>
<td>Gifts (Note I)</td>
<td>875,985</td>
<td>1,572</td>
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<td>Change in deferred support</td>
<td>(1,498,560)</td>
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<tr>
<td></td>
<td>875,985</td>
<td>1,572</td>
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<td></td>
<td>1,474,049</td>
<td>3,099,031</td>
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<tr>
<td>Miscellaneous revenue</td>
<td>104,743</td>
<td>328,358</td>
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<tr>
<td>Total support and revenues</td>
<td>6,931,876</td>
<td>592,143</td>
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*Note: Numbers may not add exactly due to rounding.*
EXPENSES:

<table>
<thead>
<tr>
<th>Category</th>
<th>2009</th>
<th>2008</th>
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<tbody>
<tr>
<td>Instruction</td>
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<td>1,328,404</td>
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<tr>
<td>Research</td>
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<td>5,070,730</td>
</tr>
<tr>
<td>Scholarships and stipends</td>
<td>233,511</td>
<td>233,511</td>
</tr>
<tr>
<td>Support activities:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dormitories</td>
<td>736,272</td>
<td>736,272</td>
</tr>
<tr>
<td>Dining hall</td>
<td>543,797</td>
<td>543,797</td>
</tr>
<tr>
<td>Library</td>
<td>606,691</td>
<td>761,654</td>
</tr>
<tr>
<td>Biological Bulletin</td>
<td>192,741</td>
<td>192,741</td>
</tr>
<tr>
<td>Research services</td>
<td>615,146</td>
<td>843,511</td>
</tr>
<tr>
<td>Marine resources</td>
<td>373,571</td>
<td>373,571</td>
</tr>
<tr>
<td>Administration</td>
<td>1,897,994</td>
<td>1,897,994</td>
</tr>
<tr>
<td>Sponsored projects administration</td>
<td>316,501</td>
<td>316,501</td>
</tr>
<tr>
<td>Plant operations</td>
<td>1,481,382</td>
<td>1,481,382</td>
</tr>
<tr>
<td>Depreciation</td>
<td>589,120</td>
<td>589,120</td>
</tr>
<tr>
<td>Other</td>
<td>38,460</td>
<td>605,884</td>
</tr>
<tr>
<td><strong>Total expenses</strong></td>
<td>6,802,555</td>
<td>14,975,072</td>
</tr>
</tbody>
</table>

Excess (deficit) of support and revenues over expenses:

<table>
<thead>
<tr>
<th>Category</th>
<th>2009</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excess (deficit) of support and revenues over expenses</td>
<td>129,321</td>
<td>747,387</td>
</tr>
<tr>
<td>Realized gains on investments</td>
<td>896</td>
<td>362,459</td>
</tr>
<tr>
<td>Unrealized gains on investment</td>
<td>30,672</td>
<td>959,927</td>
</tr>
<tr>
<td>Total gain on investments</td>
<td>4,838</td>
<td>1,322,386</td>
</tr>
<tr>
<td>Transfers</td>
<td>12,109</td>
<td>415,690</td>
</tr>
<tr>
<td>Net change in fund balances</td>
<td>7,755</td>
<td>2,160,133</td>
</tr>
<tr>
<td>Fund balances, beginning of year</td>
<td>13,275</td>
<td>409,997</td>
</tr>
<tr>
<td>Cumulative effect of change in accounting for current restricted funds (Note L)</td>
<td>(1,653,334)</td>
<td>21,444,461</td>
</tr>
<tr>
<td>Fund balances, end of year</td>
<td>$21,030</td>
<td>$12,519,771</td>
</tr>
</tbody>
</table>
Marine Biological Laboratory

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 natural 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. Separate accounts are maintained for each fund; however, in the accompanying financial statements, funds that have similar characteristics have been combined into fund groups. Accordingly, all financial transactions have been recorded and reported by fund group.

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 as the related costs are incurred (see Note L).

Endowment funds are subject to restrictions requiring that the principal be invested in perpetuity 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.

**Fixed assets**

Fixed assets are recorded at cost. Depreciation is computed using the straight-line method over estimated useful lives of fixed assets.

**Contracts and grants**

Revenues associated with contracts and grants are recognized in the statement of support, revenues, expenses and changes in fund balances as the related costs are incurred (see Note L). The Laboratory reimbursement of indirect costs relating to government contracts and grants is based on negotiated indirect cost rates with adjustments for actual indirect costs in future years. Any over or under recovery of indirect costs is recognized through future adjustments of indirect cost rates.

**Investments**

Investments purchased by the Laboratory are carried at market value. Money market securities are carried at cost, which approximates market value. 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.

The Laboratory is the beneficiary of certain endowment investments, reported in the financial statements, which are held in trust by others. Every ten years the Laboratory’s status as beneficiary of these funds is reviewed to determine that the Laboratory’s use of these funds is in accordance with the intent of the funds. The market values of these investments are $4,039,803 and $3,551,482 at December 31, 1989, and 1988, respectively.

**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 market value unit basis (Note M).

**Annuities payable**

Amounts due to donors in connection with gift annuities is determined based on remainder value calculations which generally assure a rate of return at 10%, maximum payout terms of nineteen years, and interest payout rate of 8%.

C. **Land, buildings, and equipment:**

The following is a summary of the unrestricted plant fund assets:

<table>
<thead>
<tr>
<th></th>
<th>1989</th>
<th>1988</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>$840,594</td>
<td>$689,660</td>
</tr>
<tr>
<td>Buildings</td>
<td>16,926,715</td>
<td>16,694,233</td>
</tr>
<tr>
<td>Equipment</td>
<td>2,521,904</td>
<td>2,299,094</td>
</tr>
<tr>
<td>Construction in progress</td>
<td>580,598</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>20,869,811</td>
<td>19,682,987</td>
</tr>
<tr>
<td>Less accumulated depreciation</td>
<td>(8,858,047)</td>
<td>(8,268,927)</td>
</tr>
<tr>
<td></td>
<td>$12,011,764</td>
<td>$11,414,060</td>
</tr>
</tbody>
</table>
D. Retirement fund:

On May 23, 1989, the Laboratory terminated its noncontributory defined benefit pension plan, which covered substantially all employees. Benefits earned by employees under the terminated plan became fully vested and were distributed to plan participants.

Net pension cost for fiscal year ending December 31, 1989 was:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service cost</td>
<td>$27,041</td>
</tr>
<tr>
<td>Interest cost</td>
<td>173,227</td>
</tr>
<tr>
<td>Actual return on plan assets</td>
<td>(296,846)</td>
</tr>
<tr>
<td>Net amortizations and deferrals</td>
<td>82,291</td>
</tr>
<tr>
<td>Net periodic pension income</td>
<td>(14,287)</td>
</tr>
</tbody>
</table>

On February 17, 1989, in anticipation of the plan termination, effective May 23, 1989, the Laboratory froze future benefit accruals. The accumulated benefit obligation of $2,569,454 was settled through the purchase of non-participating annuity contracts and distribution of lump sum settlements. Because all excess assets were allocated among the participants, the Laboratory recognized no curtailment gain or loss. There was a settlement gain of $289,650 attributable to amounts previously accrued by the Laboratory and the plan ceased to exist as an entity.

A portion of the settlement gain of $192,285 was used to account for separation agreements with certain current employees. The balance of the settlement gain, $97,365 was returned to grants and contracts.

The Laboratory participates in the defined contribution pension program of the Teachers Insurance and Annuity Association. Expenses amounted to $393,422 in 1989 and $130,677 in 1988.

E. Restricted pledges and grants:

As of December 31, 1989, the Laboratory reported active pledge and grant commitments outstanding of $1,073,986 (unaudited) to be received. The restricted pledges are not included in the financial statements since it is not practicable to estimate the net realizable value of such pledges. Restricted pledges of $978,786 and $95,200 are scheduled to be paid in 1990 and 1991, respectively.

F. Interfund borrowings:

Current fund interfund balances at December 31 are as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>1989</th>
<th>1988</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due to restricted endowment fund</td>
<td>$(2,190)</td>
<td>$(31,600)</td>
</tr>
<tr>
<td>Due to restricted quasi-endowment funds</td>
<td>(200)</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>$(2,390)</td>
<td>$(31,600)</td>
</tr>
</tbody>
</table>

G. Mortgage and notes payable:

Long-term debt at December 31, 1989 amounted to $1,330,000. The aggregate amount of redemption due for each of the next five fiscal years is as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>$65,000</td>
</tr>
<tr>
<td>1991</td>
<td>65,000</td>
</tr>
<tr>
<td>1992</td>
<td>60,000</td>
</tr>
<tr>
<td>1993</td>
<td>60,000</td>
</tr>
<tr>
<td>1994</td>
<td>60,000</td>
</tr>
<tr>
<td>Thereafter</td>
<td>1,020,000</td>
</tr>
<tr>
<td>Less current portion</td>
<td>1,330,000</td>
</tr>
<tr>
<td></td>
<td>65,000</td>
</tr>
<tr>
<td></td>
<td>$1,265,000</td>
</tr>
</tbody>
</table>

During 1989, the Laboratory issued $1,330,000 Massachusetts Industrial Finance Authority (MIFA) Series 1989 Bonds, which pay varying annual interest rates and mature on October 31, 2011.

The bonds are payable annually with the first payment of $65,000 due October 1, 1990. The interest rate is adjustable and was 6.5% at December 31, 1989. In compliance with the Laboratory’s MIFA bond indenture, deposits with Shawmut Bank, as trustee, represent investments in the debt service reserve fund of $133,000.

The Series 1989 bonds are collateralized by a first mortgage on certain Laboratory property.

H. Investments:

The following is a summary of the cost and market value of investments at December 31, 1989 and 1988 and the related investment income and distribution of investment income for the years ended December 31, 1989 and 1988.
### Endowment and quasi-endowment

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Government securities</td>
<td>$2,595,407</td>
<td>$1,328,927</td>
<td>$2,607,537</td>
<td>$1,323,105</td>
<td>$134,394</td>
<td>$95,234</td>
</tr>
<tr>
<td>Corporate fixed income</td>
<td>5,900,736</td>
<td>3,124,493</td>
<td>6,032,642</td>
<td>3,131,404</td>
<td>363,439</td>
<td>257,692</td>
</tr>
<tr>
<td>Common stocks</td>
<td>3,392,001</td>
<td>3,717,850</td>
<td>5,901,724</td>
<td>5,375,980</td>
<td>196,452</td>
<td>211,319</td>
</tr>
<tr>
<td>Preferred stock</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Money market securities</td>
<td>595,467</td>
<td>916,280</td>
<td>593,544</td>
<td>916,280</td>
<td>87,994</td>
<td>49,995</td>
</tr>
<tr>
<td>Real estate</td>
<td>345,749</td>
<td>15,749</td>
<td>345,749</td>
<td>15,749</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>12,829,360</td>
<td>9,103,299</td>
<td>15,481,196</td>
<td>10,762,518</td>
<td>782,279</td>
<td>614,490</td>
</tr>
<tr>
<td>Less custodian and management fees</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(49,318)</td>
<td>(44,073)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>732,961</td>
<td>570,417</td>
</tr>
</tbody>
</table>

### Restricted current fund

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificates of deposits</td>
<td>490,263</td>
<td>638,603</td>
<td>490,263</td>
<td>638,603</td>
<td>34,785</td>
<td>38,603</td>
</tr>
<tr>
<td>Money market securities</td>
<td>965,000</td>
<td>1,750,000</td>
<td>965,000</td>
<td>1,750,000</td>
<td>175,205</td>
<td>66,248</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,455,263</td>
<td>2,388,603</td>
<td>1,455,263</td>
<td>2,388,603</td>
<td>209,990</td>
<td>104,851</td>
</tr>
<tr>
<td><strong>Total investments</strong></td>
<td>$14,284,623</td>
<td>$11,491,902</td>
<td>$16,936,459</td>
<td>$13,151,121</td>
<td>$942,951</td>
<td>$675,268</td>
</tr>
</tbody>
</table>

### 1. Gift support for instruction

Unrestricted gifts includes $406,524 of gifts for the support of the Laboratory's instruction program available for indirect costs attributable to the instruction program.

### J. Litigation

The Laboratory is involved in litigation on several matters and is subject to the possibility of certain claims arising in the normal course of business, none of which, in the opinion of management are expected to have a materially adverse effect on the Laboratory's financial position.

### K. Tax-exempt status

The Laboratory is exempt from federal income tax under Section 501(c)3 of the Internal Revenue Code.

