THE MARINE BIOLOGICAL LABORATORY

FIFTY-SECOND REPORT, FOR THE YEAR 1949—SIXTY-SECOND YEAR

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I. TRUSTEES

EX OFFICIO

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

G. H. A. Clowes, Lilly Research Laboratory
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
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 1953
W. R. AMBERSON, University of Maryland School of Medicine
P. B. ARMSTRONG, Syracuse University
E. G. BALL, Harvard University Medical School
F. A. BROWN, Jr., Northwestern University
ROBERT CHAMBERS, New York University
C. L. PROSSER, University of Illinois
A. C. REDFIELD, Harvard University and Woods Hole Oceanographic Institution
ALBERT TYLER, California Institute of Technology

TO SERVE UNTIL 1952
E. S. G. BARRON, The University of Chicago
D. W. BRONK, Johns Hopkins University
G. FAILLA, Columbia University
C. O'D. ISELIN, Woods Hole Oceanographic Institution
R. T. KEMPTON, Vassar College
C. W. METZ, University of Pennsylvania
W. R. TAYLOR, University of Michigan
GEORGE WALD, Harvard University

TO SERVE UNTIL 1951
W. C. ALLEE, The University of Chicago
C. L. CLAFF, Randolph, Mass.
K. S. COLE, Naval Medical Research Institute
P. S. GALTSOFF, U. S. Fish and Wild Life Service
L. V. HEILBRUNN, University of Pennsylvania
J. H. NORTHROP, Rockefeller Institute
H. H. PLOUGH, Amherst College
A. H. STURTEVANT, California Institute of Technology

TO SERVE UNTIL 1950
DUGALD E. S. BROWN, University of Michigan
D. P. COSTELLO, University of North Carolina
M. H. JACOBS, University of Pennsylvania
D. A. MARSLAND, New York University
A. K. PARPAS, Princeton University
FRANZ SCHRADE, Columbia University
H. B. STEINBACH, University of Minnesota
B. H. WILLIER, Johns Hopkins University

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
TRUSTEES

C. LADD PROSSER, to serve until 1950
H. B. STEINBACH, to serve until 1950
C. L. CLAFF, to serve until 1951
D. A. MARSLAND, to serve until 1951
RUDOLF T. KEMPTON, to serve until 1952
H. H. PLOUGH, to serve until 1952

THE LIBRARY COMMITTEE

W. R. TAYLOR, Chairman
K. S. COLE
E. N. HARVEY
BALDWIN LUCKÉ
MARY SEARS

THE APPARATUS COMMITTEE

A. K. PARPART, Chairman
HARRY GRUNDFEST
C. L. PROSSER
O. H. SCHMITT
F. J. M. SICHEL

THE SUPPLY DEPARTMENT COMMITTEE

P. B. ARMSTRONG, Chairman
C. L. CLAFF
P. S. GALTSOFF
L. H. KLEINHOLZ
CHARLES PACKARD

THE EVENING LECTURE COMMITTEE

CHARLES PACKARD, Chairman
E. S. G. BARRON
E. G. BUTLER

THE INSTRUCTION COMMITTEE

A. K. PARPART, Chairman
W. C. ALLEE
HOPE HIBBARD
H. H. PLOUGH
CHARLES PACKARD, Ex officio

THE BUILDING AND GROUNDS COMMITTEE

C. LLOYD CLAFF, Chairman
W. R. DURYEE
RALPH WICHTERMAN
II. ACT OF INCORPORATION

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. REPORT OF THE TREASURER

To the Trustees of the Marine Biological Laboratory:

Gentlemen:

The year 1949 was notable from the financial viewpoint because of: 1) the receipt from the Rockefeller Foundation of $150,000 for the restoration and improvement of the “Old Main” laboratory, $25,000 for current expenses, and $4,905.44 in equipment; 2) the gift of a power cruiser, renamed the “Arbacia,” from Mrs. John G. Ralston; and 3) the inauguration of the “Frank R. Lillie Memorial Fund” under the able leadership of Dr. G. H. A. Clowes.

As a result of the Rockefeller and other gifts for capital items, the total assets of the Laboratory increased during the year by $173,021.65 to a total of $2,711,621.96.

The current operations for 1949, according to the report of the auditors, Seamans, Stetson and Tuttle of Boston, show total cash receipts of $307,635.14 and disbursements of $310,100.93, the latter including $281,372.89 for current expenses and $28,728.04 for “additions to capital assets” (equipment, etc.). Current income cash on hand December 31, 1949, amounted to $10,290.80. The totals of receipts and disbursements for 1949 were about the same as those for 1948, and this was true for most of the sub-totals for the various departments. One notable exception was the Supply Department where total sales declined from $94,701.77 to $78,770.38. Actual cash receipts in 1949 for the Supply Department were $82,663.36 and expenditures were $82,494.33 showing a net profit of $169.03. These cash figures, however, do not take into account credits from the Instruction and Research Departments for supplies furnished, differences of inventories, depreciation, etc. The complete statement of the auditors shows net income for the Supply Department of $12,573.29.

The Balance Sheet, Statement of Current Surplus, and Summary of Cash Transactions, as given in the auditors’ report, follow:

Marine Biological Laboratory Balance Sheet, Dec. 31, 1949

Assets

Endowment Assets and Equities:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Securities and Cash in Hands of Central Hanover Bank and Trust Company, New York, Trustee</td>
<td>$966,928.06</td>
</tr>
<tr>
<td>Securities and Cash in Minor Funds</td>
<td>18,465.54</td>
</tr>
<tr>
<td>Total Endowment Assets and Equities</td>
<td>$985,393.60</td>
</tr>
</tbody>
</table>

Plant Assets:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>$133,626.38</td>
</tr>
<tr>
<td>Buildings</td>
<td>1,357,661.51</td>
</tr>
<tr>
<td>Equipment</td>
<td>256,825.70</td>
</tr>
<tr>
<td>Library</td>
<td>390,133.36</td>
</tr>
<tr>
<td>Total Plant Assets</td>
<td>$2,118,246.95</td>
</tr>
</tbody>
</table>

Less Reserve for Depreciation: $774,440.83 $1,343,406.12

Book Fund, Securities and Cash: $5,961.99 $1,349,368.11
**REPORT OF THE TREASURER**

