Ninety-Sixth Report
for the Year 1993
One-Hundred and Fifth Year

Officers of the Corporation

Denis M. Robinson, Honorary Chairman of the Board of Trustees
Sheldon J. Segal, Chairman of the Board of Trustees
Robert E. Mainier, Vice Chairman of the Board of Trustees
James D. Ebert, President of the Corporation
John E. Burris, Director and Chief Executive Officer
Robert D. Manz, Treasurer
Neil Jacobs, Clerk of the Corporation
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1993 marked the 105th year of the Marine Biological Laboratory and my first full year as its Director and CEO. It was an exciting time, one filled with top-flight science, excellent educational opportunities, and infrastructure change.

Scientific Activities

The MBL’s year-round research program continues to be a vigorous, diverse, and well-funded mix of scientific investigations.

The largest group of year-round scientists at the MBL are in the Ecosystems Center co-directed by Jerry Melillo and John Hobbie. This group conducts field, laboratory, and computer modeling studies in areas such as coastal zone management, river basin modeling, biogeochemical cycling in the Arctic of Alaska, and the preservation of biodiversity in tropical rain forests. Its work has been central to the prediction and modeling of global climate change, especially the impact of terrestrial ecosystems. Work at the Center has also been important at the local level where studies are under way on the environment around the present outfall pipe and its future site outside of Boston Harbor.

Cutting-edge research is under way at the Architectural Dynamics in Living Cells Program where Shinya Inoué, a recently elected member of the National Academy of Sciences, and his colleagues are probing the structure of living cells at high levels of resolution. Newly developed equipment and techniques continue to allow the investigators to probe even further into the fine structure of the cell.

In the Molecular Evolution Program, studies by Mitchell Sogin and others have further elucidated the evolution of parasites relative to the later emergence of their contemporary hosts. The human pathogens of *Giardia* and *Toxoplasma* have been particularly important organisms for the study of ribosomal RNA sequences as a means of learning more about the relatedness of organisms.

Lionel Jaffe and Andrew Miller, with the input of numerous colleagues, have been carefully investigating patterns of calcium distribution to learn more about its importance in cell development and other biological phenomena. The successful transfection of the cellular slime mold *Dictyostelium* with apoaequorin has produced a strain of mold that luminesces to reveal patterns of internal free calcium during development.

In the summer, the number of scientists at the Laboratory increases several fold to over 400. The quality and diversity of their research is impressive, as is the excitement they bring. In true MBL tradition, the community gathers to share scientific information in a variety of ways: through formal evening lectures, during brown bag lunches, and in passing in the halls and streets of the MBL campus.

The active scientific interchange that occurs led this past year, as in previous years, to many experiments to test ideas. A number of these were reported at the annual General Scientific Meetings. It is at this meeting that year-round and summer scientists gather to share the results of their recent investigations at the MBL.

The topics at the Meetings ranged from calcium in development to gamete physiology and biochemistry to neurobiology to behavior to comparative physiology and estuarine ecology. This extraordinary mix of topics was presented by more than 50 investigators, students, and fellows. Of these presentations, 33 were written up, reviewed, and published as short reports in the October 1993 issue of *The Biological Bulletin*.

As in previous summers, the MBL awarded a number of research fellowships. This year 22 scientists, a record number, from around the world came to the Laboratory to study topics ranging from creating computer models of neural networks, to real-time visualizations of DNA replication in mammalian
nuclei, to understanding the roles of kinesin and other motor proteins in mitosis and organelle transport.

All of the scientists at the MBL have benefited from the recently completed Marine Resources Center. During 1993, the facility’s state-of-the-art life support and recirculating seawater systems became fully operational, allowing many of the important marine model organisms to be maintained, as well as the initiation of culturing efforts.

Two organisms that are being cultured are the dwarf surf clam, *Mulinia lateralis*, and the bay scallop, *Aquipecten irradians*. *Mulinia* is becoming increasingly popular as a model for studying cell division, cell cycling, gamete metabolism, and fertilization. This tiny clam, which measures no larger than a small fingernail, is proving to be as reliable a model as the surf clam.

*Spisula*. As surf clams become more difficult to obtain, genetically defined, cultured *Mulinia* may provide researchers with a viable alternative model system.

Hundreds of mature *Aquipecten* are being maintained in the mariculture room as part of a joint project with Taylor Seafood. These scallops have spawned tens of millions of scallops which have recently been moved into ponds where it is hoped that they will reach maturity and eventually find their way to dinner tables around the country. Several millions of the juveniles have also been seeded in public shellfishing areas to enhance local stocks.

In addition to culturing efforts such as these, a variety of other valuable animals are maintained in the MRC. For example, the dogfish shark can now be held year-round in the facility, providing researchers whose
work has implications for such diseases as cystic fibrosis and cancer with a constant supply of healthy research organisms. Leukemic Aipta clams are now being used in studies on the effects of PCBs under controlled conditions. And scup are being used in the investigation of how varied temperatures affect muscle physiology, respiration, and contractility.

Educational Programs

The MBL's tradition of excellence in education continued in 1993. There were a record number of students and instructors participating in the most extensive course schedule ever to be offered at the Laboratory. Eighteen courses were held in 1993, covering the neurosciences, cellular and molecular biology, developmental biology, molecular evolution, microbiology, and information science, as well as training in a variety of specialized laboratory techniques. Of particular note was the Embryology course, which celebrated its 100th anniversary.

The courses continue to be extremely popular and competitive, with the Education Office receiving over 2700 inquiries leading to the selection of more than 400 students representing 268 institutions. Many of these students were able to come because of the extensive scholarship support offered by the Laboratory. The students were joined by 382 instructors and lecturers who make it possible for the MBL to offer an unmatched, individualized educational opportunity. Not only were students able to participate in the courses, but for the first time in recent years, funds were raised that specifically supported post-course research for a limited number of students. During the post-course experience the students were able to conduct independent research based on projects begun during the laboratory sessions of their courses.

Although the MBL summer courses are for graduate and postgraduate students, undergraduates have an opportunity to study at the Laboratory primarily in the Boston University Marine Program. BUMP has now grown to almost 70 undergraduates and graduates who are here mainly in the fall to take a wide variety of courses. The graduate students spend year-round taking courses and doing research under the five full-time Boston University faculty now in residence in Woods Hole.

Infrastructure

The MBL was the site of changes in both its governance and physical infrastructure in 1993. The governance changes voted in 1992 were implemented successfully at the February 1993 meeting of the MBL Board of Trustees. During 1993, three new Trustees were elected to the Board: Paul Marks, President and CEO of Memorial Sloan-Kettering Cancer Center; Philip Needleman, President of Searle Research and Development; and William Steere, Jr., Chairman and CEO of Pfizer, Inc. The first Science Council, chaired by George Langford, was elected by the Corporation at its August meeting.

Our physical plant received significant attention in 1993. Extensive renovations to the Lillie Research Building are nearing completion as I write; this project was supported in part by a grant from the National Science Foundation. We also completed construction of the Marine Resources Center's Collection Support Facility, which includes a diving support facility. Finally, the Brick Apartment Dormitory has been modernized and refitted with new plumbing, wiring, and storm windows.

An important part of any institutional growth is a positive funding situation. The MBL was most fortunate this year to receive several major gifts that increased our endowment by more than 20%. Foremost among these were gifts from Dr. Ellen Grass and the Grass Foundation and bequests from Anita Zorzoli and Harold Glassman. It was also particularly gratifying that the annual fund reached a new record of $272,000, a 15% increase over 1992’s total.

Looking Ahead

1993 was a good year for the Marine Biological Laboratory, as recounted in the preceding outline of the many positive research and educational activities, as well as infrastructural and financial ones. In an era of austerity and general pessimism about science, it is gratifying to be able to provide such good news. Will I be able though to continue to provide such positive reports?

My sense is that things indeed will continue to improve. As the Laboratory confronts the changing patterns of both research and funding, its small size and unique status will continue to allow it to initiate and react quickly to new opportunities. Flexibility and a diverse funding base appear to me to be crucial traits of the MBL that will enable us to deal with change. Our educational and research programs fill a niche occupied by few, if any, other institutions. The loyalty and generosity of our Corporation members, as well as the
friends of the Laboratory and long-time Foundation supporters, encourage optimism about the Laboratory's continuing to contribute to the life sciences and remaining an attractive place for the independent researcher who is searching for the freedom of the MBL research environment.

I look forward to seeing many of you in 1994, the 106th year in the long and distinguished history of the Marine Biological Laboratory.

—John E. Burris
Report of the Treasurer

A year ago, in reviewing the financial results for 1992, I reported that we had entered a period of transition, and had come through the initial phase of that transition in a modestly successful financial manner. I also reported that as we looked forward to 1993, we sensed a continuing and an improving financial stability.

I am happy to report that the 1993 financial results have continued the financial progress we witnessed in 1992, and have even exceeded our expectations. In 1993, we had the most successful financial operating results in the recent history of the MBL.

We finished the year with an excess of revenues over expenditures in the current unrestricted fund of $656.774. After mandatory transfers to fund debt principal of $67,339 and the procurement of equipment in the amount of $92,485, I am pleased to report that we funded a portion of our depreciation by transferring $494,490 to the renewals and replacement plant fund. For the Housing Auxiliary, the funding of the renewals and replacement fund was $184,490; more significantly, for the first time in my tenure as Treasurer, we were able to transfer $310,000 to the general operations renewal and replacement fund for use in future major capital repairs and improvements.

I cannot emphasize enough the importance of this modest but significant financial achievement by the MBL, for it fulfills a long-standing goal of the Trustees. Therefore, I report to you the first step in what we hope will be a continuing and annual outcome of future financial operations. To put things in perspective, it should be understood that this funding of depreciation is far less than the amount of $1,183,814 reported in the financial statements and also far less than the $750,000 on the urgent deferred maintenance and repair schedule, but it is a start and a record we can build on in the future.

Private gift giving at the MBL continues to improve, and in 1993 we experienced the best year in modern history from the standpoint of private gift giving, recording over $5.2 million dollars with almost 53% going into the endowment fund. Continuing the success of last year, our annual fund increased by 15%, reflecting a new sense of vitality and confidence in the community (Fig. 1).

The value of our endowment funds increased by 22%, most of which is attributed to private gift support, but also including over $900,000 of growth in the value of our money through portfolio appreciation (Figs. 2, 3).

Other noteworthy financial information, not directly reflected in the financial statements, includes a four
year overhead agreement at 51% with the Department of Health and Human Services, which should add a great deal of stability to our financial planning. In addition, we were able to obtain from the same organization approval to fund our post retirement health care liability through our fringe benefit rate.

The financial achievements of 1993 represent a stepping stone to the future. We must, however, intensify our efforts to improve the financial infrastructure and flexibility of the MBL. This can be achieved by increasing our endowment, as well as by increasing the size of our relatively small scientific support base. Only with increased financial resources will we be able to maintain and enhance the excellent research and educational opportunities offered by the Laboratory.

—Robert D. Manz
REPORT OF INDEPENDENT ACCOUNTANTS

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

We have audited the accompanying balance sheet of Marine Biological Laboratory as of December 31, 1993 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 31, 1992, for 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, 1993, and its support, revenues, expenses and changes in fund balances for the year then ended in conformity with generally accepted accounting principles.

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, expenses and changes in fund balances for current funds (Schedule I), endowment funds (Schedule II) and plant funds (Schedule III) as of December 31, 1993 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.

Boston, Massachusetts
April 20, 1994
# MARINE BIOLOGICAL LABORATORY

## BALANCE SHEETS

*December 31, 1993 (with comparative totals for 1992)*

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</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>$580,165</td>
<td>$499,514</td>
<td>Current portion of long-term debt (Note F)</td>
<td>$69,010</td>
<td>$65,000</td>
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<td></td>
<td>9,354</td>
<td>6,667</td>
<td>Accounts payable and accrued expenses</td>
<td>1,489,146</td>
<td>1,278,535</td>
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<tr>
<td></td>
<td>2,048,483</td>
<td>1,628,270</td>
<td>Deferred income</td>
<td>240,672</td>
<td>250,490</td>
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<td>Accounts receivable, net of allowance for doubtful accounts of $10,000 and $8,000</td>
<td>804,955</td>
<td>597,946</td>
<td>Total current liabilities</td>
<td>1,798,828</td>
<td>1,594,025</td>
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<tr>
<td>Receivables due for costs incurred on grants and contracts</td>
<td>906,011</td>
<td>625,857</td>
<td>Accounts payable (Note E)</td>
<td>218,050</td>
<td>208,167</td>
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<tr>
<td>Other assets</td>
<td>421,392</td>
<td>180,927</td>
<td>Annuities payable (Note B)</td>
<td>157,359</td>
<td>184,553</td>
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<tr>
<td>Total current assets</td>
<td>4,770,360</td>
<td>3,539,181</td>
<td>Long-term debt (Note F)</td>
<td>2,475,680</td>
<td>2,535,000</td>
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<td>Restricted cash (Note E)</td>
<td>54,847</td>
<td>285,094</td>
<td>Deferred support (Note G)</td>
<td>3,796,864</td>
<td>3,518,263</td>
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<td>Investments, at market (Notes C and D)</td>
<td>21,636,024</td>
<td>18,236,843</td>
<td>Total long-term liabilities</td>
<td>6,647,953</td>
<td>6,445,983</td>
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<tr>
<td>Deposits with trustee (Note F)</td>
<td>492,852</td>
<td>1,492,410</td>
<td>Commitments (Note E)</td>
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<td>Fixed assets (Note B):</td>
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<td>Total liabilities</td>
<td>8,446,781</td>
<td>8,040,008</td>
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<td>Land</td>
<td>689,661</td>
<td>689,660</td>
<td>Current unrestricted fund balances</td>
<td>32,097</td>
<td>12,857</td>
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<td>Buildings</td>
<td>29,403,841</td>
<td>27,716,029</td>
<td>Annuities fund balance</td>
<td>70,115</td>
<td>145,435</td>
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<td>Equipment</td>
<td>3,120,483</td>
<td>3,024,613</td>
<td>Endowment fund balances:</td>
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<tr>
<td>Construction in progress</td>
<td>1,148,917</td>
<td>131,078</td>
<td>Quasi-endowment unrestricted</td>
<td>595,694</td>
<td>548,061</td>
</tr>
<tr>
<td>Less accumulated depreciation</td>
<td>34,362,902</td>
<td>31,561,380</td>
<td>Endowment, income for unrestricted purposes</td>
<td>3,876,604</td>
<td>3,765,379</td>
</tr>
<tr>
<td></td>
<td>(11,884,268)</td>
<td>(10,707,699)</td>
<td>Endowment, income for restricted purposes</td>
<td>9,547,900</td>
<td>6,337,988</td>
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<tr>
<td></td>
<td>22,478,634</td>
<td>20,853,681</td>
<td>Quasi-endowment restricted</td>
<td>5,907,490</td>
<td>5,629,395</td>
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<td>Total endowment funds</td>
<td>19,927,688</td>
<td>16,280,823</td>
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<td>Plant fund balances:</td>
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<td></td>
<td>Unrestricted</td>
<td>19,869,320</td>
<td>19,708,718</td>
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<td>Repairs and replacement reserve</td>
<td>546,838</td>
<td>196,470</td>
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<td>Restricted</td>
<td>539,878</td>
<td>22,898</td>
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<td>Total plant funds</td>
<td>20,965,036</td>
<td>19,928,086</td>
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<td>Total assets</td>
<td>$49,432,717</td>
<td>$44,407,209</td>
<td>Total liabilities and fund balances</td>
<td>$49,432,717</td>
<td>$44,407,209</td>
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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, 1993

(with appropriate totals for 1992)