### L. Change in accounting method for current restricted funds

Effective January 1, 1989, the Laboratory adopted the accounting policy of deferring recognition of revenue on current restricted funds until the related costs are incurred. Amounts received in excess of expenses are recorded as deferred support. This change has been retroactively applied to the fund balances as of January 1, 1988. The cumulative decrease in the fund balances was $4,450,222 and $3,951,662 at December 31, 1989 and 1988, respectively. The following summarizes the activity in the deferred support account for 1989 and 1988, respectively:

<table>
<thead>
<tr>
<th></th>
<th>1989</th>
<th>1988</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance at beginning of year</td>
<td>$2,951,662</td>
<td>$1,653,334</td>
</tr>
<tr>
<td>Additions:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gifts, endowment income and grants received</td>
<td>9,382,212</td>
<td>7,298,318</td>
</tr>
<tr>
<td>Unrealized gains</td>
<td>30,672</td>
<td></td>
</tr>
<tr>
<td>Deductions:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funds expended under gifts and grants</td>
<td>7,542,909</td>
<td>6,047,936</td>
</tr>
<tr>
<td>Transfers</td>
<td>371,415</td>
<td>(47,946)</td>
</tr>
<tr>
<td>Balance at end of year</td>
<td>$4,450,222</td>
<td>$2,951,662</td>
</tr>
</tbody>
</table>

### M. Accounting for pooled investments:

The major portion of investment assets is pooled for investment purposes with each participating fund subscribing to, or disposing of, units at market value at the beginning of the current quarter. The unit participation of the funds at December 31, 1989 is as follows:

<table>
<thead>
<tr>
<th></th>
<th>1989</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endowment and similar funds:</td>
<td></td>
</tr>
<tr>
<td>Quasi-unrestricted</td>
<td>3,975</td>
</tr>
<tr>
<td>Quasi-restricted</td>
<td>7,551</td>
</tr>
<tr>
<td>Restricted endowment</td>
<td>37,220</td>
</tr>
<tr>
<td></td>
<td>48,746</td>
</tr>
</tbody>
</table>

Pooled investment activity on a per-unit basis was as follows:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit value at beginning of year</td>
<td>$100.00</td>
</tr>
<tr>
<td>Unit value at end of year</td>
<td>107.42</td>
</tr>
<tr>
<td>Increase in realized and unrealized appreciation</td>
<td>7.42</td>
</tr>
<tr>
<td>Net income earned on pooled investments</td>
<td>5.61</td>
</tr>
<tr>
<td>Total return on pooled investments</td>
<td>$13.03</td>
</tr>
</tbody>
</table>

Investment income is distributed to individual funds as earned.
## MARINE BIOLOGICAL LABORATORY

**STATEMENT OF SUPPORT, REVENUES, EXPENSES AND CHANGES IN FUND BALANCES**

**CURRENT FUNDS**

for the year ended December 31, 1989

<table>
<thead>
<tr>
<th>SUPPORT AND REVENUES:</th>
<th>Operating Fund</th>
<th>Housing Enterprises Fund</th>
<th>Total Current Unrestricted Fund</th>
<th>Current Restricted Fund</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grant reimbursement of direct costs</td>
<td></td>
<td></td>
<td></td>
<td>$5,245,497</td>
<td>$5,245,497</td>
</tr>
<tr>
<td>Change in deferred support</td>
<td></td>
<td></td>
<td></td>
<td>440,562</td>
<td>440,562</td>
</tr>
<tr>
<td>Recovery of indirect costs related to research and instruction programs</td>
<td></td>
<td></td>
<td></td>
<td>2,948,406</td>
<td>2,948,406</td>
</tr>
<tr>
<td>Tuition</td>
<td>875,985</td>
<td>875,985</td>
<td>2,972,609</td>
<td>3,848,594</td>
<td></td>
</tr>
<tr>
<td>Support activities:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dormitories</td>
<td>632,463</td>
<td>632,463</td>
<td>632,463</td>
<td>632,463</td>
<td></td>
</tr>
<tr>
<td>Dining hall</td>
<td>249,128</td>
<td>249,128</td>
<td>249,128</td>
<td>249,128</td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td>188,681</td>
<td>188,681</td>
<td>188,681</td>
<td>188,681</td>
<td></td>
</tr>
<tr>
<td>Research services</td>
<td>494,287</td>
<td>494,287</td>
<td>494,287</td>
<td>494,287</td>
<td></td>
</tr>
<tr>
<td>Marine resources</td>
<td>141,143</td>
<td>141,143</td>
<td>141,143</td>
<td>141,143</td>
<td></td>
</tr>
<tr>
<td>Investment income</td>
<td>427,272</td>
<td>427,272</td>
<td>499,929</td>
<td>927,201</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5,951,148</td>
<td>5,951,148</td>
<td>6,185,988</td>
<td>12,137,136</td>
<td></td>
</tr>
<tr>
<td>Gifts</td>
<td>875,985</td>
<td>875,985</td>
<td>1,474,049</td>
<td>2,350,034</td>
<td></td>
</tr>
<tr>
<td>Change in deferred support</td>
<td></td>
<td></td>
<td></td>
<td>(1,498,560)</td>
<td>(1,498,560)</td>
</tr>
<tr>
<td>Miscellaneous revenue</td>
<td>104,743</td>
<td>104,743</td>
<td>223,615</td>
<td>328,358</td>
<td></td>
</tr>
<tr>
<td>Total support and revenues</td>
<td>6,062,108</td>
<td>869,768</td>
<td>7,883,852</td>
<td>14,815,528</td>
<td></td>
</tr>
</tbody>
</table>

| EXPENSES: | | | | |
| Instruction | 1,328,404 | | | 1,328,404 |
| Research | 5,070,730 | | | 5,070,730 |
| Scholarships and stipends | | | | 233,511 |
| Support activities: | | | | |
| Dormitories | 543,797 | 543,797 | 736,272 | 736,272 |
| Dining hall | 606,691 | 606,691 | 1,549,603 | 761,654 |
| Library | 192,741 | 192,741 | 192,741 | 192,741 |
| Biological Bulletin | 615,146 | 615,146 | 228,365 | 843,511 |
| Research services | 373,571 | 373,571 | 373,571 | 373,571 |
| Marine resources | 1,843,190 | 54,804 | 1,897,994 | 1,897,994 |
| Administration | 316,501 | 316,501 | 316,501 | 316,501 |
| Sponsored projects administration | 1,481,382 | 1,481,382 | 1,481,382 | 1,481,382 |
| Plant operations | 38,460 | 38,460 | 526,936 | 565,396 |
| Other | 791,076 | 791,076 | 6,802,555 | 7,542,909 | 14,345,464 |
| Total expenses | 6,011,479 | 791,076 | 6,802,555 | 7,542,909 | 14,345,464 |
| Excess (deficit) of support and revenues over expenses | 50,629 | 78,692 | 129,321 | 340,743 | 470,064 |
| Unrealized gain on investments | | | | | 30,672 |
| TRANSFERS AMONG FUNDS: | | | | |
| Debt service | (5,225) | (29,548) | (34,773) | (34,773) |
| Acquisition of fixed assets | | | (335,836) | (335,836) |
| Net transfer to restricted plant fund | | | 31,743 | 31,743 |
| Transfers to unrestricted plant fund | (2,502) | (2,502) | (2,502) | (2,502) |
| Housing transfer | (49,144) | (49,144) | (49,144) | |
| Endowment transfers | | | (3,774) | (3,774) |
| Instruction transfer | (7,160) | (7,160) | (7,160) | |
| Capitalize ecosystems income | | | (90,822) | (90,822) |
| Other transfers | (27,987) | (27,987) | (78,735) | |
| Total transfers among funds | (42,874) | (78,692) | (121,566) | (371,415) | (492,981) |
| Net change in fund balances | 7,755 | | | 7,755 |
| Fund balances, beginning of year | 13,275 | | | 13,275 |
| Fund balances, end of year | $21,030 | | | $21,030 |
## Schedule II

### Marine Biological Laboratory

**Statement of Support, Revenues, Expenses and Changes in Fund Balances**

**Endowment Funds**

for the year ended December 31, 1989

<table>
<thead>
<tr>
<th></th>
<th>Restricted</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unrestricted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quasi-endowment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support and Revenues:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gifts</td>
<td>$ 38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total support and revenues</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excess of support and revenues over expenses</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Realized gain on investments</td>
<td>896</td>
<td>$ 98,242</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unrealized gains on investments</td>
<td>3,942</td>
<td>286,227</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total gain on investments</td>
<td>4,838</td>
<td>384,469</td>
<td>467,605</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfers among funds:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capitalize ecosystems income</td>
<td>90,822</td>
<td>3,774</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endowment transfers</td>
<td>3,774</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other transfers</td>
<td>12,109</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total transfers among funds</td>
<td>12,109</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net change in fund balances</td>
<td>16,985</td>
<td>384,469</td>
<td>1,208,032</td>
<td>567,632</td>
<td>2,177,118</td>
<td></td>
</tr>
<tr>
<td>Fund balances, beginning of year</td>
<td>409,997</td>
<td>2,850,409</td>
<td>3,595,974</td>
<td>3,913,255</td>
<td>10,769,635</td>
<td></td>
</tr>
<tr>
<td>Fund balances, end of year</td>
<td>$426,982</td>
<td>$3,234,878</td>
<td>$4,804,006</td>
<td>$4,480,887</td>
<td>$12,946,753</td>
<td></td>
</tr>
</tbody>
</table>

---

**Notes:**

- All amounts are in $ thousands.
- The table above summarizes the financial statements for the Marine Biological Laboratory for the year ended December 31, 1989.
- The statements include details on support and revenues, expenses, and changes in fund balances.
- The table is divided into sections for unrestricted and restricted funds, with further breakdowns for quasi-endowment and endowment income.
### Marine Biological Laboratory

**Statement of Support, Revenues, Expenses and Changes in Fund Balances**

**Plant Funds**

for the year ended December 31, 1989

<table>
<thead>
<tr>
<th></th>
<th>Unrestricted</th>
<th>Restricted</th>
<th>Repair and Replacement Reserve</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Support and Revenues:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grant reimbursement of direct costs</td>
<td>$574,821</td>
<td></td>
<td></td>
<td>$574,821</td>
</tr>
<tr>
<td>Investment income</td>
<td>15,750</td>
<td></td>
<td></td>
<td>15,750</td>
</tr>
<tr>
<td>Gifts</td>
<td>1,572</td>
<td></td>
<td></td>
<td>1,572</td>
</tr>
<tr>
<td><strong>Total support and revenues</strong></td>
<td>592,143</td>
<td></td>
<td></td>
<td>592,143</td>
</tr>
<tr>
<td><strong>Expenses:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation</td>
<td>$589,120</td>
<td></td>
<td>$37,986</td>
<td>589,120</td>
</tr>
<tr>
<td>Other</td>
<td>2,502</td>
<td></td>
<td></td>
<td>37,986</td>
</tr>
<tr>
<td><strong>Total expenses</strong></td>
<td>591,622</td>
<td></td>
<td>37,986</td>
<td>629,608</td>
</tr>
<tr>
<td>Excess (deficit) of support and revenues over expenses</td>
<td>(591,622)</td>
<td>592,143</td>
<td>(37,986)</td>
<td>(37,465)</td>
</tr>
<tr>
<td>Realized gains on investments</td>
<td>197,498</td>
<td></td>
<td></td>
<td>197,498</td>
</tr>
<tr>
<td><strong>Transfers among Funds:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt service</td>
<td>34,773</td>
<td></td>
<td></td>
<td>34,773</td>
</tr>
<tr>
<td>Acquisition of fixed assets</td>
<td>578,415</td>
<td></td>
<td>(242,579)</td>
<td>335,836</td>
</tr>
<tr>
<td>Net transfer to restricted plant fund</td>
<td>(200,000)</td>
<td>168,257</td>
<td></td>
<td>(31,743)</td>
</tr>
<tr>
<td>Transfers to unrestricted plant fund</td>
<td>2,502</td>
<td></td>
<td></td>
<td>2,502</td>
</tr>
<tr>
<td>Housing transfers</td>
<td></td>
<td></td>
<td>49,144</td>
<td>49,144</td>
</tr>
<tr>
<td><strong>Total transfers among funds</strong></td>
<td>415,690</td>
<td>168,257</td>
<td>(193,435)</td>
<td>390,512</td>
</tr>
<tr>
<td>Net change in fund balances</td>
<td>21,566</td>
<td>760,400</td>
<td>(231,421)</td>
<td>550,545</td>
</tr>
<tr>
<td>Fund balances, beginning of year</td>
<td>10,251,388</td>
<td>29,922</td>
<td>380,341</td>
<td>10,661,551</td>
</tr>
<tr>
<td>Fund balances, end of year</td>
<td>$10,272,954</td>
<td>$790,322</td>
<td>$148,820</td>
<td>$11,122,096</td>
</tr>
</tbody>
</table>

**Fund Balances:**

- **Beginning of Year:**
  - Total: 10,251,388
- **End of Year:**
  - Total: 10,272,954
Report of the Librarian

During the last two years, the Library has changed tremendously. We’ve been entering the electronic age, and in our leap forward we inadvertently missed being included in the MBL’s 1988 Annual Report. The record should show that the Library was not in a state of somnolence, but rather in a state of rapid growth, expansion, excitement, and innovative planning.

The MBL Centennial year

1988 was a year for experiencing the Centennial. The entire library staff was involved in organizing and volunteering for many exciting Centennial events. The Futures in Science Program, the Centennial Year Summer High School Science Teacher Award, the Symposium on Learning and Memory, the History of Science Lecture Series, and Old Timers’ Day were given special emphasis by the Library. The latter event brought back many Library users from the lab’s early days, and their visits gave us an opportunity to explore the Library’s history with those who were a part of it. It was a joy to work with John (Stubby) and Julie Rankin, Donald Zinn, Sears Crowell, Garland Allen and John Valois in planning “Old Timers Day.” As a tribute to Dr. Rankin, who died before the event he had worked so hard to bring about, many of his friends and former students have contributed to a book fund in his memory. The third floor of the Library now has a “Stubby” Rankin shelf for monographs on systematic ecology and invertebrate zoology.

In 1988, the Library received the Montgomery Collection—a valuable collection of books, journals, and diaries describing Arctic and Antarctic expeditions. The gift includes Captain James Cook’s A Voyage to the Pacific Ocean—the record of his expedition to the South Pacific on the ships HMS RESOLUTION and HMS DISCOVERY during the years 1776 to 1780. The volume includes some first edition maps of the voyage.

This valuable addition to the Library was the gift of the Hugh and Raymond Montgomery families, whose ties to the MBL go back to the lab’s early years when Priscilla Montgomery was the first full-time librarian. Her husband, T. H. Montgomery, was a cytologist from the University of Pennsylvania and an MBL trustee. The books were collected by their nephew, Newcomb Thompson Montgomery, and are now cataloged and housed in the Library’s Rare Books Room.