**Current Assets:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>$16,620.21</td>
</tr>
<tr>
<td>Mortgage Note Receivable</td>
<td>$2,350.00</td>
</tr>
<tr>
<td>Accounts Receivable</td>
<td>$25,111.96</td>
</tr>
<tr>
<td>Inventories:</td>
<td></td>
</tr>
<tr>
<td>Supply Department</td>
<td>$52,482.99</td>
</tr>
<tr>
<td>“Biological Bulletin”</td>
<td>$16,004.65</td>
</tr>
<tr>
<td></td>
<td>$68,487.64</td>
</tr>
<tr>
<td>Investments:</td>
<td></td>
</tr>
<tr>
<td>Devil's Lane Property</td>
<td>$38,826.68</td>
</tr>
<tr>
<td>Stock in General Biological Supply House</td>
<td>$12,700.00</td>
</tr>
<tr>
<td>Other Investment Securities</td>
<td>$36,020.00</td>
</tr>
<tr>
<td>Retirement Fund</td>
<td>$20,557.08</td>
</tr>
<tr>
<td></td>
<td>$106,103.76</td>
</tr>
<tr>
<td>Prepaid Insurance</td>
<td>$6,665.25</td>
</tr>
<tr>
<td>Items in Suspense (Debits)</td>
<td>$1,521.43</td>
</tr>
<tr>
<td>Unadjusted Debits:</td>
<td></td>
</tr>
<tr>
<td>Old Main B'ldg Modernizing:</td>
<td></td>
</tr>
<tr>
<td>Expenditures to Dec. 31</td>
<td>$119,279.36</td>
</tr>
<tr>
<td>Cash Unexpended</td>
<td>$30,720.64</td>
</tr>
<tr>
<td></td>
<td>$150,000.00</td>
</tr>
<tr>
<td></td>
<td>$376,860.25</td>
</tr>
<tr>
<td></td>
<td>$2,711,621.96</td>
</tr>
</tbody>
</table>

**Liabilities**

**Endowment Funds:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endowment Funds</td>
<td>$965,433.05</td>
</tr>
<tr>
<td>Reserve for Amortization</td>
<td>$1,495.01</td>
</tr>
<tr>
<td>Minor Funds</td>
<td>$18,465.54</td>
</tr>
<tr>
<td></td>
<td>$985,393.60</td>
</tr>
</tbody>
</table>

**Plant Funds:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortgage Notes Payable</td>
<td>$12,000.00</td>
</tr>
<tr>
<td>Donations and Gifts</td>
<td>$1,181,564.04</td>
</tr>
<tr>
<td>Other Investments in Plant from Gifts and Current Funds</td>
<td>$155,804.07</td>
</tr>
<tr>
<td></td>
<td>$1,337,368.11</td>
</tr>
<tr>
<td></td>
<td>$1,349,368.11</td>
</tr>
</tbody>
</table>

**Current Liabilities and Surplus:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts Payable</td>
<td>$8,850.56</td>
</tr>
<tr>
<td>Items in Suspense (Credits)</td>
<td>$2,566.09</td>
</tr>
<tr>
<td>Current Surplus</td>
<td>$215,443.60</td>
</tr>
<tr>
<td>Grant of Rockefeller Foundation to Modernize Old Main Building</td>
<td>$150,000.00</td>
</tr>
<tr>
<td></td>
<td>$376,860.25</td>
</tr>
<tr>
<td></td>
<td>$2,711,621.96</td>
</tr>
</tbody>
</table>

**Current Surplus Account**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance, January 1, 1949</td>
<td>$209,432.17</td>
</tr>
<tr>
<td>Add:</td>
<td></td>
</tr>
<tr>
<td>Excess of Income over Expense for Year</td>
<td>$11,499.89</td>
</tr>
<tr>
<td>Reserve for Depreciation, 1949, Charged to Plant Funds</td>
<td>$27,919.94</td>
</tr>
<tr>
<td></td>
<td>$39,419.83</td>
</tr>
<tr>
<td></td>
<td>$248,852.00</td>
</tr>
</tbody>
</table>
Deduct:

Payments from Current Funds during year for Plant Assets:

- Land: $3,000.00
- Buildings: $11,704.65
- Equipment: $11,030.39
- Library: $9,673.36

$35,408.40

Less Mortgage Note given in Partial Payment for Elliot Property: $6,000.00

Payment on Principal of Mortgage Note given in Partial Payment for “Dolphin”: $4,000.00

Balance, December 31, 1949: $215,443.60

Summary of Cash Transactions for Year ended Dec. 31, 1949

<table>
<thead>
<tr>
<th>Expenditures</th>
<th>Current Cash</th>
<th>Receipts</th>
<th>Additions to Capital Assets</th>
<th>Total Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income from Endowment Funds</td>
<td>$40,347.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income from Other Investments</td>
<td>$22,159.95</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real Estate Rentals</td>
<td>$7,830.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donations</td>
<td>$27,602.16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Membership Dues</td>
<td>$2,364.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruction</td>
<td>$12,508.24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research (including Apparatus and Chemical Departments)</td>
<td>$27,127.63</td>
<td>$26,091.04</td>
<td>$3,036.91</td>
<td>$29,452.95</td>
</tr>
<tr>
<td>Supply Department</td>
<td>$82,663.36</td>
<td>$82,215.76</td>
<td>$278.57</td>
<td>$82,494.33</td>
</tr>
<tr>
<td>Mess</td>
<td>$40,773.70</td>
<td>$38,039.93</td>
<td>$1,333.77</td>
<td>$39,373.67</td>
</tr>
<tr>
<td>Dormitories</td>
<td>$19,417.05</td>
<td>$10,873.32</td>
<td>$6,333.54</td>
<td>$17,206.86</td>
</tr>
<tr>
<td>“Biological Bulletin”</td>
<td>$6,568.78</td>
<td>$9,389.46</td>
<td>$9,389.46</td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td>$8,702.67</td>
<td>$7,798.35</td>
<td>$11,263.01</td>
<td>$19,061.36</td>
</tr>
<tr>
<td>Book Purchase Account, Woods Hole Oceanographic Institution</td>
<td>$1,000.00</td>
<td>$1,137.62</td>
<td>$1,137.62</td>
<td></td>
</tr>
<tr>
<td>Real Estate Sales (received on account)</td>
<td>$5,007.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>$3,363.45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buildings and Grounds</td>
<td>$41,558.69</td>
<td>$3,491.01</td>
<td>$45,049.70</td>
<td></td>
</tr>
<tr>
<td>Administration</td>
<td>$29,367.71</td>
<td></td>
<td>$29,367.71</td>
<td></td>
</tr>
<tr>
<td>Interest, Insurance, Cost of Living Bonus, and other Property Maintenance (not allocated)</td>
<td>$14,537.82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payment to Retirement Fund</td>
<td>$7,696.45</td>
<td></td>
<td>$7,696.45</td>
<td></td>
</tr>
<tr>
<td>Payment on Mortgage</td>
<td></td>
<td></td>
<td>$4,000.00</td>
<td>$4,000.00</td>
</tr>
</tbody>
</table>

$307,635.14 $281,372.89 $28,728.04 $310,100.93

Cash Balance, January 1, 1949:
- Central Hanover Bank & Trust Co.: $5,487.16
- Falmouth National Bank: $7,269.43

Receipts: $307,635.14

Payments: $320,391.73

Cash Balance, December 31, 1949:
- Central Hanover Bank & Trust Co.: $8,159.11
- Falmouth National Bank: $2,131.69
REPORT OF THE LIBRARIAN

The sum of $11,164 was appropriated for the year 1949, plus $3000 from the Woods Hole Oceanographic Institution to be applied to staff salaries. The detailed account of the expenditure of the budget is covered in the Treasurer’s report. The sum of $1200 was also appropriated by the Woods Hole Oceanographic Institution to cover library acquisitions.