<table>
<thead>
<tr>
<th>Current Funds</th>
<th>Unrestricted</th>
<th></th>
<th></th>
<th></th>
<th></th>
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<th>1993 Total</th>
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<th>1992 Total</th>
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<tr>
<td></td>
<td>Operating Fund</td>
<td>Auxiliary Enterprises Fund</td>
<td>Total</td>
<td>Restricted Funds</td>
<td>Annuity Fund</td>
<td>Unrestricted</td>
<td>Restricted</td>
<td>Unrestricted</td>
<td>Restricted</td>
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<tr>
<td>SUPPORT AND REVENUES:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grant reimbursements of direct costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$5,565,338</td>
<td>$5,982,265</td>
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<tr>
<td>Grant for capital additions</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>1,450,632</td>
<td>4,032,660</td>
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<tr>
<td>Recovery of indirect costs</td>
<td>$3,711,139</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,711,139</td>
<td>3,530,621</td>
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<td>Tuition</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>611,700</td>
<td>485,247</td>
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<td>Fee for services</td>
<td>1,325,443</td>
<td>$1,993,746</td>
<td>3,319,189</td>
<td>162,115</td>
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<td>1,208</td>
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<td>Investment income</td>
<td>415,132</td>
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<td>415,132</td>
<td>521,022</td>
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<td></td>
<td>$1,208</td>
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<td></td>
<td>5,451,719</td>
<td>1,993,746</td>
<td>7,445,465</td>
<td>6,860,175</td>
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<td></td>
<td>1,208</td>
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<td>Gifts</td>
<td>572,556</td>
<td></td>
<td>572,556</td>
<td>1,845,424</td>
<td>12,598</td>
<td></td>
<td>$7,799,659</td>
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<tr>
<td>Change in deferred support</td>
<td>527,945</td>
<td></td>
<td>527,945</td>
<td>(806,546)</td>
<td></td>
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<td></td>
<td>1,100,501</td>
<td></td>
<td>1,100,501</td>
<td>1,038,878</td>
<td>12,598</td>
<td></td>
<td>2,779,659</td>
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<td>Miscellaneous revenue</td>
<td>106,548</td>
<td></td>
<td>106,548</td>
<td>332,275</td>
<td></td>
<td></td>
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<tr>
<td>Total support and revenues</td>
<td>6,658,768</td>
<td>1,993,746</td>
<td>8,652,514</td>
<td>8,231,328</td>
<td>13,806</td>
<td></td>
<td>2,779,659</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td>1,585,994</td>
<td>21,263,301</td>
</tr>
</tbody>
</table>

| EXPENSES: | | | | | | | | | |
| Research | 5,727,323 | | | | | | | 5,727,323 | 6,019,891 |
| Instruction | 1,538,190 | | | | | | | 1,526,154 | |
| Scholarships, fellowships and stipends | 447,454 | | | | | | | 394,544 | |
| Services | 1,962,483 | 1,611,963 | 3,574,446 | 381,849 | | | | | |
| Administration | 2,412,999 | 157,293 | 2,570,292 | 6,820 | | | | | |
| Plant operations | 1,850,002 | | 1,850,002 | 111 | | | | | |
| Depreciation | | | | | | | | 1,183,814 | |
| | | | | | | | | 248,238 | 15 |
| Total expenses | 6,225,484 | 1,769,256 | 7,994,740 | 8,349,985 | 15 | | | 17,601,047 | 17,350,564 |

| Excess (deficit) of support and revenues over expenses | 433,284 | 224,490 | 657,774 | (118,657) | 13,791 | 2,779,659 | (1,256,307) | 1,585,994 | 3,662,254 |

| Net realized gain (loss) on investments | 155,460 | (86,816) | ($32,841) | $955,896 | | | | | |
| Net unrealized gain (loss) on investments | (58,026) | (2,495) | 4,142 | (44,721) | | | | | |
| Total gain on investments | 97,434 | (89,111) | 36,983 | 911,175 | | | | | |
| Transfers | (414,044) | (224,490) | (638,534) | 21,223 | | | | | |
| Net change in fund balances | 19,240 | | 19,240 | (75,320) | 47,633 | 3,599,232 | 510,970 | 516,980 | 4,618,735 |
| Fund balances, beginning of year | 12,857 | | 12,857 | 145,435 | 548,061 | 15,732,762 | 19,905,188 | 22,898 | 36,367,201 |
| Fund balances, end of year | $32,097 | | $32,097 | $70,115 | $595,694 | $19,331,994 | $20,416,158 | $539,878 | $40,985,936 |

The accompanying notes are an integral part of the financial statements.
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 has full control over the utilization of unrestricted funds. Restricted gifts, grants, and other restricted support are accounted for in the appropriate restricted funds. Restricted current funds are reported as revenue as the related costs are incurred (see Note G).

Endowment funds are subject to restrictions which require that the principal be invested in perpetuity. Related investment income is available for use for restricted or unrestricted purposes by the Laboratory depending on donor restrictions. 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 at the direction of the Trustees.

Fixed Assets

Land, buildings and equipment purchased by the Laboratory are recorded at cost. Donated fixed assets are recorded at fair market value at the date of the gift. Depreciation is computed using the straight-line method, beginning the month after the asset is placed in service, over the asset's estimated useful life. Estimated useful lives are generally three to five years for equipment and 20 to 40 years for buildings and improvements. When assets are sold or retired, the cost and accumulated depreciation are removed from the accounts and any resulting gain or loss is included in income for the period.

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 G). Reimbursement of indirect costs relating to government contracts and grants is based on negotiated indirect cost rates. Any over or underrecovery 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 plus accrued interest, which approximates market value. Donated investments are recorded 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 first-in, first-out method.

The Laboratory is the beneficiary of certain investments reported in the endowment funds which are held in trust by others. The Laboratory’s continuing investment in these funds is subject to review every 10 years by an independent committee. The market values of such investments are $4,873,242 and $4,743,257 at December 31, 1993 and 1992, respectively. The income of these investments totaled $226,702 and $219,050 in 1993 and 1992, 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 a pooled investment account, which income is allocated to the participating funds on the market value unit basis (Note D).

Annuities Payable

Amounts due to donors in connection with gift annuities are determined based on remainder value calculations, as of December 31, 1993 with varied assumptions of rates of return and payout terms.

Reclassifications

Certain 1992 balances have been reclassified for comparative purposes. In 1993, the laboratory reclassified the revenues, expenses and fund balances related to annuity contracts from the current fund into a separate Annuity Fund.
Tax-Exempt Status

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

C. Investments:

The following is a summary of the cost and market value of investments at December 31, 1992 and 1991:

<table>
<thead>
<tr>
<th></th>
<th>Market</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificates of deposit</td>
<td>$48,483</td>
<td>$47,700</td>
</tr>
<tr>
<td>Money market securities</td>
<td>4,822,875</td>
<td>1,952,867</td>
</tr>
<tr>
<td>U.S. Government securities</td>
<td>—</td>
<td>1,788,066</td>
</tr>
<tr>
<td>Corporate fixed income</td>
<td>9,706,380</td>
<td>8,968,745</td>
</tr>
<tr>
<td>Common stocks</td>
<td>9,093,522</td>
<td>6,764,488</td>
</tr>
<tr>
<td>Real estate</td>
<td>13,247</td>
<td>343,247</td>
</tr>
<tr>
<td>Total investments</td>
<td>$23,684,507</td>
<td>$19,865,113</td>
</tr>
</tbody>
</table>

Investments by fund group and related portfolios for the years ended December 31, 1993 and 1992 are as follows:

<table>
<thead>
<tr>
<th></th>
<th>Market</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificates of deposit</td>
<td>$48,483</td>
<td>$47,700</td>
</tr>
<tr>
<td>Money market securities</td>
<td>2,000,000</td>
<td>1,400,000</td>
</tr>
<tr>
<td>Library funds</td>
<td>—</td>
<td>180,570</td>
</tr>
<tr>
<td>Total</td>
<td>2,048,483</td>
<td>1,628,270</td>
</tr>
</tbody>
</table>

Long Term Funds

Endowment and quasi-endowment

General endowment trust fund 3,855,724 3,755,124 3,135,652 2,897,718
Library endowment trust fund 1,017,518 988,133 807,175 753,904
Ecosystem funds 4,829,277 4,507,857 4,029,966 3,756,446
Pooled funds 10,343,724 6,910,904 9,187,655 5,806,114
Instruction fund 1,378,838 1,731,578 1,339,557 1,634,269
Other Funds:
State Street Annuity Fund 197,696 — 200,190 —
Real Estate 13,247 343,247 13,247 343,247
Total 21,636,024 18,236,843 18,713,442 15,191,698
Total investments $23,684,507 $19,865,113 $20,761,925 $16,821,991

D. Accounting for Pooled Investments:

Certain endowment fund assets are pooled for investment purposes. Investment income from the pooled investment account is allocated on the market value unit basis, and each endowment fund subscribes to or dispose of units on the basis of the market value per unit at the beginning of the calendar quarter within which the transaction takes place. The unit participation of the funds at December 31, 1993 and 1992 is as follows:

<table>
<thead>
<tr>
<th></th>
<th>1993</th>
<th>1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quasi-endowment unrestricted</td>
<td>4,342</td>
<td>4,260</td>
</tr>
<tr>
<td>Quasi-endowment restricted</td>
<td>8,771</td>
<td>8,717</td>
</tr>
<tr>
<td>Endowment, income for restricted purposes</td>
<td>62,158</td>
<td>40,345</td>
</tr>
<tr>
<td>Endowment, income for unrestricted purposes</td>
<td>152</td>
<td>79</td>
</tr>
<tr>
<td>Total</td>
<td>75,423</td>
<td>53,401</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>1993</th>
<th>1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit value at beginning of year</td>
<td>$128.66</td>
<td>$128.42</td>
</tr>
<tr>
<td>Unit value at end of year</td>
<td>137.18</td>
<td>128.66</td>
</tr>
<tr>
<td>Increase in realized and unrealized appreciation</td>
<td>8.52</td>
<td>.24</td>
</tr>
<tr>
<td>Net income earned on pooled investments</td>
<td>4.52</td>
<td>5.71</td>
</tr>
<tr>
<td>Total return on pooled investments</td>
<td>$13.04</td>
<td>$5.95</td>
</tr>
</tbody>
</table>
E. Deposits and Commitments for Construction Programs:

As of December 31, 1993, the Laboratory has $492,852 in Deposit with Trustees for the renovations of laboratories. On December 31, 1993, the Laboratory was contractually obligated for approximately $579,463 of additional expenditures in connection with its current building program. The expenditures are covered by funding commitments.

F. Long-Term Debt:

Long-term debt at December 31, 1993 amounted to $2,544,690. The aggregate amount of principal due for each of the next five fiscal years and thereafter is as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>$69,010</td>
</tr>
<tr>
<td>1995</td>
<td>79,010</td>
</tr>
<tr>
<td>1996</td>
<td>76,670</td>
</tr>
<tr>
<td>1997</td>
<td>80,000</td>
</tr>
<tr>
<td>1998</td>
<td>85,000</td>
</tr>
<tr>
<td>Thereafter</td>
<td>2,155,000</td>
</tr>
</tbody>
</table>

Less current portion: 2,544,690
Total: 2,475,680

In 1992, the Laboratory issued $1,100,000 Massachusetts Industrial Finance Authority (MIFA) Series 1992A Bonds and $1,500,000 MIFA Series 1992B. These bonds pay varying annual interest rates and Series 1992 A and B Bonds mature on December 1, 2012. The Series 1992 A and B Bonds are collateralized by a first mortgage on certain Laboratory property.

In compliance with the 1992 MIFA bond indentures, the Laboratory has on deposit with State Street Bank and Trust, as trustee for Series 1992 Bonds, investments for construction projects in the amount of $492,852.

Under the most restrictive covenant of long-term debt, the Laboratory's operating surplus (before transfers), interest, expense and transfers from the quasi-endowment for debt service must equal or exceed all debt service payments.

G. Restricted Current Funds Deferred Support:

The Laboratory defers revenue on current restricted funds until the related costs are incurred. Amounts received in excess of expenses are recorded as deferred support. The following summarizes the activity of the deferred support account:

<table>
<thead>
<tr>
<th></th>
<th>1993</th>
<th>1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance at beginning of year</td>
<td>$3,518,263</td>
<td>$4,291,705</td>
</tr>
<tr>
<td>Additions:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gifts, endowment income and grants received</td>
<td>8,509,929</td>
<td>7,997,702</td>
</tr>
<tr>
<td>Net unrealized gains (losses)</td>
<td>(58,026)</td>
<td>(77,518)</td>
</tr>
<tr>
<td>Net realized gains</td>
<td>155,460</td>
<td>78,636</td>
</tr>
<tr>
<td>Transfers</td>
<td>21,223</td>
<td>-</td>
</tr>
<tr>
<td>Deductions:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funds expended under gifts and grants</td>
<td>8,349,985</td>
<td>8,722,851</td>
</tr>
<tr>
<td>Transfers</td>
<td>-</td>
<td>49,411</td>
</tr>
<tr>
<td>Balance at end of year</td>
<td>$3,796,864</td>
<td>$3,518,263</td>
</tr>
</tbody>
</table>

Deferred restricted gifts of $527,945 and $453,970 were expended in 1993 and 1992, respectively, for the support of indirect costs attributable to the Laboratory's instruction programs.

H. Retirement Plan:

The Laboratory participates in the defined contribution pension plan of TIAA-CREF (the "Plan"). The Plan is available to permanent employees that have completed two years of service. Under the Plan, the Laboratory contributes 10% of total compensation for each participant. Contributions amounted to $507,324 in 1993 and $502,215 in 1992.

I. Pledges:

As of December 31, 1993, the Laboratory has outstanding pledges of $420,948 of which $399,948 is restricted (unaudited). Pledges are not included in the financial statements since it is not practicable to estimate the net realizable value of such pledges. These pledges are scheduled to be paid over the next four years in the amounts of $315,248, $87,700, $12,000, and $7,000, respectively.
J. **Interfund Borrowings:**

Current unrestricted fund interfund borrowings at December 31 are as follows:

<table>
<thead>
<tr>
<th></th>
<th>1993</th>
<th>1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due from restricted education funds</td>
<td>$31,098</td>
<td>$(118,755)</td>
</tr>
<tr>
<td>Due to restricted endowment fund</td>
<td>(6,445)</td>
<td>(50)</td>
</tr>
<tr>
<td>Due from (to) restricted quasi-endowment funds</td>
<td>125,000</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$149,653</strong></td>
<td>$(118,805)**</td>
</tr>
</tbody>
</table>

K. **Financial Accounting Standard No. 106:**

In December 1990, the Financial Accounting Standards Board (FASB) released Statement No. 106, “Employers’ Accounting for Postretirement Benefits Other Than Pensions.” This new standard requires employers to accrue, during the years that the employee renders the necessary service, the expected cost of benefits to be provided during retirement. On November 20, 1993, the Laboratory adopted Statement No. 106 for the year beginning January 1, 1994 and intends to record the accumulated benefit obligation of $1,588,000 over a twenty-year amortization period.

The Laboratory’s policy is that all current retirees and certain eligible employees who retire prior to June 1, 1994 will continue to receive postretirement health benefits. The remaining current employees will continue to receive benefits; however, those benefits will be limited as defined by the Plan. Employees hired on or after January 1, 1995 will not be eligible to participate in the postretirement medical benefit plan.
## MARINE BIOLOGICAL LABORATORY

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

#### CURRENT FUNDS

for the year ended December 31, 1993

<table>
<thead>
<tr>
<th>Current Unrestricted Funds</th>
<th>Operating Fund</th>
<th>Auxiliary Enterprises Fund</th>
<th>Total</th>
<th>Current Restricted Fund</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPPORT AND REVENUES:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grant reimbursements of direct costs</td>
<td></td>
<td></td>
<td></td>
<td>$5,565,338</td>
<td></td>
</tr>
<tr>
<td>Recovery of indirect costs</td>
<td>$3,711,139</td>
<td>$3,711,139</td>
<td></td>
<td>3,711,139</td>
<td></td>
</tr>
<tr>
<td>Tuition</td>
<td></td>
<td>611,700</td>
<td></td>
<td>611,700</td>
<td></td>
</tr>
<tr>
<td>Fees for services:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dormitories</td>
<td>$1,077,547</td>
<td>1,077,547</td>
<td></td>
<td>1,077,547</td>
<td></td>
</tr>
<tr>
<td>Dining hall</td>
<td>916,199</td>
<td>916,199</td>
<td></td>
<td>916,199</td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td>437,352</td>
<td>437,352</td>
<td></td>
<td>437,352</td>
<td></td>
</tr>
<tr>
<td>Biological Bulletin</td>
<td>235,993</td>
<td>235,993</td>
<td></td>
<td>235,993</td>
<td></td>
</tr>
<tr>
<td>Research services</td>
<td>423,760</td>
<td>423,760</td>
<td></td>
<td>585,875</td>
<td></td>
</tr>
<tr>
<td>Marine resources</td>
<td>228,338</td>
<td>228,338</td>
<td></td>
<td>228,338</td>
<td></td>
</tr>
<tr>
<td>Investment income</td>
<td>415,137</td>
<td>521,022</td>
<td></td>
<td>936,159</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5,451,719</td>
<td>7,445,465</td>
<td></td>
<td>14,305,640</td>
<td></td>
</tr>
<tr>
<td>Gifts</td>
<td>572,556</td>
<td>572,556</td>
<td></td>
<td>1,845,424</td>
<td></td>
</tr>
<tr>
<td>Change in deferred support</td>
<td>527,945</td>
<td>(806,546)</td>
<td></td>
<td>(278,601)</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous revenue</td>
<td>1,100,501</td>
<td>1,038,878</td>
<td></td>
<td>2,139,379</td>
<td></td>
</tr>
<tr>
<td>Total support and revenues</td>
<td>6,658,768</td>
<td>8,652,514</td>
<td></td>
<td>16,883,428</td>
<td></td>
</tr>
<tr>
<td>EXPENSES:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td></td>
<td>5,727,323</td>
<td></td>
<td>5,727,323</td>
<td></td>
</tr>
<tr>
<td>Instruction</td>
<td></td>
<td>1,538,190</td>
<td></td>
<td>1,538,190</td>
<td></td>
</tr>
<tr>
<td>Scholarships, fellowships and stipends</td>
<td>447,454</td>
<td>447,454</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dormitories</td>
<td>829,274</td>
<td>829,274</td>
<td></td>
<td>829,274</td>
<td></td>
</tr>
<tr>
<td>Dining hall</td>
<td>782,689</td>
<td>782,689</td>
<td></td>
<td>782,689</td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td>768,366</td>
<td>203,994</td>
<td></td>
<td>972,360</td>
<td></td>
</tr>
<tr>
<td>Biological Bulletin</td>
<td>185,744</td>
<td>185,744</td>
<td></td>
<td>185,744</td>
<td></td>
</tr>
<tr>
<td>Research services</td>
<td>560,961</td>
<td>168,836</td>
<td></td>
<td>729,797</td>
<td></td>
</tr>
<tr>
<td>Marine resources</td>
<td>447,412</td>
<td>9,019</td>
<td></td>
<td>456,431</td>
<td></td>
</tr>
<tr>
<td>Administration:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administration</td>
<td>2,066,297</td>
<td>2,223,590</td>
<td></td>
<td>2,230,410</td>
<td></td>
</tr>
<tr>
<td>Sponsored projects administration</td>
<td>346,702</td>
<td>346,702</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant operations</td>
<td>1,850,002</td>
<td>1,850,002</td>
<td></td>
<td>1,850,113</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>248,238</td>
<td>248,238</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total expenses</td>
<td>6,225,484</td>
<td>7,994,740</td>
<td></td>
<td>16,344,725</td>
<td></td>
</tr>
<tr>
<td>Excess of support and revenues over expenses</td>
<td>433,284</td>
<td>657,774</td>
<td>1,091,057</td>
<td>539,117</td>
<td></td>
</tr>
<tr>
<td>Net unrealized gain on investments</td>
<td>155,460</td>
<td>155,460</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net realized (loss) on investments</td>
<td>(58,026)</td>
<td>(58,026)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net gain on investments</td>
<td>97,434</td>
<td>97,434</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRANSFERS AMONG FUNDS:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt service</td>
<td>(27,339)</td>
<td>(67,339)</td>
<td></td>
<td>(67,339)</td>
<td></td>
</tr>
<tr>
<td>Acquisition of fixed assets</td>
<td>(92,485)</td>
<td>(92,485)</td>
<td></td>
<td>(92,485)</td>
<td></td>
</tr>
<tr>
<td>Repairs and replacement</td>
<td>(310,000)</td>
<td>(494,490)</td>
<td></td>
<td>(494,490)</td>
<td></td>
</tr>
<tr>
<td>Endowment transfer</td>
<td></td>
<td>325,000</td>
<td></td>
<td>325,000</td>
<td></td>
</tr>
<tr>
<td>Capitalization of income</td>
<td></td>
<td>(227,847)</td>
<td></td>
<td>(227,847)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>15,780</td>
<td>(75,930)</td>
<td></td>
<td>(60,150)</td>
<td></td>
</tr>
<tr>
<td>Total transfers among funds</td>
<td>(414,044)</td>
<td>(638,534)</td>
<td></td>
<td>(617,311)</td>
<td></td>
</tr>
<tr>
<td>Net change in fund balances</td>
<td>19,240</td>
<td>19,240</td>
<td></td>
<td>19,240</td>
<td></td>
</tr>
<tr>
<td>Fund balances, beginning of year</td>
<td>12,857</td>
<td>12,857</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fund balances, end of year</td>
<td>$32,097</td>
<td>$32,097</td>
<td></td>
<td>$32,097</td>
<td></td>
</tr>
</tbody>
</table>
**MARINE BIOLOGICAL LABORATORY**