Also in 1988, Dr. and Mrs. Robert Huettner donated a collection of MBL photographs taken by Robert’s father, Alfred Huettner, in the 1920s and ’30s. An exhibit of the photos was prepared by Ruth Davis, Library Archivist, and held in the Meigs Room during the Centennial summer. Many of the photographs, which capture the life of MBL scientists and their families, are still on display in the Library and the Candle House.

Ruth Davis and Jane Maienschein, the co-director of the History of Science summer course, prepared a popular history of the MBL titled One Hundred Years Exploring Life, 1888-1988, published by Jones and Bartlett Publishers, Boston. It is a commemorative volume about the MBL’s first one hundred years containing many previously unpublished photos that had been found in the MBL Archives. Ruth also oversaw the filming done in the Archives for Newton’s Apple, a segment of the popular PBS series NOVA.

The small and large reading rooms underwent face lifts in preparation for the Centennial and for their dedication to two families who have been generous benefactors to the MBL. The Albert M. and Ellen R. Grass Reference Room was dedicated on July 15, 1988 and the Charles Ulbrick Bay Reading Room was dedicated on August 12, 1988. The Josephine and Charles Ulbrick Bay Foundation gave a one million dollar gift to the Library to complete the 2.5 million Mellon challenge grant. At the dedication, Frederick Bay spoke of his father, Charles U. Bay:
“In the foundation that bears his name, a small fragment of Charles U. Bay’s creative industry remains, to provide what is called, in the fashion of our time, “seed money,” which makes possible the germination of ideas deemed too risky or unworkable by tangled government or the ever short-sighted profit-conscious sector.

Today, then, marks the placing of a store of seeds, if you will, here at the MBL, from which we trust a thousand creative flowerings will bloom.”

We look forward to the challenge.

The next century

The Library has embarked on a path into the next century: we are modernizing and changing the way our Library gathers and disseminates information. We are building a network that will enable scientists, information producers, vendors, and our entire research community, to communicate with each other locally and world-wide. With this vision, the Howard Hughes Medical Institute awarded the Library one million dollars for planning and development. This award prompted the creation of the Office of Library Planning; Cathy Norton has been named Director. A Library Planning Committee, consisting of nationally recognized experts in science and information research, was subsequently appointed. The members of the committee are:

Dr. Edward A. Adelberg, Deputy Provost, Yale Medical School, Chairman of the Planning Committee
Dr. Garland E. Allen, Washington University
Dr. Carl O. Bowin, Senior Scientist, Geology and Geophysics Department, WHOI
Dr. John E. Dowling, Professor of Natural Sciences, Harvard University
Dr. Alan E. Erickson, Cabot Science Library, Harvard University
Dr. David Glover, Research Associate, Chemistry Department, WHOI
Dr. Joel C. Goldman, Senior Scientist, Biology Department, WHOI
Andrew R. Maffei, Research Specialist, Applied Ocean Physics and Engineering Department, WHOI
Nina W. Matheson, Director, The William H. Welch Medical Library, The Johns Hopkins University
Dr. Edward Rastetter, Assistant Scientist, Ecosystems Center, MBL
Dr. Temple Smith, Dana-Farber Cancer Institute
Dr. John Stegeman, Senior Scientist, Biology Department, WHOI

The library Planning Committee was charged with developing a long-range plan for the Library in terms of the systems and resources needed to support the research and educational programs of the entire Woods Hole scientific community in the Twenty-First Century. In August 1989, Chairman Adelberg reported to the Trustees the goals, objectives, and recommendations put forth by the committee. These clearly state that the Library must prepare for, and provide the scientific community with, state-of-the-art information technology and services, as well as assistance and training in the use of the new technologies.

The MBL/WHOI Office of Library Planning, with the advise and support of the Library Planning Committee, has begun to establish a network that will bring the Library to the laboratory bench and take the Library and its users out into a vast national computer network. With MBL.net and the On-line Scientific Information System (OSIS), developed in the library this year, it will be possible to access databases on CD-ROMs and disks, use electronic-services, build databases, and transform the way we manage information at the MBL.

Our scientists need information that is being delivered and packaged in electronic form, and we must be able to manipulate this data by being sufficiently computer literate to use it. The Library has always been the liaison between information and those who need it; with this in mind, the Library staff has dedicated themselves to becoming familiar with all formats of information in today’s myriad of publication modes and with the methods of delivering this information.

New technical positions were added, and some staff members were reassigned during 1989 to accomplish the goals and objectives established by the Library Planning Committee. The leadership of the Library has changed: the head librarian, Jane Fessenden, moved to the newly created position of Special Collections Librarian in the Rare Books area, and Cathy Norton was appointed as Acting Librarian. A national search is underway for a Director. Three new staff positions—network technical advisor, computer users technician, and secretary to the Director of Library Planning—were added under the Hughes grant to help support the network and the move toward an “electronic library.”

During the summer of 1989, a pilot project was initiated to test new methods of accessing scientific information. The broadband connection from the Woods Hole Oceanographic Institution was installed in the Library and in a teaching lab in Loeb. This connection allowed the Library to deliver various tools and services to researchers who were connected to the network and also allowed the Library to offer e-mail services to the MBL community. A number of databases were loaded on PCs, and access to CD-ROM data files was made available to Library users. A prototype information retrieval system was installed in
the Library as a beta test site for the American Society for Microbiology (ASM). All journals published in the past three years by ASM are retrievable on this system with full text and graphics. The response to and acceptance of these new tools by Library users was overwhelmingly positive. The initiative that began with the Hughes award has led to the establishment of numerous effective partnerships and active participation of scientists and information professionals. These interactions will enhance research productivity and educational goals in the Woods Hole scientific community.

Other initiatives

The National Science Foundation Summer Research Experience for Young Scholars was conceived and received funding this year through the efforts of the Office of Library Planning and Dr. Jay Tashiro of Simon’s Rock of Bard College. The program, which will continue each summer, allows tenth and eleventh grade students to explore new ideas in science and technology in a four-week “hands-on” research experience. Students begin the program at Simon’s Rock College and then come to Woods Hole for the research and library component of their projects. These new initiatives have broadened the scope of the Library’s user population and will help bring stability and cost-support structure to the Library.

The Library joined with eighteen public libraries on the Cape and with Cape Cod Community College to form CLAMS—Cape Library Automated Material Sharing. Funding provided to CLAMS by the Massachusetts Board of Library Commissioners is supporting our efforts to automate the MBL/WHOI Library’s catalog and circulation systems as part of a Cape-wide system. The system is up and the librarians are in training on the system; bar-coding of our book collection will be completed in 1990.

The International Association of Marine Sciences Libraries and Information Centers (IAMSLIC) held their Annual Meeting this year in Bermuda. Both Cathy Norton and Judy Ashmore gave papers on fund raising in libraries and the use of library services in relation to these activities.

This report has stressed the future of the library, but I cannot close without a glance at the past. In 1979, when Jane Fessenden had been the Librarian for 17 years, she wrote a report for the Library Committee, which included the following lists of goals for the ten years to come:

1. To offer instruction in the use of bibliographic services.
2. To increase the book budget for greater benefit to students and additional reference material.
3. To add new systems for more rapid delivery of xeroxed articles.
4. To computerize our serials list.
5. Computerize circulation records and sign-out procedures.
6. To add new bibliographic search services.
7. Bind more of our reprint collection.
8. To hire robots to shelve, and re-shelve, and re-shelve . . .

At the end of 1989 we see that these tasks (alas not #8) have been accomplished and continue to be worthy pursuits. This year Ms. Fessenden has become the Special Collections Librarian in the Rare Books Room. The library staff and her many friends at the Laboratory have been the beneficiaries of Jane’s library stewardship, and we look forward to her endeavors to bring order to the history of MBL—a Herculean task.

As one may be able to ascertain from this report, the seeds that were planted by the Andrew W. Mellon Foundation, the Bay Foundation, and the Howard Hughes Medical Institute fell on fertile ground. Undoubtedly their blossoms will flourish with the continued nurturing of our unique scientific community.

—Catherine Norton
Educational Programs

Summer Courses

Biology of Parasitism (June 11 to August 11)

Directors
John E. Donelson, University of Iowa College of Medicine
Carole Long, Hahnemann Medical College

Faculty
Steven Anderson, University of Cincinnati
Steve Beverley, Harvard Medical School
Ted Bianco, Imperial College of Science and Technology, UK
Bruce M. Christensen, University of Wisconsin
Patrick Farley, Hahnemann Medical College
Brian Finnegar, University of Pennsylvania
Steven L. Hajduk, University of Alabama, Birmingham
Michael Harris, University of Alabama, Birmingham
Mary Hartman, University of Kentucky
Peter Kima, Hahnemann Medical College
James Lok, University of Pennsylvania
Rick Martin, Boehringer Mannheim Corp.
David Moser, University of Iowa
David Russell, New York University
David Sachs, NIH/NIAID
Larry Simpson, University of California, Los Angeles
Sam Turco, University of Kentucky Medical School
Mervyn J. Turner, Merck, Sharp & Dohme Laboratories
Wenlin Zeng, University of Iowa

Lecturers (in order of appearance)
Irwin Sherman, University of California, Riverside
Paul Englund, Johns Hopkins School of Medicine

Buddy Ullman, University of Oregon Health Science Center
Alan Sher, NIH/NIAID
Ruth Nessenzweig, NYU Medical Center
Victor Nussenzweig, NYU Medical Center
Elmer Pfefferkorn, Dartmouth Medical School
Paul Knopf, Brown University
Andrew Spielman, Harvard School of Public Health
John Mansfield, University of Wisconsin
Anthony Cerami, Rockefeller University
Jim McKerrow, University of California, San Francisco
Vaughn Kirchhoff, University of Iowa
Barry Bloom, Albert Einstein College of Medicine
Jim Kazura, Case Western Reserve University
Tim Nilson, Case Western Reserve University
Jack Strominger, Harvard University
Dyann Wirth, Harvard School of Public Health
Richard Young, Whitehead Institute, MIT
Debbie Peattie, Harvard School of Public Health
Hugh Taylor, Johns Hopkins University
Hank Seifert, Northwestern University
Jeffrey Chulay, Walter Reed Army Institute of Research
George Nelson, Liverpool, England, UK
Jonathan Ravdin, University of Virginia

Students
Tamara Aboagye-Kwarteng, London School of Hygiene & Tropical Medicine, UK
Paulo Andrade, Federal University of Pernambuco, Brazil
Brenda Beemtsen, University of Wisconsin
Vladimir Correado, New York University
Philip Effron, Johns Hopkins University Medical School
Najib El-Sayed, Yale University
Phyllis Freeman-Junior, Meharry Medical College
Mary Gonzatti, University Simon Bolivar, Venezuela
Christopher Karp, Georgetown University
Marika Kullberg, University of Stockholm, Sweden
Lynn Morris, University of Oxford, UK
Dania Richter, Free University Berlin, FRG
David Siegel, University of Wisconsin
Walter Weiss, Naval Medical Research Institute
David Williams, University of Illinois
Lilian Yepez-Mulia, CINVESTAV-IPN, Mexico

Embryology (June 18 to July 29)

Director
Eric H. Davidson, California Institute of Technology

Faculty and Staff
Raffi Aroian, California Institute of Technology
Carol Burdsal, Duke University
Emmeline Chiao, Bryn Mawr College
Douglas De Simone, University of Virginia
Charles Ettensohn, University of Pittsburgh
Richard A. Firtel, University of California, San Diego
Joseph Gall, Carnegie Institution of Washington
Susan Halsell, California Institute of Technology
Janet Heasman, University of Cambridge, UK
Peter Howard, University of California, San Diego
Linda Huffer, Marine Biological Laboratory
Andrew D. Johnson, University of California, Irvine
Ross Kinloch, Roche Institute of Molecular Biology
David Kirk, Washington University
Mary La Grange, University of Massachusetts, Amherst

Michael Levine, Columbia University
Howard Lipschitz, California Institute of Technology
David McClay, Duke University
Doug Melton, Harvard University
Steve McKnight, Carnegie Institution of Washington
Robert W. Nickells, California Institute of Technology

Jane Rigg, California Institute of Technology
Kenneth Robinson, Purdue University
Joan Ruderman, Harvard University
L. Dennis Smith, University of California, Irvine
Paul W. Sternberg, California Institute of Technology
Nicholas Torpey, University of Cambridge, UK
Raul Warrior, Columbia University
Paul M. Wasserman, Roche Institute of Molecular Biology

Richard Whittaker, Marine Biological Laboratory
Christopher Wylie, University of Cambridge, UK

Students
Mayi Arcellana-Panfilio, University of Calgary, Canada
Juliane Bernholz, University of Basel, Switzerland
Annette Boman, Johns Hopkins University
David Bumerot, University of Pennsylvania
John Cunniff, University of Florida
Bernard Degnan, University of Queensland, Australia
Miguel Estevez, University of Missouri
Robert Goldstein, University of Texas, Austin
Anne Groell, University of California, Irvine
Theodor Haerry, University of Basel, Switzerland
Karen Jaques, University of Cambridge, UK
Mark Johnson, Case Western Reserve University
Robert Kelsh, University of Cambridge, UK
Min Ku, Harvard University
Katherine Ladner, University of California, Irvine
Chengyu Liu, University of California, Irvine
Adnan Nasir, University of Rochester
Haruki Nishida, Kobe University, Japan
Franco Palla, Universita di Palermo, Italy
David Ranson, University of Virginia
Patrick Schnegelsberg, Clark University
Ekkehard Schulze, University of Goettingen, FRG
Robert Sparks, North Dakota State University
Dmitry Tchurikov, Academy of Science, USSR
Andre Van Loon, State University of Utrecht, The Netherlands
Menquing Xiang, University of Texas

Marine Ecology (June 18 to July 29)