During the year, 1353 (52 new) current journals were received. Of these 417 (11 new) were Marine Biological Laboratory subscriptions, 541 (13 new) were exchanges, and 154 (10 new) were gifts; 66 (2 new) were Woods Hole Oceanographic Institution subscriptions, 158 (13 new) were exchanges and 17 (3 new) were gifts. The noticeable increase in the number of current journals over that for 1948 is due to the fact that the German subscriptions have been resumed—56 out of 129 titles having been re-established since the war.

The Marine Biological Laboratory purchased 72 books, received 11 complimentary copies from authors, 46 gifts from the publisher, 37 from the E. L. Mark Library and 26 miscellaneous donations. The Woods Hole Oceanographic Institution purchased 28 titles. A total of 220 books was added to the shelves, the most outstanding purchase being Poggendorff’s “Biographisch-literarisches Handwörterbuch” in ten volumes.

There were 9 back sets completed: 2 by purchase (Woods Hole Oceanographic Institution); 6 by exchange (3, Woods Hole Oceanographic Institution) and 1 by gift; 11 were partially completed: 3 by purchase (Woods Hole Oceanographic Institution); 7 by exchange (3, Woods Hole Oceanographic Institution) and 1 by gift.

The reprint additions to the Library numbered 8407. Of these, 1449 were of current issue and 6958 of earlier dates. Gifts from Drs. W. E. Garrey, Mary D. Rogick and Dorothy Wrinch totalled 1208 papers, 394 of which were not already in the Library’s collection.

REPORT OF THE LIBRARIAN

<table>
<thead>
<tr>
<th>Other Cash Accounts</th>
<th>Balance Jan. 1, 1949</th>
<th>Received</th>
<th>Paid</th>
<th>Balance Dec. 31, 1949</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memhard Fund Cash</td>
<td>$ 33.05</td>
<td>$ 25.00</td>
<td>$</td>
<td>$ 58.05</td>
</tr>
<tr>
<td>Rev. Arsenious Boyer Burse Cash</td>
<td>436.53</td>
<td>125.00</td>
<td>$ 120.00</td>
<td>1,747.88</td>
</tr>
<tr>
<td>Lucretia Crocker Fund Cash</td>
<td>1,510.36</td>
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Respectfully submitted,
DONALD M. BRODIE,
Treasurer
A sum of $5579.61 from the Carnegie Corporation of New York Fund was spent for 8 books, 12 completed back sets, 34 partially completed back sets, and the war-time accumulation of German serials.

Forty-six volumes were borrowed on inter-library loan, and 85 were sent to other institutions. Ninety-seven microfilm orders were filled to the amount of $322.24.

During the year, the sorting of the E. L. Mark Library was completed, and a final report is herewith given: 20,307 reprints were received, 6850 of which were added to the library's collection; 192 books, and 236 serial volumes and numbers. The duplicate material has been placed in the sales-room for clearance.

Grateful acknowledgment is made to Dr. A. W. Pappenheimer for the gift of his valuable collection of reprints. Mr. Henry Stommel's gift of 16 books is also worthy of an expression of appreciation.

The amount of $682.02 was realized from the sales-room. This sum was used to purchase a microfilm camera to replace the old one, which had depreciated to the point of uselessness. The new apparatus has been installed in a recently acquired photography room located next to the librarian's office.

At the end of the year 1949, the Library contained 58,800 bound volumes and 168,935 reprints.

In closing this report, the Librarian wishes to express her gratitude to the members of the Library Committee for their helpfulness throughout the year.

Respectfully submitted,

DEBORAH LAWRENCE,
Librarian

VI. REPORT OF THE DIRECTOR

TO THE TRUSTEES OF THE MARINE BIOLOGICAL LABORATORY:

Gentlemen:

I submit herewith a report of the sixty-second session of the Marine Biological Laboratory for the year 1949.

1. Changes in Personnel

At the Annual Meeting of the Trustees held August 6, 1949, and at the adjourned meeting of August 23rd, resignations were presented by the following:

Lawrason Riggs, President of the Corporation since 1942, and its Treasurer from 1924 to 1942. He stated that rotation in office is desirable, and that since he has served on the Executive Committee for 25 years it was time that he should be replaced.

E. Newton Harvey, Vice President from 1942. Dr. Harvey wished to be relieved of the duties incumbent on this office so that he might devote more time to research.

Charles Packard, Assistant Director and Director since 1937. Having reached the retirement age, he asked that a new Director be appointed in his place.

Frank M. MacNaught, Business Manager since 1913, and already past the age set for retirement, requested that he be retired. An appreciation of his long and devoted service to the Laboratory appears in the appendix of this report.
A Committee, of which Dr. Harvey was Chairman, was appointed to nominate new officers. At the December Meeting of the Trustees, Dr. Philip B. Armstrong was proposed as the new Director and was unanimously elected. The choice is most fortunate. Dr. Armstrong has played an important part in Laboratory affairs for many years, and is thoroughly familiar with the problems with which we are faced. He assumes his duties at a time when plans for developing the resources of the Laboratory are being considered. Under his direction they will be put into operation.

The Executive Committee elected Homer P. Smith as General Manager to replace Mr. MacNaught. He has already served as Assistant Business Manager for three and one-half years.

It is worth noting that within the years 1947–1950 the President, Vice President, Director, Librarian, Manager of the Apparatus Department, Business Manager, and the Superintendent of Buildings and Grounds have been or will be replaced. The terms of office ranged from 8 to 37 years, the average being nearly 20 years.

2. Organization Problems

During the summer a Committee, of which Dr. Ball was Chairman, made a thorough study of the increasing activities of the Laboratory, their relationship to each other and to the organization as a whole. The purpose was to establish more clearly than heretofore the lines of authority and responsibility extending from the Executive Committee through the Director and General Manager to the various departments. The recommendations of the Committee were adopted and put into operation with highly satisfactory results.