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

**ENDOWMENT FUNDS**

for the year ended December 31, 1993

<table>
<thead>
<tr>
<th></th>
<th>Unrestricted</th>
<th>Income for Unrestricted Purposes</th>
<th>Income for Restricted Purposes</th>
<th>Quasi-Endowment</th>
<th>Total Restricted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SUPPORT AND REVENUES:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gifts</td>
<td>$ 10,000</td>
<td>$2,769,509</td>
<td>$                   150</td>
<td>$ 2,779,659</td>
<td>$ 2,779,659</td>
<td></td>
</tr>
<tr>
<td>Total support and revenues</td>
<td>10,000</td>
<td>2,769,509</td>
<td>150</td>
<td>2,779,659</td>
<td>2,779,659</td>
<td></td>
</tr>
<tr>
<td>Net realized gain on investments</td>
<td>$ 32,841</td>
<td>238,531</td>
<td>389,749</td>
<td>327,616</td>
<td>955,896</td>
<td>988,737</td>
</tr>
<tr>
<td>Net unrealized gain (loss) on investments</td>
<td>4,142</td>
<td>(137,306)</td>
<td>34,453</td>
<td>58,132</td>
<td>(44,721)</td>
<td>(40,579)</td>
</tr>
<tr>
<td>Net gain (loss) on investments</td>
<td>36,983</td>
<td>101,225</td>
<td>424,202</td>
<td>385,748</td>
<td>911,175</td>
<td>948,158</td>
</tr>
<tr>
<td><strong>TRANSFERS AMONG FUNDS:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capitalization of income</td>
<td>10,650</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endowment transfers</td>
<td></td>
<td></td>
<td>(325,000)</td>
<td>(325,000)</td>
<td>(325,000)</td>
<td></td>
</tr>
<tr>
<td>Other transfers</td>
<td></td>
<td></td>
<td>16,201</td>
<td></td>
<td>16,201</td>
<td></td>
</tr>
<tr>
<td>Total transfers among funds</td>
<td>10,650</td>
<td></td>
<td>16,201</td>
<td>(107,803)</td>
<td>(91,602)</td>
<td>(80,952)</td>
</tr>
<tr>
<td>Net change in fund balances</td>
<td>47,633</td>
<td>111,225</td>
<td>3,209,912</td>
<td>278,095</td>
<td>3,599,232</td>
<td>3,646,865</td>
</tr>
<tr>
<td>Fund balances, beginning of year</td>
<td>548,061</td>
<td>3,765,379</td>
<td>6,337,988</td>
<td>5,629,395</td>
<td>15,732,762</td>
<td>16,280,823</td>
</tr>
<tr>
<td>Fund balances, end of year</td>
<td>$ 595,694</td>
<td>$ 3,876,604</td>
<td>$ 9,547,900</td>
<td>$ 5,907,490</td>
<td>$ 19,331,994</td>
<td>$ 19,927,688</td>
</tr>
</tbody>
</table>
# MARINE BIOLOGICAL LABORATORY

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

### PLANT FUNDS

for the year ended December 31, 1993

<table>
<thead>
<tr>
<th>Unrestricted</th>
<th>Repairs and</th>
<th>Total</th>
<th>Restricted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reserve</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SUPPORT AND REVENUES:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grant for capital additions</td>
<td>$1,450,632</td>
<td>$1,450,632</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gifts</td>
<td>44,000</td>
<td>44,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment income</td>
<td>31,362</td>
<td>31,362</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other revenue</td>
<td>60,000</td>
<td>60,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total support and revenues</strong></td>
<td>$1,585,994</td>
<td>$1,585,994</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPENSES:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation</td>
<td>$1,183,814</td>
<td>$1,183,814</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant operations</td>
<td>72,493</td>
<td>72,493</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total expenses</strong></td>
<td>$1,256,307</td>
<td>$1,256,307</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Excess (deficit) of support and revenues over expenses</strong></td>
<td>$(1,183,814)</td>
<td>$(1,183,814)</td>
<td></td>
<td></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>67,339</td>
<td>67,339</td>
<td>67,339</td>
<td></td>
</tr>
<tr>
<td>Acquisition of fixed assets</td>
<td>92,484</td>
<td>92,484</td>
<td>92,484</td>
<td></td>
</tr>
<tr>
<td>Capital additions</td>
<td>1,184,593</td>
<td>1,184,593</td>
<td>(1,069,014)</td>
<td>115,579</td>
</tr>
<tr>
<td>Repairs and replacements</td>
<td>494,490</td>
<td>494,490</td>
<td>494,490</td>
<td></td>
</tr>
<tr>
<td>Other transfers</td>
<td>(71,629)</td>
<td>(71,629)</td>
<td>(71,629)</td>
<td></td>
</tr>
<tr>
<td><strong>Total transfers among funds</strong></td>
<td>1,344,416</td>
<td>1,344,416</td>
<td>(1,069,014)</td>
<td>698,263</td>
</tr>
<tr>
<td><strong>Net change in fund balances</strong></td>
<td>160,602</td>
<td>160,602</td>
<td>510,970</td>
<td>516,980</td>
</tr>
<tr>
<td><strong>Fund balances, beginning of year</strong></td>
<td>19,708,718</td>
<td>19,708,718</td>
<td>19,905,188</td>
<td>19,928,086</td>
</tr>
<tr>
<td><strong>Fund balances, end of year</strong></td>
<td>$19,869,320</td>
<td>$19,869,320</td>
<td>$20,416,158</td>
<td>$20,956,036</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unrestricted</th>
<th>Repairs and</th>
<th>Total</th>
<th>Restricted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reserve</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**R16**
The Library

In 1993 the MBL/WHOI Library moved towards greater inter-office cooperation. This effort was evident through our improved services, policies, budgets, planning and collections.

The journal collection

The journal cancellation process conducted in 1993 reflected the planning and cooperative efforts undertaken by staff and scientists throughout all the Woods Hole institutions. To get a profile of current use patterns, the Library staff conducted an overview of reading room materials being copied by and for WHOI, MBL, USGS, and NMFS patrons.

After twice circulating a preliminary list of MBL-collected journals being considered for cancellation, 60 subscriptions were ultimately cancelled for 1994. Many of these journals will still be available as part of our reciprocal agreement with Brandeis University. Articles from the cancelled series can be requested for quick delivery through the Library’s interlibrary loan service, and the tables of contents will be provided in the Bay Reading Room as they are published.

The book collection

The WHOI Research Librarian oversaw a project to collect and analyze areas of our monograph collection that need strengthening. In response to the analysis, the MBL/WHOI Library Joint Advisory Committee approved a new procedure to expand the monograph collection. The procedure involves assigning Library Coordinators from the departments and groups of our sponsoring institutions. These coordinators will provide a list of proposed acquisitions, and texts will be purchased from that list. Twelve departments were represented at the first meeting.

Library staff have evaluated, rearranged, labeled, expanded, and updated the Grass Reference Room collection. They have also added to the collection laboratory manuals, bibliographic material, general reference books, directories, writing and field guides, handbooks, dictionaries, guides to research and a much requested collection on Woods Hole and its scientific community. The Library also received books from the July 1993 Book Publishers Fair. Publishers from Oxford, Harvard, Yale University Press, AAUP, Sinauer, and Freeman continue to donate what amounts to 15 percent of the Library’s collection.

The book recall is in its final stages. More than 5,000 books were returned to the Library for bar-coding, and have been entered into the electronic catalog.

The volunteers

The Library took advantage of strong community support, and, with the help of the MBL Associates, established a volunteer program. Volunteers have been willing and productive as they work in the book stacks, gather data, repair monographs and improve the operations of the Library. The Rare Book and Archive volunteers, Dr. and Mrs. Robert Huettner, mounted three major exhibits in the Lillie Lobby in the past year: On the Street Where You Live, Voyeurs of Exploration, and, currently, Women of Science at Woods Hole.

Garfield Arthur and Linda Landland continue their work in the Data Library at Clark with the ALVIN Video collections, and Roger Longley and Fred Pratt have made headway with the maps and charts collections. We are very grateful to the volunteers, all of whom donate their time unselfishly to the Library. We hope to continue this program in the future.

The archives, preservation, and rare books collection

The Library has many volumes that require restoration. A few volumes at a time are being selected for professional repair. For example, the Leuckart teaching charts—examples of outstanding biological illustration—have been photographed and stored in newly constructed cabinets. These charts are also being
digitized for electronic distribution and use as a teaching tool.

As part of the computerization of our collection, we have been cataloging the obscure records of our rare books. More than half the collection can now be viewed on the public access terminals. Before long, the entire archival book collection will be available on the terminals.

Cataloging

The Library has a number of classic volumes on oceanographic expeditions and hydrographic cruises. This valuable collection has been cataloged and entered into our local database. To get a sense of the richness of this resource, one need go no further than the “A”s, where one can find information on Arctic and Antarctic expeditions; Agassiz’s cruises on the BLAKE; Albert I, Prince of Monaco’s expeditions from 1889 to 1922; the Allan Hancock Atlantic Expeditions; and cruises of the ANTON DOHRN.

Cooperative relationships

The MBL/WHOI Library received part of a Boston Library Consortium (BLC) grant called At Your Service: High speed delivery of text and graphic library resources. Through the federal LSCA pilot project grant the cooperating libraries provide faster and higher-quality document transmission to BLC members, via the Internet and high speed/high resolution scanning workstations. Students, faculty, investigators, and staff of the academic institutions who have sophisticated information needs will find this resource particularly useful.

With the addition of the University of Massachusetts' four campus libraries, the BLC has increased its library membership to 14. The cooperative association of these academic and research libraries support resource sharing and service enhancement. A computerized Gateway information service facilitates access to research materials by providing a link to the catalogs and union lists of participating libraries, reciprocal interlibrary loan and document delivery, borrowing privileges and a card program that identifies patrons and allows them to register at consortium libraries.

The user-friendly electronic library

Scientists working in Woods Hole or across the globe may obtain the Library’s electronic services throughout the year. The User Friendly Electronic Library Services handbook is a guide through the myriad of electronic services available from the Library. Researchers can access catalogs of other libraries and universities, perform literature searches in dozens of databases, keep up to date on the latest journal issues in our own stacks, view the tables-of-contents of a publication, and order documents to be faxed to a laboratory or office.

WHOI branch libraries

Bill Dunkle of the Data Library is developing a display that depicts the U.S. Navy's role in creating the American Oceanography Program. The Data Library is also developing a database for Lowering Summary Data for ANGUS, ARGO, and Jason. The information in this database will be available through an index for all lowerings carried out by these platforms.

In 1993, the Documents Library acquired more than 600 technical documents. One example, the ALVIN bibliography, contains more than 1,000 bibliographic records of the ALVIN dives, and has been mounted on a WHOI computer server. It can be accessed through the Internet library called Gopher. The Documents Library also started an outreach program to explain the new electronic services.

Gifts and donations

The Library used a grant from the Bay Foundation to expand electronic access to indices mounted on the network. This gift provided 10 additional databases in the areas of ecology fisheries and water resource management. The Library also established book funds in 1993 in memory of Dr. Kimball Atwood, Dr. Allyn Vine and Dr. Henry Stommel. Dr. Thomas Brock donated to the Library a research collection of microbiology monographs.

The Information Systems Division

The Information Systems Division (ISD) managed electronic support for Library systems. ISD implemented new “friendlier” Internet tools such as Gopher and Mosaic, and established policies on the use of the network. To ensure physical and electronic security, ISD initiated new policies that limited access to our resources. ISD installed more than 100 new network connections this year, including connections in the Whitman research labs as well as the renovated space in Lillie. ISD expanded its instructional classes, and began outreach to local Falmouth hospital staff and the general community. ISD also taught introductory courses in Medical Informatics to more than 400 students in 1993.
Library leadership

Last year, the joint MBL/WHOI Trustees’ Library Planning Committee gave a report to both institutions. Trustees unanimously agreed on the goals of the Library, stating: the primary mission of the MBL/WHOI Library is to provide, in a collaborative and collegial environment, access to the best available information essential to scientific research and teaching at the two institutions.

Other professionals in the community meet their needs through contractual agreements. They recommend three developmental priorities:

- A provision in the Library’s budget for Library leadership, informatics expertise and fund-raising capacity.
- Renovations of the Library space in Lillie to restrict access, improve lighting, reduce the risk of fire, install fire alarm systems, climate control, and repave the building envelope.
- Preserving deteriorating volumes that should remain in the collections.

Dr. David Stonehill finished his mission at the MBL/WHOI Library this past February. After his three-year stay here, with sponsorship from the Mellon grant, Dr. Stonehill went on to another leadership role at Miami University in Ohio. Carol Winn, the Research Librarian at WHOI, retired in June, 1994. Catherine Norton, the new Head Librarian, holds a joint appointment from both MBL and WHOI. Happily, this important transition for the Library and its staff has been a smooth one.