Director
J. Woodland Hastings, Harvard University

Faculty
Hans Paerl, University of North Carolina, Chapel Hill
Dennis A. Powers, Hopkins Marine Station
Thomas T. Chen, University of Maryland
Carolyn A. Currin, University of North Carolina, Chapel Hill
Steven J. Giovannoni, Oregon State University
Julie Diane Kirshstein, University of North Carolina, Chapel Hill
Robert G. Rowan, Hopkins Marine Station
Bess B. Ward, University of California, Santa Cruz

Lecturers (in order of appearance)
Richard Ogden, Agouron Institute
Rick Carlton, Michigan State University
Brad Bebout, University of North Carolina, Chapel Hill
Lee Kerkhoff, Scripps Institution of Oceanography  
John Stegeman, Woods Hole Oceanographic Institution  
Beatrice Sweeney, University of California, Santa Barbara  
Penny Chisholm, Massachusetts Institute of Technology  
Colleen Cavanaugh, Harvard University  
Katherine G. Field, Oregon State University  
R. Olson, Woods Hole Oceanographic Institution  
Ken Nealson, University of Wisconsin, Milwaukee

Students  
Dror Angel, CUNY  
Barbara Best, Columbia University  
Daniel Brazeau, SUNY, Buffalo  
Robert Browne, Wake Forest University  
Mary-Alice Coffroth, SUNY, Buffalo  
Hudson DeYoe, Bowling Green State University  
Lynne Gilson, Harvard University  
Alan Groeger, Murray State University  
Matthew Hoch, University of Delaware  
Jen-jen Lin, University of California, San Diego  
Michael Montgomery, University of Colorado  
Gisele Muller-Parker, University of Maryland  
David Penny, University of Southern California  
Carol Reeb, University of Georgia  
Christopher Scholin, Woods Hole Oceanographic Institution  
Steven Sczekan, North Carolina State University  
Jeffrey Silberman, University of Miami  
David Smith, University of California, San Diego  
Peter Starkweather, University of Nevada  
Tracy Stevens, Portland State University  
John Stolz, University of Massachusetts  
Tzung-horng Yang, University of California, San Diego

Microbiology (June 11 to July 27)

Directors  
Ralph Wolfe, University of Illinois  
E. Peter Greenberg, University of Iowa

Faculty  
Frank Aecckersberg, Phillips-Universitat, Marburg, FRG  
Richard M. Behmlander, University of Minnesota  
Deborah Eastman, University of Minnesota  
Kendall Gray, University of Southern California  
Andrew M. Kropinsky, Queens University, Ontario, Canada  
Carla Kuhner, University of Illinois

Scott G. Smith, University of Illinois  
Friedrich Widdel, Phillips-Universitat, Marburg, FRG

Lecturers (in order of appearance)  
Richard Blakemore, University of New Hampshire, Durham  
Dennis Bazylinski, Woods Hole Oceanographic Institution  
Richard Frankel, University of California, Santa Cruz  
Barry Marrs, E. I. DuPont de Nemours & Co.  
Douglas Youvan, Massachusetts Institute of Technology  
Fevzi Daldal, University of Pennsylvania  
Bert Ely, University of South Carolina  
Linc Sonenshein, Tufts University  
Wendy Champness, Michigan State University  
David Gibson, University of Iowa  
Caroline Harwood, University of Iowa  
Nick Ornston, Yale University  
Alan Hooper, University of Minnesota, St. Paul  
Robert Tabita, Ohio State University  
George Lorimer, E. I. DuPont de Nemours & Co.

Students  
Alfredo Alder, Swiss Federal Institute, Switzerland  
Porter Anderson, University of Rochester  
Carol Arnosti, Woods Hole Oceanographic Institution  
Simone Dannenberg, University of Konstanz, FRG  
Joachim Ellermann, Philipps University, Marburg, FRG  
Michael Ferris, Merek & Co.  
Leslie Gregg, Yale University  
Robert Gunsalus, University of California, Los Angeles  
John Hawkins, University of Queensland, Australia  
Min Kyung Kim, University of Iowa  
Kathleen Ledyard, Massachusetts Institute of Technology/WHOI  
Nicholas Mantis, Cornell University  
Elaine Mirkin, University of Southern California  
Esteban Monserrate, University of Massachusetts, Amherst  
Flynn Picardal, University of Arizona  
Bettina Rosner, University of Tübingen, FRG  
Jan Rosnes, University of Bergen, Norway  
Sigrid Schenk, Philipps University, Marburg, FRG  
Imke Schroeder, University of California, Los Angeles  
Hansruedi Siegrist, Swiss Federal Institute of Technology, Switzerland  
Claudia Walter, University of Osnabruck, FRG
Neural Systems and Behavior  
(June 11 to July 29)

Director  
Thomas Carew, Yale University

Faculty  
James D. Angstadt, Emory University  
Patrick Bateson, University of Cambridge, UK  
Robert Barlow, Syracuse University  
Alexander Borst, Tubingen, FRG  
John Byrne, University of Texas Medical School  
Ronald Calabrese, Emory University  
Leonard Cleary, University of Texas Medical School  
Hollis Cline, Stanford University  
Martha Constantine-Paton, Yale University  
Brian W. Edmonds, Columbia University  
Ellen Elliott, Duke University Medical School  
Russell D. Fernald, University of Oregon  
Thomas M. Fischer, University of California, Riverside  
Cole Gilbert, Indiana University  
Dennis L. Gorlick, Columbia University  
Sally G. Hoskins, CUNY  
Gwen Jacobs, University of California, Berkeley  
Darcy B. Kelley, Columbia University  
Karla Kent, University of Arizona  
Margarethe Kirchbaumer, City College of New York  
John Koester, Research Center for Mental Hygiene  
Masakazu Konishi, California Institute of Technology  
Richard Levine, University of Arizona  
Eduardo Macagno, Columbia University  
Emilie Marcus, Yale University  
Melanie Marin, Columbia University  
Naomi Nagaya, University of Southern California  
Michael Nusbaum, San Francisco State University  
Edwin Rubel, University of Washington  
Carla Shatz, Stanford University Medical School  
Antonia Stephen, Brown University  
Tim Tully, Brandeis University  
Janis C. Weeks, University of Oregon  
William Wright, Yale University

Students  
Andriana Alcantara, University of Illinois  
Viviana Berthoud, Albert Einstein College of Medicine  
David Capco, Arizona State University  
Robin Cloues, Harvard University  
Richard Fay, Loyola University  
Kent Fitzgerald, Yale University  
Linda Goldstein, Indiana University  
Keri Halsema, University of Southern California  
Aaron Joseph, University of Washington  
Kathleen Killian, Rutgers University  
Sabine Kreissl, Freie Universitat, Berlin, FRG  
Robert Lee, University of Colorado  
Michael Nitabach, Massachusetts Institute of Technology  
Joseph Pieroni, University of Texas Medical School  
Joachim Schmidt, University of Constance, FRG  
Philip Stoddard, University of Washington  
Susan Swithers, Duke University  
Dawn Tamarkin, University of Arizona  
Robert Waldeck, Temple University  
Debbie Wood, Georgia State University  
Alex Chernajovsky, Yale University  
Guylaine Durand, Albert Einstein College of Medicine  
Bernhard Flucher, NIH/NINDS  
Michael Grant, Case Western Reserve University  
Hebe Guardiola-Diaz, University of Michigan  
Ekkerh Kasper, University of Oxford, UK  
Kelley Kruger, Columbia University  
Anne Metcalf, Yale University  
Vincent O'Connor, University College, London, UK  
Ning Qian, Johns Hopkins University  
Linda Robertson, Northwestern University  
David Stauffer, California Institute of Technology  
David Welsh, Harvard Medical School

Neurobiology (June 11 to August 19)

Director  
Arthur Karlin, Columbia University

Faculty  
Brian Andrews, NIH/NINDS  
Cynthia Czajkowski, Columbia University College of Physicians & Surgeons  
Jan Paul De Weer, Duke University  
Gerald Fischbach, Washington University School of Medicine  
Robert French, University of Calgary, Canada  
Sarah Garber, Stanford University  
Linda M. Hall, Albert Einstein College of Medicine  
James Huettner, Harvard Medical School  
Laurinda A. Jaffe, University of Connecticut Health Center  
Lily Jan, Howard Hughes Medical Institute  
Yuh Nung Jan, Howard Hughes Medical Institute  
Robert S. Kass, University of Rochester School of Medicine  
Richard Kramer, Columbia University College of Physicians & Surgeons  
Dennis Landis, Case Western Reserve University  
Story Landis, Case Western Reserve University
Dennis Liu, Institute of Neuroscience  
Craig C. Malbon, SUNY, Stony Brook  
Gail Mandel, Tufts University School of Medicine  
Steven Matsumoto, University of Arizona College of Medicine  
Andres Matus, University of Basel, Switzerland  
James McCarter, Princeton University  
Christopher Miller, Brandeis University  
Robert Miller, Case Western Reserve University  
Thomas Reese, NIH  
Bert Sakmann, Max-Planck-Inst. für Biophysikalische Chemie, FRG  
Bruce Schnapp, Boston University  
Thomas I. Segerson, New England Medical Center  
Michael Sheetz, Washington University School of Medicine  
Steven A. Siegelbaum, Columbia University College of Physicians & Surgeons  
Carolyn L. Smith, NIH/NINDS  
Stefano Vicini, Georgetown University Medical School  
Hsien-Yu Wang, SUNY, Stony Brook  
Monte Westerfield, University of Oregon  
William F. Wonderlin, University of Calgary, Canada  

G. Mandel, Tufts University School of Medicine  
Linda M. Hall, Albert Einstein College of Medicine  
Lily Jan, Howard Hughes Medical Institute  
Gerald Fischbach, Washington University School of Medicine  
Yuh Nung Jan, Howard Hughes Medical Institute  
S. Landis, Case Western Reserve University  
R. Miller, Case Western Reserve University  
Monte Westerfield, University of Oregon  
J. Huettner, Harvard Medical School  
Carolyn Smith, NIH/NINDS

Students  
Alex Chernjavsky, Yale University  
Guylaine Durand, Albert Einstein College of Medicine  
Bernhard Flucher, NIH/NINDS  
Michael Grant, Case Western Reserve University  
Hebe Guardiola-Diaz, University of Michigan  
Ekkehard Kasper, University of Oxford, UK  
Kelley Kruger, Columbia University  
Anne Metcalf, Yale University  
Vincent O'Connor, University College, London, UK  
Ning Qian, Johns Hopkins University  
Linda Robertson, Northwestern University  
David Staufler, California Institute of Technology  
David Welsh, Harvard Medical School

Physiology (June 11 to July 22)

Director  
Thomas Pollard, Johns Hopkins Medical School

Faculty  
William Balch, Scripps Clinic & Research Foundation  
Kerry Bloom, University of North Carolina  
Orielan Condeelis  
Gia Harewood, University of Rochester  
Robert Jensen, Johns Hopkins Medical School  
Kenneth Johnson, Pennsylvania State University  
Johnny E. Jones, University of North Carolina, Chapel Hill  
Karen Magnus, Case Western Reserve University  
Marianne Manchester, University of North Carolina, Chapel Hill  
Mark Mooseker, Yale University  
Mark Paradise, Colorado College  
Sandra Schmid, Scripps Clinic & Research Foundation  
John Sinard, Johns Hopkins Medical School  
Murray Stewart, Medical Research Council, Cambridge, UK
Students
Kenneth Armour, St. Andrews University, Scotland
Jenny Baverstock, Wolfson College, Oxford, UK
William Bement, Arizona State University
Margaret Berg, Cornell University Medical School
Carol Berkower, Johns Hopkins School of Medicine
Annette Boman, Johns Hopkins University
Andrew Bullen, University of Texas, Austin
Lisa D’Andrea, Rutgers University
Robert DeBoy, Johns Hopkins University
Quan-Yang Dun, University of California, San Francisco
Alan Fanning, Yale University
Leslie Fischer, Columbia University
Laura Georgi, University of Missouri
Kevin Gibson, University of Pittsburgh
Heather Harper, Purdue University
Philip Hausman, Northwestern University Medical School
Philip Hertzler, Bodega Marine Laboratory
Lee Janson, Carnegie-Mellon University
Thomas Keating, University of Pennsylvania
Claudia Landis, University of California, San Francisco
Yaron Levy, Brandeis University
Cheryl Nehme, Northwestern University
Glen Nuckolls, University of North Carolina
Janet Padgett, Johns Hopkins University
Promod Pratap, SUNY Health Science Center
Victor Saavedra-Alanis, Baylor College of Medicine
Ivelisse Sanches, Hunter College of SUNY
Monica Shiel, Boston University Medical School
Amy Spater, Stanford University
Andreas Stemmer, University of Basel, Switzerland
Barbara Stolz, University of Basel, Switzerland
Jeanine Ursitti, University of Maryland
Maria Virata, Northwestern University
Sandra Williams, East Tennessee State University
Nan Wu, Brown University
Samuel Yiu, Harvard Medical School

Lecturers (in order of appearance)
Peter Novak, Yale Medical School
Ari Helenius, Yale University
Jim Rothman, Princeton University
Paul Lazarow, Rockefeller University
Don Newmeyer, La Jolla, CA
Reid Gilmore, University of Massachusetts
Paul Russell, Scripps Institution of Oceanography
Rick Klausner, NIH
Jim Paulson, University of Wisconsin
Linda Hickey
A. Szent-Gyorgyi, Brandeis University
Hugh Huxley, Brandeis University
Richard Vallee, Worcester Foundation for Experimental Biology
Edward Salmon, University of North Carolina
Steve Harrison, Harvard University
Jim Haber, Brandeis University
Mike Snyder, Yale University
John Pringle, Michigan University