3. Increases in Rates and Fees

A careful analysis of the cost of operating the mess and the residence buildings showed that the rates charged have not been sufficient to cover expenses. The deficits incurred each year had to be paid out of general Laboratory funds. The Executive Committee felt that while research should be subsidized, the cost of running the mess and dormitories should be borne entirely by those who avail themselves of these facilities. The rates were therefore raised by amounts which, it is hoped, will not only wipe out the deficit, but will permit improvements in the service.

4. Old Main

The renovation of Old Main, made possible through the generosity of the Rockefeller Foundation, is now complete. An inspection of the building will show how well the Committee in charge of the project, under the energetic Chairmanship of Mr. Claff, has done its work. Careful planning of expenditures permitted the installation of fresh and salt water supplies in every laboratory room, and in addition a new and adequate electric circuit to supply the Mess and other buildings in the area.

5. Housing

Many years ago the Laboratory obtained the Gansett and Devil's Lane tracts to provide its members with suitable building lots. In the former area all the lots
have now been sold. In Devil’s Lane 23 lots have been purchased and seven houses are either under construction or already completed. Others will be built in the near future. The Town of Falmouth has taken over the roads which had been laid out, and will be responsible for their maintenance. Water mains have also been laid, and electricity will be available in the summer of 1950.

6. Gifts

The Laboratory acknowledges with gratitude the gift of a boat, presented by Mrs. John G. Ralston of Dixon, Illinois. This craft, now appropriately named “Arbacia,” has been equipped with light dredging gear and will be used in a biological survey of this area. It is fast, seaworthy, and can accommodate a crew which may find it necessary to spend several days away from Woods Hole on extended collecting trips.

Dr. William D. Curtis gave $400 to be used for elevating the roof of the pilot house on the “Dolphin.”

The Associates of the Marine Biological Laboratory contributed $1,370 for the purchase of research apparatus.

The Rockefeller Foundation gave $4,905.44 to purchase equipment to be used by the Institute of Muscle Research under the direction of Dr. Szent-Gyorgyi.

7. The F. R. Lillie Memorial Research Fund

The appeal for contributions to the F. R. Lillie Memorial Research Fund has resulted in a generous response from members of the Corporation and from friends. In addition, Dr. Clowes, Chairman of the Committee in charge of the drive, has been successful in obtaining substantial gifts. Donations received from members will be used for the erection of a bronze tablet to be placed in the lobby of the Brick Building. Together with the present Agassiz and Whitman tablets it will be a part of a group which will emphasize the service of these three great scientists in the initiation, direction, and development of the Marine Biological Laboratory. The larger part of the fund will be used for general research purposes, including the biological survey.

8. The Biological Survey

The need for a new biological survey of this region has been repeatedly emphasized in recent years. Plans for a long range project are under consideration, but in the meantime, the finding of adequate sources of sea urchins is of immediate practical importance. This was shown by the experience of last summer when, for a time, no urchins could be obtained. Under the direction of Mr. McInnis, Vineyard Sound will be thoroughly explored. Later, the area to the westward will be worked over. The results of these operations are shown on a chart in the Committee Room. Our Naturalist, Dr. Rankin, has been placed in charge of the more general survey.

9. Instruction

Dr. Frank A. Brown, Jr., resigned after completing five years of most successful service as head of the course in Invertebrate Zoology. Under his direction the
present staff, with some assistance from former staff members and others, have published a laboratory guide, "Selected Invertebrate Types." The book is extensively illustrated, and in condensed form brings together the content of many monographs, and other material not in monograph form. In the introduction Dr. Brown expresses the hope, in which we all share, that "the publication of the volume will result in a rejuvenation in the teaching of this important subject which provides so much promise in the solution of virtually every basic problem in biology and medicine."

Dr. Lewis H. Kleinholz, Professor of Biology at Reed College, was appointed to take charge of the course in place of Dr. Brown.

10. Deaths

The Laboratory has lost one of its most distinguished members, Dr. Leonor Michaelis, whose scientific contributions based on work done here, added much to the fame of this institution. His lucid discussions at the Friday Evening Lectures and before the Physiology Class will be long remembered.

11. Election of Trustees

At the Annual Meeting of the Corporation held August 9, 1949, the following were elected Trustees of the Marine Biological Laboratory:

8 Trustees—Class of 1953

W. R. Amberson  R. Chambers
P. B. Armstrong  C. L. Prosser
E. G. Ball  A. C. Redfield
F. A. Brown, Jr.  A. Tyler

12. There are appended as parts of this report:

1. Memorials
2. Appreciation of the services of Mr. Frank M. MacNaught
3. The Staff
4. Investigators and Students
5. The Lalor Fellows
6. The Atomic Energy Fellows
7. Tabular View of Attendance, 1945–1949
8. Subscribing and Cooperating Institutions
9. Evening Lectures
10. Shorter Scientific Papers presented at the Seminars
11. Members of the Corporation

Respectfully submitted,

Charles Packard,
Director
14 MARINE BIOLOGICAL LABORATORY

1. Memorials

Sumner Cushing Brooks, 1888–1948

By

H. F. Blum

In the death of Sumner Cushing Brooks in Bermuda on April 23rd, 1948, the Marine Biological Laboratory lost a staunch friend as well as a distinguished scientist. His unflagging interest in the laboratory is testified to by the regularity of his summer attendance here, even after he took up his residence in 1928 on the other side of the continent. His first summer as independent investigator was in 1919, his last in 1946, although he paid a brief visit here in 1947. His wife, Matilda Moldenhauer Brooks, usually accompanied him, sharing a laboratory in which they worked on problems often closely allied. Brooks became a member of the Corporation in 1923, and was elected a Trustee in 1941.

Although born in Japan, Brooks could claim only very short residence there. The accident of his birthplace resulted from his father's position as Professor at the Imperial College of Agriculture, which he relinquished a few months after Sumner's birth to accept a professorship at Massachusetts Agricultural College.

Sumner Brooks took his bachelor's degree at the latter institution in 1910, and remained there afterwards as an assistant in Botany. He obtained his Ph.D. in the same subject from Harvard in 1916. Subsequently he held various positions, including six years in the Hygienic Laboratory of the U. S. Public Health Service, and professorships at Bryn Mawr, Rutgers, and California. Sumner Brooks loved to travel, and this urge took him to many parts of the earth. Often his journeys had as their chief aim, experimental studies which could best be carried on where the particular biological material was available; but wherever he went he was an avid student of nature and a careful observer of whatever came within his view, particularly bird life. I remember, for example, his account of timing the wing beats of albatross and correlating this with latitude as he came home from the South Seas to Berkeley. Such observations were seldom if ever published—this was pure avocation, stemming from his keen enjoyment of nature. His interest in birds was with him when he moved from the east coast to the west, where he was soon associated with an active group of ornithologists, and at the time of his death he was an officer in the Cooper Ornithological Society.