—Catherine Norton
Educational Programs

Summer Courses
Biology of Parasitism
(June 13–August 14)

Director
John Boothroyd, Stanford University School of Medicine

Associate Director
Richard Komuniecki, University of Toledo

Course Faculty
Richard Davis, San Francisco State University
Jean-Francois Dubremetz, INSERM
Fred Finkelman, USUHS, Herbert School of Medicine
Patricia Johnson, University of California, Los Angeles
Richard Locksley, University of California, San Francisco
Suzanne Morris, Uniformed Services University of the Health Service
Steven L. Reiner, University of California, San Francisco
Joe Urban, USDA

Instructor
Peter Hotez, Yale University

Teaching Assistants
Peter Bradley, University of California, Los Angeles
Emilio Duran, University of Toledo
Melissa A. Perreagaux, Yale University School of Medicine
Martine Soeet, INSERM
Jacinto Villanueva, San Francisco State University
Keith Wilson, Stanford University School of Medicine

Course Assistants
Michele Klingbeil, University of Toledo
Kersten Moorehead, San Francisco State University
Sally Riddles, University of Toledo

Students
Niklas Ahlborg, Stockholm University
Lisa M. Barthel, Northwestern University
Paul Bloch, Danish Bilharziasis Laboratory
Marcelo R. S. Briones, Escuela Paulista de Medicina
Fidel de la Cruz Hernandez, CINVESTAV-IPN Mexico
Wolfgang H. Hoffmann, University of Tubingen
David A. Horn, Rockefeller University
Jorge A. Hueu-Perez, University of Sao Paulo-Ribeirao Preto
Catharine E. Johnson, Johns Hopkins University School of Medicine

Maxine F. Kellman, VA-MD Regional College of Veterinary Medicine
Johannes CH. Koeller, University of Munich
Fatima SM. Noronha, Universidad Federal de Minas Gerais
Claudia M. Ochatt, INGEBI
Levi L. Omara, University of Calgary
Simon Paul, Rockefeller University
Barbara Rick, Zoologisches Institute der Universität Bonn
Paul M. Selzer, Universität Tubingen
Tim T. Stedman, Virginia Commonwealth University
Jan Tachery, Charles University
James Tang, University of Queensland

Embryology (June 18–July 30)

Directors
Eric H. Davidson, California Institute of Technology
Michael Levine, University of California, San Diego
David McClay, Duke University

Course Faculty
Marianne Bronner-Fraser, University of California, Irvine
Andrew R. Cameron, California Institute of Technology
Scott E. Fraser, California Institute of Technology
Janet Heasman, The Wellcome/CRC Institute
Alexander D. Johnson, University of California, San Francisco
Randall Moon, University of Washington
Noriyuki Satoh, Kyoto University
Paul Sternberg, California Institute of Technology
Christopher Wylie, The Wellcome/CRC Institute

Teaching Assistants
Helen Chamberlin, California Institute of Technology
Akira Hikosaka, Address unknown
Carole LaBonne, Harvard University
Lynn McGrew, Address unknown
Jeffrey Miller, Duke University
Jannette Rusch, Address unknown
Mark Selleck, Address unknown
Colin Sharpe, Cambridge University
John Shi, California Institute of Technology
Robert W. Zeller, California Institute of Technology

Administrator
Jane Rigg, California Institute of Technology

Course Assistant
Aaron Sloboda, Skidmore College

Course Coordinator
Linda Huffer, Marine Biological Laboratory
**Students**
Kristine B. Artinger, University of California, Irvine
Clare VH. Baker, Wellcome/CRC Institute
Elizabeth M. Callery, University of Toronto
Matthew J. Cockerill, Imperial Cancer Research Fund
Robbert J. Créton, University of Utrecht
Lance A. Davidson, University of California, Berkeley
David S. Fashena, University of Oregon
Silvia C. Finnemann, Freie Universität Berlin
Giulio Ghersi, Università di Palermo
Sunita Gupta, SUNY, Stony Brook
Yohko Hatada, University of Oxford
Paul G. Hodor, Carnegie Mellon University
Gabrielle Kardon, Duke University
Evelyn F. Keller, Massachusetts Institute of Technology
Karel F. Liem, Jr., Columbia University
Malcolm P. O. Logan, National Institute for Medical Research
Denise K. Lokhorst, Harvard Medical School
Edwin M. Munro, University of Washington
Cyrus Papan, Universität zu Köln
Kathleen l. Pinson, University of Michigan Medical School
Christopher S. Rose, Harvard University
Hyla C. Sweet, University of Texas, Austin
Winston E. Thompson, University of Medicine & Dentistry of New Jersey
Katherine Woo, California Institute of Technology

**Microbial Diversity (June 13–July 29)**

**Directors**
John Breznak, Michigan State University
Martin Dworkin, University of Minnesota

**Teaching Assistants**
Andreas Bruné, Michigan State University
Jared Leadbetter, Michigan State University
Joerg Overmann, University of British Columbia
Anjelica Seitz, University of Connecticut

**Course Coordinator**
Richard M. Behmlander, University of Minnesota

**Laboratory Assistant**
Jessica L. Breznak

**Students**
Dianne M. Ahmann, Massachusetts Institute of Technology
Carol C. Barford, Harvard University
Alain Brauman, Centre ORSTOM
Tsute Chen, University of Massachusetts
Paul G. Egland, University of Iowa
Eric Frings, University of Bonn
Lee E. Hughes, University of North Texas
Jill A. Kreiling, West Virginia University
Eva S. Lindström, Uppsala University
Magdalena Martínez-Camarena, University of Medicine and Dentistry of New Jersey
Margret I. Moré, Cornell University
Gerard Muyzer, Max-Planck-Institute For Marine Microbiology
Guadalupe V. Nevárez-Moñoz, University of North Texas
Diana E. Northup, University of New Mexico
Clifford A. Ochs, University of Mississippi
Rafael F. Rosenberg, University of Idaho
Maria R. Uria-Nickelsen, University of Connecticut
Minoru Wada, University of Tokyo
Tom Wakeford, King’s College
Ann E. West, University of Colorado, Boulder

**Neural Systems & Behavior (June 13–August 6)**

**Directors**
Ronald L. Calabrese, Emory University
Martha Constantine-Paton, Yale University

**Course Faculty**
Robert Douglas, University of British Columbia
William Kristan, University of California, San Diego
Christine Li, Boston University
Shawn Lockery, University of Oregon
Christine Rose, University of Kaiserslautern
Martin Shankland, Harvard Medical School
James Weimann, Stanford University

**Instructors**
Alexander Borst, Max Planck Institute fur Biologische Kybernetik
Holly Cline, University of Iowa
Patsy Dickinson, Bowdoin College
Cole Gilbert, Cornell University
Richard Levine, University of Arizona
Eduardo Macagno, Columbia University
Robert Malinow, University of Iowa
Pierre Meyrand, University of Bordeaux
Michael Nusbaum, University of Alabama, Birmingham
Ming-Ming Poo, Columbia University
Leslie Stevens, Albert Einstein College of Medicine
Janis Weeks, University of Oregon
Ansga Wenning, Universität Konstanz

**Scholars-in-Residence**
Susan McConnell, Stanford University
Richard G. M. Morris, University of Edinburgh

**Teaching Assistants**
Yang Dan, Columbia University
Douglas Falls, Harvard Medical School
Jurgen Haag, Max-Planck-Institut fur Biologische Kybernetik
Neal Hessler, Address unknown
William Lemon, University of Arizona
Andrea Novicki, University of Oregon
Glen Prusky, Address unknown
David Sandstrom, Address unknown
Anell Shirke, University of Iowa
Thomas White, Harvard Medical School
Laura Wolszon, Columbia University
James Q. Zheng, Columbia University

**Course Coordinator**
Leslie D. Herman, Vanderbilt University

**Course Assistant**
Kyle C. Kennon
Students
Marlene Bartos, Technische Universität München
John M. Beggs, Yale University
Cynthia J. Gill, University of Virginia
Joshua I. Gold, Stanford University School of Medicine
Roberto B. Gonzales, University of Texas, San Antonio
Sally K. Guthrie, University of Michigan
Jon M. Karpilow, University of Wisconsin, Madison
Madelyne Kraft, City College
Rafael Levi, Hebrew University of Jerusalem
Christina R. McKittrick, Rockefeller University
William L. Miller, University of California, Davis
Constance T. Moore, University of Nebraska Medical Center
Farzan Nadim, Boston University
Oystein H. Olsen, University of Glasgow
Craig M. Powell, Baylor College of Medicine
Janine M. Simmons, UCLA School of Medicine
Laura C. Sisola, University of Minnesota
Johanna E. Speksnijder, Hubrecht Laboratory
Adam F. Strassberg, California Technological Institute
Masanori Takahashi, Osaka University Medical School

Neurobiology (June 13-August 14)

Directors
Irwin Levitan, Brandeis University
Leonard Kaczmarek, Yale University School of Medicine

Course Faculty
Hana Asmussen, University of Virginia Medical School
Gary Banker, University of Virginia
Arlene Chiu, Beckman Research Institute of the City of Hope
Judith Drazba, National Institutes of Health/NINDS
Keith Elmslie, Case Western Reserve University
Richard Horn, Jefferson Medical College
Stephen Jones, Case Western Reserve University
Bechare Kachar, National Institutes of Health/NINDS
Richard Kramer, Columbia University
Diane Lipscombe, Brown University
John Marshall, Yale University School of Medicine
Sally Moody, The George Washington University
Angus Nairn, The Rockefeller University
Marina Picciotto, The Pasteur Institute
Thomas Reese, National Institutes of Health
Peter Reinhart, Duke University Medical Center
Talvinder Sihra, University of Dundee
Carolyn Smith, National Institutes of Health
Donald Wigston, Emory University School of Medicine

Instructor
Laura M. Roman, Yale University

Course Assistant
Ethan Treistman, University of North Carolina, Chapel Hill

Students
Cynthia Church, University of Colorado
Allen J. Ebens, Howard Hughes Medical Institute
James E. Galagan, University of Miami
Kathryn J. Greene, Case Western Reserve University
Barbara D. Hettinger-Smith, Oregon State University
Richard J. Kollmar, University of Wisconsin, Madison
C. J. Malanga, West Virginia University School of Medicine
Hidey Misawa, Tokyo Metropolitan Institute for Neuroscience
Heidi S triangle, University of Cincinnati College of Medicine
Ozanne Shichii, Technion-Israel Institute of Technology
Deborah L. Sodickson, Harvard Medical School
Kristina Wietasch, Harvard Medical School

Physiology (June 12-July 24)

Director
Thomas Pollard, Johns Hopkins Medical School

Course Faculty
William Busa, Johns Hopkins University
Laura Davis, Howard Hughes Medical Institute
Michael Mendelsohn, New England Medical Center
Andrew Murray, University of California
Robert Palazzio, University of Kansas
Edward Salmon, University of North Carolina
Roger D. Sloboda, Dartmouth College
Cynthia Staublacker, Purdue University
Ray Stephens, Marine Biological Laboratory and Boston University
Murray Stewart, Medical Research Council
Edwin Taylor, University of Chicago
Ron Vale, University of California, San Francisco
Katherine L. Wilson, Johns Hopkins University School of Medicine

Instructor
Margaret A. Titus, Duke University Medical Center

Teaching Assistants
Linda Ferrans, Johns Hopkins University
Holly Goodson, Stanford University Medical School
Richard Karas, New England Medical Center/Tufts University
Karen King, Florida State University
C. Lawrence Martin, Purdue University
Jeremy Minshall
Sarah O'Neill, Tufts University
Laura Romberg
Robert Skibbens, University of North Carolina
Jackie Vogel, University of Kansas
Yan Zhu

Course Assistants
Daniel Pollard
Katie Pollard, Pomona College
Michael Salmon, Pitzer College

Students
Katherine M. Armstrong, Stanford University School
Mary Lynn Benka, Oregon State University
Sharon A. Beresford, SUNY, Stony Brook
David J. Carroll, University of Connecticut Health Center
Jung-Ren Chen, University of Miami School of Medicine
Teheyen Chu, SUNY, Stony Brook
Signe R. Erickson, Georgia Institute of Technology
Diane E. Frank, University of Wisconsin-Madison
Scott B. Herrick, University of California, Riverside
Raquel M. Holmes, Tufts University
Stanley J. P. Iyadurai, University of Minnesota
Michelle R. Johnson, Howard University
Keith G. Kozminski, Yale University
Dmitri Krylov, Oregon State University
Annette K. Lewis, Washington University School of Medicine
Helen J. McBride, University of Utah Medical School
Joseph H. McCarty, University of California, Santa Barbara
Susan B. McLeskey, Duke University
William A. Mohler, Stanford University
Roland D. Mullins, University of Kentucky
Steven H. Myster, University of Minnesota
Kristine D. Novak, Duke University
Thandi M. Onami, Scripps Institution of Oceanography
Katsushige Sato, Tokyo Medical and Dental University School of Medicine
Sara J. Sawyer, University of California, Los Angeles
Robert H. Scannevin, SUNY, Stony Brook
Hans-Joerg Schaefler, University of California
Suzaynn F. Schick, University of California, San Francisco
Wenyung Shou, Pomona College
Diana M. Toivola, Abo Akademi University
Barbara H. Toomey, Hopkins Marine Station
Alexander J. A. Travis, University of Pennsylvania Medical Center
Jian Wang, University of Washington
Anne K. Warner, Dartmouth College
Clare M. Waterman-Storer, University of Pennsylvania Veterinary School
Cheng Zhu, Georgia Institute of Technology

Students
Daniel Abed-Navandi, University of Vienna
Charles M. Chester, University of New Hampshire
Hyacinth A. Fields, CERMES
Philippe Grosjean, CREC Station Marine
George R. Harbison, Woods Hole Oceanographic Institution
Lisa C. Hendrickson, National Marine Fisheries Service
Kris G. Kosteretz, University of Wisconsin, Milwaukee
Craig Lithgow, Beals Island Regional Shellfish Hatchery
Bill Mebane, Marine Biological Laboratory
Geoffrey F. Sampson, New England Bioassay
Craig A. Weldon, Maryland Department of Natural Resources

Analytical & Quantitative Light Microscopy
(May 15–21)

Directors
Greenfield Studer, Worcester Foundation for Experimental Biology
David E. Wolf, Worcester Foundation for Experimental Biology

Course Faculty, Lecturers, and Staff
William B. Amos, Medical Research Council
Stephen Block, Rowland Institute for Science
Richard Cardullo, University of California, Riverside
Jeff Gelles, Brandeis University
Jeff Guild, Cornell University
Shinya Inoué, Marine Biological Laboratory
Aaron Lewis, Hebrew University—Givat Ram
Leslie Loew, University of Connecticut, Farmington
Christine McKinnon, Worcester Foundation for Experimental Biology
Frederick Miller, Worcester Foundation for Experimental Biology
Edward D. Salmon, University of North Carolina, Chapel Hill
Kenneth R. Spring, National Institutes of Health
Elizabeth Thompson, Worcester Foundation for Experimental Biology
YuLi Wang, Worcester Foundation for Experimental Biology
Watt Webb, Cornell University
Chris Xu, Cornell University

Short Courses
Advances in Mariculture (May 16–29)

Director
Roger Hanlon, Marine Biomedical Institute

Course Manager
Philip Alatalo, Woods Hole Oceanographic Institution

Course Faculty
Bob Anderson, Bigelow Laboratories for Ocean Sciences
Joe Ayers, Northeastern University
Dave Bengston, University of Rhode Island
Patricia Bubikis, Mystic Marinelife Aquarium
Robert Bullis, Marine Biological Laboratory
Tom Chen, University of Maryland
Elizabeth Clarke, University of Miami
Jack Costello, Providence College
Scott Gallager, Woods Hole Oceanographic Institution
Alan Kuzirian, Marine Biological Laboratory
Jim Lester, University of Houston, Clear Lake
Donal Manahan, University of Southern California
Judy McDowell, Woods Hole Oceanographic Institution
Mike Rice, University of Rhode Island
Steve Spotte, University of Connecticut
Steve Ward, U.S. Fish and Wildlife Service

Students
Nelson R. Barton, Harvard University
Robert L. Becker, Jr., Armed Forces Institute of Pathology
David A. Begg, University of Alberta
Tatiana B. Dvornikova, University of California, Irvine
Hong Gao, LSU Medical Center, Shreveport
Jesper L. Gromada, University of Copenhagen
David A. Hessinger, Loma Linda University
Steve G. Hilliard, University of Georgia
Jan H. Hoh, Maurice E. Müller Institute at the Biocenter
Pawel J. Jastrzeboff, University of Maryland, Baltimore
Nanna K. Jorgensen, University of Copenhagen
Ronald J. Korthuis, LSU Medical Center
Kajedan Z. Kraszewski, Yale University School of Medicine
Damien P. Kuffler, University of Puerto Rico
Marjana Martincic, University of Virginia Medical School
Heinrich J. G. Matthies, Harvard University
Guang Mei, Marine Biological Laboratory
Ramkumar K. Moorthy, Scanalytics/CSP
Jeffrey H. Price, University of California, San Diego
Noah Sciaky, National Institutes of Health/NICHD
Randi B. Silver, Cornell University Medical College

Students
Robert M. Simmons, University of London
Robert H. Snyder, Pennsylvania State University
Josef M. Steenbergen, Indiana University School of Medicine
Linda A. Thomas, National Institutes of Health
Shigeo Yoshino, Massachusetts Institute of Technology

Cellular and Molecular Neurobiology and Development of the Leech (August 8–28)

Directors
Pierre Drapeau, McGill University
David Weisblat, University of California, Berkeley

Course Faculty
Shirley Bissen, University of Missouri
Susannah Blackshaw, University of Glasgow
Francisco Fernandez de Miguel, UNA Mexico
Jorgen Johansen, Iowa State University
Kenneth Muller, University of Miami
John Nicholls, University of Basel
Martin Shankland, Harvard Medical School
Lidia Szczupak, University of California, San Diego

Guest Lecturer
Ronald Calabrese, Emory University

Lecturers
W. Otto Fnesen, University of Virginia
William Kristan, Jr., University of California, San Diego
Eduardo Macagno, Columbia University

Students
Blake D. Anson, University of Oregon
Gerald W. M. Botte, Columbia University
Marco Bove, Bioelectronics Laboratory
Ashley E. Bruce, Harvard Medical School
Silvina A. Frattantoni, Instituto de Biologia Celular
Dorit Parnas, The Hebrew University
David R. Reese, Montreal General Hospital
Carolina Salvador, Albert Einstein College of Medicine
Leonard A. Stein, SUNY, Stony Brook
Zolld M. Varga, Biocenter of Basel University
Jamie L. Weiss, Iowa State University
Jane Williams, University of Glasgow

DNA Methodology Workshops (August 2–7 and August 9–14)

Director
Robert Farrell, Exxon-Intron, Inc.

