THE

BIOLOGICAL BULLETIN

PUBLISHED BY THE MARINE BIOLOGICAL LABORATORY

THE MARINE BIOLOGICAL LABORATORY

FIFTIETH REPORT, FOR THE YEAR 1947—SIXTIETH YEAR

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I. TRUSTEES

EX OFFICIO

*FRANK R. LILLIE, President Emeritus of the Corporation, The University of Chicago

LAWRASON RIGGS, President of the Corporation, 120 Broadway, New York City

E. NEWTON HARVEY, Vice President of the Corporation, Princeton University

CHARLES PACKARD, Director, Marine Biological Laboratory

OTTO C. GLASER, Clerk of the Corporation, Amherst College

DONALD M. BRODIE, Treasurer, 522 Fifth Avenue, New York City

EMERITI

E. G. CONKLIN, Princeton University

W. C. CURTIS, University of Missouri

B. M. DUGGAR, University of Wisconsin

W. E. GARREY, Vanderbilt University

ROSS G. HARRISON, Yale University

F. P. KNOWLTON, Syracuse University

* Deceased.
R. S. Lillie, The University of Chicago
A. P. Mathews, University of Cincinnati
W. J. V. Osterhout, Rockefeller Institute
G. H. Parker, Harvard University

TO SERVE UNTIL 1951

W. C. Allee, The University of Chicago
C. L. Claff, Randolph, Mass.
G. H. A. Clowes, Lilly Research Laboratory
K. S. Cole, The University of Chicago
P. S. Galtsoff, U. S. Fish and Wild Life Service
L. V. Heilbrunn, University of Pennsylvania
J. H. Northrop, Rockefeller Institute
A. H. Sturtevant, California Institute of Technology

TO SERVE UNTIL 1950

Dugald E. S. Brown, Bermuda Biological Station
D. P. Costello, University of North Carolina
M. H. Jacobs, University of Pennsylvania
D. A. Marsland, New York University
A. K. Parpart, Princeton University
Franz Schrader, Columbia University
H. B. Steinbach, University of Minnesota
B. H. Willier, Johns Hopkins University

TO SERVE UNTIL 1949

V. R. Amerson, University of Maryland School of Medicine
P. B. Armstrong, Syracuse University
L. G. Barth, Columbia University
S. C. Brooks, University of California
F. A. Brown, Jr., Northwestern University
H. B. Goodrich, Wesleyan University
A. C. Redfield, Harvard University
C. C. Speidel, University of Virginia

TO SERVE UNTIL 1948

Eric G. Ball, Harvard University Medical School
R. Chambers, Washington Square College, New York University
Eugene F. DuBois, Cornell University Medical College
Columbus Iselin, Woods Hole Oceanographic Institution
C. W. Metz, University of Pennsylvania
H. H. Plough, Amherst College
E. W. Sinnott, Yale University
W. R. Taylor, University of Michigan

Executive Committee of the Board of Trustees

Lawrason Riggs, Ex officio, Chairman
E. N. Harvey, Ex officio
D. M. Brodie, Ex officio
Charles Packard, Ex officio
P. B. Armstrong, to serve until 1948
P. S. Galtsoff, to serve until 1948
TRUSTEES

M. H. Jacobs, to serve until 1949
A. K. Parpart, to serve until 1949
C. C. Speidel, to serve until 1950
H. B. Steinbach, to serve until 1950

The Library Committee

W. R. Taylor, Chairman
K. S. Cole
E. N. Harvey
M. E. Krahl
A. C. Redfield

The Apparatus Committee

E. P. Little, Chairman
C. L. Claff
G. Failla
A. K. Parpart

The Supply Department Committee

P. B. Armstrong, Chairman
P. S. Galtsoff
R. T. Kempton
D. A. Marsland
Charles Packard

The Evening Lecture Committee

Charles Packard, Chairman
L. G. Barth
E. M. Landis

The Instruction Committee

H. B. Goodrich, Chairman
W. C. Allee
S. C. Brooks
Viktor Hamburger
Charles Packard, Ex officio

The Buildings and Grounds Committee

C. Lloyd Claff, Chairman
D. P. Costello
Roberts Rugh
A. C. Scott
Mrs. C. C. Speidel
II. ACT OF INCORPORATION

No. 3170

COMMONWEALTH OF MASSACHUSETTS

Be It Known, That whereas Alpheus Hyatt, William Sanford Stevens, William T. Sedgwick, Edward G. Gardiner, Susan Minns, Charles Sedgwick Minot, Samuel Wells, William G. Farlow, Anna D. Phillips, and B. H. Van Vleck have associated themselves with the intention of forming a Corporation under the name of the Marine Biological Laboratory, for the purpose of establishing and maintaining a laboratory or station for scientific study and investigation, and a school for instruction in biology and natural history, and have complied with the provisions of the statutes of this Commonwealth in such case made and provided, as appears from the certificate of the President, Treasurer, and Trustees of said Corporation, duly approved by the Commissioner of Corporations, and recorded in this office;

Now, therefore, I, HENRY B. PIERCE, Secretary of the Commonwealth of Massachusetts, do hereby certify that said A. Hyatt, W. S. Stevens, W. T. Sedgwick, E. G. Gardiner, S. Minns, C. S. Minot, S. Wells, W. G. Farlow, A. D. Phillips, and B. H. Van Vleck, their associates and successors, are legally organized and established as, and are hereby made, an existing Corporation, under the name of the MARINE BIOLOGICAL LABORATORY, with the powers, rights, and privileges, and subject to the limitations, duties, and restrictions, which by law appertain thereto.

Witness my official signature hereunto subscribed, and the seal of the Commonwealth of Massachusetts hereunto affixed, this twentieth day of March, in the year of our Lord One Thousand Eight Hundred and Eighty-Eight.

HENRY B. PIERCE,
Secretary of the Commonwealth.

III. BY-LAWS OF THE CORPORATION OF THE MARINE BIOLOGICAL LABORATORY

I. The members of the Corporation shall consist of persons elected by the Board of Trustees.

II. The officers of the Corporation shall consist of a President, Vice President, Director, Treasurer, and Clerk.

III. The Annual Meeting of the members shall be held on the second Tuesday in August in each year, at the Laboratory in Woods Hole, Massachusetts, at 11:30 A.M., and at such meeting the members shall choose by ballot a Treasurer and a Clerk to serve one year, and eight Trustees to serve four years, and shall transact such other business as may properly come before the meeting. Special meetings of the members may be called by the Trustees to be held at such time and place as may be designated.

IV. Twenty-five members shall constitute a quorum at any meeting.

V. Any member in good standing may vote at any meeting, either in person or by proxy duly executed.

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

VII. The Annual Meeting of the Trustees shall be held on the second Tuesday in August in each year, at the Laboratory in Woods Hole, Mass., at 10 A.M. Special
meetings of the Trustees shall be called by the President, or by any seven Trustees, to be held at such time and place as may be designated, and the Secretary shall give notice thereof by written or printed notice, mailed to each Trustee at his address as shown on the records of the Corporation, at least one (1) week before the meeting. At such special meeting only matters stated in the notice shall be considered. Seven Trustees of those eligible to vote shall constitute a quorum for the transaction of business at any meeting.

VIII. There shall be three groups of Trustees:
(A) Thirty-two Trustees chosen by the Corporation, divided into four classes, each to serve four years; and in addition there shall be two groups of Trustees as follows:
(B) Trustees ex officio, who shall be the President and Vice President of the Corporation, the Director of the Laboratory, the Associate Director, the Treasurer, and the Clerk;
(C) Trustees Emeriti, who shall be elected from present or former Trustees by the Corporation. Any regular Trustee who has attained the age of seventy years shall continue to serve as Trustee until the next Annual Meeting of the Corporation, whereupon his office as regular Trustee shall become vacant and be filled by election by the Corporation and he shall become eligible for election as Trustee Emeritus for life. The Trustees ex officio and Emeriti shall have all the rights of the Trustees except that Trustees Emeriti shall not have the right to vote.

The Trustees and officers shall hold their respective offices until their successors are chosen and have qualified in their stead.

IX. The Trustees shall have the control and management of the affairs of the Corporation; they shall elect a President of the Corporation who shall also be Chairman of the Board of Trustees; and shall also elect a Vice President of the Corporation who shall also be the Vice Chairman of the Board of Trustees; they shall appoint a Director of the Laboratory; and they may choose such other officers and agents as they may think best; they may fix the compensation and define the duties of all the officers and agents; and may remove them, or any of them, except those chosen by the members, at any time; they may fill vacancies occurring in any manner in their own number or in any of the offices. The Board of Trustees shall have the power to choose an Executive Committee from their own number, and to delegate to such Committee such of their own powers as they may deem expedient. They shall from time to time elect members to the Corporation upon such terms and conditions as they may think best.

X. Any person interested in the Laboratory may be elected by the Trustees to a group to be known as Associates of the Marine Biological Laboratory.

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

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

XIII. These By-laws may be altered at any meeting of the Trustees, provided that the notice of such meeting shall state that an alteration of the By-laws will be acted upon.

IV. THE REPORT OF THE TREASURER

To the Trustees of the Marine Biological Laboratory:

Gentlemen:

The accounts of the Marine Biological Laboratory for the year 1947 have been audited as heretofore by Messrs. Seamans, Stetson and Tuttle, certified public ac-
countants of Boston, and a copy of their audit is available for inspection at any time in the Laboratory office.

There were few changes in the Balance Sheet from the preceding year, and it is appended as Exhibit A. As of December 31, 1947, the total book value of all the Endowment Assets, including the Scholarship Funds, was $978,677.67, an increase of $1,478.37. The securities and cash comprising these assets had at the end of the year a market value of $989,814.16. Plant Assets (Land, Buildings and Equipment) amounted to $1,311,950.55, a reduction for the year of $1,013.55. Current Assets were increased $10,156.31 to a total of $231,008.19. Current Liabilities (Accounts Payable) were $11,621.59.

In recent years the Treasurer's Report has also included the "Exhibit B—Income and Expense" of the Auditors' Report. This year there is being substituted a summary of "Receipts and Expenditures" prepared by the Treasurer giving the actual cash transactions during the year. The Auditors' statement of "Income and Expense" is a necessary accounting of the books of the Laboratory as they are set up, but does not, in the Treasurer's judgment, give a simple picture of the moneys received and spent during the year. It includes items of a purely bookkeeping character such as depreciation, the value of Library serials received through exchange, and interdepartmental charges. It does not include expenditures for capital items including some apparatus, books and serials for the Library, etc., even though some of these are normal operating expenses, nor either pensions paid nor funds paid into the Retirement Fund. (All of these are accounted for elsewhere in the Auditors' Report, Schedule IV or Exhibit B.) It does include all gifts in "income" even though some of these gifts are designated for such special purposes as a new boat, and cannot be used for current expenses.

Statement I which follows is a summary of the actual financial transactions of the year except for donations for special purposes, special agency accounts, and real estate development accounts which are listed subsequently. Actual receipts in 1947 for current operations were $250,098.72. Current expenditures were $253,822.09 and are listed in detail by departments in "II. Current Expenses." An additional $32,806.56 was spent on repairs and special purchases entered on the books as "Plant Assets" and listed below in "III. Additions to Capital Assets from Current Funds." The total of the year's expenditures is therefore $286,628.65. After the deduction of $2,671.07 transferred from the Carnegie Book Fund and used for the purchase of some of the Library items, the resulting cash deficit for the year is $33,858.86. This was taken care of by using $10,000 of the Reserve Fund (reducing it to $6,218.88) and by reducing the cash balances in the checking accounts to a total of $7,949.16 at the end of the year.

It should be noted that at the end of the year there was a net increase of the excess of Accounts Receivable over Accounts Payable amounting to $5,776.01, and an increase in the value of Supply Department inventory of $4,848.29. If these two items are taken into account, the actual deficit for the year is reduced to $23,234.56. On the other hand, if the reserve for depreciation is deducted, as it properly is in the Auditors' Report, the deficit would be $25,806.10 greater or $49,040.66.
REPORT OF THE TREASURER

I. Cash Statement for Year Ended December 31, 1947

<table>
<thead>
<tr>
<th>Class</th>
<th>Receipts</th>
<th>Current Additions to Capital Assets</th>
<th>Total Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Membership Dues</td>
<td>$2,238.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donations for Current Expenses</td>
<td>944.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income from Endowment</td>
<td>$35,616.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income other Securities</td>
<td>21,492.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real Estate Rentals</td>
<td>6,360.00</td>
<td>$1,002.84</td>
<td>$1,002.84</td>
</tr>
<tr>
<td>Instruction</td>
<td>12,630.00</td>
<td>7,824.94</td>
<td>7,824.94</td>
</tr>
<tr>
<td>Research (incl. Apparatus and Chemical Depts.)</td>
<td>25,193.34</td>
<td>17,372.60</td>
<td>19,499.82</td>
</tr>
<tr>
<td>Mess</td>
<td>32,029.42</td>
<td>33,965.04</td>
<td>35,845.87</td>
</tr>
<tr>
<td>Dormitories and Apt. House</td>
<td>16,600.10</td>
<td>13,570.83</td>
<td>24,584.08</td>
</tr>
<tr>
<td>Library</td>
<td>3,000.00</td>
<td>11,649.19</td>
<td>20,801.89</td>
</tr>
<tr>
<td>Buildings and Grounds</td>
<td>46,184.88</td>
<td>5,882.06</td>
<td>52,066.94</td>
</tr>
<tr>
<td>Supply Department</td>
<td>87,462.76</td>
<td>86,551.69</td>
<td>89,004.45</td>
</tr>
<tr>
<td>&quot;Biological Bulletin&quot;</td>
<td>6,044.42</td>
<td>9,812.79</td>
<td>9,812.79</td>
</tr>
<tr>
<td>Administration</td>
<td>486.96</td>
<td>1,551.59</td>
<td>1,551.59</td>
</tr>
</tbody>
</table>

Total Expenditures: $286,628.65

Total Receipts: $250,098.72

Deduct Carnegie Book Fund Payment: $36,529.93

Deficit for Year: $33,858.86

None of the totals in the above Statement include any interdepartment charges, nor any charges for depreciation or interest on investment.

1 Donations were $775 given by the "Associates" of the Laboratory for apparatus, and $169.95 contributed for a Washing Machine.

2 The Library income of $3,000 is the payment from the Oceanographic Institution towards Library expenses. The monetary value of serials received in exchange for the "Bulletin," estimated at $4,937.80, is not included in the above, nor is the $1,350 received from the Oceanographic Institution for the purchase of books for their account.