Brooks' scientific achievements, particularly in the field of permeability, need no review for this audience. His researches were always attempts to probe into fundamental problems of cellular physiology, rather than applications of existing biological knowledge. He was a general physiologist in the broadest sense, and when the formation of a Society of General Physiologists was undertaken here, in 1946, he, of course, took an active part.

Although suffering severe physical handicaps during the last years of his life, he continued until the end his interest in biology inside and outside the laboratory. His death came quickly, and as he might have wished—during a period of investigation, characteristically far from home.

Selig Hecht, 1892–1947

By

Otto Glaser

Selig Hecht arrived at Woods Hole in 1918. It was five years after his graduation from the City College of New York, where he had studied chiefly Physics, Chemistry, and Mathematics, but where also, and with rare perception, George Gilmore Scott had
interested his pupil in measurements on dogfish. Two seasons at Beaufort, 1912 and 1913, produced additional measurements on 12 species of teleost. Perhaps most decisive at this stage of Hecht's career was the display of mathematically definable order by quantitative data on various dimensions of an organism and the obvious relevance of the measurements to one another. In 1916 a third paper, "Form and Growth of Fishes," comments on the use of volumes and especially weights as criteria of growth and demonstrates how fluent he had become in the idiom of biology. "The usefulness of an organ," he wrote, "and the adaptedness of an organism to its environment, are hardly functions of their weight. The form, however, is of prime importance. Sixteen years later this work was assigned its place in what is now called Allometry.

Before entering Harvard in 1915, Hecht served as a Pharmacologist in the department of Agriculture and in one year saved enough money to begin graduate study. A doctoral thesis prepared under George Howard Parker took Hecht to Bermuda. "The Physiology of Ascidia atra" was published in 1918, part of the thesis having won the Bowdoin Prize in 1917 "for essays of high literary merit." These observations and experiments included, incidentally, the qualitative basis for all his later work.

Fresh from a rigorous quantitative analysis of photic responses in Ciona intestinalis, studied at La Jolla, Hecht knew precisely why he came to Woods Hole. He had postulated a simple mechanism. A photo-sensitive material is present in the Ciona siphons. Under the influence of light this substance breaks down into two others whose reunion restores the original photosensitive material. Here was the first version of a model destined for some changes and numerous applications.

Between 1918 and 1924, the year of his election to our Corporation, Hecht tested this hypothesis with the utmost care on the clam, Mya arenaria. From conversations and the nature of the experiments on Mya, it was apparent that he expected to study vision, but also that he intended to rest his case among organisms where photoreception is uncomplicated by psychological factors or even optics. About sixteen publications dealt with the duration of the latent period; with the stationary state; with intensity and photoreception; with the kinetics of dark adaptation; with time, intensity, and wave length, in photic excitation; and with the applicability of the Bunsen-Roscoe law to minimal and other energy levels.

During this period Hecht labored in the catacombs then under Old Main and frequently by accident but sometimes to relieve his maddening migraine, whacked his head against the rafters. In those days he spoke poignantly about three books that had captivated his imagination. One was George Moore's "The Brook Kerith"—reread several times and always with tears over the same passages. But there were also the concise "Quantitative laws in biological chemistry" by Arrhenius, and Mellor's "Higher mathematics for students of chemistry and physics." From Arrhenius he absorbed the idea of using temperature as a tool for the interpretation of biological processes in terms of chemical reaction kinetics. From Mellor and more specialized sources he acquired the technique and insights that enabled him to extract meaning, implications and the implications of these, from his meticulous data and his meticulously drawn curves. A curve was more than a graphic representation. It was something to "stew" over until its naive statements and their direct and indirect consequences crystallized into a system internally consistent and congruous with other data, either known or obtainable by further experimentation. In the atmosphere of that decade, facile taxonomists classified Hecht's rationalism and sophisticated methodology mostly as witchcraft.

By 1921 a fourth year had rolled by as Assistant Professor of Biochemistry in the Creighton University Medical School in Omaha, Nebraska. Seconded by two powerful friends, Jacques Loeb and Thomas Hunt Morgan, Hecht then embarked on a series of National Research and General Education Board Fellowships. For another five years these enabled him to work now with Henderson at Harvard, now with Baly or Barcroft
in England; to travel on the continent, and to spend a year at Naples. By 1926 he was appointed Associate Professor of Biophysics at Columbia and two years later rose to full professorship. After 1924 he did not return to Woods Hole until 1927 and after 1929 came only for short visits. Between these last dates he worked in room 231 of the Brick Building and devoted his time largely to the effects of intermittent light; produced his theoretical derivation of Talbot's Law, and a validation of the theory on Mya.

Hecht's entire scientific development is an illustration of intellectual orthogenesis. Even before his foundations had solidified in detail, he used Ciona and Mya as guides to dark adaptation and intensity discrimination in man. His prolonged and incomparable exploration of the human retina began in 1920. These investigations quickly uncovered objective criteria for distinguishing rod from cone vision. His dramatic demonstration that curves depicting the relation between intensity and visual acuity are population curves reflecting differences in the sensitivity of individual rods and cones, and also the number of such receptors active at given intensities, was presented in a memorable Friday Evening lecture in 1924. Later the underlying idea was tested more directly on the eyes of fruit flies and bees where the same relations hold and where the number of functional ommatidia can be easily counted.

Beginning also in 1920, and interspersed with the researches of the next 22 years, were experiments on the photochemistry of Visual Purple. Here temperature effects on the rate of bleaching indicated a first order reaction directly proportional to intensity and with no thermal increment. With the assistance of Chase, Schlaer and Haig this phase culminated in the verification, long overdue, of Köhne's reported regeneration of Visual Purple in solution. The Ciona model had found its replica in the vertebrate eye.

From the outset Hecht brooded over the perennially difficult problems of color vision, but felt unprepared. In another 12 papers he reexamined every relevant aspect of his foundations. At Naples in 1925, he reinvestigated Ciona and added the lamellibranch Pholas to his small repertoire of animals. He was now postulating for Ciona, Mya and Pholas photoreceptive processes identical in architecture but different in their chemical components.