Course Faculty
Greg Hale, Exxon-Intron, Inc.
Greg Leppert, Exxon-Intron, Inc.
Charlie Vaslet, Brown University

Students
Susan E. Aach, U.S. Geological Survey
Pamela L. Arnofsky, Northeastern University

Donald C. Chang, Hong Kong University of Science & Technology
Howard A. Chansky, University of Washington
Doni J. Clark, Beckman Instruments, Inc.
Kimberlee E. Fish, Children's Hospital
George M. Langford, Marine Biological Laboratory
Ming-Chou Lee, Beckman Institute
James K. Min, University of Pennsylvania
Raymond N. Sambrotto, Columbia University
Amy R. Simon, New England Medical Center, Tufts University
Deepak Srivastava, Children's Hospital
Ruci Vergadi, Thunder Bay Regional Cancer Centre
Brian T. Williamson, Eco Science

History of Biology (August 1–11)

Directors
Garland Allen, Washington University
John Beatty, University of Minnesota
Jane Mainschein, Arizona State University

Course Faculty
Mark B. Adams, University of Pennsylvania
Eric Juengst, National Center for Human Genetics Research
Evelyn Fox Keller, Massachusetts Institute of Technology
Barbara Kimmelman, Freelance
Susan Lindee, University of Pennsylvania
Martin Natowicz, Shriver Center
Dorothy Nelkin, New York University
Diane Paul, University of Massachusetts, Boston
Robert Proctor, Pennsylvania State University
Keith Wailoo, University of North Carolina

Visiting Lecturer
Bernardino Fantini, University of Geneva

Students
Lois M. Banta, Haverford College
John S. Ceccatti, Conceptual Foundations of Science
Kathy J. Cooke, California Institute of Technology
Sharon J. Durfy, University of Washington
Kenneth L. Garver, West Pennsylvania Hospital, University of Pittsburgh
Betty L. Garver, Freelance
Christiane Groeben, Stazione Zoologica-Anton Dohrn
Jennifer L. Gunn, University of Pennsylvania
Elizabeth A. Hanson, University of Pennsylvania
Youngran Jo, IIHST, Victoria College
Stephanie H. Kenen, University of California, Berkeley
Eric D. Kupferberg, Massachusetts Institute of Technology
Catharina Landström, University of Göteborg
Maureen A. McCormick, West Virginia University
Sylvia W. McGrath, Stephen F. Austin State University
Ronald J. Overmann, National Science Foundation
Karen A. Rader, Indiana University
Robert G. Resta, Swedish Hospital Medical Center
Clark T. Sawin, Veterans Administration Medical Center
Carmen J. Schiellite, York University
Judith Johns Schloegel, Indiana University
Jessica J. Shubow, Brown University
Susan B. Spath, University of California
Karen-Sue Taussig, Johns Hopkins University
Tracy L. Teslow, University of Chicago
Lipman.
Paterson, Black, Course Director
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Robert
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Andy
Keith
David
Sylvia
Paul
Edward
Ann
Roger
Valene
Irene
John
Steven
Karen
Ross
Phillip
Narayan
Kathleen
Dennis
Donald
Mark-Allen
Coordinator
Clayton,
Rodgers.
J.
Newton,
H.
Haug,
D.
Fingar,
Jessen,
J.
A.
J.
Lipson,
H.
P.

Institute
Informatics
A.
Shellhase,
Sinar,
Wheeler,
Scanlon,
Sherrington,
Nayak.
Ryan,
Cason.
Cogdill.
F.
Warner.
Long,
Okstein,
Informatics
A.

University
B.
University
Hatch,
Hebrew
Ohio
Emory
Lindberg,
Center
Listerhill
Biotechnical
Dalhousie
Harvard
School
of
Health
Science
Canada
Medical
of
Canada
Medical
Research
Council
of
Canada

University
of
Texas
Southwestern
Medical
Center

Methods in Computational Neuroscience
(August 3–31)

Directors
David Kleinfeld, AT&T Bell Laboratories
David W. Tank, AT&T Bell Laboratories

Course Faculty
Joseph Atick, Rockefeller University
Mark F. Bear, Brown University
William Bialek, NEC Research Institute
Rodney James Douglas, MRC
Bard Ermentrout, University of Pittsburgh
William N. Frost, University of Texas Medical School
Apostolos P. Georgopoulos, VA Medical Center
Charles Gray, Salk Institute
John J. Hopfield, California Institute of Technology
Christof Koch, California Institute of Technology
Nancy Kopell, Boston University
Stephen M. Kosslyn, Harvard University
Jeff W. Lichtman, Washington University
John E. Lisman, Brandeis University
Rodolfo R. Linds, New York University Medical Center
Eve E. Marder, Brandeis University
John H. R. Maunsell, University of Rochester
David A. McCormick, Yale University School of Medicine
Bruce L. McNaughton, University of Arizona
Kenneth D. Miller, California Institute of Technology
John Rinzel, National Institutes of Health
David A. Robinson, Johns Hopkins University
Idan Segev, Hebrew University
H. Sebastian Seung, AT&T Bell Laboratories
Arthur Sherman, National Institutes of Health
Karen Sigvardt, University of California, Davis
Haim Sompolinsky, Hebrew University
Michael Stryker, University of California Medical Center
Roger Traub, IBM Corporation

Lab Instructors
David Berkowitz, Yale University Medical School
David Golomb, National Institutes of Health
Michael Hines, Duke University Medical Center
Roderick Jensen, Texas A&M University
Terrance Kovacs, AT&T Bell Laboratories
Rafael Yuste, AT&T Bell Laboratories

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Maria E. Andreu, Universidad de Alicante
Naama Barkai, Hebrew University
Victoria Booth, Northwestern University
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Yang Dan, Columbia University
Chandan Dasgupta, Indian Institute of Science
Didier A. Depireux, University of Montreal
Patricia M. Di Lorenzo, State University of New York, Binghamton
Andrew A. Hill, University of Massachusetts, Amherst
Lindsay B. Hough, Albany Medical College
Michael Hucka, University of Michigan
Adam L. Jacobs, University of California, Berkeley
Robert A. Jacobs, University of Rochester
Shan Jiang, Brown University

Medical Informatics (June 2–8)

Director
Homer R. Warner, University of Utah School of Medicine

Course Faculty
Paul Clayton, Columbia Presbyterian Medical Center
Peter J. Haug, University of Utah School of Medicine
Donald D. A. B. Lindberg, National Library of Medicine
David J. Lipman, Biotechnological Information
David H. Masys, Listerhill Center for Biomedical Communications
Carol Newton, University of California School of Medicine
Rick Rodgers, National Library of Medicine
Robert V. Sidei, Center for Medical Informatics

Lab Coordinator
Sylvia Jessen, University of Utah School of Medicine

Course Assistant
Andy Kogelnik, Emory University School of Medicine

Students
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Kevin J. Black, Washington University School of Medicine
Gerald J. Cason, University of Arkansas for Medical Sciences
David A. Chernin, Harvard School of Dental Medicine
Keith W. Cogdill, University of Illinois, Chicago
Diana J. Cunningham, Medical Sciences Library
Robert H. Dolin, Kaiser-Permanente
Edward M. Dzierzak, Marshall University
Paul A. Farber, Temple University
Ann R. Fingar, Ohio University
Valerie Florance, Welch Medical Library
Roger J. Guard, SIU School of Medicine
Christopher L. Hatch, National Cancer Institute
Deborah A. Jankowski, Michigan State University
Irene P. Kaplan, Albany College of Pharmacy
Ross S. Kazer, United Family Health Center
Karen E. Larsen, Rochester Methodist Hospital
Steven Lipson, Hebrew Home of Greater Washington
Phillip D. Long, SUNY Health Science Center
John P. Mordes, University of Massachusetts Medical School
Narayan H. Nayak, Kaiser Foundation Hospital
Charles J. Okstein, Maricopa Medical Center
Grace I. Paterson, Dalhousie University
Kathleen F. Ryan, Hahnemann Hospital
Thomas S. Scanlon, Naval Hospital
Jeremy C. Shellhase, University of Pittsburgh
Andrew M. Sherrington, Medical Research Council of Canada
Dennis R. Sinar, East Carolina University
Mark-Allen Taylor, Temple University School of Medicine
Donald E. Wheeler, University of Texas Southwestern Medical Center
Microinjection Techniques (May 25-June 21)

Director
Robert B. Silver, Cornell University

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Suzanne Chandler, Cornell University
Karen Kindle, Cornell University
Douglas Kline, Kent State University
Patricia Wadsworth, University of Massachusetts

Course Assistant
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Nancy L. Bossert, Duke University Medical Center
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Teresa M. Dunn, SUNY, Stony Brook
Daniel C. Flynn, West Virginia University
Stephen L. Frawley, Oregon Health Sciences University
Masahiko Fujinaga, Anesthesiology Service
Ursula E. Glick, Weizmann Institute of Science
Ming-Ta Hsu, Institute of Biomedical Sciences
Bruce E. Magun, Oregon Health Science University
Merle Mizell, Tulane University
Nancy S. Rafferty, Marine Biological Laboratory
Barnard B. Rees, Stanford University
Mary Ann Sens, Medical University of South Carolina
David I. Soybel, Brigham & Women's Hospital
Jan M. Spitsbergen, Cornell University
Fedora Sutton, South Dakota State University
Richard Yanagihara, National Institutes of Health

Workshop on Molecular Evolution (August 8–20)

Director
Mitchell L. Sogin, Marine Biological Laboratory

Course Faculty
Patrick Argos, European Molecular Biology Laboratory
Dan Davison, University of Houston
Michael Donoghue, Harvard University
Joseph Felsenstein, University of Washington
Walter Fitch, University of California, Irvine
Jotun Hein, Institute for Biological Sciences
Martin Kreitman, University of Chicago
Laura Landweber, Harvard University
David Maddison, University of Arizona
Roger Milkman, University of Iowa
Gary Olsen, University of Illinois
James Ostell, National Library of Medicine
Margaret Riley, Yale University
Monica Riley, Marine Biological Laboratory
James Shapiro, University of Chicago
Terry Speed, University of California, Berkeley
David Swafford, Smithsonian Institution
Bruce Walsh, University of Arizona
Liz Zimmer, Smithsonian Institution

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Steve Thompson, Washington State University, Pullman

Course Consultant
Brendan Reilly, Software Editing Corporation

Course Assistant
Scott Price

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J. William O. Ballard, University of Chicago
Jonas L. O. Blomberg, University of Lund
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Eugenia S. Boulyagina, University of Minnesota
Jan A. Boussy, Loyola University of Chicago
Steven M. Carr, Memorial University of Newfoundland
Lisa A. Castlebury, University of Illinois, Urbana-Champaign
Edward S. Chen, University of Houston
Michael I. Cherry, South Africa Museum
Soowon Cho, University of Maryland
Cynthia S. Cohen, Hopkins Marine Station
Joseph A. Cook, University of Alaska Museum
Catherine L. Craig, Yale University
Elisa Cupolillo, Harvard Medical School
Niels Daugbjerg, University of Copenhagen
Lidia L. Demchyshyn, Clark Institute of Psychiatry
Sergio F. dosReis, University of California, Berkeley
Nicole Dubilier, Harvard University
Richard W. Eberle, National Science Foundation
Suzanne Edmands, University of California, Santa Cruz
Karol S. Elias, USD/ARS
Andrea Gargas, Smithsonian Institution
Clarke E. Garry, University of Wisconsin, River Falls
Brandon S. Gaut, North Carolina State University
Jennifer M. Gleason, Yale University
Terry A. J. Hedderson, Louisiana State University
Victoria C. Hollowell, Columbia College
Patrick J. Keeling, Dalhousie University
Dilip S. Kittur, Johns Hopkins Medical Institutions
Marcia C. Lara, University of California, Berkeley
Dolena R. Ledec, Ohio State University
Tim G. Littlejohn, University of Montreal
Jose V. Lopez, NCI-FCRDC
Wojciech Makalowski, University of Montreal
Dmitri A. Maslov, University of California, Los Angeles
Monica Medina, RSMAS
Diogo Meyer, Universidade de Sao Paulo
Alison E. Murray, Tiburon Center for Environmental Studies
Michele K. Nishiguchi, University of California, Santa Cruz
Dimitri M. Odorico, James Cook University of North Queensland
Cristian Orrego, San Francisco State University
Christopher L. Parkinson, University of Louisville
Christian W. Pitulle, University of Houston
David D. Pollock, Stanford University
Thomas O. Powers, University of Nebraska, Lincoln
Kathleen M. Pryer, Duke University
Jonathan P. Rast, All Children’s Hospital
Steve A. Rehner, ARS, USDA, SBML
Sandra L. Romano, Kewalo Marine Lab/PBRC
Elaine Rumbak, The Natural History Museum
Jack W. Sites, Brigham Young University
Yan Song, Johns Hopkins University
Diane R. Stothard, Ohio State University
Ying Tan, Yale University
George Tzertzinis, Harvard University
Mary A. Voytek, University of California
Elizabeth R. Waters, University of Arizona
James L. Wee, Loyola University
Jennifer J. Wernigreen, Yale University
Dawn M. Wesson, Centers for Disease Control

Optical Microscopy (October 20-28)

Director
Colin S. Izzard, State University of New York, Albany

Course Faculty
Steven M. Block, Rowland Institute for Science
Gary R. Bright, Case Western Reserve University
Fredric S. Fay, University of Massachusetts Medical School
Kevin Fogarty, University of Massachusetts Medical School
Robert Hard, State University of New York, Buffalo
Shinya Inoue, Marine Biological Laboratory
Ernst Keller, Carl Zeiss, Inc.
Greta M. Lee, University of North Carolina
John M. Murray, University of Pennsylvania
Kenneth R. Spring, National Institutes of Health

Central Microscopy Coordinator
Louis Kerr, Marine Biological Laboratory

Course Associates
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Elizabeth Welhoffer, State University of New York, Albany
Joseph A. DePasquale, New York State Department of Health

Lab Manager
Linda Huffer, Marine Biological Laboratory

Students
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Mikhail L. Borin, University of Maryland, Baltimore
Mary B. Boyle, University of Texas Medical Branch
David K. Brauer, EERC/ARS/USDA
Michael Cammer, Albert Einstein College of Medicine
Mark A. Chamberlin, Pioneer Hi-Bred International
Nancy Connelly, Schering Plough Research Institute
Eugene V. Golanov, Cornell Medical College

Shelley Halpain, University of Virginia Health Sciences Center
James J. Hartman, University of California, San Francisco
Ajaykumar R. Jain, Omega Optical Inc.
Tatiana A. Kassessinoff, National Institutes of Health
Martha R. Kirby, National Institutes of Health
Larry G. Moss, New England Medical Center
Roland H. O. Nitschke, National Institutes of Health
Pamela M. Pasciak, Bristol Myers Squibb Company
Giovanni Pauletti, UCLA School of Medicine
Douglas J. Pon, Merck Frost Centre for Therapeutic Research
Anne M. Sydor, Harvard University
Keith Taylor, State University of New York, Buffalo
Peter W. Tsao, Dupont-Merck Pharmaceutical Company
William P. Van De Merwe, Uniformed Services University of the Health Sciences
Joanne H. Whallion, Michigan State University
Lloyd M. Williams, Hunter College

Pathogenesis of Neuroimmunologic Diseases
(August 15-27)

Directors
J. Murdoch Ritchie, Yale University School of Medicine
Byron Waksman, New York and Harvard Universities

Course Faculty
Vahi E. Amassian, State University of New York, Brooklyn
Stanley H. Appel, Baylor College of Medicine
Barry G. W. Arras, University of Chicago
Ety Benveniste, University of Alabama, Birmingham
Joel A. Black, VA Medical Center and Yale University
Ivan Bodis-Wollner, University of Nebraska Medical Center
Celia F. Brosnan, Albert Einstein College of Medicine
Ian Nicholas Crespe, Yale School of Medicine
Judah A. Denburg, McMaster Medical Center
Susan D. Denburg, McMaster Medical School
Daniel B. Drackman, Johns Hopkins School of Medicine
Andrew G. Engel, Mayo Clinic
David C. Felten, University of Rochester School of Medicine
Diane E. Griffin, Johns Hopkins School of Medicine
David A. Hafer, Brigham & Women’s Hospital of Harvard Medical School
Stephen L. Hauser, University of California School of Medicine
William F. Hickey, Dartmouth-Hitchcock Medical Center
Gilla Kaplan, The Rockefeller University
Jeffrey Koecs, VA Medical Center and Yale University
Norman Latov, College of Physicians and Surgeons of Columbia University
Cathy G. McAllister, University of Pittsburgh
Robert B. Nussenblatt, National Eye Institute, NIH
Jerome B. Posner, Memorial Sloan-Kettering Cancer Center
Donald L. Price, Johns Hopkins University
Richard W. Price, University of Minnesota Health Center
James W. Prichard, Yale University School of Medicine
Anthony T. Reder, University of Chicago
Jack Rosenbluth, New York University Medical Center
Benjamin F. Roy, Albany Medical Center
Clifford B. Saper, Beth Israel Hospital
Randolph B. Schiller, Strong Memorial Hospital
Bhagwan T. Shahani, University of Illinois, Chicago
Moon L. Shin, University of Maryland, Baltimore
Raymond A. Sobel, Stanford University Medical Center
Michele Solimena, Yale University Medical School
J. Wayne Streilein, University of Miami School of Medicine
Howard L. Weiner, Brigham & Women’s Hospital of Harvard Medical School
Jerry S. Wolinsky, University of Texas Health Science Center at Houston
Scott Zamvil, Brigham & Women’s Hospital
Susan Zolla-Pazner, New York University Medical Center

Students
Donald W. Ayres, Sioux City Neurology Neurosurgery
Jeffrey P. Blount, University of Minnesota
Gerhard A. Brandl, Max-Planck-Institut für Psychiatrie
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Alison J. Gatrill, University of Cambridge
Maira Gironi, Hospital Sau Raffaela
Norbert Goebels, Max-Planck-Institute für Psychiatrie