3 The actual sales of the Supply Department were $96,191.85. The values of specimens and supplies furnished Research and Instruction Depts. were $7,132.44 and $4,672.05 respectively. If these values are taken into account and also the gain in inventory of $4,848.29, the increase in accounts receivable of $5,233.85, and a debit charge of $1,800 for administrative and maintenance expense, there would be a net profit of $20,997.70 on the operations of the Supply Department for 1947. This does not take into account the $2,749.50 spent for capital items, or the Auditors' charges of $1,461.67 for depreciation and $2,221.29 for interest on investment. If these had been included, the net profit for the Supply Department would have been $14,565.24.
II. Current Expenses for 1947 by Departments

<table>
<thead>
<tr>
<th>Department</th>
<th>Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Administration</strong></td>
<td></td>
</tr>
<tr>
<td>Salaries</td>
<td>$18,851.55</td>
</tr>
<tr>
<td>Central Hanover Bank Trustee</td>
<td>1,034.87</td>
</tr>
<tr>
<td>Falmouth Nat'l Bank Service Charges</td>
<td>142.45</td>
</tr>
<tr>
<td>Audit</td>
<td>1,045.83</td>
</tr>
<tr>
<td>Treasurer's Office</td>
<td>600.00</td>
</tr>
<tr>
<td>Advertising</td>
<td>333.34</td>
</tr>
<tr>
<td>Office Supplies</td>
<td>837.74</td>
</tr>
<tr>
<td>Sundrys (Telephone, Postage, etc.)</td>
<td>1,682.82</td>
</tr>
<tr>
<td><strong>Total Administration</strong></td>
<td>24,528.60</td>
</tr>
</tbody>
</table>

| Deduct Cash Receipts                | 191.90                            |
| **Total After Deducting**           | 24,336.70                         |

| **Instruction**                     |                                  |
| Salaries and Travel All.            | 7,273.80                          |
| Sundries                            | 551.14                            |
| **Total Instruction**               | 7,824.94                          |

| **Research (Inc. Apparatus and Chemical Depts.)** |                                  |
| Salaries                                 | 11,378.87                         |
| Travel                                   | 200.00                            |
| Repairs                                  | 798.67                            |
| Supplies and Sundries                    | 6,763.96                          |
| **Total Research**                      | 19,141.50                         |

| Deduct Cash Receipts                | 1,768.90                          |
| **Total After Deducting**           | 17,372.60                         |

| **Library**                          |                                  |
| Salaries                              | 10,881.25                         |
| Office Supplies                        | 423.29                           |
| Sundries                               | 343.65                            |
| **Total Library**                     | 11,648.19                         |

| **Buildings and Grounds**             |                                  |
| Salaries and Wages                    | 22,630.19                         |
| Fuel                                   | 2,825.30                          |
| Gas                                    | 1,871.81                          |
| Light and Power                        | 2,749.00                          |
| Water                                  | 623.88                            |
| Insurance                              | 1,666.23                          |
| Repairs                                | 10,605.74                         |
| Sundries                               | 4,190.39                          |
| **Total Buildings and Grounds**        | 47,162.54                         |

| Deduct Cash Receipts                | 977.66                            |
| **Total After Deducting**           | 46,184.88                         |

| **Dormitories and Apt. House**       |                                  |
| Salaries and Wages                   | 4,800.50                          |
| Lighting, Gas and Water              | 2,134.87                          |
| Repairs to Bldgs. and Grounds        | 2,820.28                          |
| Outside Rentals                      | 500.00                            |
| Laundry                               | 1,390.59                          |
| Insurance                             | 734.22                            |
| Sundries                              | 1,190.37                          |
| **Total Dormitories and Apt. House** | $13,570.83                        |

| **Mess**                             |                                  |
| Salaries and Wages                   | $8,431.22                         |
| Cost of Food                          | 21,326.59                         |
| Gas, Water, Light and Power           | 1,650.78                          |
| Repairs                               | 231.03                            |
| Replacement of Dishes, etc.           | 391.15                            |
| Insurance                             | 603.69                            |
| Laundry                               | 311.80                            |
| Freight and Express                   | 102.07                            |
| Sundries                              | 916.71                            |
| **Total Mess**                        | 33,965.04                         |

| **Supply Department**                |                                  |
| Salaries and Wages                   | 30,756.78                         |
| Purchase of Specimens                | 38,668.92                         |
| Chemicals                             | 2,579.60                          |
| Containers                            | 3,708.63                          |
| Boat Expenses                         | 1,972.44                          |
| Truck Expenses                        | 825.69                            |
| Freight and Express                   | 3,313.63                          |
| Fuel                                  | 775.37                            |
| Light                                 | 96.00                             |
| Office Supplies                       | 511.18                            |
| Telephone and Telegraph               | 317.10                            |
| Insurance                             | 873.74                            |
| Advertising                           | 344.54                            |
| Specimens and Supplies purchased for Research | 1,058.40 |
| Sundries                              | 749.66                            |
| **Total Supply Department**           | 86,551.69                         |

| "Biological Bulletin"                |                                  |
| Salaries and Wages                   | 2,101.00                          |
| Printing, etc.                       | 7,711.79                          |
| **Total Biological Bulletin**        | 9,812.79                          |

| **Real Estate (Rented)**             |                                  |
| Taxes and Insurance on Bar Neck Property (Garage) and Janitor's House | 1,002.84 |
| **Total Real Estate**                |                                  |

| **Other Expenses**                   |                                  |
| Workmen's Compens. Ins.              | 725.28                            |
| Truck Expense                        | 222.26                            |
| Bay Shore and Great Cedar Swamp Expenses | 203.72 |
| Interest on Mortgage                 | 250.00                            |
| Evening Lectures                     | 128.96                            |
| Special Repairs, 1944 Hurricane Damage | 21.37               |
| **Total Other Expenses**             | 1,551.59                          |

| **Total Expenses**                   | $253,822.09                      |
III. Additions to Capital Assets from Current Funds

A. Land

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvements Bake House Lot</td>
<td>$201.00</td>
</tr>
</tbody>
</table>

B. Buildings

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waterproofing of Dormitory</td>
<td>$4,000.00</td>
</tr>
<tr>
<td>Waterproofing Apt. House</td>
<td>$2,780.00</td>
</tr>
<tr>
<td>Dormitories</td>
<td>$3,349.32</td>
</tr>
<tr>
<td>Brick Laboratory</td>
<td>$2,116.75</td>
</tr>
<tr>
<td>Wharf</td>
<td>$450.00</td>
</tr>
<tr>
<td>Other Buildings</td>
<td>$1,081.14</td>
</tr>
<tr>
<td>Total Additions</td>
<td>$13,777.21</td>
</tr>
</tbody>
</table>

C. Equipment

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apparatus Department</td>
<td>$2,127.22</td>
</tr>
<tr>
<td>Dormitories</td>
<td>$883.93</td>
</tr>
<tr>
<td>Mess</td>
<td>$1,880.83</td>
</tr>
<tr>
<td>Brick Laboratory</td>
<td>$1,273.60</td>
</tr>
<tr>
<td>Carpenter Shop</td>
<td>$347.62</td>
</tr>
<tr>
<td>Old Main Building</td>
<td>$411.95</td>
</tr>
<tr>
<td>Supply Department</td>
<td>$2,749.50</td>
</tr>
<tr>
<td>Total Additions</td>
<td>$9,674.65</td>
</tr>
</tbody>
</table>

D. Library

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back Sets</td>
<td>$2,587.72</td>
</tr>
<tr>
<td>Books</td>
<td>$801.85</td>
</tr>
<tr>
<td>Serials</td>
<td>$3,901.46</td>
</tr>
<tr>
<td>Reprints</td>
<td>$10.76</td>
</tr>
<tr>
<td>Binding</td>
<td>$1,851.91</td>
</tr>
<tr>
<td>Total Additions</td>
<td>$9,153.70</td>
</tr>
</tbody>
</table>

IV. Gifts for Special Purposes

A. Boat Fund

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contributions Received</td>
<td>$9,335.00</td>
</tr>
<tr>
<td>Payments on New Boat</td>
<td>$4,032.21</td>
</tr>
<tr>
<td>Balance Dec. 31, 1947</td>
<td>$5,302.79</td>
</tr>
</tbody>
</table>

In addition securities were received in 1947 from Mrs. W. Murray Crane for the Boat Fund that were subsequently sold for $784.53.

B. Dr. Frank R. Lillie Memorial Fund

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Contribution</td>
<td>$1,900.62</td>
</tr>
</tbody>
</table>

V. Real Estate Accounts

A. Devil's Lane Property

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash Received in 1947 from Sale of Lots</td>
<td>$5,198.00</td>
</tr>
<tr>
<td>Disbursements:</td>
<td></td>
</tr>
<tr>
<td>Taxes</td>
<td>$286.66</td>
</tr>
<tr>
<td>Road Construction</td>
<td>4,161.66</td>
</tr>
<tr>
<td>Total Disbursements</td>
<td>4,448.32</td>
</tr>
</tbody>
</table>

Cost of Devil's Lane Property to Dec. 31, 1947 was $54,296.13. Eighteen lots were sold in 1946 and 1947 for $14,250.00. $6,990.50 was paid in 1946 and 1947 on these purchases. The Devil's Lane Property as of Dec. 31, 1947, was carried on the books at $40,046.13, with the unpaid installments on the lots sold amounting to $7,259.50 carried as Accounts Receivable.

B. Gansett Property

No cash transactions in 1947 except payment of $87.69 taxes. Gansett Property including Accounts Receivable of $970, and deducting Reserve of $1,950 is now carried on the books at $1,162.36.
VI. Agency Accounts

A. Fellowship Fund

Cash Received from the Lalor Foundation .................. $ 5,000.00
Disbursements:
  For Fellowships ........................................ $2,512.50
  For Apparatus, Supplies and Laboratory Space ......... 1,444.47 3,956.97
Balance, Dec. 31, 1947 .................................. 1,043.03

B. Cancer Research Account

Cash Received from U. S. Public Health Service as grant-in-aid for "The Mechanism of Cell Division and Protoplasmic Growth" (under direction of Dr. Robert Chambers) .......... $25,000.00
Cash paid for Salaries, Laboratory Space, Apparatus and Supplies ............................................... 6,278.81
Balance, Dec. 31, 1947 .................................. 18,721.19

EXHIBIT A

MARINE BIOLOGICAL LABORATORY BALANCE SHEET, DECEMBER 31, 1947
(From Auditors' Report)

Assets

Endowment Assets and Equities:
  Securities and Cash in Hands of Central Hanover Bank and Trust Company, New York, Trustee .................. $ 981,036.65
  Securities and Cash in Minor Funds .................. 17,641.02 1,078,677.67

Plant Assets:
  Land ...................................................... $ 110,626.38
  Buildings .................................................. 1,337,188.88
  Equipment .................................................. 202,358.59
  Library ..................................................... 363,325.72

  $2,013,499.57

Less Reserve for Depreciation .................. 722,069.52 1,291,430.05

Reserve Fund, Cash .................................. 6,218.88
Book Fund, Securities and Cash .................. 14,301.62 1,311,950.55

Current Assets:
  Cash .................................................. 18,648.18
  Mortgage Note Receivable .......................... 2,425.00
  Accounts Receivable .................................. 39,100.94
  Inventories:
    Supply Department .................................. $ 43,932.10
    "Biological Bulletin" .................................. 16,775.67 60,707.77

Investments:
  Devil's Lane Property ................................ 47,305.63
  Gansett Property .................................. 1,162.36
  Stock in General Biological Supply House, Inc. ...... 12,700.00
  Other Investment Securities ........................ 21,464.00
  Retirement Fund .................................. 16,388.44 99,020.43
  Prepaid Insurance .................................. 5,575.99
  Items in Suspense (Debits) .................. 5,529.88 231,008.19

$2,521,636.41
REPORT OF THE LIBRARIAN

Liabilities

Endowment Funds:

<table>
<thead>
<tr>
<th>Fund Type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endowment Funds</td>
<td>$959,619.12</td>
</tr>
<tr>
<td>Reserve for Amortization</td>
<td>$1,417.53</td>
</tr>
<tr>
<td>Minor Funds</td>
<td>17,641.02</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$978,677.67</strong></td>
</tr>
</tbody>
</table>

Plant Funds:

<table>
<thead>
<tr>
<th>Fund Type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortgage Note Payable</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>Donations and Gifts</td>
<td>$1,172,564.04</td>
</tr>
<tr>
<td>Other Investments in Plant from Gifts and Current Funds</td>
<td>134,386.51</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,311,950.55</strong></td>
</tr>
</tbody>
</table>

Current Liabilities and Surplus:

<table>
<thead>
<tr>
<th>Fund Type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts Payable</td>
<td>$11,621.59</td>
</tr>
<tr>
<td>Items in Suspense (Credits)</td>
<td>1,937.38</td>
</tr>
<tr>
<td>Reserve for Repairs and Replacements</td>
<td>7,166.71</td>
</tr>
<tr>
<td>Current Surplus</td>
<td>231,008.19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$2,521,636.41</strong></td>
</tr>
</tbody>
</table>

Respectfully submitted,

DONALD M. BRODIE,
Treasurer

V. REPORT OF THE LIBRARIAN

1947

The sum of $11,500 appropriated to the library in 1947 was expended as follows: books, $588.11; serials, $3,936.94; binding, $1,851.91; supplies, $444.99; express, $117.52; salaries, $9,475.25 ($3,000 of this sum was contributed by the Woods Hole Oceanographic Institution); back sets, $130.39; insurance, $45.00; sundries, $247.11; total, $16,837.22. The cash receipts of the library totalled: for microfilms, $222.76 (the cost was $531.47); sale of duplicates, $264.20. These receipts revert to the Laboratory; so also do the fees from library readers. There were 55 of these readers in the library during the year.

Of the Carnegie Corporation of New York Fund, $2,457.33 was expended for the completion of 17 back sets and for the partial completion of 12 back set; $213.74 was expended for 10 books.

The Woods Hole Oceanographic Institution budget was $800 plus $500 for additional purchases made during the year. The total spent was $1,322.28. The Woods Hole Oceanographic Institution also contributed $3,000 (see above under "salaries").

During 1947, the library received 1,201 current journals: 327 (13 new) by subscription to the Marine Biological Laboratory; 48 (3 new) to the Woods Hole Oceanographic Institution; exchanges with the "Biological Bulletin," 512 (12 new; 43 reinstated foreign) and 130 (21 new; 3 reinstated foreign) with the Woods Hole Oceanographic Institution publications; 173 (8 new) as gifts to the former and 11
(3 new) to the latter. The library acquired 178 books: 55 by purchase of the Marine Biological Laboratory; 18 by purchase of the Woods Hole Oceanographic Institution; 9 by gift of the authors; 43 by the publishers; and 53 by various donors, those of Dr. Oscar W. Richards (8); Dr. W. J. V. Osterhout (1); Dr. Bradley M. Davis (2) and Dr. Paul S. Galtsoff (2) among the most notable. There were 32 back sets of serials completed; 19 purchased by the Marine Biological Laboratory (17 with the “Carnegie Fund”); 5 by the Woods Hole Oceanographic Institution; 6 by exchange with the “Biological Bulletin”; 2 by exchange with the Woods Hole Oceanographic Institution publications. Partially completed sets numbered 56: purchased by the Marine Biological Laboratory, 29 (12 with the “Carnegie Fund”); purchased by the Woods Hole Oceanographic Institution, 11; by exchange with the “Biological Bulletin,” 1; by exchange with the Woods Hole Oceanographic Institution publications, 6; by gift and exchange of duplicate material, 9.

The reprint additions to the library were 6,926; current of 1947, 257; current of 1946, 1,041; and of previous dates, 5,628. Acknowledgment is made to Drs. F. A. Hartman, Charles Packard, and F. K. Knowlton for valuable contributions to the reprint collection. Also, through Dr. E. G. Butler of Princeton University, the reprint collection of Dr. Ulric Dahlgren was presented to the library.

At the end of the year 1947 the library contained 56,594 bound volumes and 149,218 reprints.

In the fall 96 titles of the German journals delayed since 1940 were received in scattered volumes and numbers. The majority of these were for the years 1940–42.

The above report for 1947 is given in a format similar to preceding years. There follows a summary of the main events in the growth of the library from 1924 to 1947 inclusive. The figures of the varying budgets and acquisitions have been transformed for easy reading into graphs covering these twenty-four years. The data, as well as the running account, have been gathered for the most part from the yearly reports of the librarian.

The year 1924 was chosen for the starting point for several reasons. For one, a fair account of the library from its inception in 1888 to 1924 has already been published in the “Collecting Net” of 1929. But more important, the date marks a change in the administration of the library, in its expansion and in its budget. Previous to 1924 there is no mention of a library committee. The librarian (Dr. H. McE. Knower, followed by Dr. R. P. Bigelow) directed the work with the help of a paid assistant from 1914 to 1923. In 1924 a committee was appointed by the trustees with Dr. C. E. McClung as chairman, and Mrs. T. H. Montgomery, Jr. was made the full-time librarian. Dr. McClung remained as chairman through 1924–1931. Professor E. G. Conklin followed until 1941 and Dr. A. C. Redfield served in this office from 1942 to the end of 1947. In 1924, also, the present library was under construction; and in 1925 the collection was moved from room 217 in the Crane Building to its present position. At this time the library acquired a secretary, Miss Deborah Lawrence, whose invaluable assistance has continued throughout the development of the library into the present. The special significance of the period beginning in 1924 consists in the change that occurred in the library budget. Careful checks having been made to list the journals and books necessary for research in an expanding library, large sums of money were secured to purchase these, especially the back sets of needed journals. The accumulated (“library fund”)
of $8,000 was made available for 1924–25. In 1925 the General Education Board contributed $50,000 on the condition that it should be spent for back sets during the years 1926–30. In 1929 the General Education Board gave $200,000 for the general purposes of the library.

In addition to these gifts there have been special funds which came to the library later, not a part of the regular annual budget. The Woods Hole Oceanographic Institution, established in 1930, in that year contributed $5,000 for back sets and books, and for current journals on oceanography. Subsequently its annual budget for this purpose was $1,000 to $600, increased in 1941 to $800. In addition it has contributed to our library salary budget. The appropriation for this purpose was $1,100 in 1944, $1,700 in 1946 and $3,000 in 1947. The "Carnegie Fund" of $25,000 became available in 1941. Since the gift was not conditioned by a time limit for its expenditure and since the market for rare sets has been limited during and after the war years there remains a balance of this fund amounting to about $10,000.