The frontal attack on Color Vision began in 1928. Characteristically, Hecht established almost at once the essential formal adequacy of Young's three-fiber theory. This was indeed capable of yielding a quantitative formulation of Color Vision. Nevertheless, retaining only the structural intuition in Young's view and integrating this with the Helmholtz three-substance theory, he decided in favor of a three-cone hypothesis. This became basic for his analysis of the several types of color-blindness.

After night-blindness had been associated by others with deficiency or absence of Vitamin A, and Wald had identified both Vitamin A and the carotenoid retinene in normal retinas, Hecht instigated five special studies on dark adaptation and from the general similarities between rod and cone vision, indicated that Vitamin A is probably present also in cones. In cooperation with Mandelbaum, a study of Vitamin A and Rod-Cone adaptation in cases of cirrhosis of the liver was followed by the development of a diagnostic method for determining Vitamin A deficiencies.

Early in the Mya era, Hecht had dealt with minimal responses in relation to minimal energy levels. Twenty years later, after a study of night vision in the owl, he undertook from an entirely different standpoint his Quantum Analysis of Vision. Given the discontinuities of light, the discontinuities of the retinal receptors, and certain ingenious corrections for reflection and absorption by the non-photosensitive ocular media, he succeeded in finding what proportion of incident light actually reaches the retina. In order to see, a minimum of from 5 to 14 rods must each absorb one quantum of light. At this level he maintained conventional explanations for variability of behavior breakdown for here the stimulus is less accurately controlled than the organism.

Hecht's output includes about twenty-two communications of a general nature. Some of these, notably his first papers on temperature, on Young's theory, and his deriva-
tion of Talbot's Law, suggest the moods of the theoretical physicist. About fifteen others are lectures, contributions to symposia, critical summaries and reviews. In this family of papers, Hecht kept up with himself, tightening his hold by keeping all parts of his field freshly before his mind.

The audiences he addressed differed widely. Some were essentially lay; others were Ophthalmologists, Clinicians, Physicists, Chemists, or Biologists. Mostly in English, the list also includes German, French and even Russian items. The longest, with 47 illustrations, is the great Summary in the Asher-Spiro Ergebnisse for 1931, which appeared later in book form in French. Repetitions were, of course, unavoidable and on occasion he followed verbatim earlier statements that he could not improve. Yet, in general, each attempt to reach a different group involved a fresh effort at simplification and intelligibility. Concerned always with the historical development of his subject he frequently referred to contributions over 100, and even 226 years old. From the Classics, especially Koenig and Brodhun, 1889, he recovered usable measurements not influenced by his own ideas and hence sources of the greatest satisfaction. Unless editorial policies over-ruled, his bibliographies were unscathed by the drought that dries the streamlined reference lists. He always gave the full title of every citation.

With our entry into the war the practical value of Hecht's experience became at once obvious. Under the Division of Medical Sciences of the National Research Council, he joined the sub-committee on Visual Problems and under the O.S.R.D. became an official investigator both for the Army and the Navy. Promptly Hecht and his colleagues were swamped by Government contracts entailing special laboratory and field investigations. More grinding experiences were provoked by the paper work, and the innumerable discussions with Officers of the Armed Forces. When not flying to Camp LeJeune in North Carolina or to Milwaukee, Hecht oscillated between Bridgewater, Connecticut, and New York or between New York and Washington. Only a few of the results have been printed, e.g., on the relation between Anoxia and Brightness Discrimination; on size, shape, and contrast in the Detection of Targets by Daylight and on Dark Adaptation following Light Adaptation to Red and White Lights. To this period belongs also a popular article in Harper's magazine on "Seeing in a black out."

For Biology in general, it is unfortunate that the four large volumes of the Hechtian Corpus should be almost exclusively the possession of specialists. Here we have one of the best examples to show how a limited acreage cultivated intensively may produce flowers of research able to pollinate adjacent fields and also to set the fruits required for self-propagation or available for immediate consumption in cases of need. More widely appreciated, the logical sequence of these investigations and the special logic of each installment, could only raise the level of scientific writing. His style permitted revealing comments and asides. "The essential function of vision is to explore the environment by the use of light"; "My purpose is not to add to the literature but rather to subtract from it"; "Experiments are exciting in proportion to the ideas which determine their existence"; "The ideas themselves must be considered merely as quantitative experiments in thinking about Color Vision," are all trenchant sentences. Hecht unmasked more completely during a joint meeting of the Optical Society and the Society of Rheology. In reporting his Quantum Studies he begins: "I would like to lay before you more than the data and conclusions. If possible I want to convey something of the pleasure with which this research has been associated, something of the intellectual excitement which surrounded its progress. Researches vary in this respect but of all those in which I have engaged none has carried such a consistent accompaniment of delight and I hope some of this may be carried over in the presentation."

All his writings unfold the teacher who could take his learning lightly yet with no trace of flippancy, or clowning. We recall a charming but profound essay on Human Behavior and the Uncertainty Principle printed in Harper's Magazine and editorialized
in the New York Times. Certainly “Explaining the atom” is another case in point. The most satisfactory of a group of popular books on atomic energy, it had a surprising sale, was adopted as a text by the Armed Forces and explains his presence on the Committee of Atomic Scientists.

In conventional teaching he was extraordinarily effective. The impressionism that gave such flare to hundreds of his watercolors bespoke a deep seated temperamental diathesis. In science, too, he could hack a trail through jungles of detail and irrelevancies, irksome, but not invariably as innocent as he thought. Always he reached a clearing. At the New School for Social Research he impressed Alvin Johnson as the best teacher he had ever known.

Hecht was one of those about whom the hours seem to hover in their flight. Preoccupied as he was, he always had time to paint and sing; time for literature, concerts, and conversations; time also to run a summer school for children who repeated the classical experiments of Archimedes, Galileo and Newton in a Vermont barn with the simplest of improvised equipment. Of himself he gave lavishly. Criticisms, suggestions, help with the experiments of others and with mathematical interpretations were available in inexhaustible supply. He conducted a lively correspondence. Still his energies were unspent. He revived and edited the Columbia Biological Series. His services on the Editorial Boards of the Biological Bulletin; of the Journal of the Optical Society of America; of the Monographs of Experimental Biology; and of the Documenta Ophthalmologica were additional outlets to regulate the creative pressure.

It is difficult to realize that one who was to cherish the Ives Medal of the Optical Society, the Townsend Harris Medal of the City College of New York and election to the National Academy of Sciences could, in 1917, find no proper niche for his unique constellation of talents. Are there comparable instances today? During the decade between the doctorate and his Professorship, he depended heavily on a few friends and on the constant sympathy, encouragement and sacrifices of his wife, Celia Hecht. Why were these the only human beings to recognize the early symptoms of his great potentialities? That one so vital could be struck down with all his powers still at flood tide remains almost incredible to those who, in fancy, can still hear these corridors reverberate with his impassioned argument and his Homeric laughter.