Daniel Gonzalez-Dunia, Institut Pasteur
Maria Isabel S. Leite, Hospital Geral Santo Antonio
Margarita I. Manescu, Laboratorio de Neuroquimica
Clyde E. Markowitz, Columbia Presbyterian Medical Center
Deborah S. Rames, Texas A&M University
Adrienne Riethmüller, University of Tübingen
Pradeep K. Sahota, University of Missouri Hospitals & Clinics
Boris Sakic, McMaster University
Virginia J. Sanders, University of California, Los Angeles
Lisa M. Schrott, University of Colorado Health Sciences Center
Gary G. Schwartz, University of Pittsburgh School of Medicine
Pradip K. Toshniwal, Private practice
Raymond D. Voltz, Max-Planck-Institut für Psychiatrie
Emmanuelle L. Waubant, University of California, San Francisco
Mauro Zaffaroni, Centro Studi Sclerosi Multipla
Andrew W. Zimmerman, East Tennessee Children’s Hospital
Einat Zisman, The Weizmann Institute of Science
Summer Research

Principal Investigators

Adamo, Shelley A., Cornell University
Alkon, Daniel L., National Institutes of Health
Armstrong, Clay, University of Pennsylvania
Armstrong, Peter B., University of California, Davis
Arnold, John M., University of Hawaii, Manoa
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Barlow, Jr., Robert B., Syracuse University Institute for Sensory Research
Bearer, Elaine, Brown University
Beauge, Thomas A., Lehman College, CUNY
Borst, David, Illinois State University
Boyter, Barbara C., Union College
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Bodznick, David, Wesleyan University
Borgese, Thomas A., Lehman College, CUNY
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Charlton, Milton, University of Toronto, Canada
Chang, Robert, National Institutes of Health
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Clear, William D., Hunter College, CUNY
Cook, Heather, University of Toronto, Canada
Cook, Sherwin J., The University of Connecticut Health Center
Crutcher, Keith A., University of Cincinnati
Cuenca, Charlene, Hampshire College
Dawson, Timothy C., University of Kansas
Demarest, Jeffrey R., University of Arkansas
DeWeer, Paul, Pennsylvania State University School of Medicine
DePolo, Reinaldo, IVIC, Venezuela
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Goold, Robert, New York State Inst. Basic Research in Develop. Disabilities
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Kaneshiro, Edwin, University of Cincinnati
Kaplan, Ilene M., Union College
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Kooi, Samuel S., Population Council
Kremer, James N., University of Southern California
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Boston University Marine Program

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Atema, Jelle, Professor of Biology, Director
Dionne, Vincent, Professor of Biology
Humes, Arthur G., Professor of Biology Emeritus
Tamm, Sidney L., Professor of Biology
Valiela, Ivan, Professor of Biology
Voigt, Rainer, Research Associate Professor

Staff

Hahn, Dorothy, Senior Administrative Secretary
Kean, Kristen, Program Assistant
Schillizzi, Cynthia, Program Manager

Visiting Faculty and Investigators

D'Avanzo, Charlene, Hampshire College
DiLorenzo, Patricia, SUNY, Binghamton
Dubin, Adrienne, Visiting Research Scientist
Gunderson, John, Tennessee Technological University
Kaufman, Les, New England Aquarium
Kommer, James, USC
Levine, Joe, Boston Science Communications
Lobel, Phillip, Associate Scientist, WHOI
Mulsow, Sanders, Bedford Institute of Oceanography
Rietsma, Carol, SUNY, New Paltz
Rosenbaum, Joel, Yale University
Sardet, Christian, Villefranche Zoological Station
Simmons, William, Visiting Lecturer, Boston University
Trouslard, Robert, Institut National Agronomique, Paris
Ward, Nathalie, Center for Coastal Studies

Research Staff

Basil, Jennifer, Postdoctoral Investigator
Bierzychudek, Ann, Visiting Research Assistant
Breithaupt, Thomas, Postdoctoral Investigator
Collins, Glynnis, Visiting Research Assistant
Eisthen, Heather, Postdoctoral Investigator
Foreman, Kenneth, Postdoctoral Investigator
Gerardo, Hortense, Postdoctoral Investigator
Grasso, Frank, Postdoctoral Investigator
McConnell, Joanne, Postdoctoral Investigator
Pinedo, Susana, Visiting Investigator
Soucy, Lori, Research Assistant
Sceley, Brad, Visiting Research Assistant
Tamm, Signhild, Senior Research Associate

Graduate Students

Anderson, John
Barak, Jeri
Batjakas, Ioannis
Bloom, David
Bryden, Cynthia
Burns, Maura
Bushman, Paul
Dale, Jonathan
Eisenegger, Felice
Farley, Lynda
Fricke, Julie
Gomez, George
Han, Tina
Hersh, Douglas
Joy, Jennifer
Karavanich, Christy
La Duca, Nathalia
LaMontagne, Michael
Landmesser, Shari
LaRocca, Beth
Larsen, David
Lowe, Brian
Loynes, Janet
Ma, Diana
Manglapus, Glen
McClelland, James
Millard, Jennifer
Mosiaich, Simon
O’Brien, Todd
Phipps, Derek
Portnoy, John
Rubenstein, Belinda
Schlezinger, David
Tamse, Armando
Thomassen, Lori
Usup, Gires
White, David

Summer Undergraduate Interns
Bayha, Keith
Bello, Roberto
Duran, Robert
Evans, Chloë
Faulstich, Emily
Flowers, Alissa
Gribble, Kristin
Hauxwell, Jennifer
Judge, Bryan
Kaplan, Liat
Lin, Winchee
Lowrance, Courtney
Richards, Timothy
Terry, Joseph
Tolley, Krystal
Williams, Samantha

Undergraduate Students, Fall 1993
Agudelo, Sylvia
Arnell, Harry
Barth, Colleen
Berg, Heather
Brown, Julie
Burns, Jennifer
Carnes, Denise
Carroll, Mark
Colby, William
Darras, Todd
Davis, Travis
Director, Syril
Dunlavey, Eric
Economakis, Alistair
Elison, Rob
Fowler, Brandi
Geer, Tom
Goldboro
Grady Erinn
Gregoire, Judith
Griffin, Sean
Gunderson, Troy
Highestad, Richard
Holeva, Tom
Howard, Corinne
Hunt, Ritchie
Iocco, Linda
Jehn, Christopher
Kapoor, Tina
Kim, Hea Jin
Kitson, Mark
Koonce, Lea
Kooy, Liz
Landers, Thomas
Leonard, Ann
Lowrance, Courtney
Machelor, Eva
McCullough, Michelle
Moni, Jill
Muehe, Melanie
Patel, Druhvesh
Pothier, Bryan
Raines, Jason
Sheehan, Daniel
Sugarman, Casey
Townsend, Jessica
Tsutsui, Neil
Vincent, Lara
Voparil, Ian
Washburn, Erika
Wennermer, Heidi
York, Randall

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 food signals and pheromones used in courtship and dominance, neurophysiology of receptor cells, behavior guided or modulated by chemical signals, computational models of odor plumes and neural filters, and underwater robotics.

Laboratory of Vincent Dionne
Odors are powerful stimuli. They can focus the attention, elicit behaviors (or misbehaviors), and even resurrect forgotten memories. These actions are directed by the central nervous system, but they depend upon the initial transduction of chemical signals by olfactory receptor neurons in the nasal passages. The processes that underlie odor transduction are far more diverse than once thought, involving hundreds of receptor molecules, several different second messengers, and various types of membrane ion channels. Using electrophysiological and molecular approaches, our research examines
how these cellular components produce odor detection, identification, and discrimination. The studies are conducted on aquatic salamanders using amino acids and other soluble chemical stimuli which they perceive as odors.

**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 poecilostomatoid and siphonostomatoid copepods from deep-sea hydrothermal vents and cold seeps.

**Laboratory of Sidney Tamm**

Marine model systems offer unique experimental advantages for solving basic problems in cell biology and physiology. In particular, comb jellies (ctenophores), important members of the marine zooplankton, possess the largest cilia and smooth muscles in nature, a simple nervous system, and interesting feeding and locomotory behaviors. We use ctenophores to investigate the mechanism of ciliary movement and ciliary coordination, the neural and ionic control of cilia (particularly stimulus-evoked intracellular calcium transients and distribution of ciliary calcium channels), geotaxis and mechanosensory transduction by motile cilia statocyst, and structure and function of smooth muscle, double-modality sensory receptors and the cytoskeleton, and evolution of neurotransmitters, and a new type of reversible cell-cell adhesion that resembles the mouth of *Beroe*, a voracious predator of other ctenophores. In addition, we use a termite protozoan with a continuously rotating head to investigate novel types of cell motility, the fluid nature of cell membranes, and remarkable prokaryotic-eukaryotic motility symbioses.

**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 understand and model the coupling of land use and consequences to receiving waters, to study the processes involved, and to assess consequences and opportunities for coastal management. 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.

**Calcium Patterning Program**

This laboratory investigates the role played by calcium ions in a wide range of fundamental cell processes; in developing eggs, in differentiated tissues, and in cell extracts. This is possible through the use of aequorin, a bioluminescent protein complex. Aequorin can either be microinjected into cells or transgenically expressed without disturbing function or development. The pattern of luminescence that is emitted by an aequorin-loaded cell reveals changing patterns and levels of free calcium within the cell (or its progeny). Photons are collected and correlated with dynamic cellular events by an imaging system developed in our laboratory. This technique has some substantial advantages over other methods of imaging intracellular calcium and as a result supports an extensive collaborative research effort. The laboratory is currently studying cytokinesis in frog and fish eggs; cell cycle control in sea urchin and surf clam eggs; polarity expression in frog eggs; tip growth in pollen tubes; injury and degeneration in neurons; mechanisms of fertilization in sea urchins; differentiation in slime molds; and calcium release in cell extracts from frog eggs. The laboratory is supported by the NSF to both pursue biological questions and to develop the aequorin-based imaging technique.

**Staff**

Miller, Andrew L., Assistant Scientist
Karplus, Eric, Design Engineer
Jaffe, Lionel F., Senior Scientist
Fischer, Gabriele, Graduate Student

**Visiting Investigators**

Abraham, Vivek, C., Franklin and Marshal College
Browne, Carole, Wake Forest University
Creton, Robert, University of Utrecht, The Netherlands
Cubitt, Andrew, C., UCSD
Denege, Jim, University of California, Irvine
Eckberg, Bill, Howard University
Febvre, Jean, Villefranche-sur-mer, France
Febvre-Chevalier, Colette, Villefranche-sur-mer, France
Fechter, Larry, University of Oklahoma
Fishman, Harvey M., University of Texas Medical Branch.
Fluck, Richard, A., Franklin and Marshall College
Galione, Antony, Oxford University, UK
Kinney, Greg, A., Northwestern University Medical School
Pierson, Elizabeth, University of Siena, Italy
Rossi, David, J., Northwestern University Medical School
Sardet, Christian, Villefranche-sur-Mer, France
Short, Lisa, Howard University
Speksnijder, Johanna, E., Hubrecht Laboratoty, The Netherlands
Tobias, Martha, Columbia University
Todora, Michael, University of Texas Medical Branch
Wilding, Martin, University College London, UK

**The Ecosystems Center**

The Center was established in 1975 to promote research and education in ecosystems ecology. Twelve senior scientific staff and 43 research assistants and support staff study the terrestrial and aquatic ecology of a wide variety of ecosystems ranging from Brazil (carbon cycling and trace gas emissions from tropical forests and pastures) to the Alaskan Arctic (long-term studies of the response of tundra, lake, and stream biota to change) to the Harvard Forest (long-term studies of the effects of disturbance in forest ecosystems) to Massachusetts Bay (rates of denitrification). 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 in acid rain, ground water contamination, and possible carbon dioxide-caused climate change.
Laboratory of Aquatic Biomedicine

This laboratory investigates leukemias of soft shell clams. Monoclonal antibodies developed by this laboratory and techniques in molecular biology are used to investigate the differences between normal and leukemic cells and their ontogeny. The impact of pollutants on leukemogenesis is currently being studied with an emphasis on regional superfund sites.

Staff
Reinisch, Carol L., Investigator, MBL and Chairperson Department of Comparative Medicine, Tufts University School of Veterinary Medicine
Rosenfield, Jonah, Laboratory Assistant

Laboratory of Cell Biochemistry

This laboratory uses cell and molecular biological methods to study the regulation of gene expression in marine fish. Current emphasis is on gene products involved in hepatic heme biosynthesis and utilization. These processes are affected by hormonal, nutritional, and pharmacological agents as well as xenobiotics, and carcinogens. In addition, free heme is a feedback regulator of its biosynthesis. The principal site at which these agents act to control the rate of heme production is 5-aminolevulinate synthase (ALS), the first enzyme of the pathway. However, it has not been possible to define the mechanisms that lead to enzyme induction or repression. Marine fish are attractive for that purpose because they have similar regulatory features for heme biosynthesis but lack some of the hepatic processes that have confounded studies in mammals. Evidence to date strongly indicates that expression of fish ALS is regulated at a posttranscriptional stage. Cloned cDNAs have been isolated for both the housekeeping and erythroid forms of ALS, and the sequence of the e-type cDNA encodes an iron regulatory element that controls the rate of mRNA translation. It is expected that these studies of the fish ALS system will give new insights into the control of heme biosynthesis in vertebrate organisms, including man. Primary cultures of fish hepatocytes provide the experimental material for this work, and an additional interest of this laboratory is in establishing these cell cultures as a nonmammalian model for biomedical research.

Staff
Cornell, Neal W., Senior Scientist
Bruning, Grace, Research Assistant
Pianka, Karen, Research Assistant
Rosenfield, Jonah, Laboratory Assistant

Laboratory of Shinya Inoué

Study of the molecular mechanism and control of mitosis, cell division, cell motility, and cell morphogenesis, with emphasis on biophysical studies made directly on single living cells, especially developing eggs in marine invertebrates. Development of biophysical instrumentation and methodology, such as polarization optical and video microscopy and digital image processing techniques, and exploration of their underlying theory are an integral part of the laboratory's effort.

Staff
Fox, T. O., Harvard Medical School
Inoué, Shinya, Distinguished Scientist
Knudson, Robert, Instrument Development Engineer
Leighton, Jane, Executive Assistant
Mei, Guang, Research Associate
Stemmer, Andreas, Visiting Assistant Scientist
Woodward, Bertha M., Laboratory Manager

Visiting Investigators
Bajer, Andrew, University of Oregon
Burgos, Marío, Universidad Nacional de Cayo-Conicet
Febvre, Colette, Station Zoologique, Villefranche-sur-Mer, France
Febvre, Jean, Station Zoologique, Villefranche-sur-Mer, France
Sardet, Christian, Station Zoologique, Villefranche-sur-Mer, France

Laboratory of Alan M. Kuzirian

Research in this laboratory explores the functional morphology and ultrastructure of various organ systems present in opisthobranch mollusks. The program includes mariculture of the nudibranch, *Hermissenda crassicornis*, with emphasis on developing reliable culture methods for rearing and maintaining this animal as a research resource. Studies include optimization of adult and larval nutrition, control of facultative pathogens and disease, development of morphological criteria for staging larvae and juveniles, and metamorphic induction. Morphologic studies stress the ontogeny of neural and sensory structures, and neurochemicals associated with the photic and vestibular systems which have been used as models systems in learning and memory studies.

Concurrent with these studies is the development of a new technique to obtain and reconstruct serial block face images (SBFI) of epoxy-embedded or cryopreserved tissues sectioned or freeze-fractured/freeze-etched inside an SEM by an *in situ* miniature ultramicrotome.

Collaborative research includes histochemical investigations on stromium's role in initiating calcification in molluscan embryos (shell and statoliths), as well as immunocytochemical labelling of cell-surface and secretory product antigens using monoclonal and polyclonal antibodies on *Hermissenda* sensory and neurosecretory neurons *in situ*, and in cell culture.

Additional collaborative research includes DNA fingerprinting of *Hermissenda* using RAPD-PCR techniques in preparation for genetic strain development, as well as chemical ecological studies of the roles natural products play in larval metamorphosis and predator-prey recognition and defense mechanisms. Systematic and taxonomic studies of nudibranch mollusks are also of interest.

Staff
Kuzirian, Alan M., Associate Scientist
Tamse, Catherine T., Research Assistant

Visiting Investigators
Avila, Conxita, Postdoctoral Associate, Centre d’Estudis Avançats de Blanes, Blanes, Spain
Chikarmane, Hemant, Assistant Scientist, MBL

Laboratory of Rudolf Oldenbourg

We study physical optics relevant to microscopic imaging and develop advanced instrumentation in light microscopy for the study of structural dynamics in cells and cell components. The current focus of this new laboratory is the development of a novel polarized light microscope that combines polarization optics with new electro-optical components, video, and digital image processing for a fast analysis of specimen anisotropies over the entire viewing field at the highest resolution of the light microscope. Biological mechanisms to be explored with this new instrument range from the emergence and functional role of filamentous structures in living cells, to the generation of ordered domains in liquid crystals and polymer solutions. The laboratory currently investigates the distribution and dynamics of spindle microtubules directly in living cells (fertilized sea urchin eggs and newt lung cells).

Staff
Oldenbourg, Rudolf, Associate Scientist
Mei, Guang, Research Associate
Knudson, Robert, Instrumentation Engineer

Laboratory of Nancy Rafferty

This laboratory investigates the role of the lens cytoskeleton and its associated proteins in the maintenance of lens shape, in lens accommodation and development of cataract when the cytoskeleton is disrupted. Studies include an assessment of the role of cytosolic free calcium on homeostasis of the lens cytoskeleton, the localization of various cytoskeletal proteins in lens epithelium, and determination of the relative amounts of soluble actin to filamentous actin in lens cells during aging. Most of these studies employ an elasmobranch fish and rabbit model using primary cultures of lens epithelium and electron and immunofluorescence microscopy.