The spacious library, begun in 1924, with five floors of stacks sufficient to hold 100,000 volumes, large reading and cataloguing rooms and librarian's office was thought to be adequate for many years. As early as 1936, however, when the library had acquired half this number of volumes and about 100,000 reprints the librarian reported "it is necessary to explain also how 50,000 volumes (which will be the total in four years if growth occurs at the present rate of 2,000 annually, and and 108,000 reprints if each years adds 3,500) will completely fill space that in 1925 was estimated to be adequate for 100,000 volumes, or 20,000 on each of five floors. The reprint floor at once reduces the available space for volumes to a capacity of 80,000. Besides this the many serial sets and books of quarto size, and over, reduce the space, and half of the bound serials recorded in our count are in reality two volumes bound together, so that the library will at the end of the year 1940 actually be housing more nearly 75,000 volumes, counted as volumes and not by the accession number, and 108,000 reprints." This prediction was amply fulfilled. By 1940 all available space in the stacks and wall shelves was occupied. An appeal to the Rockefeller Foundation for funds to build an addition met with a generous response. This gift of $110,400 was used, during the fall and winter of 1940–41, to erect a new wing which more than doubled the capacity of the library. Special provision was made for readers who can now enjoy private, well-lighted tables.

Through the period from 1924 until 1941 Dr. Frank R. Lillie was President of the Corporation and Chairman of the Executive Committee of the Laboratory. Any analysis of the steps taken in the development of the library throughout these years points directly to his wisdom, forethought and executive ability. He conceived its broad plan and under his guidance the library has grown from a small beginning to its present outstanding position.

The cost of building up and maintaining the library is shown in Figure 1. The total expenditures for each year since 1924 are given, and the amounts used for serials and books, and for back sets. Other expenses, such as salaries, binding, supplies, etc., are not shown. Reference has already been made to the great increase in overall expenditure from 1924 to 1932. The effects of the depression then began to be felt. The income of the Library Endowment and of the Laboratory as a whole dropped sharply. The library budgets have been successively re-
duced. This is especially noticeable during the war years when foreign journals, those from Germany in particular, could not be delivered and paid for. The extent of the drop in the number of journals received at that time is seen in Figure 2. Beginning in 1944 the number has risen rapidly until now the total is 1,201, as contrasted with 1,339 in 1936. Some of the back numbers published during the war are gradually coming in.

The yearly additions of volumes of serials and reprints is shown in Figure 3. At present there are 56,594 such volumes and in addition 8,000 books. Attention is called to the reprint receipts from 1924 to 1932, an increase of nearly 7,000 each year. During these years the large collections from Dr. Whitman's library and those of Sidney I. Smith and Maynard M. Metcalf were catalogued. At this time also about 5,000 reprints previously listed under books were shifted from the count of volumes to that of reprints. In 1938, besides other generous gifts, a collection from Dr. F. R. Lillie was recorded, and in 1943–1947 Dr. Rudolf Höber's large contribution, those of Drs. E. B. Meigs, W. E. Garrey, A. C. Redfield, Ulric Dahlgren, and others, greatly increased the count.

Much of the work of the Library Committee and of the staff has already been indicated. But in a summary of the past twenty-four years it is appropriate to note other services that are not as obvious from a study of the tables. That the purchase of journals and books was preceded by a careful selection is self-evident. In the matter of choice the investigators who use the library have always been the arbiters. To aid them in this the librarian, under the direction of the Library

![Figure 1](image)
Committee has, each summer since 1927, compiled a list of desirable journals and books. The titles on these lists recommended by the investigators, as well as their own suggestions, were obtained either by purchase or exchange. Policies regarding exchange material were decided at the summer meeting of the Library Committee.

Another service rendered by the staff was the preparation of the complete list of journal titles, published as a supplement to the "Biological Bulletin." The full titles and holdings of each journal, with cross references of duplication in titles, were arranged in alphabetical order exactly as they appear on the shelves of the
16 MARINE BIOLOGICAL LABORATORY

library. This made a volume of 80 pages in its initial publication in 1943. Additions, in similar form, have been published in each subsequent year.

For the benefit of the investigators the “sales room” of duplicate reprints and books has been in operation for many years.

The microfilm service, initiated in 1942, has been used extensively by investigators to secure literature not available to them elsewhere. This service has resulted in a reduction in the number of loans requested by outside libraries during the winter months. In this connection the printed list of journals, mentioned above, has been helpful.

The most difficult of the services carried on throughout this period was that of the catalogues. A journal catalogue separated from that of the books and reprints and complete in cross-references proved satisfactory. It seems to present no problem for its future use. On the other hand, the catalogue for books and reprints has always presented difficulties. That the books should be catalogued by subject as well as by author has never been questioned. Whether the enormous collections of reprints should be catalogued in the same way has not met the same unanimity of opinion. Finally, the librarian established a system of assigning subjects by which the catalogue became less bulky. By this method a bibliography card was placed in front of each author’s catalogued works. On this card a list of his subjects appears and on a subject card a cross-reference is given to the author’s name. In this way many names appear as cross-references from the subject, thus eliminating the making of repetitive subject cards. After this system was installed throughout the catalogue, it was estimated that the card count was 472,500. If the new entries following 1947 can be continued in this manner the catalogue should form a useful guide to those unacquainted with the literature of the reprint collection.

This account of the library is not complete without a very special acknowledgment of the constant attention given to its development by the Directors (Dr. Merkel M. Jacobs and Dr. Charles Packard) and by the Library Committee members. All problems, large or small, in policy or in execution, that were laid before them, received attentive guidance and encouragement. Through their suggestions and moral support the work of the library has maintained its growth and stability.

PRISCILLA B. MONTGOMERY,
Librarian (retired)

VI. THE REPORT OF THE DIRECTOR

To THE TRUSTEES OF THE MARINE BIOLOGICAL LABORATORY

Gentlemen:

I submit herewith a report of the sixtieth session of the Marine Biological Laboratory for the year 1947.

The Laboratory has suffered an irreparable loss in the death of Dr. F. R. Lillie. For more than forty years he was its guiding spirit; under his leadership it grew from a small, struggling institution to its present eminence. His career began and ended in Woods Hole. Here he came as a young student, and here, full of years and honors, he was buried. For fifty-six consecutive seasons he returned, serving as instructor, investigator, and administrator, always with the interests of the Lab-
oratory at heart. On becoming Director in 1907 he said, “Our purpose is essentially ideal, and its pursuit demands our best efforts and our loyalty.” When he resigned in 1926 the trustees wrote, “The Trustees appreciate the conspicuous ability, combined with unselfishness, with which you have guided the Laboratory. To you, in large measure, is due the steady broadening in scope and method that has been so conspicuous a feature of its work in recent years. As its Director you began with an institution already rich in achievement but still poverty stricken in respect to material things. You have left it unsurpassed in equipment and endowment, the center of activities that exert an always increasing influence on scientific progress throughout the world.”

In his reply Dr. Lillie characteristically gave all credit to others—to the Trustees, to Mr. Crane, to the technical staff, and added, “Patience and faith were the only other necessary factors. I have no fear for the future as long as the Woods Hole spirit survives.” Genuine cooperation and mutual helpfulness, he said, constitute the basis of this spirit. But elsewhere he added this note of warning, “We must not allow ourselves to forget that the principles for which we stand are never entirely won.”

Those of us who worked with him will not forget his quiet and unhurried approach to current problems, his ability to foresee future needs, his untiring and successful efforts to meet them; and his lifelong devotion to the welfare of this Laboratory. It is fitting that a tablet to his memory should be placed in the entrance of the building. But more than that, we should build an F. R. Lillie Laboratory which will remind future generations of biologists of our debt to him.

1. Changes in Personnel

Mrs. Montgomery, our Librarian since 1924, retired at the end of 1947. For twenty-three years she carried on the business of the Library, beginning at the time when it was a small and insignificant collection, and continuing throughout the entire period of its expansion. In addition to her regular Annual Report she has presented a brief history of the Library during her incumbency. Of her own important and successful work she says little. But all who use the Library are fully aware that she, more than anyone else, is responsible for its completeness, its fine arrangement, and its perfect condition. We owe her a debt of gratitude for her outstanding work in the development of this world famous part of the Laboratory.

Miss Deborah Lawrence, who has worked with Mrs. Montgomery since 1925, has been appointed Acting Librarian. Under her supervision the Library continues to be carried on in a most satisfactory way.

Mr. Larkin, Superintendent of Buildings and Grounds, also retired this year. Through a long term of service he has been devoted to the interests of the Laboratory, on hand in emergencies at any time of day or night, always capably carrying on the work of his department. He has been retained as Consultant because of his intimate knowledge of the complicated installations in our buildings.

Mr. Robert Kahler, for many years Mr. Larkin’s assistant, is now in charge of the plant, and has demonstrated his competence and resourcefulness in meeting the usual and unusual problems connected with the work.

Mr. Homer P. Smith joined the staff in July 1947 as Assistant Business Manager. The need of a second man in the office has been felt for some time for the
business of the Laboratory has increased greatly in recent years, and one man could
not be expected to carry the entire burden. Under Mr. MacNaught's tutelage he
has become familiar with the various phases of work, has adapted himself to the
situation, and has proved to be a valuable addition.

2. New Boats

The Laboratory is now well provided with boats for all its various needs. New
craft were urgently needed to replace the Sagitta, considered unsafe after 40 years
of service, to collect the large amount of material required by schools and colleges,
and to carry the classes on their field trips. It was, therefore, decided to make an
appeal for funds to all members of the Corporation, to all workers at the Laboratory,
and to friends living in the vicinity of Woods Hole. The Boat Fund Committee,
under the direction of Dr. Heilbrunn, was highly successful in obtaining contribu-
tions, the total amount being $10,035. Among the nearly 300 donors were the
Lilly Endowment $3,000, Mr. William Proctor $1,000, and Dr. G. H. A. Clowes
$1,000.

Dr. Redfield, Chairman of the Committee appointed to secure a suitable boat,
after visiting a number of boat yards, advised that the new craft should be designed
by Mr. Crocker, a naval architect. After the Committee had approved the plans,
construction was begun and carried forward without delay. The boat, 33 feet on
the water line, has a cruising speed of 12 knots, and is equipped with dredging gear
and a two-way radio. It will be in service in the summer of 1948.

In the spring of 1948 Mr. Crocker reported that a much larger boat, which he
designed, could be bought for $12,000—about half the original cost. Mr. Walter
Kahler inspected it thoroughly and urged that the Laboratory acquire it. The Ex-
ecutive Committee approved its purchase. The boat, large enough to accommo-
date the entire Zoology class, will be used during the summer of 1948.

3. Repairs and Improvements

In the course of the past two years we have made many repairs and improve-
ments in several of our buildings. The much needed waterproofing, roof repairs,
and outside painting of the Brick Building have been completed. The Apparatus
Department is now situated in the well lighted and airy basement of the new wing
of the Library. The rooms which were vacated will be now used as laboratories.
The Chemical Department now has an air-conditioned room where special meas-
urements can be made. The south wing of Old Main has been shored up so that
the floors no longer vibrate as freely as in the past. Useful changes have been made
in the Botany and Rockefeller Buildings. In the Stone Building a freight elevator
is under construction. The top floor can be used for the storage of Supply Depart-
ment materials. The Drew House has been put into good shape and painted; a
new apartment was made out of the reception room of the Apartment House. Here
also extensive repairs to the balcony supports were imperative. These and other
much needed changes and repairs have cost nearly $38,000.

We must next make extensive alterations in the Supply Department Building,
and put in good condition the wooden residences. Each year at least one of our
buildings should be restored to first class shape. In this way they can be prevented
from falling into serious disrepair.
4. The Housing Problem

Each year since the war ended we have experienced great difficulty in providing living quarters for those who want to work here. This is, to a considerable extent, due to the fact that, compared with former years, many more of the young investigators and students are married and require apartments, suites, or other special accommodations for their growing families. The Laboratory can provide for a relatively small proportion of these applicants; in the village there is a reluctance to rent rooms to families with children. As a result a number of good investigators are forced to withdraw their requests for research space.

When the housing situation became critical soon after the Brick Building was finished, Dr. Lillie urged the erection of a building to accommodate a large number of single investigators, and, in addition, ten bungalows for families. Today we can provide for the first group, but for the latter we need more apartments or small houses. To add to our present Apartment House or to erect a new one is too costly a venture at this time. But simple houses could be built on Devil's Lane property at a moderate cost. I believe that if the Laboratory built several, with a view to selling them to our members on easy terms, we could soon dispose of them, together with the lots on which they stand. Without doubt such a housing project would stimulate others to purchase Devil's Lane lots. Thus both the workers and the Laboratory would be benefited.

5. Lalor Fellowships

Lalor Fellowships, established by the Lalor Foundation, were granted to the following investigators:

Senior Fellow: Prof. Jean Brachet, University of Brussels, Visiting Professor at the University of Pennsylvania

Junior Fellows: Dr. I. M. Klotz—Northwestern University
Dr. Arnold Lazarow—Western Reserve University
Dr. Benjamin Libet—University of Chicago
Dr. Claude Villee—Harvard University

6. Winter Research

The Laboratory of Experimental Cell Research, under the direction of Dr. Robert Chambers, has been engaged since the Fall of 1947 in the study of the mechanism of cell division and growth, employing micromanipulation methods and tissue cultures.

7. Gifts

The Laboratory gratefully acknowledges the following gifts:

The Associates of the Marine Biological Laboratory, $775
Dr. G. H. A. Clowes—for a Lillie Memorial, $1,000
Mrs. W. Murray Crane, $700
Contributors to the Boat Fund, $10,035
8. Election of Trustees

At the Meeting of the Corporation on August 12, 1947, the following trustees were elected:

Class of 1951

W. C. Allee
C. L. Claff
G. H. A. Clowes
K. S. Cole

P. S. Galtsoff
L. V. Heilbrunn
J. H. Northrop
A. H. Sturtevant

9. There are appended as parts of this report:

1. Memorials to Prof. William B. Scott, Prof. Robert A. Harper, Mr. George M. Gray, Professor Herbert S. Jennings, Professor Samuel O. Mast, and Professor L. L. Woodruff
2. The Staff
3. Investigators and Students
4. Tabular View of Attendance
5. Subscribing and Cooperating Institutions
6. Evening Lectures
7. Shorter Scientific Papers (Seminars)
8. Members of the Corporation

Respectfully submitted,

CHARLES PACKARD,
Director

1. Memorials

William Berryman Scott, 1858–1947

By E. G. Conklin

William Berryman Scott, the oldest member of the Board of Trustees of the Marine Biological Laboratory, was born on the birthday of Charles Darwin and Abraham Lincoln, February 12, but 49 years later than these great predecessors, viz. 1858. He died in his 90th year on March 29, 1947 in Princeton, New Jersey, his life-long home.

He and his colleague at Princeton, William Libbey, first visited Woods Hole in 1883 on invitation Spencer F. Baird, head of the U. S. Fish Commission, to confer with him on plans for the development of the Fisheries Station at Woods Hole, and as a result, Libbey contributed in the name of Princeton University, $1,000, toward the purchase of the land on which the Station was established.

In 1890, two years after the founding of the Marine Biological Laboratory, Prof. Scott became a member of the Corporation and in 1897 he was elected a Trustee and continued in that office and as Trustee Emeritus until his death. During these forty years as Trustee, he made it a point of honor to be present whenever possible at the annual meetings, and in 1897 and 1898, he gave lectures at the Laboratory on the methods and results of his paleontological researches.
Although he was for fifty years a member of the staff of the Department of Geology at Princeton, and for forty-six years head of that department, he was primarily a zoologist. At the close of his senior year in college, he and two other classmates, Osborn and Speir, organized a scientific expedition to Colorado and Wyoming. The collection of vertebrate fossils made that summer of 1877 was described in their first scientific publication and was instrumental in shaping the future careers of Scott and Osborn. After a year of graduate study at Princeton and a second expedition to the West in the summer of 1878, Scott spent two years in graduate study in Europe; first with Huxley in London, then with Balfour in Cambridge, and finally with Gegenbaur in Heidelberg. His work with these masters was in anatomy and embryology. Under the stimulus of Balfour, he, with Osborn, completed and published a study on "The Early Development of the Common Newt," the first such study on the embryology of a urodele. In Gegenbaur's laboratory he was assigned for study the valuable material which had been collected by Dr. Calberla, deceased, on the embryology of a cyclostome fish and the results of this study were published in Gegenbaur's Morphologisches Jahrbuch in 1880 as his thesis for the Ph.D. degree, with the title, "Beiträge zur Entwicklungs geschichte der Petromyzonten."