Short Courses

Cellular Neurobiology in the Leech
(August 3 to 23)

Directors
Ken Muller, University of Miami School of Medicine
John Nicholls, Biocenter, Basel, Switzerland

Faculty
Susanna Blackshaw, Glasgow University, UK
Edwardo Macagno, Columbia University
Brian W. Payton, Memorial University School of Medicine, Newfoundland, Canada
David Weisblat, University of California, Berkeley

Lecturers
Ron Calabrese, Emory University
Larry Cohen, Yale University Medical School
Otto Friesen, University of Virginia
William Kristan, University of California, San Diego
William Ross, New York Medical College
Marty Shankland, Harvard Medical School
Genther Stent, University of California, Berkeley

Students
Thomas Becker, University of Kohn, FRG
Lucy Díaz-Miranda, University of Puerto Rico
Tamar Gallily, Hebrew University of Jerusalem, Israel
Lisa Sara Gascoigne, University of London, UK
Simone Grumbacher, Biozentrum, Basel, Switzerland
Masako Isokawa-Akesson, Brain Research Institute, UCLA
Nechama Lasser-Ross, New York Medical College
Theres Luthi, The Rockefeller University
Mark Q. Martindale, Harvard Medical School
David C. Merz, McGill University
History of Biology: Neurobiology and Behavior (July 30 to August 12)

Directors
E. Garland Allen, Washington University
Richard W. Burkhardt, Jr., University of Illinois
Jane Maienschein, Arizona State University

Lecturers
Colin Beer, Rutgers University
Michael Bennett, Albert Einstein Medical College
Anne Harrington, Harvard University
Sharon E. Kingsland, The Johns Hopkins University
Edward Manier, University of Notre Dame

Students
Joyce V. Cadwallader, St. Mary-of-the-Woods College
Eileen Crist, Boston University
Eunice A. Cronin, Belmont Abbey College
Marcia D. Edwards, The Thatcher School
Daniel R. Goodman, Harvard College
Christiane Groeber, Stazione Zoologica-Anton Dohrn, Italy
Ann E. Kammer, Arizona State University
Ronald J. Overmann, National Science Foundation
Michael Barry Reiner, Salem College
Robert C. Richardson, University of Cincinnati
Clark T. Savin, Boston Veterans Administration Medical Center
Jonathan S. Schiffman, Yale School of Medicine
John R. Shaver, University of Puerto Rico
Jan Butin Sloan, University of Kansas

Methods in Computational Neuroscience (August 6 to September 2)

Directors
James M. Bower, California Institute of Technology
Christof Koch, California Institute of Technology

Faculty
Paul Adams, SUNY, Stony Brook
Edward Adelson, Massachusetts Institute of Technology
Daniel Alkon, NIH/NINDS

Microinjection Techniques in Cell Biology (May 21 to 26)

Director
Robert B. Silver, Cornell University
Faculty
Shinya Inoué, Marine Biological Laboratory
Douglas Kline, Ponce School of Medicine
Joanne Kline, Ponce School of Medicine
Katherine Luby-Phelps, Carnegie-Mellon University
Paul L. McNeil, Harvard Medical School

Students
Nika Adham, Neurox Corporation, California
Patricia L. Ansel, Dana-Farber Cancer Institute
Stuart K. Calderwood, Dana-Farber Cancer Institute
James A. DeCaprio, Dana-Farber Cancer Institute
Steven Demeter, University of Rochester
James V. Desirderio, Bristol-Myers Company, Connecticut
Frank J. Dye, Western Connecticut State University
Judith A. Eash, USDA, ARS, WRRC, PDP
Alison K. Hall, Case Western Reserve University
Seigo Izumo, Children's Hospital, Boston
Thomas B. Kinraide, USDA Agricultural Research Service
Thomas F. Lee, Saint Anselm College
Qun Lu, Emory University School of Medicine
James L. Madara, Harvard Medical School
Tadashi Maruyama, Marine Biotechnology Institute, Japan
John Ortega, University of Illinois
Ming Wan Su, SUNY Health Science Center, Brooklyn

Molecular Evolution (August 2 to September 1)

Directors
Mitchell L. Sogin, National Jewish Center for Immunology & Cell Biology
Mark Wheelis, University of California, Davis

Lecturers
Robert Cedegren, University of Montreal, Canada
Michael Clegg, University of California, Riverside
Bernard Davis, Harvard Medical School
Dan Davison, Los Alamos National Laboratories
Ford Doolittle, Dalhousie University, Canada
Jan Drake, NIEHS
Joseph Felsenstein, University of Washington
Walter Fitch, University of Southern California
Linda Goff, University of California, Santa Cruz
Richard Goldstein, Boston University School of Medicine
Michael Gray, Dalhousie University, Canada
James Lake, University of California, Los Angeles
Nancy Maizels, Yale Medical School
Lynn Margulis, University of Massachusetts, Amherst
Michael Melkonian, University of Cologne, FRG
Roger Milkman, University of Iowa
David Nanney, University of Illinois
Gary Olsen, University of Illinois
Colin Patterson, British Museum (Natural History), UK
Peg Riley, Harvard University
Eugene Small, University of Maryland
Temple Smith, Dana-Farber Cancer Institute
David Swoford, Illinois Natural History Survey
Bruce Walsh, University of Arizona
Alan Weiner, Yale Medical School
Jeffrey Wong, University of Toronto, Canada

Staff
Claude Bibeau, National Jewish Center for Immunology & Cell Biology

Students
Chris T. Amemiya, Tampa Bay Research Institute
Susan R. Barnum, Miami University
Mark A. Batzer, Louisiana State University
Gregory Beck, SUNY, Stony Brook
Amanda R. Benson, Harvard University
Debashish Bhattacharya, National Jewish Center for Immunology & Respiratory
Carol J. Bult, University of New Hampshire, Durham
Robert G. Chapman, University of Massachusetts, Amherst
Zhi-Qing Chen, University of Alberta, Canada
Ivan E. Collier, Washington University School of Medicine
David S. Conant, Lyndon State College
Langtuo Deng, Memorial University of Newfoundland, Canada
David S. Durica, University of Oklahoma
Keith O. Elliston, Merck Sharp & Dohme Research Laboratories
Robert C. Fleischer, University of North Dakota
Karen F. Fox, WJB Dorn Veterans Hospital
Daniel J. Freeman, Smith College
Michael D. Garrick, SUNY, Buffalo
Chris Gaskins, University of Oklahoma
Diddahally R. Govindaraju, Case Western Reserve University
Roger T. Hanlon, University of Texas
Linda K. Hardison, University of Washington
Richard E. Hudson, University of Arizona
Paul Joyce, Dalhousie University, Canada
Susanne R. Kaplan, Harvard University
Elizabeth Anne Kellogg, Harvard University Herbaria
Robert G. Kemp, Chicago Medical School
Anthony R. Kerlavage, NIH/NINDS
C. William Kilpatrick, University of Vermont
Ron S. Lundstrom, University of Utah
Educational Programs

Ross J. MacIntyre, Cornell University
Paul Marjoram, Queen Mary College, London, UK
Yves M. Markowicz, Michigan State University
W. Richard McCombie, National Institutes of Health
William S. Moore, National Science Foundation
Eva Y. Ng, Tufts University
Fiouhi Nouzha, University of Montreal, Canada
Brian Palenik, Massachusetts Institute of Technology
Bruno Paquin, University of Montreal, Canada
Thomas Parsons, Smithsonian Institution
David J. Patterson, University of Bristol, UK
Daniel J. Prochaska, Miami University
Rollin C. Richmond, Indiana University
Maria C. Rivera, University of California, Los Angeles
Gary Rosenberg, Harvard University
Gualberto Ruano, Yale University School of Medicine
Gene D. Sattler, Smithsonian Institution
Evan W. Steeg, University of Toronto, Canada
Arlin Stoltzflus, University of Iowa
David T. Sullivan, Syracuse University
Hayde G. Torres, Harvard Medical School
Ena Urbach, Massachusetts Institute of Technology
J. Craig Venter, NIH
Susan White, Yale University
Connie J. Wolfe, University of California, San Diego
Hong Xue, University of Toronto, Canada
Yinqing Yang, University of Houston
Karen Zeller, Smithsonian Institution

Faculty
Kenneth A. Jacobson, University of North Carolina
John M. Murray, University of Pennsylvania
Kenneth Orndorff, Dartmouth College
Kenneth R. Spring, NIH/NHLBI
Roger Y. Tsien, University of California, Berkeley

Students
Martin Baehler, The Rockefeller University
Marty Bartholdi, Los Alamos National Laboratory
Gary Bird, NIH/NIEHS
Karla J. Daniels, Harvard Medical School
Jeffery R. Demarest, University of Arkansas
Richard M. Dillaman, Center for Marine Science Research
Jorgen Frokjaer-Jensen, The Panum Institute, University of Copenhagen, Denmark
Juyang Huang, Cornell University
Philip L. Huang, MGH/Harvard Medical School
Michael G. Klein, University of Maryland School of Medicine
Greg Law, Yale University School of Medicine
Raphael C. Lee, Massachusetts Institute of Technology
Denis A. Leong, University of Virginia Medical Center
Walter F. Mangel, Brookhaven National Laboratory
Babetta L. Marrone, Los Alamos National Laboratory
Elaine M. Merisko, Sterling Research Group, Dept. of Drug Delivery
Stewart Mullin, Carolina Biological Supply Company
Mailken Nedergaard, Cornell University Medical Center
Rudolf Oldenbourg, Marine Biological Laboratory
Hirotoshi Terada, Hamamatsu Photonics K.K., Japan

Optical Microscopy & Imaging in the Biomedical Sciences (March 5 to 11)

Directors
Nina Stromgren Allen, Wake Forest University
Colin S. Izzard, SUNY, Albany
Summer Research Programs

Principal Investigators

Albert, Daniel, The University of Chicago
Alkon, Daniel, NIH/NINDS
Anderson, Winston A., Howard University
Armstrong, Clay M., University of Pennsylvania
Armstrong, Peter, University of California, Davis
Augustine, George, University of Southern California
Baker, Robert G., New York University Medical Center
Barlow, Jr., Robert B., Syracuse University
Barry, Susan R., University of Michigan, Ann Arbor
Bass, Andrew H., Cornell University
Bearer, Elaine L., University of California, San Francisco
Beauge, Luis, Instituto M. y M. Ferreyra, Argentina
Begenisich, Ted, University of Rochester School of Medicine
Begg, David A., Harvard Medical School
Bennett, Michael V. L., Albert Einstein College of Medicine
Bezanilla, Francisco, University of California, Los Angeles
Bloom, George S., University of Texas Southwestern Medical Center
Bodznick, David, Wesleyan University
Borgese, Thomas A., Lehman College, CUNY
Boron, Walter, Yale University School of Medicine
Borst, David, Illinois State University
Boyer, Barbara, Union College
Brady, Scott T., University of Texas Southwestern Medical Center
Brown, Joel, Washington University School of Medicine
Browne, Carole, Wake Forest University
Burdick, Carolyn J., Brooklyn College, CUNY
Burger, Max M., Frederick Miesener Institute, Switzerland
Cariello, Lucio, Stazione Zoologica, Italy
Carrow, Grant M., Brandeis University
Chang, Donald, Baylor College of Medicine
Chappell, Richard L., Hunter College and CUNY Graduate Center
Charlton, Milton, University of Toronto, Canada
Chilcote, Tamie, The Rockefeller University
Chin, Gilbert J., NIH
Clark, J. Marshall, University of Massachusetts
Clay, John R., NIH/NINDS
Cohen, Avis H., Cornell University
Cohen, Lawrence B., Yale University School of Medicine
Cohen, William D., Hunter College, CUNY
Cooperstein, Sherwin J., University of Connecticut Health Center
DeReimer, Susan, Columbia University
De Weer, Paul, Washington University
Eckberg, William, Howard University
Ehrlich, Barbara, University of Connecticut Health Center
Fein, Alan, University of Connecticut Health Center
Feinman, Richard D., SUNY Health Science Center
Fink, Rachel, Mount Holyoke College
Fishman, Harvey M., University of Texas Medical Branch, Galveston
Gadsby, David C., The Rockefeller University
Gainer, Harold, National Institutes of Health, NINDS
Garrick, Rita Anne, New Jersey Medical School
Giuditta, Antonio, University of Naples, Italy
Goldman, Robert D., Northwestern University Medical School
Gonzalez-Serratos, Hugo, University of Maryland School of Medicine
Gould, Robert M., Institute for Basic Research
Govind, C. K., University of Toronto, Canada
Graf. Werner, The Rockefeller University

Haimo, Leah T., University of California, Riverside
Highstein, Stephen M., Washington University School of Medicine
Hoskin, Francis C. G., Illinois Institute of Technology
Ilan, Joseph, Case Western Reserve University
Ilan, Judith, Case Western Reserve University

Jeffery, William R., University of Texas, Austin
Jockusch, Brigitte M., University of Bielefeld, FRG
Johnson, J. Kelly, Syracuse University
Jong, De-Shien, University of Cincinnati
Josephson, Robert K., University of California, Irvine

Kaczmarek, Leonard K., Yale University School of Medicine
Kaminer, Benjamin, Boston University School of Medicine
Kaplan, Ehud, The Rockefeller University
Kaplan, Ilene, Union College
Kriehel, Mahlon E., SUNY Health Science Center, Syracuse

Langford, George M., University of North Carolina, Chapel Hill
Lauler, Hans, University of Connecticut
Lawrence, Jeanne B., University of Massachusetts Medical School
Leeman, Susan, University of Massachusetts Medical School
Levitan, Edwin S., Yale University
Levitan, Irwin B., Brandeis University
Lewis, Mark, Michigan State University
Lian, Jane B., University of Massachusetts Medical Center
Libersat, Frederic, Cornell University
Lipicky, Raymond, U. S. Food and Drug Administration
Lipson, Stephen, Harvard Medical School
Lisman, John, Brandeis University
Llinas, Rodolfo R., New York University Medical Center
Loewenstein, Werner R., University of Miami School of Medicine