Staff
Rafferty, Nancy S., Scientist, Northwestern University
Rafferty, Keen A., Research Associate

Laboratory of Monica Riley

Research in this laboratory focuses on the molecular evolution and gene expression in the bacterium *Escherichia coli*. In a collaborative effort, a database containing information on the intermediary metabolism and biochemical pathways of *E. coli* is being developed. When completed, this database is expected to contain information on each metabolic reaction, the enzyme, the reactants, products, cofactors, activators, inhibitors, kinetics, equilibrium constants, binding constants, etc.

Related research is on the evolution of the *E. coli* DNA and organization of the genes in the chromosome. Comparative nucleotide and amino acid sequence data provide information on the evolutionary relationships of *E. coli* genes to other genes in the *E. coli* genome and to homologous genes in related bacteria.

Staff
Riley, Monica, Senior Scientist
Pellegrino-Toole, Alida, Research Assistant

Laboratory of Sensory Physiology

Since 1973, The Laboratory has conducted research on various aspects of vision. Current investigations focus on structural, functional, and evolutionary questions concerning visual pigments. The chemical basis of color vision is investigated principally with light-microscope-based absorption spectroscopy. In collaboration with other laboratories, we study gene sequences and evolutionary aspects
of visual pigments aimed at revealing the molecular mechanisms responsible for spectral tuning.

Staff
Harosi, Ferenc I., Associate Scientist, MBL, and Boston University School of Medicine

Visiting Investigators
Hawryshyn, Craig W., University of Victoria, Canada
Schmitt, Ellen A., and Dowling, John E., Harvard University
Kelly, Mary E., and Barlow, Robert B. Jr., Syracuse University
Solessio, Eduardo, and Engbretson, Gustaf, Syracuse University

Laboratory of Osamu Shimomura

Various biochemical mechanisms involved in the bioluminescence of different luminous organisms are investigated. Based on the results obtained in this laboratory, various improved forms of bioluminescent probes are designed and produced for the measurements of intracellular free calcium and superoxide anion.

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

Laboratory of Raquel Sussman

We investigate the molecular mechanism of DNA damage-inducible functions in *E. coli*. Present studies deal with novel genes that affect radiation-induced mutagenesis and analysis of RecA functions. In addition, we have been developing techniques for genomic mapping and collaborating in the isolation of neuronal genes in squid.

Staff
Sussman, Raquel, Associate Scientist

Visiting Investigators
Wangh, Larry, Brandeis University
Berberian, Graciela, Instituto de Investigacion Medica, Cordoba, Argentina

Molecular Evolution Program

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

Staff
Sogin, Mitchell L., Director and Senior Scientist
Gunderson, John, Research Associate
Hinkle, Greg, Postdoctoral Fellow
Lepe, Detlev, Postdoctoral Fellow
Morrison, Hillary, Postdoctoral Fellow
Silberman, Jeffrey, Postdoctoral Fellow

National Vibrating Probe Facility

The past year has seen a pronounced shift in interest from the Facility’s tool of long standing, the vibrating probe, to the recently developed ion-selective probe. Twenty-four off-campus investigators have visited the Facility this past year, and nearly all of them have exploited the unique qualities of this newly invented electrophysiological technique. Studies have ranged from measuring calcium flux across growing pollen tubes, through developmental currents and pancreatic beta cell transmembrane ion flux, to monitoring free-radical attacks on cultured neurons. The forthcoming year promises further developments of magnesium-selective probes and the first animal experiments with the ground-breaking BioKelvin probe.

Staff
Jaffe, Lionel F., Director Emeritus
Smith, Peter J. S., Director
McLaughlin, Jane A., Research Assistant
Sanger, Richard H., Senior Electronics Technician
Shipley, Alan M., Research Associate

Sabbatical Visitors
Kunkel, Joseph, University of Massachusetts, Amherst
Ryan, James, Hobart and William Smith College

Visiting Investigators
Allen, Nina, Wake Forest
Baikie, Iain, Aberdeen, U.K.
Fishman, Harvey, Texas A & M University
Hill, Susan, Michigan State
Kaczmarek, Leonard, Yale University
Kox, Ronny, Yale University
Leech, Colin, Harvard University and Massachusetts General Hospital
Marcus, Daniel, Omaha, NB
Nägel, Wolfram, Munich, Germany
Persson, Elisabeth, Siena, Italy
Shepherd, Dave, Southampton, U.K.
Tytell, Mike, Wake Forest
Wright, Jonathan, McMaster University
Friday Evening Lectures

Hans Moravec, Robotics Institute, Carnegie Mellon University, June 25, “The Age of Mind”


Bruce M. Alberts, President, National Academy of Sciences, July 9, “The Centrosome: Organizer of the Cytoplasm in the Early Drosophila Embryo”

Sien Grillner, Karolinska Institutet, Forbes Lectures July 15 and 16, “Cellular Mechanisms Used to Control Timing in a Pattern-Generating Network” and “How Does the Lamprey Nervous System

Make the Lamprey Swim? Integration Between the Networks Controlling Locomotion and Equilibrium”

Norman R. Pace, Indiana University, July 23, “Seeing the Unseen: Opening the Door Onto the Natural Microbial World”

Shirley Tilghman, Princeton University, July 30, “Parental Imprinting in the Mouse”

J. Michael Bishop, University of California, San Francisco, August 6, “Wayward Cells: The Genesis of Human Cancer”

Gene E. Likens, Mary Flagler Carey Arboretum, August 13, “Human-Accelerated Environmental Change: An Ecologist’s View”

Arnold J. Levine, Princeton University, August 20, “Genes Involved in Inherited and Spontaneous Human Cancer: The p-53-mdm-2 Suppressor Gene”

Fellowships and Scholarships

In 1993, the MBL awarded research fellowships amounting to $131,076 to 22 scientists from around the world who investigated topics ranging from creating computer models of neural networks, to real-time visualization of DNA replication in mammalian nuclei, to studying kinesin and motor proteins in mitosis and organelle transport. The MBL’s educational and training program attracted more than 400 students who participated in the most extensive course schedule yet offered at the Laboratory. Scholarship awards totalling $104,098 helped to underwrite this important program.

Donors who made a gift to the Fellowship and Scholarship Program during 1993 are noted below in bold letters. The 1993 recipients of the awards are listed below in italics along with their institutions.

MBL Research Fellowships Awarded in 1993:

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Fatima K. Gyueva, Russian Academy of Sciences

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Mrs. Betsy G. Bang
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Andrew Olson, University of Pennsylvania
Angel Manuel Pastor-Loro, University of Sevilla
Haohua Quian, Harvard University
Sylvia Rykebusch, California Institute of Technology
Ferdinand Sven Vilim, Columbia University
Philip Wahl, Royal Danish School of Pharmacy
Samuel Sheng-Hung Wang, Hopkins Marine Station, Stanford University

LAKIAN RESEARCH FELLOWSHIPS
Lakian Foundation
Timothy Bestor, Harvard Medical School
Jonathan M. Scholey, University of California, Davis

LAKIAN POST-DOCTORAL SCHOLAR
Lakian Foundation
Joseph Vallino, Scripps Institution of Oceanography

JAMES S. MCDONNELL FOUNDATION FELLOWSHIP
Vladimir I. Makarenko, Russian Academy of Sciences, Institute of Mathemactic Problems of Biology

JAMES A. AND FAITH MILLER FELLOWSHIP FUND
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Nikon, Inc.
Vladimir I. Gelfand, University of California, San Francisco

EVELYN AND MELVIN SPIEGEL FELLOWSHIP
Drs. Joseph and Jean Sanger, Sprague Foundation, Inc.

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Jonathan Wright, McMaster University

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Hollis Cline, University of Iowa
Jeffery R. Demarest, University of Arkansas
Sighunde Gramoll, Emory University
Fatima K. Gyoeva, Russian Academy of Sciences
Sergoi A. Kaznetsov, Moscow State University
Elisabeth Pieron, University of Siena
Takashi Shimizu, National Institute of Bioscience & Human Technology
Nancy Standard, University of Cambridge
Jonathan Wright, McMaster University

HORACE W. STUNKARD FELLOWSHIP FUND
the Estate of Horace W. Stunkard
Hollis Cline, University of Iowa

MBL Research Fellowships and Scholarships Awarded in 1993 (Combined funds):

BERNARD DAVIS FELLOWSHIPS AND SCHOLARSHIPS
Dr. Porter W. Anderson, Jr.
Alain Brauman, Centre ORSTOM
Gabriele Fischer, University of Konstanz
Eric Frings, University of Bonn
Lee Hughes, University of North Texas
Shahid Khan, Albert Einstein College of Medicine

Jill Kreiling, West Virginia University
Eva Lindstrøm, Uppsala University
Magdalena Martinez-Caname, University of Medicine and Dentistry of New Jersey
Margret Moré, Cornell University
Clifford Ochs, University of Mississippi

FRANK R. LILLIE FELLOWSHIP AND SCHOLARSHIP FUND
Malcolm Logan, National Institute for Medical Research
Steven Myster, University of Minnesota
Clifford Ochs, University of Mississippi
Fumio Oosawa, Jichi Institute of Technology
Rafael Rosenzweig, University of Idaho

WILLIAM TOWNSEND PORTER FELLOWSHIP AND SCHOLARSHIP FUND
Sharon Beresford, SUNY, Stony Brook
Timothy C. Dawson, University of Kansas
Roberto Gonzales, University of Texas, San Antonio
Raquell Holmes, Tafts University
Michelle Johnson, Howard University
Maxine Kellman, VA-MD Regional College of Veterinary Medicine
Winston Thompson, University of Medicine and Dentistry of New Jersey

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Bernhard E. Fliucher, National Institutes of Health
Anotny Galione, Oxford University
Ihiyoshi Miyakawa, Yamagata University School of Medicine
Farzan Nadim, Boston University
Erch A Nigg, Swiss Institute for Experimental Cancer Research

MBL Scholars Awarded in 1993:

AMERICAN SOCIETY FOR CELL BIOLOGY SCHOLARSHIPS
American Society for Cell Biology
Sharon Beresford, SUNY, Stony Brook
Roberto Gonzales, University of Texas, San Antonio
Raquell Holmes, Tafts University
Michelle Johnson, Howard University
Maxine Kellman, VA-MD Regional College of Veterinary Medicine
Thandie Onani, Scripps Institution of Oceanography
Winston Thompson, University of Medicine and Dentistry of New Jersey

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Madelyne Kraft, City College

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Joshua Gold, Stanford University School of Medicine

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Christina McKittrick, Rockefeller University

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Giulio Ghersi, Università di Palermo

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Tim Stedman, Virginia Commonwealth University
Adam Strassberg, California Technological Institute

LUCRETIA CROCKER SCHOLARSHIP FUND
Farzan Nadim, Boston University
Oystein Olsen, University of Glasgow

WILLIAM F. AND IRENE C. DILLER SCHOLARSHIP FUND
Joshua Gold, Stanford University School of Medicine
Steven Myster, University of Minnesota

CASWELL GRAVE SCHOLARSHIP FUND
Jorge Huete-Perez, University of Sao Paulo-Ribeirao Preto
Malcolm Logan, National Institute for Medical Research

ALINE D. GROSS SCHOLARSHIP FUND
Mr. and Mrs. Alfred Weisberg
Gabrielle Kardon, Duke University

WILLIAM RANDOLPH HEARST EDUCATIONAL ENDOWMENT SCHOLARSHIPS
Clare Baker, Wellcome/CRC Institute
Elizabeth Collery, University of Toronto
Gabrielle Kardon, Duke University

HOWARD HUGHES MEDICAL INSTITUTE EDUCATIONAL PROGRAM SCHOLARSHIP FUNDING
Sharon Beresford, SUNY, Stony Brook
Roberto Gonzales, University of Texas, San Antonio
Raquell Holmes, Tufts University
Michelle Johnson, Howard University
Dmitri Krylov, Oregon State University
Farzan Nadim, Boston University
Thandi Onami, Scripps Institution of Oceanography
Janine Simmons, University of California, Los Angeles, School of Medicine
Johanna Speksnijder, Hubrecht Laboratory
Winston Thompson, University of Medicine and Dentistry of New Jersey
Anne Warner, Dartmouth College
Clare Waterman-Storer, University of Pennsylvania Veterinary School
Cheng Zhu, Georgia Institute of Technology

MERKEL H. JACOBS SCHOLARSHIP FUND
Marlene Bartos, Technische Universität München

ARTHUR KLOREIN SCHOLARSHIP FUND
Marlene Bartos, Technische Universität München
Heidi Scrable, University of Cincinnati College of Medicine
Oriam Shirihai, Technion-Israel Institute of Technology
Deborah Sadickson, Harvard Medical School
Kristina Wietasch, Harvard Medical School

JACQUES LOEB FOUNDERS' SCHOLARSHIP FUND
Christina McKitrick, Rockefeller University

JOHN D. AND CATHERINE T. MACARTHUR FOUNDATION SCHOLARSHIPS
Niklas Ahlberg, Stockholm University
Lisa Barthel, Northwestern University
Paul Bloch, Danish Bilharziasis Laboratory
Marcelo Briones, Escola Paulista de Medicine
Fidel de la Cruz Hernandez, CINVESTAV-IPN Mexico
Wolfgang Hoffmann, University of Tubingen
David Horn, Rockefeller University
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Mrs. Julia S. Rankin
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Mrs. Lola E. Robertson
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Ms. Virginia F. Ross
Dr. Don Rowe
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Dr. R. Walter Schlesinger
Mr. Peter J. Schwamb
Mrs. Elyce M. Scott
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Mrs. Harriet S. Shapiro
Dr. John R. Shaver
Dr. Charlotte Shemin
Dr. James Sidde
Mr. Bertram R. Silver
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Mrs. Virginia B. Sinnott
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Mrs. Perle Sonnenblick
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Mrs. M. Evelyn Steele
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Ms. Gail Stetten
Mrs. Jane Lazarow Stetten
Dr. Dorothy A. Stracher
Mr. Robert Stump
Mr. Albert H. Swain
Mrs. Marjorie P. Swope
Mr. George H. Taber
Mr. James K. Taylor
Mr. Emil D. Tietje, Jr.
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Miss Natalie Trousof
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Mrs. Clare M. Wilber
Dr. T. Hastings Wilson
Dr. William M. Winn
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Mrs. Elizabeth S. Yntema
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Mr. Kenneth H. Zimble

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Harriet Bernheimer
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Jennie Brown
Kitty Brown
Elizabeth Buck
Mary Buckley
Shirley Chaet
Vera Clark
Peggy Clowes

Jewel Cobb
Villa Crowell
Janet Daniels
Betsy Daugnault
Fran Eastman
Alma Ebert
Margaret German
Violet Gifford
Becky Glazebrook
Rose Grant
Eddie Grosch
Barbara Grossman
Jean Halvorson
Pat Hancock
Helen Hodosh
Polly Hyde
Sally Karush
Bucky Ketchum
Barbara Little
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Winne Mackey
Miriam Mauzerall
Mary Mavor
Florence Mixer
Lorraine Mizell
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Bertha Person
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Peg Talcet
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Natalie Trousof
Mary Ulbrich
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Alice Veeder
Dorothy Villie
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MBL Summer Tour Guides
Betsy Bang
John Buck
Sears Crowell
Teru Hayashi
Julie Rankin
Lola Robertson
Mary Ulbrich
Donald Zinn
Margery Zinn
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.

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

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

(Approved on March 20, 1975).

Articles of Amendment

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

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

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

"No Officer, Trustee or Corporate Member of the corporation shall be personally liable for the payment or satisfaction of any obligation or liabilities incurred as a result of, or otherwise in connection with, any commitments, agreements, activities or affairs of the corporation.

"Except as otherwise specifically provided by the Bylaws of the corporation, meetings of the Corporate Members of the corporation may be held anywhere in the United States.

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

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

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

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

Paul Guzzi
Secretary of the Commonwealth)
Bylaws

(Revised August 7, 1992 and December 10, 1992)

ARTICLE I—THE CORPORATION

A. Name and Purpose. 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 marine history.

B. Nondiscrimination. The Corporation shall not discriminate on the basis of age, religion, color, race, national or ethnic origin, sex or sexual preference in its policies on employment and administration or in its educational and other programs.

ARTICLE II—MEMBERSHIP

A. Members. The Members of the Corporation (“Members”) shall consist of persons elected by the Board of Trustees (the “Board”), upon such terms and conditions and in accordance with such procedures, not inconsistent with law or these Bylaws, as may be determined by the Board. At any regular or special meeting of the Board, the Board may elect new Members. Members shall have no voting or other rights with respect to the Corporation or its activities except as specified in these Bylaws, and any Member may vote at any meeting of the Members in person only and not by proxy. 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 retired from his or her home institution may, upon written request to the Corporation, be designated a Life Member. Life Members shall not have the right to vote and shall not be assessed for dues.

B. Meetings. The annual meeting of the Members shall be held on the Friday following the first Tuesday in August of each year, at the Laboratory of the Corporation in Woods Hole, Massachusetts, at 9:30 a.m. The Chairperson of the Board shall preside at meetings of the Corporation. If no annual meeting is held in accordance with the foregoing provision, a special meeting may be held in lieu thereof with the same effect as the annual meeting, and in such case all references in these Bylaws, except in this Article II.B., to the annual meeting of the Members shall be deemed to refer to such special meeting. Members shall transact business as may properly come before the meeting. Special meetings of the Members may be called by the Chairperson or the Trustees, and shall be called by the Clerk, or in the case of the death, absence, incapacity or refusal by the Clerk, by any other officer, upon written application of Members representing at least ten percent of the smallest quorum of Members required for a vote upon any matter at the annual meeting of the Members, to be held at such time and place as may be designated.