Thus at the early age of twenty-two years, he had finished his work for the doctor's degree, published three important papers, been a leader in two exploring expeditions, and had met on terms of intimate friendship and cooperation, some of the foremost scientists and scholars of Europe and America.

On his return from Europe, he was appointed assistant in geology at Princeton and three years later was made full professor in that department, which position he continued to hold until he had completed fifty years of teaching at Princeton University. During that time, he made eight additional exploring expeditions to the West and published more than 150 paleontological reports. Perhaps his most monumental work was the "Reports of the Princeton Expedition to Patagonia" which was published in nine magnificent volumes, of which he was editor and co-author. His later work, undertaken after he was seventy-six years old, in association with his former student and colleague, Dr. Jepson, was a great monograph of 1,000 pages and 100 plates on the "Mammalian Fauna of the White River Oligocene"; while his latest work was a similar monograph on the "Mammalian Fauna of the Uinta Formation," upon the final pages of which he was at work until two days before his death.

In addition to these research publications, he was the author of a number of important books of a more general nature, among them, an "Introduction to Geology," which ran through three editions. "A History of Land Mammals of the Western Hemisphere," two editions; "Physiography, the Science of the Abode of Man"; "The Theory of Evolution"; and finally, a most interesting and important autobiography, "Some Memories of a Paleontologist."

He was abundantly honored both in Europe and America by universities and learned societies. The Universities of Pennsylvania, Harvard, Princeton and Oxford, gave him honorary degrees. He received ten medals and awards from learned societies here and abroad. He was elected a member of the American Philosophical Society when he was twenty-eight years old and at the time of his death, had been a member for more than sixty years. For seven years he was president of that soci-
ety of which his great, great, great-grandfather, Benjamin Franklin, had been founder and first president. He was also president of the Geological Society of America (1925) and of the Paleontological Society (1911), and a member of the National Academy of Sciences, the American and British Associations for Advancement of Science, the American Academy of Arts and Sciences, the Academy of Natural Sciences of Philadelphia, the New York Academy of Sciences, the Washington Academy of Sciences, the Geological, Zoological and Linnean Societies of London.

Professor Scott was a brilliant lecturer and he often enlivened scientific meetings with his humorous stories and his phenomenal memories of great men and events. Nevertheless, he was a scholar and thinker rather than a popular lecturer or writer. Fortunately, he has recorded in his autobiography many of his memories of some of the greatest men of his generation.

The Corporation and Trustees of the Marine Biological Laboratory record their sorrow in the loss of one of their oldest and most distinguished members and transmit to the members of his family this expression of their esteem and sympathy.

Dr. Robert A. Harper
By Edmund W. Sinnott

In Dr. Harper's death, plant science has lost a man who for years was one of its greatest leaders.

Dr. Harper was born on January 21, 1862 at Le Claire, Iowa. He received his B.A. at Oberlin in 1886 and then for two years taught Latin and Greek at Gates College. From 1889 to 1891 he was instructor in science at Lake Forest Academy. He took an M.A. at Oberlin 1891 and then served for a time as professor of botany and geology at Lake Forest College.

Dr. Harper's chief interests centered more and more in botany and he soon determined to make this his career. As so many young botanists did in the nineties, he went to Germany for graduate work. At Bonn he came under the influence of Strasburger and other notable teachers, taking his doctorate in 1896. Here began his life-long interest in cytology. Soon after his return to America, he went to the University of Wisconsin where he became professor of botany and head of the department. In 1911 he was called to Columbia University as Torrey Professor of Botany, serving until his retirement in 1930. Here he reorganized the department and greatly widened its scope and activities. He was keenly interested in the New York Botanical Garden, the Boyce Thompson Institute for Plant Research and the Torrey Botanical Club.

Dr. Harper was a student of plant cells since his days at Bonn, but he was much more than a mere cytologist. He liked to describe himself as a cellular physiologist and studied many aspects of the activities of all sorts of plant cells. He was for a long time especially concerned with a study of reproduction in the fungi, and his work on nuclear behavior in the ascomycetes is classic. Studies of development and morphogenesis particularly appealed to him and he was a stout supporter of the view that the phenomena of development are best approached through a knowledge of the behavior of cells. He was much interested in some of the simpler algae, notably Pediastrum and Hydrodictyon, in which he investigated the problems of cellular activities.
Unlike so many biologists of today, Dr. Harper had a wide knowledge not only of his own science, but of others and of wider fields of learning. He was a good field botanist, a successful farmer, a skilled experimenter, and a man of wide reading and erudition. He encouraged his students to train themselves broadly and not to be carried away by the fashions of the time. He was a stimulating teacher, and in a discussion, delighted to take the less popular side and to defend it vigorously. He was highly critical and a foe of slipshod works. His own papers were beautifully done and his drawings, in particular, were remarkably fine.

Dr. Harper had close contacts with Woods Hole for many years. He was a student here in 1891, along with Bradley Moore Davis, C. P. Sigerfoos and Katherine Foote. In 1893, he worked as an investigator at the Laboratory. Frequently during ensuing years he came to Woods Hole for part of the summer. He was elected to the Board of Trustees in 1911 and in 1932 became Trustee Emeritus. In recent time he has rarely come to the Laboratory but devoted all his time to his farm at Bedford, Virginia, where he spent his last years happily close to the soil and with plants he loved.

Dr. Harper's warm and friendly personality endeared him to his many students and to a host of friends all over the world. He was a great teacher, a friendly opponent in debate, and a constant stimulus and inspiration to all who knew him. He will be sorely missed.

George M. Gray

By W. C. Curtis

George Milton Gray was born at Bristol, Rhode Island, November 2, 1856. As a boy he was interested in natural history, particularly in birds and insects. When a young man he worked as a taxidermist, gave lectures on birds at a boys' camp and made collections in the vogue of his day. He was thus a naturalist from his youth up. Later, he was discovered by Dr. H. C. Bumpus and engaged as a technician in the Department of Zoology at Brown University. Mr. Gray first came to the Marine Biological Laboratory in the summer of 1891 as a laboratory assistant. He served in this capacity for six summers (1891–96), as collector for two summers (1897–98), and became Curator of the Supply Department in 1899.

Although this department was established in 1891, its effective operation began with Mr. Gray. At first the orders were filled only in the summer months. In the years 1896–97 and 1897–98, a stock was shipped to Williams College, and sales totaling about $125 per year were made during each of these winter periods. The trustees were elated when it was announced that the sales might exceed $500 for the summer of 1897 and again in 1898. In September 1899, when Mr. Gray became Curator and a year-round appointee of the Laboratory, the department began its continuous existence at Woods Hole. It was then located in the basement space between the two wings of the Old Main Building. In winter the supplies were moved to the invertebrate laboratory where a stove was set up to keep Mr. Gray and the specimens from freezing. The Stone Building, to which the department was transferred several years later, was luxury indeed when he was first established there. As a result of his untiring efforts during these early years, the department flourished. In the year 1912 the sales totaled $13,966.35. In 1925 the total was
$57,771.67. The creation of this necessary adjunct to the work of the Laboratory and important source of revenue was largely the work of George M. Gray.

Mr. Gray not only established the reputation of the department for reliability and for quality of material, he also established a record of service to classes and investigators. Beginning as a one-man organization, it employed an increasing number of assistants, and the role of those who "worked in the Supply Department" for a summer or two and later attained distinction in some field of biological science is an impressive one. Another notable contribution by Mr. Gray was his personal influence upon these youngsters.

In later years he was able to devote more time to aspects of the work in which he was particularly interested. After he withdrew from the Supply Department (1931), he became Curator of the Museum, which was named in his honor and was his special pride. He was fairly active even as Curator Emeritus since 1935. He died December 1, 1946 and is buried in the Woods Hole Cemetery.

Writing in a laboratory room, the windows of which look out upon the Hole and the islands where I worked as his assistant fifty years ago this summer, I cannot forbear my personal tribute. I have always thought him one of the most honest and kindly men I ever know. He was my close friend always from that summer long ago. About that time I was taken by a remark, made sadly by an elderly clergyman wise in the ways of men, that he had known some individuals to whom he thought the term "Christians" might be applicable although he had never seen any reason for applying it to church members as a group. I thought then and I have thought ever since that George Milton Gray was one of the few among my acquaintances to whom I would apply that term. We of the Marine Biological Laboratory never had a more devoted service nor greater loyalty than he gave us. He well exemplified the dictum of his faith: "He that would be great among you let him be the servant of you all."

Dr. Herbert Spencer Jennings

By O. C. Glaser

With the death of Herbert Spencer Jennings, at Santa Monica, California, on April 14, 1947, the Marine Biological Laboratory lost one of its most distinguished members—a trustee for 33 years and a trustee emeritus since 1938.

The son of a physician, Jennings was born in Tonica, Illinois, on April 8, 1868, and educated as he said "in most states of the Union." This migratory life continued with only short interludes until he was 38. Like his namesake, he was precocious and for years hard pressed by economic difficulties and the struggle for scientific opportunity. At 20 he prepared for college, so to speak, as an Assistant Professor of Botany and Horticulture at the Agricultural and Mechanical College of Texas. As an undergraduate at Ann Arbor, he joined the Biological Survey of the Great Lakes conducted by the Michigan State Board of Fisheries and laid the foundations for his first monograph on Rotifers, published in 1894—a year after receiving his B.S. from the University of Michigan. At Harvard he received the M.S. in 1895 and his Ph.D. in 1896. His thesis on cell-lineage of the rotifer Asplanchna herrickii, related the orientation of the spindles to the general problems of developmental mechanics whose solution he projected into the molecular realm.

Travelling fellowships enabled Jennings to spend the following year with Max
Verworn in Biedermann's Laboratory at Jena. Here began his preoccupation with the reactions of unicellular organisms.

Returning in 1897, he became Professor of Botany and Bacteriology at the Agricultural College of Montana; accepted next instructorships, first at Dartmouth, then at Michigan where he became Assistant Professor of Zoology in 1900 and remained until called in 1903 to an Assistant Professor at the University of Pennsylvania.

These frequent translocations must have had serious disadvantages but his tremendous drive and unbounded enthusiasm found or created time for both teaching and research. By 1906 when he left Pennsylvania, he had to his credit at least 40 publications. The joint text with Reighard on the Anatomy of the Cat based on his own dissections and illustrated by Mrs. Jennings, belongs to the second Michigan period. Here too, as Director in 1901 of the Biological Survey of the Great Lakes under the U. S. B. F., he gathered material for three additional monographs on the Systematics of Rotifers and in connection with his teaching gave the first expression to a lively and recurrent interest in simulacra. Outstanding among the special contributions were his Psychology of the Protozoa in which Paramecium is shown to have "hardly taken the first step in the evolution of mind," and his analysis of the Biological Significance of Asymmetry. There were further studies on stimulation in Protozoa, followed by more from Pennsylvania. There were also publications on the behavior of the earthworm, the sea-anemone and the starfish—the latter a veritable storehouse of information on the activities of this animal—appearing in 1907. Many of his results during the Philadelphia period were either summarized in the great monograph on the behavior of lower organisms published by the Carnegie Institution or in the famous Behavior of the Lower Organisms appearing in the Columbia Biological Series in 1906; reprinted in 1915; and translated by Ernst Mangold in 1914 into German. The chief product of all his meticulous observations and simple experiments was a general outlook with variability, modifiability, unity and adaptiveness of behavior as the central themes.

With his transfer in 1906 to an Associate Professorship of Experimental Zoology at the Johns Hopkins University and his subsequent elevation to the Henry Walters Chair of Zoology and Directorship of the laboratory—both in succession to William Keith Brooks—Dr. Jennings entered upon his only long tour of duty at any one institution. He also changed his field of investigation. Although theoretical and controversial writings on behavior continued to appear, 1908 marks the beginning of a long series of researches on the life-cycles, heredity, variation, and evolution of Protozoa, notably Paramecium, Arcella, and Diffugia. In 1928, he reverted to his rotifers and, with Ruth Stocking Lynch, published two papers on Age, Mortality, Fertility, and Individual Diversities in Proales sordida.

During his genetic phase, Jennings substituted for full verbal description, long tables of measurements and enumerations. He became a biometrician. So highly did he perfect his mathematical techniques and insights that he was called upon to act as a statistician for the Food Administration during the first World War. Among his most important genetic results we must cite the analysis of conjugation in Paramecium whose significance he found in the diversities so created rather than in any rejuvenating effects; his pure lines in the same organism; and finally, the discovery of mating types—at long last the key to Protozoan Genetics. Through-
out this period, Jennings strengthened his position as the apostle of diversity. He also developed further his inborn sensitivities to the more general intellectual and social climate. Contributions on special and general methodology such as genetic method and Radical Experimental Analysis appeared in a stream of critical evaluations of Vitalism, Mechanism, Determination and Freedom. In the social area, he wrote on Immigration, Defectives, "Undesirable Aliens," Racial Progress, the Family and Marriage. Apparently unaware of his powers, he invaded more distant territory. In his essay on the advantages of Growing Old, the euphorious state created by the presentation of a portrait of one's self and the pessimistic outlook of a young man trying to lead the life of a productive scholar on a $900 instructorship, are contrasted with humor, pathos and artistry sufficient to suggest pure literature. All told, the output of 32 years at Johns Hopkins amounts to about 120 papers, long or short, and seven books.

Modest, shy, nervous and frail, Jennings nevertheless accepted many outside lecture engagements. He spoke with great animation and charm to audiences invariably responsive to his sincere excitement and well ordered presentations. He gave more than one of our evening lectures. Few who heard his mathematical analysis of the data on genic linear array will forget his enraptured delight with the Naperian Case or the suspense he created and maintained until the final unveiling of Morgan's own theory at the very end. He gave the Terry lectures at Yale; the Vanuxem, at Princeton; the Leidy, at Pennsylvania, where he received the first award of the Leidy medal.

In 1931–32 he was Visiting Professor at Keio University, Tokio, and in '35–'36, Eastman Visiting Professor at Oxford. After retirement, he gave the Patten lectures at Indiana; became Visiting Professor for one year and remained as Research Associate at the University of California in Los Angeles.

Dr. Jennings was active on the Editorial Boards of four Journals; was a member of the National Academy, the American Philosophical Society and other coveted American Academies. He was President of the American Society of Zoologists (1909). His presidential address (1911) to the American Naturalists on Heredity and Personality—one of the most memorable of his gems—exposed, with a gaiety born of many insights, the genetic and environmental odds against the birth of any particular individual. Foreign recognitions included Honorary Fellowship in the Royal Microscopical Society, Corresponding Memberships in the Russian Academy of Sciences and in the Société Biologique de France or de Paris—he was not certain which. His honorary degrees proved quite unmanageable. The British Who's Who for 1944 records eight such degrees; the American counterpart and the American Men of Science both also in 1944 each list six. Agreement on totals, however, obscures the true diversities among four D.Sc.'s, three LL.D.'s and an Oxford A.M.; one D.Sc. and five LL.D.'s; and four D.Sc.'s with two LL.D.'s. One highly reputable LL.D. he avoided. As long as there were Paramecia to measure, count and keep in order, why bother about honorary degrees?

Whoever recalls him will continue to regret that his work at the Marine Biological Laboratory ended in 1933 and that he was a regular attendant only during the decade of the twenties. We should have liked to share him with many others. His inspiring example and achievement can be fully appreciated only against his background of almost continuous ill health. Yet he was always friendly and cheer-
ful; always excited about something; and ready to discuss a case, not for the sake of argument, but because of his passions for both sides of every question; for clarity of mind and for fairness. Impelled as he was by ceaseless cerebration, he nevertheless lists two related forms of recreation—travel and motoring. As a travelling companion, one can hardly imagine another more delightful; however, his friends who either rode with him or merely observed him spiraling briskly down the main street of Woods Hole were far too apprehensive to benefit from the recreative powers of his driving.