Malchow, Robert P., University of Illinois
Matsumura, Fumio, University of California, Davis
Matteson, Donald R., University of Maryland School of Medicine
McDonald, John K., Emory University School of Medicine
McGurk, James, The Rockefeller University
Metzals, Janis, University of Ottawa, Canada
Miller, Christopher, Brandeis University

Narahashi, Toshio, Northwestern University Medical School
Nasi, Enrico, Boston University School of Medicine
Nelson, Leonard, Medical College of Ohio
New, John Gerard, University of California, San Diego
Noe, Bryan D., Emory University School of Medicine

Obaid, Ana Lia, University of Pennsylvania
Ohki, Shinpei, SUNY, Buffalo

Palazzo, Robert E., University of Virginia
Pant, Harish C., NIH/NINDS
Pappas, George, NIH/NINDS
Pierce, Sidney K., University of Illinois, Chicago
Pierce, Sidney K., University of Maryland, College Park
Piwnica-Worms, Helen, Tufts University
Pumplin, David, University of Maryland School of Medicine

Quigley, James P., SUNY, Stony Brook

Rafferty, Nancy S., Northwestern University
Rakowski, Robert F., University of Health Sciences
Rebhun, Lionel L., University of Virginia
Reese, Thomas, NIH/NINDS
Rose, Birgit, University of Miami School of Medicine
Ruderman, Joan V., Duke University
Russell, John M., University Texas Medical Branch
Ryan, Una S., University of Miami School of Medicine

Sakakibara, Manabu, NIH/NINDS
Salmon, Edward D., University of North Carolina, Chapel Hill
Salzberg, Brian M., University of Pennsylvania School of Medicine
Sanger, Jean M., University of Pennsylvania School of Medicine
Sanger, Joseph, University of Pennsylvania School of Medicine

Schnapp, Bruce, Boston University Medical Center
Segal, Sheldon J., The Rockefeller Foundation
Silver, Robert B., Cornell University
Singer, Joshua J., University of Massachusetts Medical School
Singer, Robert H., University of Massachusetts Medical School
Sivramakrishnan, Shobinah, University of Southern California
Sloboda, Robert, Dartmouth College
Sluder, Greenfield, Worcester Foundation for Experimental Biology
Smith, Stephen J., Howard Hughes Medical Institute/Yale Medical School
Spiegel, Evelyn, Dartmouth College
Spiegel, Melvyn, Dartmouth College
Stein, Gary S., University of Massachusetts Medical School
Steinacker, Antoinette, Washington University School of Medicine
Stracher, Alfred, SUNY Health Science Center, Brooklyn
Stuart, Ann E., University of North Carolina, Chapel Hill

Tanguy, Joelle, Ecole Normale Superieure, France
Telzer, Bruce, Pomona College
Tilney, Lewis G., University of Pennsylvania
Treistman, Steven N., Worcester Foundation for Experimental Biology
Trinkaus, John P., Yale University
Troll, Walter, New York University Medical Center
Tucker, Edward B., Baruch College, CUNY
Tykocinski, Mark L., Case Western Reserve University
Tytell, Michael, Wake Forest University, Bowman Gray Medical School

Vallee, Richard B., Worcester Foundation for Experimental Biology
Vogel, Steven S., NIH/NIDDK
Walsh, Jr., John V., University of Massachusetts Medical Center
Waxman, Stephen, Yale Medical School
Weissmann, Gerald, New York University Medical Center

Yeh, Jay Z., Northwestern University

Zigman, Seymour, University of Rochester School of Medicine
Zottoli, Steve J., Williams College
Zukin, R. Suzanne, Albert Einstein College of Medicine

Other Research Personnel

Adler, Elizabeth M., University of Toronto, Canada
Ahluwalia, Balwant, Howard University
Alberghina, Mario, University of Catania, Italy
Altamirano, Anibel, University of Texas Medical Branch
Arnold, John M., University of Hawaii
Augustine, Christine, Max-Planck-Institut, Gottingen, FRG

Baccetti, Baccio, University of Sienna, Italy
Balazs, Andre, University of Connecticut
Bamrunghphol-Watanaba, Wattana, University of Pennsylvania
Bandivdekar, Atmaram, The Population Council-CBR
Barone, Leesa M., University of Massachusetts Medical Center
Bechtold-Imhof, Ruth, Boston University School of Medicine
Bernal-Martinez, Juan, University of Connecticut Health Center
Bernhart, David, Williams College
Bloom, Jonathan G., Northwestern University Medical School

Suprenant, Kathy A., University of Kansas, Lawrence
Swalla, Billie J., University of Texas, Austin
Swenson, Katherine I., Harvard Medical School
Szent-Györgyi, Andrew G., Brandeis University
Blundon, Jay, University of Texas, Austin
Bourke, Sharon, Lehman College, CUNY
Bradley, David, Wesleyan University
Breitweiser, Gerda, Johns Hopkins University School of Medicine
Brozen, Reed, University of Chicago
Buchanan, Jo Ann, Yale University School of Medicine
Buchheit, Thomas, Wake Forest University

Callaway, Joseph C., University of North Carolina, Chapel Hill
Celli, Giulia B., Wheaton College
Chen, Chong, California Institute of Technology
Chiel, Hillel J., Case Western Reserve University
Chludzinski, John, NIH/NINDS
Cohen, Akiva, University of Maryland School of Medicine
Cohen, Avrum, Yale University
Collin, Carlos, NIH/NINDS
Cooper, Robin L., Texas Tech. University
Correa, Ana Maria, University of California, Los Angeles
Cottrell, Glen, NYU Medical Center
Couch, Ernest F., Texas Christian University

Danhauer, Ann, Williams College
Davis, Marion B., Yale University School of Medicine
DeHaven, William T., Emory University School of Medicine
Dessev, George, Northwestern University Medical School
DiPolo, Reinaldo, I.V.I.C., Venezuela
Dias-Silveira, Carlos, University of Miami School of Medicine
Ding, Xiao-hua, Institute for Basic Research
Dodge, Frederick A., IBM—T. J. Watson Research Center
Dome, Jeff S., University of Pennsylvania School of Medicine
Dowdall, Michael J., University of Nottingham, England, UK
Dragolovitch, Julia, University of Maryland
Drazba, Judy, NIH
Dworkin, Jonathan, Swarthmore College
Dyett, Lydia, Howard University

Estabrooks, Gordon, Union College
Falk, Chun Xiao, Yale University School of Medicine
Feinman, Robin
Fischbach, Peter, Washington University School of Medicine
Floyd, Carl C., NIH
Flucher, Bernard, NIH/NINDS

Forbush, Benjamin W., Dartmouth College
Forman, Robin, University of Virginia
Fraser, Claire M., NIH/NINDS
Freementhe, Michelle, Williams College
Friedman, Marc M., Olympus Corporation

Gallant, Paul, NIH/NINDS
Gerosa, Daniela, Fredrich Miesener Institute, Switzerland
Getty, Robert R., Case Western Reserve University
Gill-Kumar, Pritam, U. S. Food & Drug Administration
Ginsburg, Kenneth S., Northwestern University Medical School
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Knudsen, Knud, U.S. Food & Drug Administration
Koide, Samuel S., The Population Council, CBR
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Snyder, Robert, Colgate University
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Wittenberg, Jonathan, Albert Einstein School of Medicine
Wolken, Jerome J., Carnegie Mellon University
Zimmerman, Morris, Watchung, NJ
Zipser, David, La Jolla, California
Zweig, Ronald, MBL

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Yale University School of Medicine
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CINEVESTAV-IPN, Mexico
Cologne, University of, FRG

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Dalhousie University Medical School, Canada

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Konstanz, University of, FRG

**Life Sciences Institute, Israel**
London School of Hygiene & Tropical Medicine, UK
London, University of, Egham, UK

**Max-Planck-Institut-fur-Biophysikalische Chemie, Nikolausberg, FRG**
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<td>Queens University, Canada</td>
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<td>McGill University, Canada</td>
<td>Queens University of, Australia</td>
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<td>Medical Research Council, UK</td>
<td>St. Andrews University, Scotland, UK</td>
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<td>Milan, University of, Italy</td>
<td>Seoul National University, Korea</td>
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<td>Montreal, University of, Canada</td>
<td>Sienna, University of, Italy</td>
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<td>Osnabruch, University of, FRG</td>
<td>Simon Bolivar, University of, Venezuela</td>
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<td>Ottawa, University of, Canada</td>
<td>State University of Utrecht, The Netherlands</td>
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<tr>
<td>Philipps-Universitat, Marburg, FRG</td>
<td>Stazione Zoologica, Italy</td>
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<tr>
<td>Queens College, UK</td>
<td>Stockholm, University of, Sweden</td>
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<td>Swiss Federal Institute, Switzerland</td>
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<td>Swiss Federal Institute of Technology, Switzerland</td>
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<td>Toronto, University of, Canada</td>
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<td>Tubingen, University of, FRG</td>
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<td>University College, UK</td>
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<td>Universita di Palermo, Italy</td>
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<td>Vrije Universiteit Brussels, Belgium</td>
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<td>Wolfson College, UK</td>
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</tbody>
</table>
Year-Round Research Programs

Boston University Marine Program

Faculty

Strickler, J. Rudi, Professor of Biology, Program Director
Atema, Jelle, Professor of Biology
Humes, Arthur G., Professor of Biology Emeritus
Tamm, Sidney L., Professor of Biology
Valiela, Ivan, Professor of Biology

Visiting faculty and investigators

Baldwin, Christopher, Boston University
Bloomer, Sherman, Boston University
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D'Avanzo, Charlene, Hampshire College
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Gerhardt, Greg, University of Colorado
Kotrschal, Kurt, University of Salzburg, Austria
Marrase, Celia, University of Barcelona, Spain
Nakamura, Shogo, Toyama University, Japan
Peckol, Paulette, Smith College
Perez Castillo, Fernando, CIQRO, Cancun, Mexico
Peters, Rob, University of Utrecht, Netherlands
Peterson, Susan, Boston University
Rhoads, Donald
Richman, Sumner, Lawrence University
Rietsma, Carol, SUNY, New Paltz
Spungin, Ben, Tel-Aviv University, Israel
Stephens, Raymond E., Boston University School of Medicine
Tyack, Peter, Woods Hole Oceanographic Institution

Research staff

Costello, Jack, Research Associate
Foreman, Kenneth, Research Associate
Gerardo, Hortense, Research Associate
Tamm, Signhild, Senior Research Associate
Voigt, Rainer, Research Associate

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Hahn, Dorothy, Senior Administrative Secretary
Moore, Michael, Course Assistant

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Coughlin, David
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Hersh, Douglas
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Katz, Andrea
Kennedy, Blain
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LaMontagne, Michael
Lavalli, Kari
Mazel, Charles
Merrill, Carl
Moore, Paul
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Mulsow, Sandor
Portnoy, John
Tamse, Armando
Trager, Geoffrey
Trott, Thomas
White, David
Varela, Diana

Undergraduate students Fall 1989

Abbot, Amy (Mt. Holyoke)
Anderson, Tami (Lawrence)
Argyros, George
Babione, Michelle (Hampshire)
Beneteau, Shana (Lawrence)
Bolles, Tom
Brown, Kevin
Calvo, Beatriz (University of Madrid)
Laboratory of Jelle Atema

Organisms use chemical signals as their main channel of information about the environment. These signals are transported in the marine environment by turbulent currents, viscous flow, and molecular diffusion. Receptor cells extract signals through various filtering processes. Currently, the lobster with its exquisite sense of taste and smell is our major model to study the signal filtering capabilities of the whole animal and its narrowly tuned receptor cells. Research focuses on amino acids (food signals) and pheromones (courtship), neurophysiology of receptor cells, behavior guided or modulated by chemical signals, and computer modeling of odor plumes and neural filters.

Laboratory of Arthur G. Humes

Research interests include systematics, development, host specificity, and geographical distribution of copepods associated with marine invertebrates. Current research is on taxonomic studies of copepods from invertebrates in the tropical Indo-Pacific area, and pectinostomatoid and siphonostomatoid copepods from deep-sea hydrothermal vents and cold seeps.

Laboratory of Rudi J. Strickler

We use high-speed cinematography and special laser light optical systems with target tracking devices to observe zooplankton-algae, carnivorous-herbivorous zooplankton, and fish-zoo-plankton interactions. Lab and field results show the degree to which abiotic forces influence the evolution of species, feeding guilds, and predator-prey interactions. Additional topics in the feeding ecology of crinoids, bryozoans and other suspension feeding invertebrates enhance perception of the first consumer level in the aquatic food chain.

Laboratory of Ivan Valiela

Our major research activity involves the Waquoit Bay Land Margin Ecosystems Research Project. This work examines how human activity in coastal watersheds (including landscape use and urbanization) increases nutrient loading to groundwater and streams. Nutrients in groundwater are transported to the sea, and after biogeochemical transformation, enter coastal waters. There, increased nutrients bring about a series of changes. The Waquoit Bay LMER is designed to help us understand and model the coupling of land use and consequences to receiving waters, and to study the processes involved.

A second long-term research topic is the structure and function of salt marsh ecosystems, including the processes of predation, herbivory, decomposition, and nutrient cycles.