2. In Appreciation

The following minute, prepared by Dr. H. H. Plough, was adopted by the Trustees at the meeting held in New York City on December 29, 1949:

On January 1, 1950, Frank M. MacNaught will retire as business manager of the Marine Biological Laboratory. When he thus attains emeritus status, Mr. MacNaught will have served the laboratory for thirty-seven years in what is in many respects the most important position on the laboratory staff. During that period he has come to know more members and guests of the laboratory than any other officer, excepting only his chief associate, Miss Polly Crowell. There are none of this long list but bear for Mr. MacNaught not only respect but warm personal regard.

Mr. MacNaught was appointed as the sole member of the business staff in 1913. The writer of this minute was a student in one of the courses in that summer, and he still remembers with pleasure the kindness and friendliness shown by Mr. MacNaught to a young college student who was unfamiliar with the arrangements at the laboratory. His unique gift of friendliness, his ability to treat each member of the laboratory as though his needs were paramount, his willingness to spend time with each one personally until, within the range of the possible, his needs were satisfied—these human qualities have endeared Mr. MacNaught to hundreds of Woods Hole visitors. They will hope to see him each summer even if he turns over his official duties to younger hands.
The work of Mr. MacNaught rapidly grew in the years following his appointment. During the term of Frank R. Lillie as director, it was realized that two sorts of service were required in the office and he took them both over. One had to do, as originally contemplated, with keeping the accounts of the laboratory under the advice of the Director for consideration of the Executive Committee. In another respect, however, service as registrar was required—including not only arrangements for laboratory space and course tables, but the even more difficult responsibility of arranging and assigning housing, and of taking responsibility for the mess and its many temporary employees. All of these many tasks were gradually consolidated in Mr. MacNaught's capable hands and he was, by appointment of the Executive Committee, made Business Manager in 1916.

Since then he has served under two directors following Dr. Lillie—Drs. Jacobs and Packard, and has continued to merit the confidence and cooperation of each.

Both Trustees and Staff congratulate Mr. MacNaught on a unique and valuable contribution to the Marine Biological Laboratory, and hope they may continue to call him fellow member and friend.

For the Trustees,
WILLIAM R. AMBERSON,
Secretary of the Board

3. The Staff, 1949

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

Senior Staff of Investigation

E. G. Conklin, Professor of Zoology, Emeritus, Princeton University.
W. E. Garrey, Professor of Physiology, Emeritus, Vanderbilt University Medical School.
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.

Zoology

I. Consultants

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

II. Instructors

F. A. Brown, Jr., 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.
L. H. Kleinholz, Associate Professor, Reed College.
John H. Lochhead, Assistant Professor of Zoology, University of Vermont.
Madeleine E. Pierce, Associate Professor of Zoology, Vassar College.
W. M. Reid, Professor of Biology, Monmouth College.
T. H. Waterman, Assistant Professor in Biology, Yale University.

III. Laboratory Assistants

R. S. Howard, University of Miami.
Marie Wilson, Northwestern University.
EMBRYOLOGY

I. INSTRUCTORS
Donald P. Costello, Professor of Zoology, University of North Carolina, in charge of course.
William W. Ballard, Professor of Zoology, Dartmouth College.
Arthur L. Colwin, Assistant Professor of Zoology, Queens College.
Charles B. Metz, Assistant Professor of Zoology, Yale University.
James A. Miller, Associate Professor of Anatomy, Emory University.
Albert Tyler, Associate Professor of Embryology, California Institute of Technology.

II. RESEARCH ASSISTANT
Margaret E. M. Davidson, McGill University.

III. LABORATORY ASSISTANTS
Helen A. Padykula, Mount Holyoke College.
James M. Moulton, Harvard University

PHYSIOLOGY

I. CONSULTANTS
Eric G. Ball, Professor of Biochemistry, Harvard University Medical School.
Merkel H. Jacobs, Professor of Physiology, University of Pennsylvania.
Otto Loewi, Professor of Pharmacology, New York University, School of Medicine.
Arthur K. Parpart, Professor of Biology, Princeton University.

II. INSTRUCTORS
E. S. Guzman Barron, Associate Professor of Biochemistry, The University of Chicago, in charge of course.
M. J. Kopac, Associate Professor of Biology, New York University.
Hans Neurath, Professor of Biochemistry, Duke University Medical School.
Robert F. Pitts, Professor of Physiology, Syracuse University, College of Medicine.
H. Burr Steinbach, Professor of Zoology, University of Minnesota.
George Wald, Professor of Biology, Harvard University.

BOTANY

I. CONSULTANTS
Bostwick H. Ketchum, Woods Hole Oceanographic Institution.
Wm. Randolph Taylor, Professor of Botany, University of Michigan.

II. INSTRUCTORS
Maxwell S. Doty, Assistant Professor of Botany, Northwestern University. In Charge of Course.
Edwin T. Moul, Instructor in Botany, Rutgers University.
R. D. Wood, Assistant Professor of Botany, Rhode Island State College.

III. RESEARCH ASSISTANT
Justine Garnic, Carnegie Institute of Technology.
REPORT OF THE DIRECTOR

IV. LABORATORY ASSISTANT

ALBERT J. BERNAKOWICZ, University of Michigan.

V. LECTURERS

RUTH PATRICK, Curator of Limnology, Academy of Natural Sciences of Philadelphia.

VI. FIELD CONSULTANT AND COLLECTOR

HANNAH T. CROASDALE, Research Associate, Dartmouth College.

EXPERIMENTAL RADIOLOGY

G. FAILLA, College of Physicians and Surgeons, Columbia University.
L. ROBINSON HYDE, Phillips Exeter Academy, Exeter, N. H.