Samuel Ottmar Mast

By B. H. Willier

On October 5, 1871, Samuel Ottmar Mast was born on a farm near Ann Arbor, Michigan. His early schooling, academic training and teaching experience were in his native state. After obtaining a “full diploma” in 1897 from the Michigan State Normal College, he went to the University of Michigan where he received the B.S. degree in 1899. From 1899 to 1908, he was Professor of Botany and Biology at Hope College, Holland, Michigan. In 1906, he received the Ph.D. degree in zoology from Harvard University. He then came to the Eastern seaboard where he spent the remainder of his life. For a period of three years (1908–1911) he was a member of the biology staff at Goucher College. In the autumn of 1911, he joined the zoology staff at Johns Hopkins as associate professor which soon culminated in a Professorship of Zoology and later upon the retirement of the late Professor H. S. Jennings in the chairmanship of the Department of Zoology (1938–41). Since 1942, he has been professor emeritus of zoology.

According to the records, he first attended the Marine Biological Laboratory during the summer session of 1907. In 1908, he was elected a member of the Corporation and later (1936–1942) served as a member of the Board of Trustees and of its executive committee for two years (1938–1940). Since 1942 he has been Trustee Emeritus. He and his family have been regular summer residents of Woods Hole for a period of over twenty years. Over these years, he has been in regular attendance as an investigator and his interest in the laboratory has been constant and genuine.

In 1908, he married Grace Rebecca Tennent, the sister of the late David Hilt Tennent of Bryn Mawr and of this laboratory. She and three daughters and many grandchildren survive him. He died quite suddenly on Monday evening, February 3, 1947, at the age of 75 at his home in Roland Park in the city of Baltimore.

The life long work of Professor Mast was directed toward an understanding of the physiology of the "lower" organisms, especially the Protozoa. His major interest was in the mechanisms of behavior of these forms and more specifically in their reactions to light. This is best exemplified in his most significant book, “Light and the Behavior of Organisms” (1911) and in his numerous published papers on the motor responses, factors in the process of orientation, etc. of a variety of unicellular animals and other invertebrates. In 1926, as a result of his interest in the behavior of Amoeba proteus he formulated a theory to account for amoeboid movement, which has received wide recognition. His wide interest in the physiology of the Protozoa led him later to make a study of the nutrition of the colorless flagellate, Chilomonas. Together with Dr. Donald M. Pace and other students, he showed...
that this organism in the total absence of light can synthetize carbohydrates, fats, proteins and protoplasm from a few simple inorganic salts, resembling in this respect, the green plants and certain bacteria. During the last few years of his life, Mast turned his attention to an investigation of the processes of feeding and digestion in the Protozoa, which culminated in his most significant paper on this subject entitled, “The Food-Vacuole of Paramecium.” This work is a fitting and lasting example of the exactness and care which characterized all of his researches and publications. His every publication was marked by the meticulous care with which each word and phrase were weighed to make sure they meant exactly what he had in mind, no more and no less.

Professor Mast commanded to a marked degree the loyalty and admiration of graduate students. He had many pupils and has trained a whole generation of zoologists who have much to thank him for. His loss is deeply felt by many friends, former colleagues and students, and no less by the community of biologists at Woods Hole.

Dr. Lorrande Loss Woodruff

By R. G. Harrison

Lorrande Loss Woodruff, Colgate Professor of Protozoology at Yale University and Director of the Osborn Zoological Laboratory, died at his home in New Haven after a long illness on June 23, 1947 in his 68th year. With his passing, the Corporation of the Marine Biological Laboratory loses a member of more than forty years standing and the Board of Trustees, one who had served faithfully for 24 years.

Dr. Woodruff was born in New York on July 14, 1879, and received his education in his native city, graduating from Columbia University with the A.B. degree in 1901 and the Ph.D. in 1905. Before completing his graduate work, he was appointed Assistant and later Instructor in Biology at Williams College, where he remained until he was called to Yale in 1907. There he served successively as Instructor, Assistant Professor and Professor, until his death. He became Chairman of the department and Director of the Osborn Zoological Laboratory in 1938, but took leave of absence in November 1946 on account of ill health.

His connection with the Marine Biological Laboratory began in 1905 when he attended the summer session as Investigator and Instructor in the Invertebrate Course and was elected to membership in the Corporation. Four years later, he joined the Staff of the course in Embryology of which he remained a member until 1914. During the absence of Dr. Calkins in the summer of 1927, he was in charge of the course in Protozoology. Elected to the Board of Trustees in 1923, he served with them until his death and during the years 1930–32, he was a member of the Executive Committee.

Coming to Yale at a time when a radical reorganization of the instruction in biology was to be undertaken, Woodruff took part from the first in teaching general biology and in 1910 assumed full charge of the general course in Yale College. This he built up into one of the soundest and at the same time, most popular courses in the University. Through the years, thousands of students listened to his masterly lectures, later incorporated in his textbook, “The Foundations of Biology,” which has been very widely used and has run through six editions.
Woodruff’s research was exclusively in the field of unicellular organisms. Beginning with his doctoral dissertation, which was done under the direction of the late Professor Calkins and published in 1905, he made many contributions to our knowledge of the life history of ciliates, their division rate, nuclear reorganization, the effect of environmental factors on their life cycle. He is perhaps best known for the famous pedigreed race of Paramecium aurelia, which was carried for eight years with daily isolation of the products of division, thus precluding conjugation and showing that these organisms can reproduce asexually indefinitely without dying out. In the first eight years over 5,000 generations were obtained and afterward the culture was carried in a less rigorous manner though sufficiently carefully to exclude conjugation except possibly between closely related individuals. The culture has now reached more than 24,000 generations without loss of vigor. In the course of this work, Woodruff and Erdmann discovered that, corresponding to the rhythms in division rate, the nuclei of the paramecia undergo a reorganization process which they termed “endomixis” and which they described as a form of nuclear reorganization with syncaryon formation. This stirred up much discussion and more recently the process has been described by others as autogamy, involving fusion between micronuclei from the same cell.

His research naturally attracted graduate students, and throughout the years many have written their dissertations under his direction and carried his methods to new centers, just as his assistants and students in the course in general biology, many of whom have become teachers, have spread his ideas of the teaching of biology throughout the land.

Woodruff was intensely interested in the history of science. Early in his career at Yale, he organized a course in the history of biology which he continued throughout his life. He was a collector of scientific books of historical significance. He published a number of essays and addresses in this field and organized two series of lectures on the history of science under the auspices of Gamma Alpha Fraternity, which were later published in book form under his editorship. A paper on “Baker on the Microscope and the Polypa” led to a friendly encounter with a descendant of Trembly, the famous author of the treatise on Hydra published in 1744.

Woodruff was Chairman of the Division of Biology and Agriculture of the National Research Council, 1928–29. He was a member of many scientific societies, including the National Academy of Sciences, the American Society of Zoologists, of which he was Secretary-Treasurer, 1907–09 and President in 1942, the American Physiological Society, the American Society of Naturalists (Vice-President, 1923), the American Association for the Advancement of Science, (Fellow) and others. He was a member of Phi Beta Kappa, Gamma Alpha and Sigma Xi, having been President of the Yale Chapter of the last in 1915. He lectured on Protozoology at four summer sessions of the Mountain Laboratory of the University of Virginia. For two terms of three years each, he was an Associate Editor of the Journal of Morphology. In 1935, he received the Townsend Harris medal from the College of the City of New York, where he had been as a student before entering Columbia.

For one who was closely associated with Woodruff for nearly forty years, it is difficult to realize that this intimate relation has been forever broken. The association was one of mutual trust throughout and without serious disagreement. He was always on the side of high standards, which he applied to himself as well as to
others. Indeed, this was one of his outstanding qualities, as was his intense loyalty to the institutions he served. He was quiet and reserved, but with a kindliness that meant much to those about him. With all of his reserve, he could be deeply moved, and he never recovered from the shock of Mrs. Woodruff's death, which came with such cruel suddenness in March 1946.

The members of the Corporation of the Marine Biological Laboratory desire to record their sorrow over the loss of one of their body, a friend and a fellow servant whom they will miss acutely and whose memory they will always cherish.

2. The Staff, 1947

Charles Packard, Director, Marine Biological Laboratory, Woods Hole, Massachusetts.

Senior Staff of Investigation

E. G. Conklin, Professor of Zoology, Emeritus, Princeton University.
Frank R. Lillie, Professor of Embryology, Emeritus, The University of Chicago.
Ralph S. Lillie, Professor of General Physiology, Emeritus, The University of Chicago.
A. P. Mathews, Professor of Biochemistry, Emeritus, University of Cincinnati.
G. H. Parker, Professor of Zoology, Emeritus, Harvard University.

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Libbie H. Hyman, American Museum of Natural History.
A. C. Redfield, Woods Hole Oceanographic Institution.

II. Instructors

F. A. Brown, Associate Professor of Zoology, Northwestern University, in charge of course.
W. D. Burbank, Professor of Biology, Drury College.
C. G. Goodchild, Professor of Biology, S.W. Missouri State College.
John H. Lochhead, Professor of Zoology, University of Vermont.
Madeleine E. Pierce, Associate Professor of Zoology, Vassar College.
W. M. Reid, Associate Professor of Biology, Monmouth College.
Mary D. Rogick, Professor of Biology, College of New Rochelle.
T. H. Waterman, Instructor in Biology, Yale University.

III. Laboratory Assistants

Virginia L. Fogerson, Vassar College.
Amos L. Hopkins, Harvard University.
Marie Wilson, Western Maryland College.

Embryology

I. Consultants

P. B. Armstrong, Professor of Anatomy, College of Medicine, Syracuse University.
H. B. Goodrich, Professor of Biology, Wesleyan University.

* Deceased.
REPORT OF THE DIRECTOR

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JOHN A. MOORE, Assistant Professor of Zoology, Barnard College.
JEAN BRACHET, Professor of Experimental Morphology, University Brussels.

III. RESEARCH ASSISTANT

MARJORIE HOPKINS FOX, University of California.

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MERKEL H. JACOBS, Professor of Physiology, University of Pennsylvania.

II. INSTRUCTORS

ARTHUR K. PARPART, Associate Professor of Biology, Princeton University, in charge of course.
E. S. GUZMAN BARRON, Associate Professor of Biochemistry, The University of Chicago.
RUDOLPH T. KEMPTON, Professor of Zoology, Vassar College (absent in 1946).
M. J. KOPAC, Assistant Professor, New York University.
GEORGE WALD, Associate Professor of Biology, Harvard University.
DOROTHY WRINCH, Lecturer, Smith College.

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W. R. TAYLOR, University of Michigan.

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HANNAH CROASDALE, Dartmouth College.
ISABELLA ABBOTT, University of California.

III. RESEARCH ASSISTANTS

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R. D. WOOD, Northwestern University.
IV. Laboratory Assistant

Edwin T. Moul, University of Pennsylvania.

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L. Robinson Hyde, Phillips Exeter Academy, Exeter, N. H.

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Robert Adams
G. T. Nickelson, Jr.
R. W. Kahler
A. J. Pierce
Geo. Kahler
T. E. Tawell

THE GEORGE M. GRAY MUSEUM

3. Investigators and Students

Independent Investigators, 1947

Abbott, Isabella A., Graduate Student, University of California.
Abelson, Philip H., Chairman Bio Physics Section, Carnegie Inst. of Washington.
Allen, M. Jean, Instructor in Biology, Mather College, Western Reserve University.
REPORT OF THE DIRECTOR

ANDERSON, RUBERT S., Assistant Professor of Physiology, University of Maryland Medical School.

ARMSTRONG, PHILIP B., Professor of Anatomy, College of Medicine, Syracuse University.

ATLAS, MEYER, Assistant Professor of Biology, Yeshiva University.

BAEZ, SILVIO, Research Fellow, Cornell Medical College.

BALL, ERIC G., Professor of Biological Chemistry, Harvard Medical School.

BARRON, E. S. GUZMAN, Associate Professor of Biochemistry, The University of Chicago.

BARTLETT, JAMES H., Professor of Theoretical Physics, University of Illinois.

BARTON, ELEANOR, Assistant Professor of Zoology, N. J. College for Women, Rutgers University.

BERGER, CHARLES A., Director, Biological Laboratory, Fordham University.

BLISS, ALFRED F., Assistant Professor of Physiology, Tufts College Medical School.

BLOOM, HAROLD F., Guggenheim Fellow, National Cancer Institute.

BOELL, E. J., Professor of Biology, Yale University.

BROWNELL, KATHERINE A., Instructor, Ohio State University.

BRUST, MANFRED, Graduate Student, University of Chicago.

BUNO, WASHINGTON, Professor and Director Department of Histology, School of Medicine, Montevideo.

BURBANCK, W. D., Professor of Biology, Drury College.


CHAMBERS, ROBERT, Research Professor of Biology, New York University.

CHASE, AURIN M., Assistant Professor of Biology, Princeton University.

CHEN, RALPH H., Associate Professor of Biology, Brooklyn College.

CHRYSSTALL, FRIEDA L., Teacher of Biology, New York City Public High School.

CLAFF, C. LLOYD, Research Fellow in Surgery, Harvard Medical School.

CLARK, A. M., Instructor in Biology, University of Delaware.

CLARK, ELIOT R., Professor of Anatomy, University of Pennsylvania School of Medicine.

CLARK, L. B., Professor of Biology and Chairman of Department, Union College.

CLEMENT, A. C., Professor of Biology, College of Charleston.

CLOWES, G. H. A., Research Director Emeritus, Eli Lilly & Company.

COLE, KENNETH S., Professor of Biophysics, University of Chicago.

COLVIN, ARTHUR L., Assistant Professor of Biology, Queens College.

CONKLIN, E. G., Professor Emeritus of Biology, Princeton University.

COOPER, KENNETH W., Associate Professor of Biology, Princeton University.


COPELAND, D. E., Assistant Professor of Zoology, Brown University.

CORSMAN, IVOR, Research Fellow, Sloan-Kettering Institute.

COSTELLO, DONALD P., Professor of Zoology, University of North Carolina.

CROADALE, HANNAH T., Associate in Zoology, Dartmouth College.

CROWELL, SEARS, Associate Professor of Zoology, Miami University.

CURTIS, WINSTON C., Professor Emeritus of Zoology, University of Missouri.

DAY, JEAN C., Independent Investigator, Misaki Marine Biological Station, Japan.

DOTY, MAXWELL S., Assistant Professor of Botany, Northwestern University.

DUMM, MARY Y., Instructor in Chemistry, New York University Medical College.

DURVISON, WILLIAM R., Guest Investigator, Carnegie Institute of Washington.

EDELBURG, ROBERT H., Assistant Professor of Zoology, University of Alabama.

EICHEL, BERTRAM, Teaching Research Fellow, N. Y. U. College of Dentistry.

EVANS, TITUS C., Assistant Professor of Radiobiology, College of Physicians and Surgeons.

FAILL, G., Professor of Radiology, College of Physicians and Surgeons.