The Ecosystems Center

The Center was established in 1975 to promote research and education in ecosystems ecology. Eleven senior scientific staff and 40 research assistants and support staff study the
terrestrial and aquatic ecology of a wide variety of ecosystems. These ecosystems range from northern Europe (trace gas emission from acid-rain affected forests) to the Alaskan Arctic (long-term studies of the controls of tundra, lake, and stream biota) to the Harvard Forest (long-term studies of the effects of disturbance in forest ecosystems) to Buzzards Bay (controls of anaerobic decomposition). Many projects, such as those dealing with sulfur transformations in lakes and nitrogen cycling in the forest floor, investigate the movements of nutrients and make use of the Center's mass spectrometry laboratory (directed by Brian Fry) to measure the stable isotopes of carbon, nitrogen, and sulfur. The research results are applied wherever possible to questions of the successful management of the natural resources of the earth. In addition, the ecological expertise of the staff is made available to public affairs groups and government agencies who deal with such problems as acid rain, ground water contamination, and possible carbon dioxide-caused climate change. Opportunities are available for postdoctoral fellows.

Staff and consultants
Hobbie, John E., Co-Director
Melillo, Jerry M., Co-Director
Banta, Gary
Bauman, Carolyn
Berger, Laurel
Boutwell, Anne
Bowles, Francis
Bowles, Margaret
Cochran, Wendy
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Schwarzman, Beth
Semino, Suzanne
Shaver, Gaus
Steudler, Paul
Tucker, Jane

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Kling, George
Raich, James
Ryan, Michael
Wainright, Sam

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Neill, Christopher, University of Massachusetts, Amherst

Laboratory for Marine Animal Health
The laboratory provides diagnostic, consultative research, and educational services to the institutions and scientists of the Woods Hole community concerned with marine animal health. Diseases of wild, captive, and cultured animals are investigated.
Laboratory of D. Eugene Copeland

Electron microscopy of luminescent organs (photophores) in deep-sea fish; gas secretion in swimbladders of deep-sea fish; and osmoregulatory tissue in *Limulus*.

Laboratory of Developmental Genetics

This research group studies the early gene control of cellular differentiation pathways (cell lineage determination) in the embryos of tunicates and other marine invertebrate species.

Staff

Whittaker, J. Richard, Senior Scientist
Crowther, Robert, Research Assistant
Loescher, Jane L., Research Assistant
Meechel, Thomas H., Assistant Scientist

Visiting investigators

Collier, J. R., Brooklyn College
Lee, James J., Columbia University, College of Physicians & Surgeons

Laboratory of Judith P. Grassle

Studies on the population genetics and ecology of marine invertebrates living in disturbed environments, especially of sibling species in the genus *Capitella* (Polychaeta).

Staff

Grassle, Judith P., Senior Scientist
Mills, Susan W., Research Assistant

Laboratory of Harlyn O. Halvorson

This laboratory is interested in the molecular process of sporulation and spore germination in *Bacillus*, and in the regulation of phosphate metabolism in microorganisms.

We had earlier indentified several 1 genomic clones carrying the *gerJ* region of *Bacillus subtilis*. Subclones corresponding to *gerJ* were sequenced. The deduced amino acid sequence of the polypeptide does not show any homology with other *Bacillus* germination and sporulation genes that have been characterized, or with other bacterial genes. Spore germination requirements of several marine *Bacillus* species were also investigated. We found that these bacilli fell into two groups. The first responded only to germination stimulants characteristic of marine bacilli, while those in the second group responded to marine as well as terrestrial germination stimulants.

Inorganic phosphate transport in *Acinetobacter lwofli* was further characterized. A high affinity transport system was identified which was repressed by high phosphate concentrations. Components of this system were lost by osmotic shock treatment, and activity could be recovered by incubation of shocked cells with concentrated shock fluid. The fact that shocked repressed cells did not respond to such
treatment indicated that additional protein(s) are involved in high affinity phosphate transport.

Solubilization of rock (insoluble) phosphate by microorganisms has traditionally been attributed to be due to the metabolic formation of acids that help solubilize phosphate. Using several phosphate-solubilizing microbes, it was shown that “insoluble” phosphate was, in fact, sufficiently soluble to permit growth of organisms possessing high affinity phosphate transport systems.

**Staff**

Halvorson, Harlyn O., Principal Investigator and Director, MBL
Chikarmae, Hemant, Assistant Scientist
Ferkowicz, Michael, Research Assistant
Pratt, Sara, Research Assistant

**Visiting investigators**

Anderson, Porter, University of Rochester
Keynan, Alex, Hebrew University, Jerusalem
Kornberg, Hans, Christ College, Cambridge
Vincent, Walter, University of Delaware
Yashphe, Jacob, Hebrew University, Jerusalem

**Laboratory of Shinya Inoué**


**Staff**

Inoué, Shinya, Distinguished Scientist
Anniwallt, Dyon, Programming Engineer
Berliner, Elise, Research Assistant
Boyd, Steven, Programming Engineer
Knudson, Robert, Instrument Development Engineer
Oldenbourg, Rudolf, Visiting Assistant Scientist
Taracka, Richard, Instrument Maker
Woodward, Bertha M., Laboratory Manager

**Laboratory of Molecular Evolution**

The major research effort of this laboratory is the structure analysis of ribosomal RNA. Similarities between small subunit ribosomal RNA sequences are used to infer the evolutionary history of eukaryotic microorganisms and to design molecular probes for studies in marine ecology.

**Staff**

Sogin, Mitchell L., Director
Ariztia, Edgardo, Research Associate
Bhattacharya, Debashish, Post-Doctoral Fellow
Bibbeau, Claude, Research Technician
Bucklin, Ann, Visiting Scientist
Elwood, Hille, Consultant
Stickel, Shawn, Research Technician

**Laboratory of Neuroendocrinology**

This laboratory studies the molecular and cellular bases of two neural programs that regulate different important behaviors in the model mollusc *Aplysia*. Research is conducted on the mechanisms of the neuronal circadian oscillators located in the eyes. These circadian oscillators drive the circadian activity rhythm of the animal, which is concerned with the daily timing of food gathering and of prolonged rest. Additional research is conducted on a group of neuroendocrine cells that produce a peptide, “egg-laying hormone,” that initiates egg laying and associated behaviors. The laboratory is interested in how the three-dimensional shape of this peptide hormone allows a highly specific interaction with its receptor and the intracellular processes that are triggered by it. In another project, the laboratory has discovered and is continuing research on an anti-toxin protein that inhibits ADP-ribosylation of G-proteins induced by bacterial exotoxins.

**Staff**

Strumwasser, Felix, Director, Laboratory of Neuroendocrinology, MBL
Beetlestone, Linda, Laboratory Assistant
Cox, Rachel L., Senior Research Assistant
Glick, David, Senior Postdoctoral Fellow
Hellmich, Mark, Postdoctoral Fellow

**Laboratory of Sensory Physiology**

Since 1973, the laboratory has conducted research on various aspects of vision. Current studies focus on photoreceptor cells, on their light-absorbing pigments, and on their biochemical reactions initiated by light stimulation. Microspectrophotometric and biochemical techniques are used to study the receptors of both vertebrates (amphibia, fish, and mammals) and invertebrates (horseshoe crab and squid).

**Staff**

Harosi, Ference, Director, Associate Scientist, MBL, and Boston University School of Medicine
Szuts, Ete, Assistant Scientist, MBL, and Boston University School of Medicine
Trapp, Susan, Research Assistant
Visiting investigators
Cornwall, Carter, Boston University School of Medicine
Lall, Abner B., Johns Hopkins University
Miller, James L., University of California, San Francisco

Laboratory of Osamu Shimomura

Biochemical studies of the various types of bioluminescent systems. Preparation of the improved forms of aequorin for measuring intracellular free calcium.

Staff
Shimomura, Osamu, Senior Scientist, MBL, and Boston University School of Medicine
Shimomura, Akemi, Research Assistant

Visiting investigator
Nakamura, Hideshi, Harvard University

Laboratory of Raquel Sussman

Investigation of the molecular mechanism of DNA damage-inducible functions and structure-function relationships of γ repressor analyzed by immunological techniques. Present studies deal with the molecular mechanism of radiation-induced mutagenesis.

Staff
Sussman, Raquel, Associate Scientist
Cornuel, Catherine, Research Assistant
Wainwright, Patricia, Postdoctoral Research Associate

National Vibrating Probe Facility

We are exploring the roles of ionic currents, gradients, and waves in controlling development. We focus on controls of pattern and controls by calcium ions.

Staff
Jaffe, Lionel, Senior Scientist and Facility Director
Kuhtreiber, Wiel, Physiologist
McClaughlin, Jane, Laboratory Assistant
Miller, Andrew, Research Associate
Sanger, Richard, Technician
Shipley, Alan, Technician

Visiting investigators
Brownlee, Colin, Plymouth Marine Station
Buono, Mark, M.L.T.
Elliott, Ellen, Duke University
Fluck, Richard, Franklin & Marshall College
Isaacs, Hugh, Brookhaven National Lab
Kinraide, Tom, Appalachian Soil & Water Conservation Lab
Koshian, Leon, Cornell University
Lucas, William, University of California, Davis
McConnaughy, Ted, University of California, Davis
O’Donnell, Michael, McMaster University, Ontario, Canada
Rubinacci, Alessandro, University of Milano, Italy
Sardet, Christian, Station Marine Villefranche-sur-mer, France
Saunders, Mary Jane, University of South Florida, Tampa
Shankland, Martin, Harvard University
Smith, Peter, Cambridge University
Speksnijder, Annelies, University of Utrecht, The Netherlands
Zivkovic, Donna, University of Utrecht, The Netherlands
Honors

**Friday Evening Lectures**

Mary Lou Pardue, Massachusetts Institute of Technology, 30 June
"Heat Shock Locus 93D: A Gene with Unusual Functions"

Michael McElroy, Harvard University, 7 July
"Change in the Global Environment: Surprises from the Polar Stratosphere"

James Watson, Cold Spring Harbor Laboratory, 14 July
"The RNA Tie Club"

J. Murdoch Ritchie, Yale University School of Medicine, 20, 21 July (Forbes Lectures)
"Voltage Dependent Anion and Cation Channels in the Satellite Cells of the Nervous System" (20 July)
"A Pharmacologist's Approach to Multiple Sclerosis" (21 July)

Franklin M. Loew, Tufts University, 28 July
"The History, Science, and Politics of the Use of Animals in Research"

Robert B. Barlow, Jr., Syracuse University, 4 August (Lang Lecture)
"What the Brain Tells the Eye"

Leroy Hood, California Institute of Technology, 11 August (Monsanto Biotechnology Lecture)
"Biotechnology, the Genome Initiative, and Medicine of the Twenty-First Century"

Anthony Fauci, NIAID/NIH, 18 August
"Pathogenic Mechanisms of HIV Infection"

Terrence Sejnowski, Computational Neurobiology Laboratory, 25 August
"Computational Neuroscience: From Neurons to Networks"

Patricia Draper, Pennsylvania State University, 1 September
"Kung Bushmen: What the Study of Hunters and Gatherers Can Tell Us"

**Fellowships**

*Robert Day Allen Fellowship*
Fink, Rachel D., Mount Holyoke College

*American Psychological Association Minority Fellowship Program in Neuroscience*
July 17 to August 11

**Directors**
James Jones, American Psychological Association
Joe L. Martinez, Jr., University of California, Berkeley

**Faculty**
George M. Langford, University of North Carolina, Chapel Hill
Peter R. MacLeish, Rockefeller University
James G. Townsel, Meharry Medical College

**Students**
Dylan Bulseco
Bernard G. Crowell, Jr., Meharry Medical College
Ivy M. Dunn, University of Texas, Dallas
Katheryn L. Edwards, University of California, San Diego
Sonia I. Ortiz-Miranda, University of California, Davis
Weslia R. Patterson, University of Pennsylvania
Domingo Tomas Rivera, Clark University
Victor Sierra, St. John's University
Mary A. Tucker, University of Miami
James C. Woodley, University of North Carolina, Chapel Hill

**Frederik B. Bang Fellowship**
Bearer, Elaine L., University of California, San Francisco

**Frank A. Brown Memorial Readership**
Grossman, Albert, New York University Medical Center

**Jean and Katsuma Dan Fellowship Fund**
Chiba, Kazuyoshi, Tokyo Institute of Technology, Japan
Founders Fellowship
Kasper, Ekkehard, University of Oxford, UK
O'Connor, Vincent, University College of London, UK

Hayden-Baille Fellowship
Armour, Kenneth, St. Andrews University, Scotland, UK
Baverstock, Jenny, Wolfson College, UK
Jaques, Karen, University of Cambridge, UK
Kelsh, Robert, University of Cambridge, UK
Morris, Lynn, University of Oxford, UK

Stephen W. Kuffler Fellowships
Chin, Gilbert J., Howard Hughes Medical Institute/ Columbia University
Fink, Rachel D., Mount Holyoke College

Frank A. Lillie Fellowship
Ryan, Una S., University of Miami School of Medicine

Jacques Loeb Fellowship
Chernjavsky, Alex, Yale University

MBI Summer Fellowships
Chilcote, Tamie J., Rockefeller University
DeReimer, Susan A., Columbia University
Fink, Rachel D., Mount Holyoke College
Piwnica-Worms, Helen, Tufts University
Swalla, Billie J., University of Texas
Vogel, Steven S., NIH/NIDDK

Faith A. Miller Fellowship
Chilcote, Tamie J., Rockefeller University

Herbert W. Rand Fellowship
Heasman, Janet, University of Cambridge, UK
Jockusch, Brigitte M., University of Bielefeld, FRG
Wylie, Christopher, University of Cambridge, UK

Science Writing Fellowships
DiCanio, Margaret, Freelance writer
Jaffe, Mark Stephen, *Philadelphia Inquirer*
Katzenstein, Larry, *Consumer Reports* magazine
Kaufman, Wallace V., Freelance writer
Okie, Susan M., *Washington Post*