C. Quorum. One hundred (100) 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 at a meeting attended by a quorum shall constitute action on behalf of the Members.

D. Notice of Meetings. Notice of any annual meeting or special meeting of Members, if necessary, 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.

E. Waiver of Notice. Whenever notice of a meeting is required to be given a Member, under any provision of the Articles or Organization or Bylaws of the Corporation, a written waiver thereof, executed before or after the Meeting by such Member, or his or her duly authorized attorney, shall be deemed equivalent to such notice.

F. Adjournments. Any meeting of the Members may be adjourned to any other time and place by the vote of a majority of those Members present at the meeting, whether or not such Members constitute a quorum, or by any officer entitled to preside at or to act as Clerk of such meeting, if a Member is present or represented. It shall not be necessary to notify any Members of any adjournment unless no Member is present or represented at the meeting which is adjourned, in which case, notice of the adjournment shall be given in accordance with Article II.D. Any business which could have been transacted at any meeting of the Members as originally called may be transacted at an adjournment thereof.

ARTICLE III—ASSOCIATES OF THE CORPORATION

Associates of the Corporation. 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. The Associates of the Marine Biological Laboratory shall have no voting rights.

ARTICLE IV—BOARD OF TRUSTEES

A. Powers. The Board of Trustees shall have the control and management of the affairs of the Corporation. The Trustees shall elect a Chairperson of the Board who shall serve until his or her successor is elected and qualified. They shall annually elect a President of the Corporation. They shall annually elect a Vice Chairperson of the Board who shall be Vice Chairperson of the meetings of the Corporation. They shall annually elect a Treasurer. They shall annually elect a Clerk, who shall be a resident of Massachusetts. They shall elect Trustees-at-Large as specified in this Article IV. 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 shall choose such other officers and agents as they shall think best. They may fix the compensation of all 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 shall have the power to choose an Executive Committee from their own number as provided in Article V, and to delegate to such Committee such of their own powers as they may deem expedient in addition to those powers conferred by Article V. 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. Composition and Election

(1) The Board shall include 24 Trustees elected by the Board as provided below:

(a) At least six Trustees ("Corporate Trustees") shall be Members who are scientists, and the other Trustees ("Trustees-at-Large") shall be individuals who need not be Members or otherwise affiliated with the Corporation.

(b) The 24 elected Trustees shall be divided into four classes of six Trustees each, with one class to be elected each year to serve for a term of four years, and with each such class to include at least one Corporate Trustee. Such classes of Trustees shall be designated by the year of expiration of their respective terms.

(2) The Board shall also include the Chief Executive Officer, Treasurer and the Chairperson of the Science Council, who shall be ex officio voting members of the Board.

(3) Although Members or Trustees may recommend individuals for nomination as Trustees, nominations for Trustee elections shall be made by the Nominating Committee in its sole discretion. The Board may also elect Trustees who have not been nominated by the Nominating Committee.

C. Eligibility. A Corporate Trustee or a Trustee-at-Large who has been elected to an initial four-year term or remaining portion thereof, of which he/she has served at least two years, shall be eligible for re-election to a second four-year term, but shall be ineligible for re-election to any subsequent term until one year has elapsed after he/she has last served as a Trustee.

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

E. Vacancies. Any vacancy in the Board may be filled by vote of a majority of the remaining Trustees present at a meeting of Trustees at which a quorum is present. Any vacancy in the Board resulting from the resignation or removal of a Corporate Trustee shall be filled by a Member who is a scientist.

F. Meetings. Meetings of the Board shall be held from time to time, not less frequently than twice annually, as determined by the Board. Special meetings of Trustees may be called by the Chairperson, or by any seven Trustees, to be held at such time and place as may be designated. The Chairperson of the Board, when present, shall preside over all meetings of the Trustees. Written notice shall be sent to a Trustee’s usual or last known place of residence at least two weeks before the meeting. Notice of a meeting need not be given to any Trustee if a written waiver of notice executed by such Trustee before or after the meeting is filed with the records of the meeting, or if such Trustee shall attend the meeting without protesting prior thereto or at its commencement the lack of notice given to him or her.

G. Quorum and Action by Trustees. A majority of all Trustees then in office shall constitute a quorum. Any meeting of Trustees may be adjourned by vote of a majority of Trustees present, whether or not a quorum is present, and the meeting may be held as adjourned without further notice. When a quorum is present at
any meeting of the Trustees, a majority of the Trustees present and voting (excluding abstentions) shall decide any question, including the election of officers, unless otherwise required by law, the Articles of Organization or these Bylaws.

H. Transfers of Interests in Land. There shall be no transfer of title nor long-term lease of real property held by the Corporation without prior approval of not less than two-thirds of the Trustees. Such real property transactions shall be finally acted upon at a meeting of the Board only if presented and discussed at a prior meeting of the Board. Either meeting may be a special meeting and no less than four weeks shall elapse between the two meetings. Any property acquired by the Corporation after December 1, 1989 may be sold, any mortgage or pledge of real property (regardless of when acquired) to secure borrowings by the Corporation may be granted, and any transfer of title or interest in real property pursuant to the foreclosure or endorsement of any such mortgage or pledge of real property may be effected by any holder of a mortgage or pledge of real property of the Corporation, with the prior approval of not less than two-thirds of the Trustees (other than any Trustee or Trustees with a direct or indirect financial interest in the transaction being considered for approval) who are present at a regular or special meeting of the Board at which there is a quorum.

ARTICLE V—COMMITTEES

A. Executive Committee. There shall be an Executive Committee of the Board of Trustees which shall consist of not more than eleven (11) Trustees, including ex officio Trustees, elected by the Board.

The Chairperson of the Board shall act as Chairperson of the Executive Committee and the Vice Chairperson as Vice Chairperson. The Executive Committee shall meet at such times and places and upon such notice and appoint such subcommittees as the Committee shall determine.

The Executive Committee shall have and may exercise all the powers of the Board during the intervals between meetings of the Board 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.

The Executive Committee shall keep appropriate minutes of its meetings, which shall be reported to the Board. Any actions taken by the Executive Committee shall also be reported to the Board.

B. Nominating Committee. There shall be a Nominating Committee which shall consist of not fewer than four nor more than six Trustees appointed by the Board in a manner which shall reflect the balance between Corporate Trustees and Trustees-at-Large on the Board. The Nominating Committee shall nominate persons for election as Corporate Trustees and Trustees-at-Large, Chairperson of the Board, Vice Chairperson of the Board, President, Treasurer, Clerk, Director of the Laboratory and such other officers, if any, as needed, in accordance with the requirements of these Bylaws. The Nominating Committee shall also be responsible for overseeing the training of new Trustees. The Chairperson of the Board of Trustees shall appoint the Chairperson of the Nominating Committee. The Chairperson of the Science Council shall be an ex officio voting member of the Nominating Committee.

C. Science Council. There shall be a Science Council (the "Council") which shall consist of Members of the Corporation elected to the Council by vote of the Members of the Corporation, and which shall advise the Board with respect to matters concerning the Corporation's mission, its scientific and instructional endeavors, and the appointment and promotions of persons or committees with responsibility for matters requiring scientific expertise. Unless otherwise approved by a majority of the members of the Council, the Chairperson of the Council shall be elected annually by the Council. The chief executive officer of the Corporation shall be an ex officio voting member of the Council.

D. Board of Overseers. There shall be a Board of Overseers which shall consist of not fewer than five nor more than eight scientists who have expertise concerning matters with which the Corporation is involved. Members of the Board of Overseers may or may not be Members of the Corporation and may be appointed by the Board of Trustees on the basis of recommendations submitted from scientists and scientific organizations or societies. The Board of Overseers shall be available to review and offer recommendations to the officers, Trustees and Science Council regarding scientific activities conducted or proposed by the Corporation and shall meet from time to time, not less frequently than annually, as determined by the Board of Trustees.

E. Board Committees Generally. The Trustees may elect or appoint one or more committees (including, but not limited to, an Investment Committee, Development Committee, an Audit Committee, a Facilities and Capital Equipment Committee and a Long-Range Planning Committee) and may delegate to any such committee or committees any or all of their powers, except those which by law, the Articles of Organization or these Bylaws the Trustees are prohibited from delegating; provided that any committee to which the powers of the Trustees are delegated shall consist solely of Trustees. The members of any such committee shall have such tenure and duties as the Trustees shall determine. The Investment Committee, which shall oversee the management of the Corporation's endowed funds and marketable securities shall include as ex officio members, the Chairperson of the Board, the Treasurer and the Chairperson of the Audit Committee, 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.

F. Actions Without a Meeting. Any action required or permitted to be taken at any meeting of the Executive Committee or any other committee elected by the Trustees may be taken without a meeting if all members of such committees consent to the action in writing and such written consents are filed with the records of meetings. Members of the Executive Committee or any other committee elected by the Trustees may also participate in any meeting by means of a telephone conference call, or otherwise take action in such a manner as may, from time to time, be permitted by law.

G. Manual of Procedures. The Board of Trustees, on the recommendation of the Executive Committee, shall establish guidelines and modifications thereof to be recorded in a Manual of Procedures. Guidelines shall establish procedures for: (1) Nomination and election of members of the Corporation, Board of Trustees and Executive Committee; (2) Election of Officers; (3) Formation and Function of Standing Committees.

ARTICLE VI—OFFICERS

A. Enumeration. The officers of the Corporation shall consist of a President, a Treasurer and a Clerk, and such other officers having the powers of President, Treasurer and Clerk as the Board may determine, and a Director of the Laboratory. The Corporation may have such other officers and assistant officers as the Board may determine, including (without limitation) a Chairperson of the Board, Vice Chairperson and one or more Vice Presidents, Assistant Treasurers or Assistant Clerks. Any two or more offices may be held by the same person. The Chairperson and Vice Chairperson of the Board shall be elected by and from the Trustees, but other officers of the Corporation need not be Trustees or Members. If required by the Trustees, any officer shall give the Corporation a bond for the faithful performance of his or her duties in such amount and with such surety or sureties as shall be satisfactory to the Trustees.

B. Tenure. Except as otherwise provided by law, the Articles of Organization or by these Bylaws, the President, Treasurer, and all other officers shall hold office until the first meeting of the Board following the annual meeting of Members and thereafter, until his or her successor is chosen and qualified.

C. Resignation. Any officer may resign by delivering his or her written resignation to the Corporation at its principal office or to the President or Clerk and such resignation shall be effective upon receipt unless it is specified to be effective at some other time or upon the happening of some other event.

D. Removal. The Board may remove any officer with or without cause by a vote of a majority of the entire number of Trustees then in office, at a meeting of the Board called for that purpose and for which notice of the purpose thereof has been given, provided that an officer may be removed for cause only after having an opportunity to be heard by the Board at a meeting of the Board at which a quorum is personally present and voting.

E. Vacancy. A vacancy in any office may be filled for the unexpired balance of the term by vote of a majority of the Trustees present at any meeting of Trustees at which a quorum is present or by written consent of all of the Trustees, if less than a quorum of Trustees shall remain in office.

F. Chairperson. The Chairperson shall have such powers and duties as may be determined by the Board and, unless otherwise determined by the Board, shall serve in that capacity for a term coterminous with his or her term as Trustee.

G. Vice Chairperson. The Vice Chairperson shall perform the duties and exercise the powers of the Chairperson in the absence or disability of the Chairperson, and shall perform such other duties and possess such other powers as may be determined by the Board. Unless otherwise determined by the Board, the Vice Chairperson shall serve for a one-year term.

H. Director. The Director shall be the chief operating officer and, unless otherwise voted by the Trustees, the chief executive officer of the Corporation. The Director shall, subject to the direction of the Trustees, have general supervision of the Laboratory and control of the business of the Corporation. At the annual meeting, the
Director shall submit a report of the operations of the Corporation for such year and a statement of its affairs, and shall, from time to time, report to the Board all matters within his or her knowledge which the interests of the Corporation may require to be brought to its notice.

1. **Deputy Director.** The Deputy Director, if any, or if there shall be more than one, the Deputy Directors in the order determined by the Trustees, shall, in the absence or disability of the Director, perform the duties and exercise the powers of the Director and shall perform such other duties and shall have such other powers as the Trustees may, from time to time, prescribe.

**J. President.** The President shall have the powers and duties as may be vested in him or her by the Board.

**K. Treasurer and Assistant Treasurer.** The Treasurer shall, subject to the direction of the Trustees, have general charge of the financial affairs of the Corporation, including but not limited to financial planning, and shall cause to be kept accurate books of account. The Treasurer shall prepare a yearly report on the financial status of the Corporation to be delivered at the annual meeting. The Treasurer shall also prepare or oversee all filings required by the Commonwealth of Massachusetts, the Internal Revenue Service, or other Federal and State Agencies. The account of the Treasurer shall be audited annually by a certified public accountant.

The Assistant Treasurer, if any, or if there shall be more than one, the Assistant Treasurers in the order determined by the Trustees, shall, in the absence or disability of the Treasurer, perform the duties and exercise the powers of the Treasurer, shall perform such other duties and shall have such other powers as the Trustees may, from time to time, prescribe.

**L. Clerk and Assistant Clerk.** The Clerk shall be a resident of the Commonwealth of Massachusetts, unless the Corporation has designated a resident agent in the manner provided by law. The minutes or records of all meetings of the Trustees and Members shall be kept by the Clerk who shall record, upon the record books of the Corporation, minutes of the proceedings at such meetings. He or she shall have custody of the record books of the Corporation and shall have such other powers and shall perform such other duties as the Trustees may, from time to time, prescribe.

The Assistant Clerk, if any, or if there shall be more than one, the Assistant Clerks in the order determined by the Trustees, shall, in the absence or disability of the Clerk, perform the duties and exercise the powers of the Clerk and shall perform such other duties and shall have such other powers as the Trustees may, from time to time, prescribe.

**M. Other Powers and Duties.** Each officer shall have in addition to the duties and powers specifically set forth in these Bylaws, such duties and powers as are customarily incident to his or her office, and such duties and powers as the Trustees may, from time to time, designate.

**ARTICLE VII—AMENDMENTS**

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 meeting of Members next following the making, amending or repealing by the Trustees of any Bylaw, notice thereof stating the substance of such change shall be given to all 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.

**ARTICLE VIII—INDEMNITY**

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 comprised unless such matter 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 the Executive Committee, or (ii) a majority of the 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 VIII, or under any applicable law.

As used in the Article VIII, 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 VIII of all persons who are determined by the Corporation or otherwise to be or to have been "fiduciaries" of any employee benefits plan of the Corporation which may exist, from time to time, this Article VIII 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 tax 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 VIII 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 VIII shall be offset to the extent of any other source of indemnification of any otherwise applicable insurance coverage under a policy maintained by the Corporation or any other person. Nothing contained in the 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 or of the Executive Committee or otherwise.

**ARTICLE IX—DISSOLUTION**

The consent of every Trustee shall be necessary to effect a 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 Trustees then in office in accordance with the laws of the Commonwealth of Massachusetts.

**ARTICLE X—MISCELLANEOUS PROVISIONS**

A. **Fiscal Year** Except as otherwise determined by the Trustees, the fiscal year of the Corporation shall end on December 31st of each year.

B. **Seal.** Unless otherwise determined by the Trustees, the Corporation may have and use such form as the Trustees may determine, from time to time.

C. **Execution of Instruments.** All checks, deeds, leases, transfers, contracts, bonds, notes and other obligations authorized to be executed by an officer of the Corporation in its behalf shall be signed by the Director or the Treasurer except as the Trustees may generally or in particular cases otherwise determine. A certificate by the Clerk or an Assistant Clerk, or a temporary Clerk, as to any action taken by the Members, Board of Trustees or any officer or representative of the Corporation shall as to all persons who rely thereon in good faith be conclusive evidence of such action.

D. **Corporate Records.** The original, or attested copies, of the Articles of Orga-
nization, Bylaws and records of all meetings of the Members shall be kept in Massachusetts at the principal office of the Corporation, or at an office of the Corporation's Clerk or resident agent. Said copies and records need not all be kept in the same office. They shall be available at all reasonable times for inspection by any Member for any proper purpose, but not to secure a list of Members for a purpose other than in the interest of the applicant, as a Member, relative to the affairs of the Corporation.

E. Articles of Organization. All references in these Bylaws to the Articles of Organization shall be deemed to refer to the Articles of Organization of the Corporation, as amended and in effect, from time to time.

F. Transactions with Interested Parties. In the absence of fraud, no contract or other transaction between this Corporation and any other corporation or any firm, association, partnership or person shall be affected or invalidated by the fact that any Trustee or officer of this Corporation is pecuniarily or otherwise interested in or is a director, member or officer of such other corporation or of such firm, association or partnership or in a party to or is pecuniarily or otherwise interested in such contract or other transaction or is in any way connected with any person or person, firm, association, partnership, or corporation pecuniarily or otherwise interested therein; provided that the fact that he or she individually or as a director, member or officer of such corporation, firm, association or partnership in such a party or is so interested shall be disclosed to or shall have been known by the Board of Trustees or a majority of such Members thereof as shall be present at a meeting of the Board of Trustees at which action upon any such contract or transaction shall be taken; any Trustee may be counted in determining the existence of a quorum and may vote at any meeting of the Board of Trustees for the purpose of authorizing any such contract or transaction with like force and effect as if he/she were not so interested, or were not a director, member or officer of such other corporation, firm, association or partnership, provided that any vote with respect to such contract or transaction must be adopted by a majority of the Trustees then in office who have no interest in such contract or transaction.