FIGGE, FRANK H. J., Associate Professor of Anatomy, University of Maryland School of Medicine.
FISHER, HARVEY F., Western Reserve University.
FROEHLICH, ALFRED, Associate, May Institute for Medical Research.
GABRIEL, MORDECAI L., Instructor of Biology, Brooklyn College.
GILMAN, LAUREN C., Assistant Professor of Zoology, University of South Dakota.
GLASER, OTTO, Professor of Biology, Amherst College.
GOODCHILD, C. G., Professor of Biology, Missouri State College.
GOODRICH, H. B., Professor of Biology, Wesleyan University.
GOREMAN, AUBREY, Assistant Professor of Zoology, Columbia University.
GOULD, HARLEY N., Professor of Biology, Newcomb College.
GROSH, DANIEL S., Assistant Professor, University of North Carolina.
GRUNDFEST, HARRY, Research Associate in Neurology, Columbia University Medical School.
HALL, THOMAS S., Associate Professor of Zoology, Washington University.
HAMILTON, HOWARD L., Assistant Professor of Zoology, Iowa State College.
HARTMAN, FRANK A., Professor of Physiology, Ohio State University.
HARVEY, ETHEL BROWN, Research Biology Department, Princeton University.
HARVEY, E. NEWTON, Professor of Physiology, Princeton University.
HEIDENTHAL, GERTRUDE, Assistant Professor of Biology, Russell Sage College.
HEILBRUNN, L. V., Professor of Zoology, University of Pennsylvania.
HICHOSON, ANNA KELTCH, Research Chemist, Eli Lilly & Company.
HINTON, TAYLOR, Instructor, Amherst College.
HOPKINS, HOYT S., Associate Professor of Physiology, N. Y. U. College of Dentistry.
HSAIO, SIDNEY C., Visitor and Seessel Fellow, Yale University.
IPPT, JOHN D., Assistant Professor of Biology, Simmons College.
JABLONS, BENJAMIN, Associate Clinical Professor, New York Medical College.
JACOBS, M. H., Professor of General Physiology, University of Pennsylvania.
JENKINS, GEORGE B., Emeritus Professor of Anatomy, George Washington University.
JEROME, SISTER FRANCIS, Professor of Biology, Ohio State University.
KARUSH, FRED, Research Associate, N. Y. U. Medical School.
KEMP, MARGARET, Associate Professor of Botany, Smith College.
KEMPSON, RUDOLPH T., Professor of Zoology, Vassar College.
KICSH, BRUNO, Professor at Yeshiva University.
KITCHEN, I. C., Research Fellow, Princeton University.
KLOTZ, IRVING M., Assistant Professor of Chemistry, Northwestern University.
KOPAC, M. J., Associate Professor of Biology, N. Y. U. Washington Square College.
KRahl, M. E., Assistant Professor of Pharmacology, Washington University.
KREEZER, GEORGE L., Guggenheim Fellow, Princeton University.
KRUCELIS, EDITH J., Research Associate, University of Pennsylvania.
KUFFLER, STEPHEN W., Assistant Professor of Physiological Optics, Johns Hopkins Medical School.
LAVIN, GEORGE I., in charge of Spectroscopic Laboratory, Rockefeller Institute for Medical Research.
LAZAROW, ARNOLD, Assistant Professor of Anatomy, Western Reserve University.
LEFEBRE, PAUL G., Instructor in Physiology, University of Vermont.
LIBET, BENJAMIN, Instructor in Physiology, University of Chicago.
LIU, CHIEN-KANG, Graduate Student, McGill University.
LILLIE, RALPH S., Professor Emeritus of Physiology, University of Chicago.
LOCKHEAD, JOHN H., Assistant Professor of Zoology, University of Vermont.
LYNN, W. GARDNER, Associate Professor, The Catholic University of America.
MACDOUGALL, MARY S., Professor of Zoology, Agnes Scott College.
MARSHAK, ALFRED, Research Associate, New York University Medical College.
MARSLAND, DOUGLAS A., Associate Professor of Biology, N. Y. U. Washington Square College.
MAVOR, JAMES W., Research Professor of Biology, Union College.
MAZIA, DANIEL, Associate Professor of Zoology, University of Missouri.
MCDONALD, SISTER ELIZABETH SETON, Professor of Biology, College of Mt. St. Joseph.
MEMHARD, ALLEN R., Riverside, Connecticut.
METZ, CHARLES B., Assistant Professor of Zoology, Yale University.
METZ, C. W., Chairman, Department of Zoology, University of Pennsylvania.
MILLER, JAMES A., Chairman, Department of Anatomy, Emory University.
MOORE, JOHN A., Assistant Professor of Zoology, Barnard College.
MOUL, EDWIN T., Assistant Instructor of Botany, University of Pennsylvania.
NABRIT, S. M., Professor of Biology, Atlanta University and Moreland College.
NACHMANSOHN, DAVID, Research Associate in Neurology College of Physicians and Surgeons.
MOORE, JOHN A., Research Fellow, Institute of Zoology, Academia Sinica, China.
NORTHROP, JOHN H., Member of the Institute, Rockefeller Institute, Princeton.
O'BRIEN, JOHN A., JR., Assistant Professor of Biology, Catholic University of America.
OLMSTED, FREDERICK, Member Research Staff, Cleveland Clinic.
OSTERHOUT, W. J. V., Member Emeritus, Rockefeller Institute for Medical Research.
PAPPENHEIMER, A. M., Associate Professor of Bacteriology, New York University.
PARMENTER, ARTHUR K., Professor of Biology, Princeton University.
PARMENTER, CHARLES L., Professor of Zoology, University of Pennsylvania.
PARS, ARTHUR K., Professor of Biology, Princeton University.
PATT, DONALD L., Instructor in Biology, Middlebury College.
PEQUEIGNAT, WILLIS E., Assistant Professor of Zoology, Pomona College.
PIERCE, MADELENE E., Associate Professor, Vassar College.
PLUGH, HAROLD H., Professor of Biology, Amherst College.
PROSSER, C. LADD, Associate Professor of Zoology, University of Illinois.
RED, W. MALCOLM, Associate Professor and Department Head of Biology, Monmouth College.
ROBBIE, WILBUR A., Research Assistant Professor, State University of Iowa.
ROGICK, MARY D., Professor of Biology, College of New Rochelle.
ROOPEN, PAUL G., Professor of Anatomy, University of Kansas.
ROTH, ALEXANDER, Research Assistant, University of Kansas.
RUDNISKI, ANNA MARIA, Research Worker, Washington Square College.
RUGI, ROBERTS, Associate Professor of Biology, N. Y. U. Washington Square College.
RULON, OLIN, Assistant Professor of Biology, Wayne University.
SCHMIDT, GEHEART, Research Fellow, Tufts Medical School.
SCHNEIDER, LEON H., Instructor, New York University Dental College.
SOUTH, ALAN, Associate Professor of Biology, Union College.
SHAPIRO, HERBERT, Physiologist, National Institute of Health.
SHEEP, FREDERICK G., Instructor of Biology, Brown University.
SICHEL, F., Professor of Physiology, University of Vermont.
SHEMET, SYDNEY, University Lecturer, Cambridge University, England.
STEWART, DOBETHY R., Assistant Professor of Anatomy, Western Reserve Medical School.
SPREDEL, CARL C., Professor of Anatomy, University of Virginia.
STEINBACH, H. B., Professor of Zoology, University of Minnesota.
STOUK, ALMA G., Professor Emeritus, Mount Holyoke College.
STOUT, HARRY N., Instructor in Biology, Temple University.
STRAND, WILLIAM L., Associate Professor of Anatomy, Johns Hopkins University.
STUNKARD, HORACE W., Professor of Biology, New York University.
SZENT-GYORGYI, ALBERT, Professor of Biochemistry, Budapest University, Budapest.
TAYLOR, WM. RANDOLPH, Professor of Botany, University of Michigan.
TOWNSEND, GRACE G., Professor of Biological Science, Cincinnati College of Pharmacy.
TRACY, HENRY, Professor of Anatomy, University of Kansas.
TREITEL, OTTO, Research Associate, Botanical Laboratory, University of Pennsylvania.
VILNER, CLAIRE A., Instructor in Biological Chemistry, Harvard Medical School.
WAINIO, WALTER W., Assistant Professor, New York University College of Dentistry.
WALD, GEORGE, Associate Professor, Harvard University.
WARD, HELEN L., Instructor in Zoology, University of Tennessee.
WARNER, ROBERT C., Assistant Professor of Chemistry, New York University College of Medicine.
WATERMAN, TALBOT, Instructor, Yale University.
Watterson, Ray L., Assistant Professor of Zoology, University of Chicago.
Whiting, Anna R., Guest Investigator, University of Pennsylvania.
Whiting, P. W., Professor of Zoology (Genetics), University of Pennsylvania.
Wichterman, Ralph, Associate Professor of Biology, Temple University.
Wilber, Charles G., Assistant Professor of Physiology, Fordham University.
Wilde, C. E., Jr., Instructor of Biology, Princeton University.
Winston, Charles P., Assistant Professor, School of Hygiene, Johns Hopkins University.
Witkus, Eleanor R., Instructor in Botany and Cytology, Fordham University.
Winch, Dorothy, Lecturer, Smith College.
Yntema, Chester L., Associate Professor of Anatomy, Syracuse University Medical College.
Zinn, Donald J., Instructor in Zoology, Rhode Island State College.
Zorzi, Anita, Instructor in Physiology and Biochemistry, Washington University.
Zweifach, Benjamin W., Assistant Professor of Physiology, Cornell Medical College.

Beginning Investigators, 1947

Alscher, Ruth P., Instructor in Biology, Manhattanville College.
Allen, Mary Belle, Research Fellow, Washington University.
Berg, George G., Graduate Student, Columbia University.
Blumenthal, Gertrude, University of Pennsylvania.
Bronfenbrenner, Alice, Medical Student, Washington University Medical School.
Crane, Robert K., Graduate Student, Harvard University.
Fahy, Elizabeth M., Boston University.
Ferguson, Alice, Graduate Assistant, Louisiana State University.
Fogerson, Virginia L., Assistant in Zoology, Vassar College.
Fontanella, M. A., Instructor in Comparative Anatomy, Fordham University.
Fowle, Ann M. C., Research Assistant, University of Toronto.
Gollub, Seymour, Student, University of Pennsylvania.
Green, James W., Graduate Student, Princeton University.
Herbruck, Bruce K., Student, Western Reserve University School of Medicine.
Kunzt, Eloise, Assistant in Biology, Brown University.
Lerner, Eleanor, Fellow in Zoology, Washington University.
Lorace, Roberta, Teaching Fellow, University of North Carolina.
Lums, Ethel Sue, Graduate Assistant in Zoology, Washington University.
Martin, Barbara A., Assistant in Zoology, Barnard College.
McLean, Dorothy J., Demonstrator, University of Toronto.
Nelson, Thomas Gifford, Graduate Assistant, Columbia University.
Nurnberg, Miriam, Graduate Student, New York University.
Pettengill, Olive S., Graduate Assistant in Physiology, Brown University.
Ransmeier, Robert E., Graduate Student, University of Chicago.
Recknagel, Richard O., Student, University of Pennsylvania.
Schlesinger, Arthur H., Research Fellow, Northwestern University.
Shaver, John R., Instructor in Zoology, University of Pennsylvania.
Sirot, Gustave, Western Reserve University.
Taylor, Babette, Graduate Student, University of Minnesota.
Tietze, F., Research Fellow, Northwestern University.
Van Hoesen, Drusilla, Graduate Student, University of Pennsylvania.
Weiner, Milton H., Student, Western Reserve University.
Weinstein, H. G., Research Assistant, University of Illinois.
Wilson, Jean R., Graduate Student, University of Pennsylvania.
Wilson, Walter L., Assistant Instructor in Zoology, University of Pennsylvania.
Wittenberg, Jonathan, Student, Columbia University.

Research Assistants, 1947

Abramsky, Tess, Research Assistant, Rockefeller Institute for Medical Research.
Benson, Eleanor, Research Assistant, University of Pennsylvania.
Berman, Jack H., Graduate Student, Western Reserve University.
Berman, Ruth, Student and Research Assistant, University of Pennsylvania.
Carlson, Francis D., Research Assistant, Johnson Foundation, University of Pennsylvania.
REPORT OF THE DIRECTOR

CLIFFINGER, F. W., Student, Drury College.
CONNELLY, C. M., Graduate Student, Johnson Foundation, University of Pennsylvania.
COOPER, OCTAVIA, Research Assistant, Harvard Medical School.
COOPERSTEIN, SHERWIN, Student, New York University College of Dentistry.
DANUSKY, PHILIP, Research Assistant, University of Pennsylvania.
DEV, THOMAS E., Research Technician, Princeton University.
DIETZ, ALMA, Student, University of Michigan.
ESTABLE, JOSE J., Professor of Pharmacology, University of Montevideo, Uruguay.
FERREIRA, HISS M., Fellow in Biophysics, University of Chicago.
FOLEY, MARY T., Research Assistant, Yale University.
FOX, MARJORIE HOPKINS, Instructor, San Francisco Junior College.
GOLD, MARCIA, Research Assistant, University of Chicago.
HENDEE, EDELMIRA D., Research Assistant, New York University Medical School.
HENLEY, CATHERINE, Research Assistant, University of North Carolina.
Hirschhorn, Henry A., Student, New York University.
HOARE, CATHERINE V., Graduate Assistant in Bacteriology, Brown University.
HONEGGER, CAROL M., Instructor, Temple University.
JAFFE, LIONEL F., Harvard University.
KEMP, GRACE, Graduate Assistant, Wesleyan University.
METZ, DELILAH B., Research Associate in Medicine, Cornell Medical School.
MEZZO, LISLELOTTE, Washington University.
MITCHELL, CONSTANCE, Research Assistant, University of Pennsylvania.
Neff, Robert J., Research Assistant, University of Missouri.
Norris, Karl H., Electronic Engineer, University of Chicago.
Northcraft, Richard D., Instructor, Rutgers University.
PORTIS, RICHARD A., Graduate Student, Western Reserve University.
RALL, WILFRID, Fellow in Biophysics, University of Chicago.
RIESER, PETER, Research Assistant, University of Pennsylvania.
ROTHENBERG, M. A., Research Assistant in Neurology, Columbia University.
SANDEEN, MURIEL, Teaching Assistant, Northwestern University.
SEAMAN, GERALD R., Graduate Assistant, Fordham University.
VOLKMAN, ALVIN, Graduate, Union College.
WALTERS, C. PATRICIA, Research Assistant, Eli Lilly & Company.
WEBB, MARGUERITE, Teaching Assistant, Northwestern University.
WEISS, MICHAEL S., Research Assistant in Neurology, College of Physicians and Surgeons.
WHEELER, CHARLES B., Research Assistant, Anatomy Department, University of Kansas.
WILLIS, MARION, Research Assistant, University of Pennsylvania.
WILSON, MARIE, Assistant in Zoology, Northwestern University.
WOODWARD, ARTHUR A., Jr., Instructor in Zoology, University of Pennsylvania.
YOUNG, MARCIA A., Technical Assistant, Ohio State University.

Library Readers, 1947

BERG, WILLIAM E., Research Fellow in Medical Physics, University of California.
BERNHEIMER, ALLAN W., Assistant Professor of Bacteriology, New York University College of Medicine.
BLOCH, ROBERT, Research Associate in Botany, Yale University.
CANTONI, G. L., Assistant Professor in Pharmacology, Long Island College of Medicine.
CLIFFORD, SISTER ADELE, Teacher, College of Mount St. Joseph.
DEANE, HELEN W., Instructor, Harvard Medical School.
FRIES, E. F. B., Assistant Professor of Biology, City College of New York.
GATES, R. RUGLES, Research Fellow in Biology, Harvard University.
GRANT, MADELEINE, Member Teaching Faculty, Sarah Lawrence College.
GUDERNATSCHE, FREDERICK, Visiting Professor, New York University.
GUREWICH, VLADIMIR, Assistant Visiting Physician, Bellevue Hospital.
HARRISON, JOHN W., Student, Medical School, University of Pennsylvania.
HOBSON, LAWRENCE B., Assistant, Resident, New York Hospital.
JOFTES, David L., Assistant in Biology, Tufts College.
JONASSEN, Hans B., Assistant Professor of Chemistry, Tulane University.
LANGE, Mathilde M., Professor of Zoology, Wheaton College.
LEDERBERG, Joshua, Fellow, Jane Coffin Childs Fund, Yale University.
LEVITT, Leo C., Graduate Student in Physics, Princeton University.
LEVEY, Stanley, Instructor in Biochemistry, Wayne University College of Medicine.
LOEWI, Otto, Research Professor of Pharmacology, New York University College of Medicine.
MEYERSHOF, Otto, Research Professor of Biochemistry, University of Pennsylvania.
MOUTON, Robert F., Head of Mission, Belgium.
OSTER, Robert H., Associate Professor of Physiology, University of Maryland School of Medicine.
PICK, Joseph, Associate Professor of Anatomy, New York University College of Medicine.
PRICE, Bronson, Analyst, U. S. Public Health Service.
ROSE, S. Mary, Assistant Professor, Smith College.
RYAN, Francis J., Assistant Professor of Zoology, Columbia University.
SCHNEIDER, Lillian K., Research Assistant in Microbiology, Columbia University.
SCHWARTZMAN, Gregory, Head of Department of Bacteriology, Mt. Sinai Hospital.
SIEGEL, Benjamin, Associate in Laboratory of Electron Microscopy, Polytechnic Institute.
SPRATZ, Nelson T., Jr., Assistant Professor of Biology, Johns Hopkins University.
TAUSK, Hertha H., Research Associate, Cornell University Medical College.
VON SALLMAN, Ludwig, Associate Professor, College of Physicians and Surgeons.
WAGMAN, Irving H., Associate in Physiology, Jefferson Medical College.
WATTS, Nellie P., Pharmacologist, Abbott Laboratories.
ZAWADZKI, Bronislaw, Fellow, College of Physicians and Surgeons.