H. B. Steinbach Fellowship
Vogel, Steven S., NIH/NIDDK

Scholarships

Biology Club of City University of New York
Angel, Dror, CUNY

Father Arsenius Boyer Scholarship Fund
Grant, Michael, Case Western Reserve University

C. Lalor Burdick Scholarship
Degnan, Bernard, University of Queensland, Australia

Gary N. Calkins Memorial Scholarship
Grant, Michael, Case Western Reserve University
Guardiola-Diaz, Hebe, University of Michigan
Kriebl, Sabine, Freie Universität, Berlin, FRG

Frances S. Claff Memorial Scholarship
O'Connor, Vincent, University College of London, UK

Lucretia Crocker Endowment Fund
Ledyard, Kathleen, Massachusetts Institute of Technology and Woods Hole Oceanographic Institution
Penny, David, University of Southern California

William F. and Irene Diller Scholarship Fund
Durand, Guylaine, Albert Einstein College of Medicine

Caswell Grave Scholarship
Tchurikov, Dmitry, Academy of Science, USSR
Aline D. Gross Scholarship
Groell, Anne, University of California, Irvine

William Randolph Hearst Fellowship
Brazeau, Daniel, SUNY, Buffalo
Kruger, Kelley, Columbia University
Yang, Tzung-horng, University of California, San Diego

Arthur Klorfein Fund Scholarship
Metcalf, Anne, Yale University
Schulze, Ekkehard, University of Goettingen, FRG
Van Loon, Andre, State University of Utrecht, The Netherlands

S. O. Mast Founders Scholarship
Kreibl, Sabine, Freie Universitat, Berlin, FRG

James S. Mountain Memorial Fund Scholarship
Berkower, Carol, Johns Hopkins School of Medicine
Boman, Annette, Johns Hopkins University
Harper, Heather, Purdue University
Hertzler, Philip, Bodega Marine Laboratory
Williams, Sandra, East Tennessee State University

Planetary Biology Internship
Hawkins, John, University of Queensland, Australia
Reeb, Carol, University of Georgia

Society of General Physiologists
Chernjavsky, Alex, Yale University
Fitzgerald, Kent K., Yale University
Janson, Lee W., Carnegie-Mellon University
Ku, Min, Harvard University

Marjorie W. Stetten Scholarship Fund
Kreibl, Sabine, Freie Universitat, Berlin, FRG

Surdna Foundation Scholarship
Angel, Dror, CUNY
Browne, Robert, Wake Forest University
Flucher, Bernhard, NIH/NINDS
Lin, Jen-jen, University of California, San Diego
Stevens, Tracy, Portland State University

Awards

Business Leadership Award
P. Roy Vagelos, Chairman and CEO, Merck and Co., Inc.

Dr. P. Roy Vagelos (l) accepting the Business Leadership Award from Mr. Edwin C. Whitehead.

Lewis Thomas Award
Roger Lewin, Science magazine

MBL Tour Guides Award for Outstanding Science Presentation to the General Public
Diane Cowan, Boston University Marine Program/MBL
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D. Thomas Trigg, Wellesley, MA
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Aurin Chase, Princeton University, Princeton, NJ
Seymour S. Cohen, Woods Hole, MA
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Laura Hunter Colwin, Key Biscayne, FL
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Laboratory Support Staff*

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Clapp, Pamela L., Managing Editor
Puckett, Kathryn

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Speer, John W., Controller

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Binder, Ellen F.
Campbell, Ruth B.
Davis, Doris C.
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Godin, Frances T.
Goldsmith, Ruth E.
Hobbs, Roger W., Jr.
Hough, Rose A.
Oliver, Elizabeth
Poravas, Maria

**Chem Room**
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Sadowski, Edward A.

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Ridley, Sheree

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Ayers, Donald E., Director
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Lessard, Kelley J.
O’Hara, Aqua
Thimas, Lisa M.

**Director’s Office**
Halvorson, Harlyn O., President
and Director
Epstein, Ray L.
Kinneally, Kathleen R.
Watkins, Joan E.

**Gray Museum**
Bush, Louise, Curator
Armstrong, Ellen P.
Montiero, Eva

**Housing**
King, Lou Ann D., Conference Center
and Housing Manager
Crocker, Susan
Farrell, Bernice R.
Gomes, Susan A.

**Human Resources**
Goux, Susan P., Manager
Donovan, Marcia H.

**Library**
Fessenden, Jane, Librarian
Norton, Catherine N., Acting Librarian
Ashmore, Judith A.
Costa, Marguerite E.
Mirra, Anthony J.
Mountford, Rebecca J.
Nelson, Heidi
Page, Joel
Page, Kristin
Pratson, Patricia G.
Tamm, Ingrid
deVeer, Joseph M.

* Including persons who joined or left the staff during 1989.
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<th>MBL Associates Liaison</th>
<th>Mills, Stephen A.</th>
<th>Buckley, Joseph</th>
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<td>Scanlon, Deborah</td>
<td>Rattacaca, Frank D.</td>
<td>Burgess, Kristin</td>
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<td>Rossetti, Michael F., Jr.</td>
<td>Burke, Sean</td>
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<td><strong>Public Information Office</strong></td>
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<td>Capobianco, James A.</td>
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<td>Liles, George W., Jr., Director</td>
<td>deVeer, Robert L.</td>
<td>Chen, Chong</td>
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<tr>
<td>Anderson, Judith L.</td>
<td>Ward, Frederick</td>
<td>Child, Malcolm S.</td>
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<td>Stone, Beth R.</td>
<td>Weeks, Gordon W.</td>
<td>Cishek, Dawn</td>
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<tr>
<td><strong>Radiation Safety</strong></td>
<td>Wilson, Mitchell J.</td>
<td>Costa, Christopher</td>
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<td>Mattox, Andrew H., Safety Officer</td>
<td></td>
<td>Cullen, Timothy</td>
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<td><strong>Apparatus</strong></td>
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<td>DeGiorgis, Joseph</td>
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<td>Barnes, Franklin D.</td>
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<td>Dickerson, Catherine</td>
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<td>Haskins, William A.</td>
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<td>Martin, Lowell V.</td>
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<td>Dodge, Michael F.</td>
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<td><strong>Shipping and Receiving</strong></td>
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<td>Donovan, Jason P.</td>
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<td>Dooley, Kimberly A.</td>
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<td>Ilgen, Robert F.</td>
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<td>Frye, Jennifer</td>
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<td>Monteiro, Dana</td>
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<td>Grassle, John T.</td>
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<tr>
<td><strong>Services, Projects, and Facilities</strong></td>
<td></td>
<td>Grimes, Jeffrey</td>
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<tr>
<td>Cutler, Richard D., Manager</td>
<td></td>
<td>Grossman, Howard</td>
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<tr>
<td><strong>Buildings and Grounds</strong></td>
<td></td>
<td>Hallock, David</td>
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<tr>
<td>Lehy, Donald B., Superintendent</td>
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<td>Hamilton, Elizabeth R.</td>
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<td>Allen, Wayne D.</td>
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<td>Hill, Evan S.</td>
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<td>Anderson, Lewis B.</td>
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<td>Horowitz, Rachel</td>
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<td>Baldic, David P.</td>
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<td>Blunt, Hugh F.</td>
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<td>Boucher, Richard L.</td>
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<td>Bourgoin, Lee E.</td>
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<td>Carini, Robert J.</td>
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<td>Carr, Edward T., Jr.</td>
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<td>Marini, Michael F.</td>
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<td>Collins, Paul J.</td>
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<td>Milliken, Sally T.</td>
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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. Gardner, 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. Gardner, 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. Gardner, 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

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 thereto 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 hereunto 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)
Bylaws of the Corporation of the Marine Biological Laboratory

(Revised August 11, 1989)

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 or 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 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 signs 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(C), 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) As much 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 Members of any adjournment.

VII. The Annual Meeting of the Trustees shall be held promptly after the Annual Meeting of the Corporation at the Laboratory in Woods Hole, Massachusetts. Special meetings of the Trustees shall be called by the Chairman, the President, or by any seven Trustees, to be held at such time and place as may be designated. Notice of Trustees' meetings may be given orally, by telephone, telegraph or in writing; and notice given in time to enable the Trustees to attend, or in any case notice sent by mail or telegraph to a Trustee's usual or last known place of residence, at least one week before the meeting shall be sufficient. Notice of a meeting need not be given to any Trustee if a written waiver of notice, executed by him before or after the meeting is held 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 ("Trustees-at-large") approved by members according to such procedures, not inconsistent with these Bylaws, as the Trustees shall have determined. Except as provided below, such Trustees-at-large shall be elected into four classes of four, 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, Trustees-at-large shall be individuals who have not been considered for election as Corporate Trustees.

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

(C) 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 of the Members or by the Board, as the case may be. The Trustees ex officio and emeriti shall have all the rights of the Trustee, except that Trustees emeriti shall not have the right to vote.

(B) The aggregate number of Corporate Trustees and Trustees-at-large elected in any year (excluding Trustees elected to fill vacancies which do not result from expiration of a term) shall not exceed ten. The number of Trustees-at-large so elected shall not exceed four and unless otherwise determined by vote of the Trustees, the number of Corporate Trustees so elected shall not exceed six. Corporate Trustees shall always constitute a majority on the Board of those elected or approved by the Corporation.

(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 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 Trustees, however arising, may be filled by the Trustees then in office unless and until filled by the Members at the next Annual Meeting.

(F) A Corporate Trustee or a Trustee-at-large who has served an initial term of at least two 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 four 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 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. Beginning with the members elected for terms ending in 1990, one of the Trustees elected to serve on the Executive Committee should be a Trustee-at-large. This procedure will be repeated in the class of 1991, and henceforth the Trustees will elect to the Executive Committee Trustees to ensure that the composition of the Committee is four Corporate Trustees and two Trustees-at-large.

(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 subcommittees 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 a standing “Committee for the Nomination of Officers,” responsible for making nominations, at each Annual Meeting of the Corporation, and of the Board of Trustees, for candidates to fill each office as the respective terms of office expire (Chairman of the Board, 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 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. Except as otherwise provided below, the Corporation shall, to the extent legally permissible, indemnify each person who is, or shall have been, a Trustee, director or officer of the Corporation or who is serving, or shall have served, at the request of the Corporation as a Trustee, director or officer of another organization in which the Corporation directly or indirectly has any interest, as a shareholder, creditor or otherwise, against all liabilities and expenses (including judgments, fines, penalties and reasonable attorneys’ fees and all amounts paid, other than to the Corporation or such other organization, in compromise or settlement) imposed upon or incurred by any such person in connection with, or arising out of, the defense or disposition of any action, suit or other proceeding, whether civil or criminal, in which he or she may be a defendant or with which he or she may be threatened or otherwise involved, directly or indirectly, by reason of his or her being or having been such a Trustee, director or officer.

The Corporation shall provide no indemnification with respect to any matter as to which any such Trustee, director or officer shall be finally adjudicated in such action, suit or proceeding not to have acted in good faith in the reasonable belief that his or her action was in the best interests of the Corporation. The Corporation shall provide no indemnification with respect to any matter settled or compromised, pursuant to a consent decree or otherwise, unless such settlement or compromise shall have been approved as in the best interests of the Corporation, after notice that indemnification is involved, by (i) a disinterested majority of the Board of Trustees or of the Executive Committee or, (ii) a majority of the Corporation’s Members.

Indemnification may include payment by the Corporation of expenses in defending a civil or criminal action or proceeding in advance of the final disposition of such action or proceeding upon receipt of an undertaking by the person indemnified to repay such payment if it is ultimately determined that such person is not entitled to indemnification under the provisions of this Article XVI, or under any applicable law.

As used in this Article, the terms “Trustee,” “director” and “officer” include their respective heirs, executors, administrators and legal representatives, and an “interested” Trustee, director or officer is one against whom in such capacity the proceeding in question or another proceeding on the same or similar grounds is then pending.

To assure indemnification under this Article of all persons who are determined by the Corporation or otherwise to be or to have been "fiduciaries" of any employee benefit plan of the Corporation which may exist from time to time, this
Article shall be interpreted as follows: (i) "another organization" shall be deemed to include such an employee benefit plan, including without limitation, any plan of the Corporation which is governed by the Act of Congress entitled "Employee Retirement Income Security Act of 1974," as amended from time to time ("ERISA"); (ii) "Trustee" shall be deemed to include any person requested by the Corporation to serve as such for an employee benefit plan where the performance by such person of his or her duties to the Corporation also imposes duties on, or otherwise involves services by, such person to the plan or participants or beneficiaries of the plan; (iii) "fines" shall be deemed to include any excise taxes assessed on a person with respect to an employee benefit plan pursuant to ERISA; and (iv) actions taken or omitted by a person with respect to an employee benefit plan in the performance of such person's duties for a purpose reasonably believed by such person to be in the interest of the participants and beneficiaries of the plan shall be deemed to be for a purpose which is in the best interests of the Corporation.

The right of indemnification provided in this Article shall not be exclusive of or affect any other rights to which any Trustee, director or officer may be entitled under any agreement, statute, vote of members or otherwise. The Corporation's obligation to provide indemnification under this Article shall be offset to the extent of any other source of indemnification or any otherwise applicable insurance coverage under a policy maintained by the Corporation or any other person. Nothing contained in this Article shall affect any rights to which employees and corporate personnel other than Trustees, directors or officers may be entitled by contract, by vote of the Board of Trustees or of the Executive Committee or otherwise.

XVII. There shall be no transfer of title or long-term lease of real property held by the MBL Corporation without prior approval of two-thirds of the full Board of Trustees. Such real property transactions shall be presented and discussed at one meeting of the Board and finally acted upon at a subsequent meeting of the Board. Either meeting could be a special meeting and no less than four weeks should elapse between these meetings.