Students, 1947

BOTANY

BOYLE, E. Marie, Science Teacher, Baldwin School.
CADORET, Remi, Student, Harvard College.
COYLE, Elizabeth E., Assistant Professor of Biology, College of Wooster.
DEARDEN, Elizabeth R., Research Assistant, University of Toronto.
DIPPEL, Ruth D., Research Associate, Indiana University.
DOWREN, Zelman Z., Instructor, University of Connecticut.
ERSKINE, David S., Acadia University.
FERGUSON, Edward L., Undergraduate, Wesleyan University.
GAGE, Marilyn A., Student, Pennsylvania College for Women.
GRIMM, Madelon R., Research Assistant in Bacteriology, Amherst College.
HOLMES, Robert W., Student, Haverford College.
HULBERT, Edward M., Graduate Student, University of Michigan.
HYDE, Beal B., Student, Harvard University.
LAWSON, Dorothy L., Wellesley College.
SPIEGEL, Leonard E., Drew University.
WOOD, Richard D., Northwestern University.
WOOD, Urda K., Northwestern University.

EMBRYOLOGY

BAUER, Mark H., Graduate Student, Princeton University.
BLAIR, Charles B., Graduate Student, Instructor, University of North Carolina.
BOLTON, Ellis T., Graduate Assistant, Rutgers University.
BUCHANAN, Douglas, Assistant in Biochemistry, Dartmouth Medical School.
CALVET, Julie N., Demonstrator in Biology, Bryn Mawr College.
CHMIELOWSKI, Adam A., Graduate Assistant, Marquette University.
CLOUD, Preston E., Jr., Assistant Professor of Geology, Harvard University.
COTELLOU, Rev. J. R., Student, Northwestern University.
REPORT OF THE DIRECTOR

DICKASON, MARY E., Smith College.
EDWARDS, JOHN P., Graduate, Drury College.
GOMBURG, CHARLES, Student, McGill University.
GREGG, JAMES H., Graduate Student, Princeton University.
HILL, HENRIETTA J., Dickinson College.
HINCEY, M. CATHERINE, Instructor in Biology, Temple University.
HOLTZER, HOWARD, Student, University of Chicago.
HOPKINS, AMOS L., Harvard College.
ISAAC, ISAAC B., Wesleyan University.
KLAI, HELENE H., Graduate Assistant, University of Oklahoma.
LEONE, CHARLES A., Instructor, Rutgers University.
MAGDEBARGER, ALICE E., Student, Goucher College.
MAXON, MARION G., Graduate Assistant, Claremont Graduate School.
NELSON, BETTY G., Graduate Student, Johns Hopkins University.
ODUM, HOWARD T., Graduate Student, University of North Carolina.
PADDYCARLIS, HELEN A., Graduate Assistant, Mt. Holyoke College.
RIGGS, AUSTIN F., Student, Harvard College.
ROBBINS, MARYLYN, Student, Stanford University.
ROSENDELMAN, LIBBY, Laboratory Assistant, University of Michigan.
RUSSE, EVELYN E., Rosemont College.
SIMMER, RUTH E., Graduate Student, Yale University Medical School.
STOLACK, RICHARD B., Graduate Assistant, University of North Carolina.
WEINSTEN, HYMAN G., Research Assistant, University of Chicago.
WENGER, BYRON S., Graduate Assistant, Washington University.
ZUCKERKANDL, EMIL, University of Illinois.

PHYSIOLOGY

ARDAO, MARIA I., Assistant Professor of Chemistry, Montevideo, Uruguay.
BATeman, MARGARET M., Graduate Student, Washington University.
BICK, RICHARD O., Long Island College of Medicine.
BLOCH, SAMUEL W., Hammond, Louisiana.
COSGROVE, WILLIAM B., Graduate Assistant, New York University.
DAS, S. M., Government Scholar, Government of India.
EDELBERG, ROBERT E., Graduate Student, University of Pennsylvania.
FLAIA, SILVIO, Charles University, Prague.
FRIEDMAN, FLORENCE L., Teaching Assistant, Washington University.
GOUBLEY, D. R. H., Research Assistant, University of Toronto.
HAMILTON, JAMES D., Fellow, Department of Medical Research, University of Western Ontario.
HANKE, HARRETT, Teaching Fellow in Biology, New York University.
IRVING, JACK HOWARD, Graduate Student, Princeton University.
KAUPE, WALTER, Massachusetts Institute of Technology.
KELLOGG, RALPH H., Teaching Fellow in Physiology, Harvard Medical School.
LAYTON, LAURENCE L., Assistant Professor, Johns Hopkins University.
LOVE, WARREN E., Graduate Student, University of Pennsylvania.
MCANN, WILLIAM P., Cornell University Medical College.
MOSEKOVIC, SAMUEL, Graduate School, New York University.
NELSON, LEONARD, Graduate Teaching Assistant, Washington University.
PAULSEN, ELIZABETH C., Instructor in Zoology, University of Vermont.
PERLMAN, PRESTON L., Research Fellow, Cornell University.
RANSOME, R. E., Graduate Student, University of Chicago.
STOKER, ALOYS C., Research Fellow, University of Toronto.
STOKER, BURTON, Student, New York University Medical School.
TAYLOR, ROBERT E., Fellow in Physiology, Strong Memorial Hospital.
INVERTEBRATE ZOOLOGY

ALLEN, JOHN M., Drury College.
ALSCHER, RUTH P., Instructor in Biology, Manhattanville College.
ANDERTON, LAURA G., Laboratory Assistant, Brown University.
BAUER, EDWARD CHARLES, Undergraduate Assistant, University of Connecticut.
BOSS, WILLIS R., University of Iowa.
BOYER, GEORGE F., Graduate Student, University of Illinois.
BRAGG, NANA I., Student, Oberlin College.
BUCKLIN, DONALD H., Graduate Assistant, Amherst College.
BUCKLIN, DONALD H., Graduate Assistant, Amherst College.
CHAMBERLIN, J. LOCKWOOD, Tufts College.
COLE, GERALD A., Laboratory Assistant, University of Minnesota.
CORLISS, CLARK E., Graduate Student, University of Massachusetts.
DANIEL, EDWIN E., Student, Johns Hopkins University.
EHRLICH, MIRIAM, Graduate Student, Yale University.
EVANS, JEANNE F., Student, University of Pennsylvania.
FLYNN, JOYCE M., Newton, Massachusetts.
FORD, BENJAMIN P., Princeton University.
FORD, DONALD H., Laboratory Assistant, Wesleyan University.
FULLER, FORST D., Instructor in Zoology, Purdue University.
GLOCKLER, ANNABEL, Western Maryland College.
HAY, ELIZABETH D., Undergraduate, Smith College.
HENOCH, STEPHANIE D., Graduate Assistant, Indiana University.
KAMNER, SANDRA L., Goucher College.
KELLER, MILDRED E., Randolph-Macon Woman's College.
MCCELLIGOTF, JANE K., Graduate Student, Fordham University.
MCGUIRE, IRENE E., Fordham University.
McWHINNIE, MARY A., Instructor in Zoology, DePaul University.
MELTZER, JAY, Student, Princeton University.
ODUM, HOWARD T., Graduate Student, University of North Carolina.
PENNA, VINCENT, Student, Wesleyan University.
PRONKO, ROBERT C., Student, Drury College.
RADFORD, BETTY J., Assistant in Biology Department, Agnes Scott College.
SCHAEPE, GLADYS E., Western Maryland College.
SPRUNGER, ELEANOR V., Vassar College.
STAY, BARBARA A., Student, Vassar College.
STEVES, TAYLOR A., East Weymouth, University of Massachusetts.
STOLACK, RICHARD B., Graduate Student, University of North Carolina.
STUBBS, LOUIS, Graduate Student, Fordham University.
THAYER, PHILIP S., Amherst College.
TRENT, JANE, Assistant, Wesleyan University.
WENGER, BYRON S., Graduate Assistant, Washington University.
WINN, HUDSON S., Graduate Teaching Assistant, Northwestern University.
WINSTON, PAUL W., Student, University of Massachusetts.
WOLF, DORIS E., Graduate Student, University of Minnesota.
WONG, AN CHI, Wellesley College.
REPORT OF THE DIRECTOR

4. Tabular View of Attendance

<table>
<thead>
<tr>
<th></th>
<th>1943</th>
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<td>INVESTIGATORS—Total</td>
<td>160</td>
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<tr>
<td>Independent</td>
<td>89</td>
<td>112</td>
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<td>Library readers</td>
<td>35</td>
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<td>Research assistants</td>
<td>17</td>
<td>20</td>
<td>26</td>
<td>25</td>
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<tr>
<td>STUDENTS—Total</td>
<td>68</td>
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<td>Zoology</td>
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<td>Less persons registered as both students and investigators</td>
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<td>124</td>
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<td>By investigators</td>
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<td>74</td>
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<td>SCHOOLS AND ACADEMIES REPRESENTED</td>
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<td>FOREIGN INSTITUTIONS REPRESENTED</td>
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<td>By students</td>
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5. Subscribing and Cooperating Institutions, 1947

Cooperating Institutions

American Philosophical Society (Penrose Fund)
Amherst College
Brooklyn College
Brown University
Bryn Mawr College
The Catholic University of America
College of Mt. St. Joseph on the Ohio
Columbia University
Cornell University
Duke University
Fordham University
Goucher College
Harvard University
Harvard University Medical School
Johns Hopkins Medical School
Johns Hopkins University
Johnson Foundation
Eli Lilly & Company
Macy Foundation
Massachusetts Institute of Technology
Memorial Hospital
Miami University
New York University
New York University College of Medicine
New York University School of Dentistry
New York University Washington Square College
Oberlin College
Ohio State University
Pomona College
Princeton University
Rockefeller Institute of Medical Research
State University of Iowa
Syracuse University Medical School
Temple University
Tufts College
Union College
University of Chicago
University of Illinois
University of Kansas
University of Maryland Medical School
University of Missouri
University of Pennsylvania
University of Pennsylvania School of Medicine
University of Rochester
University of Toronto
University of Vermont
University of Virginia
Vassar College
Washington University
Wayne University
Wellesley College
Wesleyan University
Western Reserve Medical School
Wilson College
Woods Hole Oceanographic Institution
Yale University
6. THE FRIDAY EVENING LECTURES, 1947

June 27
  DR. GOTTFRIED FRAENKEL ................... "Nutritional Research with Insects."
July 3
  DR. JEAN BRACHET ......................... "Metabolism of Nucleic Acids in Embryonic Development."
July 11
  PROF. E. L. TATUM ....................... "Mutation in Microorganisms."
July 25
  DR. F. O. SCHMITT ....................... "Studies of the Ultra Structure of Connective Tissue Constituents."
August 1
  DR. PHILIP H. ABELSON .................. "Tracer Isotopes in Biology."
August 8
  PROF. ALFRED S. ROMER ................. In celebration of the 74th Anniversary of the founding of the Agassiz Laboratory at Penikese.
August 15
  DR. JOHN A. MOORE ..................... "Early Development of Amphibian Hybrids."
August 22
  DR. DANIEL MAZIA ....................... "The Molecular Structure of Chromosomes."

OTHER LECTURES

July 24
  DR. PAUL S. GALTSOFF .................. "The Bikini Atom Bomb Test."
July 30
  DR. K. J. HEINICKE ..................... "Recent Developments in Microscopy."
August 13
  DR. OSCAR W. RICHARDS ................. "Phase Microscopy, with Special Reference to Biology."
August 18
  DR. H. J. ABRAHAM .................... U. S. State Dept. Associate Director of Relations with UNESCO.
August 27
  DR. ALBERT SZENT-GYORGYI ............. "Muscular Contraction."
August 28
  PROF. LOUIS VAN DEN BERGHE .......... "National Parks and Scientific Research in the Congo."
REPORT OF THE DIRECTOR

7. Seminars, 1947

July 15
ANNA R. WHITING .................................. "Androgenetic Males from Eggs X-rayed
with Dose Many Times Lethal."
T. S. HALL AND FLORENCE MOOG ............. "Effects of Sodium Azide in Solution upon
the Rate of Amphibian Development."
C. A. VILLEE AND H. B. BISSEL .................. "Nucleic Acids and Nucleotides as Growth
Factors in Drosophila."

July 22
IVOR CORNMAN .................................. "The Effects of Podophyllin on the Matura-
tion and Cleavage of the Starfish Egg."
C. G. WILBER .................................... "The Synthesis of Lipids from Protein in
Colpidium Campylum."
W. W. WAINIO, S. COOPERSTEIN,
S. KOLLEN AND B. EICHEL ....................... "The Preparation of a Soluble Cytochrome
Oxidase."

July 29
Otto MYERHOFF AND JEAN R. WILSON .......... "Glycolysis of Glucose, Fructose, and Hex-
osephosphates in Tumor and Brain Ex-
tracts."
B. LIBET .......................................... "Relatively Steady Potentials and Brain Ac-
tivity."
J. T. BONNER ................................... "Morphogenetic Movement in the Slime
Molds."

August 5
EDITH J. KRUGELIS .............................. "Alkaline Phosphatase Localization in Early
Embryonic Development."
J. R. SHAVER ................................... "Experimental Study of the ‘Second Fac-
tor’ in Artificial Parthenogenesis in Frog
Eggs."
ROBERT BLOCH ................................. "Irreversible Differentiation in Certain
Plant Cell Lineages."

August 12
DOROTHY WRINCH ............................... "Biological Specificity and Biological Mor-
phology."
TAYLOR HINTON ................................. "Factors Influencing the Expression of ‘Posi-
tion Effects.’"
D. E. COPELAND ................................. "The Cytological Basis of Salt Excretion
from the Gills of Fundulus heteroclitus."

August 19
P. W. WHITING .................................. "Spermatogenesis in Sphecoid Wasps."
ETHEL BROWNE HARVEY .......................... "Bermuda Sea Urchins and Their Eggs."
PAUL S. GALTSOFF .............................. "The Red Tide along the Gulf Coast and
Florida."

8. Members of the Corporation, 1947

1. Life Members

*ALLIS, MR. E. J., JR., Palais Carnoles, Menton, France.
BECKWITH, DR. CORA J., Vassar College, Poughkeepsie, New York.
BILLINGS, MR. R. C., 66 Franklin Street, Boston, Massachusetts.
COLE, DR. LEON J., College of Agriculture, Madison, Wisconsin.

* Deceased.
CONKLIN, PROF. EDWIN G., Princeton University, Princeton, New Jersey.
COWDRY, DR. E. V., Washington University, St. Louis, Missouri.
JACKSON, MR. CHAS. C., 24 Congress Street, Boston, Massachusetts.
JACKSON, MISS M. C., 88 Marlboro Street, Boston, Massachusetts.
KING, MR. CHAS. A.
KINGSBURY, PROF. B. F., Cornell University, Ithaca, New York.
LEWIS, PROF. W. H., Johns Hopkins University, Baltimore, Maryland.
MEANS, DR. J. H., 15 Chestnut Street, Boston, Massachusetts.
MOORE, DR. GEORGE T., Missouri Botanical Gardens, St. Louis, Missouri.
MORGAN, MRS. T. H., Pasadena, California.
NOYES, MISS EVA J.
SCOTT, DR. ERNEST L., Columbia University, New York City, New York.
SEARS, DR. HENRY F., 86 Beacon Street, Boston, Massachusetts.
SHEDD, MR. E. A.
STRONG, DR. O. S., Columbia University, New York City, New York.
WAITE, PROF. F. C., 144 Locust Street, Dover, New Hampshire.
WALLACE, LOUISE B., 359 Lytton Avenue, Palo Alto, California.

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ADAMS, DR. A. ELIZABETH, Mount Holyoke College, South Hadley, Massachusetts.
ADOLPH, DR. EDWARD F., University of Rochester Medical School, Rochester, New York.
ALBAUM, DR. HARRY G., Biology Dept., Brooklyn College, Brooklyn, N. Y.
ALBERT, DR. ALEXANDER, Mayo Clinic, Rochester, Minnesota.
AMBERSON, DR. WILLIAM R., Department of Physiology, University of Maryland, School of Medicine.
ANDERSON, DR. RUBERT S., University of Maryland School of Medicine, Department of Physiology, Baltimore, Maryland.
ANGERER, PROF. C. A., Department of Physiology, Ohio State College, Columbus, Ohio.
ARMSTRONG, DR. PHILIP B., College of Medicine, Syracuse University, Syracuse, New York.
AUSTIN, DR. MARY L., Wellesley College, Wellesley, Massachusetts.
BAILLESTELL, DR. GEORGE A., Yale University, New Haven, Connecticut.
BALLARD, DR. WILLIAM W., Dartmouth College, Hanover, New Hampshire.
BALLENTINE, DR. ROBERT, Columbia University, Department of Zoology, New York City, New York.
BALL, DR. ERIC G., Department of Biological Chemistry, Harvard University Medical School, Boston, Massachusetts.
REPORT OF THE DIRECTOR

BARD, Prof. Philip, Johns Hopkins Medical School, Baltimore, Maryland.
BARRON, Dr. E. S. Guzman, Department of Medicine, The University of Chicago, Chicago, Illinois.
BARTH, Dr. L. G., Department of Zoology, Columbia University, New York City, New York.
BARTLETT, Dr. James H., Department of Physics, University of Illinois, Urbana, Illinois.
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BEHRE, Dr. Elinor H., Louisiana State University, Baton Rouge, Louisiana.
BERTHOLF, Dr. Lloyd M., Western Maryland College, Westminster, Maryland.
BEVELANDER, Dr. Gerrit, New York University School of Medicine, New York City, New York.
BEGELLOW, Dr. H. B., Museum of Comparative Zoology, Cambridge, Massachusetts.
BEGELLOW, Prof. R. P., Massachusetts Institute of Technology, Cambridge, Massachusetts.
Bissonnette, Dr. T. Hume, Trinity College, Hartford, Connecticut.
BLANCHARD, Prof. K. C., Johns Hopkins Medical School, Baltimore, Maryland.
BLUM, Dr. Harold F., Department of Biology, Princeton University, Princeton, New Jersey.
BODINE, Dr. James H., Department of Zoology, State University of Iowa, Iowa City, Iowa.
BOEIL, Dr. Edgar J., Yale University, New Haven, Connecticut.
BORING, Dr. Alice M., Yenching University, Peiping, China.
BRADLEY, Prof. Harold C., University of Wisconsin, Madison, Wisconsin.
BRODIE, Mr. Donald M., 522 Fifth Avenue, New York City, New York.
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BROOKS, Dr. Matilda M., University of California, Department of Zoology, Berkeley, California.
BROOKS, Dr. S. C., University of California, Berkeley, California.
BROWN, Dr. Dugald E. S., Bermuda Biological Station, Bermuda.
BROWN, Dr. Frank A., Jr., Department of Zoology, Northwestern University, Evanston, Illinois.
BROWNELL, Dr. Katherine A., Ohio State University, Columbus, Ohio.
BUCK, Dr. John B., Industrial Hygiene Research Lab., National Institute of Health, Bethesda, Maryland.
BUCKINGHAM, Miss Edith N., Sudbury, Massachusetts.
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BULLINGTON, Dr. W. E., Randolph-Macon College, Ashland, Virginia.
BULLOCK, Dr. T. H., University of California, Los Angeles, California.
BURBANK, Dr. William D., Department of Biology, Drury College, Springfield, Missouri.
Burkenroad, Dr. M. D., Yale University, New Haven, Connecticut.
Burkholder, Dr. Paul R., Yale University, New Haven, Connecticut.
Butler, Dr. E. G., Princeton University, Princeton, N. J.
Cameron, Dr. J. A., Baylor College of Dentistry, Dallas, Texas.
Cannan, Prof. R. K., New York University College of Medicine, New York City, New York.
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Carver, Prof. Gail L., Mercer University, Macon, Georgia.
Cattell, Dr. McKern, Cornell University Medical College, New York City, New York.
Cattell, Mr. Ware, Cosmos Club, Washington, D. C.
Chambers, Dr. Robert, Woods Hole, Massachusetts.
Chase, Dr. Aurin M., Princeton University, Princeton, New Jersey.
Cheyney, Dr. Ralph H., Biology Department, Brooklyn College, Brooklyn 10, New York.
Child, Prof. C. M., Jordan Hall, Stanford University, California.
Churney, Dr. Leon, Dept. of Physiology, Louisiana State University School of Medicine, New Orleans 13, Louisiana.
Claff, Mr. C. Lloyd, 31 West Street, Randolph, Massachusetts.
Clark, Prof. E. R., Wistar Institute, Woodland Avenue and 36th Street, Philadelphia 4, Pennsylvania.
Clark, Dr. Leonard B., Department of Biology, Union College, Schenectady, New York.
Clarke, Dr. G. L., Department of Biology, Harvard University, Cambridge 38, Mass.
Cleland, Prof. Ralph E., Indiana University, Bloomington, Indiana.
Clowes, Dr. G. H. A., Eli Lilly and Company, Indianapolis, Indiana.
Coe, Prof. W. R., Yale University, New Haven, Connecticut.
Cohn, Dr. Edwin J., 183 Brattle Street, Cambridge, Massachusetts.
Cole, Dr. Elbert C., Department of Biology, Williams College, Williamstown, Massachusetts.
Cole, Dr. Kenneth S., University of Chicago, Chicago, Illinois.
Collett, Dr. Mary E., Western Reserve University, Cleveland, Ohio.
Colton, Prof. H. S., Box 601, Flagstaff, Arizona.
Colwin, Dr. Arthur L., Queens College, Flushing, Long Island, New York.
Cooper, Dr. Kenneth W., Department of Biology, Princeton University, Princeton, New Jersey.
Copeland, Dr. D. E., Department of Zoology, Brown University, Providence, Rhode Island.
Copeeland, Prof. Manton, Bowdoin College, Brunswick, Maine.
Costello, Dr. Donald P., Department of Zoology, University of North Carolina, Chapel Hill, North Carolina.
COSTELLO, Dr. HELEN MILLER, Department of Zoology, University of North Carolina, Chapel Hill, North Carolina.

CRAMPTON, Prof. H. E., American Museum of Natural History, New York City, New York.

CRANE, JOHN O., Woods Hole, Massachusetts.

CRANE, MRS. W. MURRAY, Woods Hole, Massachusetts.

CROASDALE, HANNAH T., Dartmouth College, Hanover, New Hampshire.

CROUSE, Dr. HELEN V., University of Pennsylvania, Philadelphia, Pennsylvania.

CROWELL, Dr. P. S., Jr., Department of Zoology, Miami University, Oxford, Ohio.

CURTIS, Dr. MAYNIE R., 377 Dexter Trail, Mason, Michigan.

CURTIS, Prof. W. C., University of Missouri, Columbia, Missouri.

DAVIS, Dr. KATSUMA, Misaki Biological Station, Misaki, Japan.

DAVIS, Dr. DONALD W., College of William and Mary, Williamsburg, Virginia.

DAWSON, Dr. A. B., Harvard University, Cambridge, Massachusetts.


DINAR, Dr. PAULINE H., Connecticut College, New London, Connecticut.


DILLER, Dr. WILLIAM F., 1016 South 45th Street, Philadelphia, Pennsylvania.

DODDS, Prof. G. S., Medical School, University of West Virginia, Morgantown, West Virginia.

DOLLEY, Prof. WILLIAM L., University of Buffalo, Buffalo, New York.

DONALDSON, Dr. JOHN C., University of Pittsburgh, School of Medicine, Pittsburgh, Pennsylvania.

DOTY, Dr. MAXWELL S., Northwestern University, Department of Botany, Evanston, Illinois.

DUBois, Dr. EUGENE F., Cornell University Medical College, New York City, New York.

DUSSAR, Dr. BENJAMIN M., c/o Lederle Laboratories Inc., Pearl River, New York.

DUNGAY, Dr. NEIL S., Carleton College, Northfield, Minnesota.

DURREE, Dr. WILLIAM R., Dept. of Terrestrial Magnetism, Washington 15, D. C.

ELLIS, Dr. F. W., 1175 Centre Street, Newton, Massachusetts.

EVANS, Dr. TITUS C., Radiation Research Laboratory, College of Medicine, Iowa City, Iowa.

FAILLA, Dr. G., College of Physicians and Surgeons, New York City, New York.

FAURÉ-FREMiet, Prof. EMANUEL, Collège de France, Paris, France.

FAUST, Dr. ERNEST C., Tulane University of Louisiana, New Orleans, Louisiana.

FERGUSON, Dr. JAMES K. W., Department of Pharmacology, University of Toronto, Ontario, Canada.

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FISCHER, Dr. ERNST, Baruch Centre of Physical Medicine, Medical College of Virginia, Richmond 19, Virginia.

FISHER, Dr. JEANNE M., Department of Biochemistry, University of Toronto, Toronto, Canada.
FISHER, DR. KENNETH C., Department of Biology, University of Toronto, Toronto, Canada.

FORBES, DR. ALEXANDER, Harvard University Medical School, Boston, Massachusetts.

FRISCH, DR. JOHN A., Canisius College, Buffalo, New York.

FURTH, DR. JACOB, V. A. Hospital (Lisbon) Laboratories, Dallas, Texas.

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GASSER, DR. HERBERT, Director, Rockefeller Institute, New York City, New York.

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GEISER, DR. S. W., Southern Methodist University, Dallas, Texas.


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GRAHAM, DR. J. Y., Roberts, Wisconsin.


GRAY, PROF. IRVING E., Duke University, Durham, North Carolina.

GRANT, DR. MADELEINE P., Woods Hole, Massachusetts.

GRAVE, PROF. B. H., DePauw University, Greencastle, Indiana.

GRAY, PROF. IRVING E., Duke University, Durham, North Carolina.

GREGORY, DR. LOUISE H., Barnard College, Columbia University, New York City, New York.


HAGUE, DR. FLORENC E., Sweet Briar College, Sweet Briar, Virginia.

HALL, PROF. FRANK G., Duke University, Durham, North Carolina.

HAMMER, DR. VIKTOR, Department of Zoology, Washington University, St. Louis, Missouri.

HAMILTON, DR. HOWARD L., Iowa State College, Ames, Iowa.


HARMAN, DR. MARY T., Kansas State Agricultural College, Manhattan, Kansas.


HARRISON, PROF. ROSS G., Yale University, New Haven, Connecticut.

HARTMAN, DR. FRANK A., Hamilton Hall, Ohio State University, Columbus, Ohio.

HARVEY, DR. E. NEWTON, Guyot Hall, Princeton University, Princeton, New Jersey.

HARVEY, DR. ETHEL BROWNE, 48 Cleveland Lane, Princeton, New Jersey.


HAYES, DR. FREDERICK R., Zoological Laboratory, Dalhousie University, Halifax, Nova Scotia.

HAYWOOD, DR. CHARLOTTE, Mount Holyoke College, South Hadley, Massachusetts.

HECHT, DR. SELIG, Columbia University, New York City, New York.


HENSHAW, DR. PAUL S., National Cancer Institute, Bethesda, Maryland.

HESS, PROF. WALTER N., Hamilton College, Clinton, New York.

HIBBARD, DR. HOPE, Department of Zoology, Oberlin College, Oberlin, Ohio.

HILL, DR. SAMUEL E., 18 Collins Avenue, Troy, New York.

HINRICH'S, DR. MARIE, Department of Physiology and Health Education, Southern Illinois Normal University, Carbondale, Illinois.

HISAW, DR. F. L., Harvard University, Cambridge, Massachusetts.

HOADLEY, DR. LEIGH, Biological Laboratories, Harvard University, Cambridge, Massachusetts.


HODGE, DR. CHARLES IV, Temple University, Department of Zoology, Philadelphia, Pennsylvania.

HOGUE, DR. MARY J., University of Pennsylvania Medical School, Philadelphia, Pennsylvania.

HOLLAENDER, DR. ALEXANDER, P.O. Box W., Clinton Laboratories, Oak Ridge, Tennessee.

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HOPKINS, DR. HOYT S., New York University, College of Dentistry, New York City, New York.

HYMAN, DR. LIBBIE H., American Museum of Natural History, New York City, New York.

IRVING, LT. COL. LAURENCE, Swarthmore College, Department of Zoology, Swarthmore, Pennsylvania.

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JACOBS, PROF. MERKEL H., School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania.

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JONES, DR. E. RUFFIN, University of Florida, Gainesville, Florida.

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KEMPTON, PROF. RUDOLF T., Vassar College, Poughkeepsie, New York.
KIDDER, DR. GEORGE W., Amherst College, Amherst, Massachusetts.
KIDDER, JEROME F., Woods Hole, Massachusetts.
KILLE, DR. FRANK R., Carleton College, Northfield, Minnesota.
KINDRED, DR. J. E., University of Virginia, Charlottesville, Virginia.
KING, DR. HELEN D., Wistar Institute of Anatomy and Biology, Philadelphia, Pennsylvania.
KING, DR. ROBERT L., State University of Iowa, Iowa City, Iowa.
KLOTZ, DR. I. M., Department of Chemistry, Northwestern University, Evanston, Illinois.
KNOX, DR. F. P., Syracuse University, Syracuse, New York.
KRAHL, DR. M. E., Washington University School of Medicine, Department of Pharmacology, St. Louis, Missouri.
KRIEG, DR. WENDELL J. S., 303 East Chicago Ave., Chicago, Illinois.
LANCASTER, DR. D. E., Queens College, Flushing, New York.
LANCASTER, DR. REBECCA C., Rockefeller Institute, New York City, New York.
LANDIS, DR. E. M., Harvard Medical School, Boston, Massachusetts.
LANGE, DR. MATHILDE M., Wheaton College, Norton, Massachusetts.
LAVIN, DR. GEORGE I., Rockefeller Institute, New York City, New York.
LAZAROW, DR. ARNOLD, Western Reserve University School of Medicine, Cleveland 6, Ohio.
LEWIS, PROF. I. F., University of Virginia, Charlottesville, Virginia.
LILLIE, PROF. RALPH S., The University of Chicago, Chicago, Illinois.
LOCHHEAD, DR. JOHN H., Department of Zoology, University of Vermont, Burlington, Vermont.
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LOEB, DR. R. F., Department of Medicine, College of Physicians and Surgeons, New York City, New York.
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LOWTHE, MRS. FLORENCE DELE., Barnard College, Columbia University, New York City, New York.
LUCAS, DR. ALFRED M., Regional Poultry Research Laboratory, East Lansing, Michigan.
LYNCH, DR. CLARA J., Rockefeller Institute, New York City, New York.
LYNCH, DR. RUTH STOCKING, Dept. of Zoology, University of California, Los Angeles 24, California.
LYNN, DR. WILLIAM G., Department of Biology, The Catholic University of America, Washington, D.C.
MACDOUGALL, DR. MARY S., Agnes Scott College, Decatur, Georgia.
MACNAUGHT, MR. FRANK M., Marine Biological Laboratory, Woods Hole, Massachusetts.
McCouch, DR. MARGARET SUMWALT, University of Pennsylvania Medical School, Philadelphia, Pa.
* Deceased.
REPORT OF THE DIRECTOR

McGREGOR, Dr. J. H., Columbia University, New York City, New York.
MACKLIN, Dr. CHARLES C., School of Medicine, University of Western Ontario, London, Canada.
MAGRUDER, Dr. SAMUEL R., Department of Anatomy, Tufts Medical School, Boston, Massachusetts.
MALONE, Prof. E. F., 153 Cortland Avenue, Winter Park, Florida.
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MATHews, Prof. A. P., Woods Hole, Massachusetts.
MATTHEWS, Dr. SAMUEL A., Thompson Biological Laboratory, Williams College, Williamstown, Massachusetts.
MAVOR, Prof. JAMES W., 24 Edward Street, Belmont, Massachusetts.
MAZIA, Dr. DANIEL, University of Missouri, Department of Zoology, Columbia, Missouri.
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MEMARD, Mr. A. R., Riverside, Connecticut.
MENKIN, Dr. VALY, Department of Surgical Research, Temple University Medical School, Philadelphia, Pennsylvania.
METZ, Dr. C. B., Osborn Zoological Laboratory, Yale University, New Haven, Connecticut.
METZ, Prof. CHARLES W., University of Pennsylvania, Philadelphia, Pennsylvania.
MICHAELIS, Dr. LEONOR, Rockefeller Institute, New York City, New York.
MILLER, Dr. J. A., Emory University, Atlanta 3, Georgia.
MILNE, Dr. LORUS J., Zoology Department, University of Vermont, Burlington, Vermont.
MINNICH, Prof. D. F., Department of Zoology, University of Minnesota, Minneapolis, Minnesota.
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