LIBRARY

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MARGARET P. McINNIS  MARY A. ROHAN
JEAN GOODFELLOW

APPARATUS DEPARTMENT

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J. D. GRAHAM  DOROTHEA LEFEVRE
E. P. LITTLE, Consultant
SEAVY R. HARLOW, Machinist

CHEMICAL DEPARTMENT

ROBERT B. MILLS, Manager

SUPPLY DEPARTMENT

JAMES McINNIS, Manager
JOHN S. RANKIN, Naturalist

RUTH CROWELL  MARCIA McLAUGHLIN
W. E. KAHLER  R. E. TONKS
A. M. HILTON  CARL O. SCHWEIDENBACK  F. N. WHITMAN
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GENERAL OFFICE

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HOMER P. SMITH, Assistant Business Manager

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R. GUNNING  G. T. NICKELSON, JR.
J. H. HEAD  A. J. PIERCE
G. A. KAHLER  T. E. TAWELL
4. INVESTIGATORS AND STUDENTS

Independent Investigators, 1949

ABRAMS, RICHARD, Assistant Professor, University of Chicago.
ALLAN, EZRA, Visiting Professor of Biology, Stetson University.
ALLEN, M. JANE, Instructor in Zoology, University of New Hampshire.
ALTSCHER, RUTH P., Instructor, Manhattanville College.
AMBERSON, WILLIAM R., Professor of Physiology, University of Maryland Medical School.
ANDERSON, RUBERT S., Professor of Physiology, University of South Dakota.
ATWOOD, KIMBALL C., Research Associate in Microbiology, Columbia University.
BAILY, NORMAN A., Research Scientist, Columbia University.
BALL, ERIC G., Professor of Biological Chemistry, Harvard Medical School.
BALLARD, W. W., Professor of Biology, Dartmouth College.
BARBER, E. S. GUZMAN, Associate Professor of Biochemistry, The University of Chicago.
BERGER, CHARLES A., Director, Biological Laboratory, Fordham University.
BERNSTEIN, MAURICE H., Graduate Assistant, Washington University.
BILSS, ALFRED F., Associate Professor of Physiology, Tufts College Medical School.
BLUM, HAROLD F., Physiologist, Princeton University.
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BROWN, FRANK A., Jr., Professor of Zoology, Northwestern University.
BROWNING, IBEN, National Research Fellow, University of Pennsylvania.
BRUST, MANFRED, Research Assistant in Physiology, University of Chicago.
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BUTLER, ELMER G., Professor of Biology, Princeton University.
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CHERRY, RALPH H., Professor of General Physiology, Brooklyn College.
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CLARK, ARNOLD M., Professor of Biology, University of Delaware.
CLARK, ELIOT R., Professor of Anatomy, University of Pennsylvania School of Medicine.
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DRISSOL, DOROTHY H., Instructor, Smith College.
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GRAND, C. G., Research Associate, New York University.
GREEN, JAMES W., Assistant Professor of Physiology, Rutgers University.
GREENBERG, RUVEN, Instructor of Physiology, Ohio State University.
GRÖSCH, DANIEL S., Assistant Professor of Zoology, North Carolina State College.
GRUNDFEST, HARRY, Associate Professor of Neurology, Columbia University.
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HARVEY, ETHEL BROWNE, Independent Investigator of Biology, Princeton University.
HARVEY, E. NEWTON, Professor of Physiology, Princeton University.
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HAYWOOD, CHARLOTTE, Professor of Physiology, Mount Holyoke College.
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HOSLO, SIDNEY C., Guest Professor of Biology, New York University.
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IRVING, LAURENCE, Consultant, U. S. Public Health Service.
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KISCH, BRUNO, Professor of Chemistry, Yeshiva University.
KITCIN, I. C., Associate Professor of Biology, University of Georgia.
KLEINHOLZ, LEWIS H., Associate Professor of Biology, Reed College.
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Roy, S. S., Lecturer, Calcutta University.
Rubenberg, Frank H., Harvard University.
Rugh, Roberts, Associate Professor of Radiology, Columbia University.
Sarkar, Nirmal, Lecturer in Chemistry, Calcutta University.
Schaeffer, A. A., Professor of Biology, Temple University.
Schaller, William B., Assistant Professor of Biology, University of Oregon.
Schmitt, Francis O., Head of the Department of Biology, Massachusetts Institute of Technology.
Schmitt, Otto H., Professor of Zoology, University of Minnesota.
Scholander, P. F., Swarthmore College.
Scott, Allan C., Associate Professor of Biology, Union College.
Scott, Sister Florence Marie, Professor of Biology, Seton Hill College.
Scott, George T., Associate Professor of Zoology, Oberlin College.
Seaman, Gerald R., Research Fellow, Fordham University.
Shanes, A. M., Associate Professor of Physiology, Georgetown University School of Medicine.
Sichel, F. J. M., Professor of Physiology, University of Vermont College of Medicine.
Slifer, Eleanor H., Assistant Professor of Zoology, State University of Iowa.
Speidel, Carl C., Professor of Anatomy, University of Virginia.
Steinbach, H. B., Professor of Zoology, University of Minnesota.
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REPORT OF THE DIRECTOR

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STRAUS, WILLIAM L., Associate Professor of Anatomy, Johns Hopkins University School of Medicine.
STUNKARD, HORACE H., Professor of Biology, New York University.
SUCKLING, EUSTACE E., Instructor, Long Island Medical College.
SZENT-GYORGYI, A. E., Institute for Muscle Research.
TAYLOR, LAURISTON S., Chief Biophysics Branch, Atomic Energy Commission.
TAYLOR, W. RANDOLPH, Professor of Botany, University of Michigan.
TERRY, ROBERT L., Assistant Professor of Biology, Union College.
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WILSON, WALTER L., Research Associate, University of Pennsylvania.
WOOD, RICHARD D., Instructor in Botany, Rhode Island State College.
WOODWARD, ALVALYN E., Assistant Professor of Zoology, University of Michigan.
WOODWARD, ARTHUR A., Assistant Professor of Zoology, Brown University.
WRENCH, DOROTHY, Lecturer in Physics, Smith College.
WULFF, VERNER J., Assistant Professor of Zoology, University of Illinois.
ZALOKAR, MARKO, Research Fellow, California Institute of Technology.
ZEUTHEN, ERIK, Lecturer, University of Copenhagen.

Beginning Investigators, 1949

BACON, CHARLES R. T., Student, University of Pennsylvania.
BATTLEY, EDWIN H., Student, Harvard University.
BATTY, THOMAS V., Graduate Student, University of Kansas.
BAUER, MARK H., Graduate Student, Princeton University.
CARLSON, FRANCIS D., Instructor, Johns Hopkins University.
COOKSON, BRIAN A., Cancer Research Fellow, University of Pennsylvania.
ESSNER, EDWARD S., Assistant Instructor, University of Pennsylvania.
EVANS, JEANNE F., Student, University of Pennsylvania.
FLOOD, VERONICA M., Junior Biochemist, Argonne National Laboratory.
GAGNON, ANDRE, University of Pennsylvania.
GASWODA, BETTY, Junior Biochemist, Argonne National Laboratory.
GENNARO, JOSEPH F., University of Pittsburgh.
HALABAN, ATIDA, Graduate Student, University of Pennsylvania.
HARDING, CLIFFORD V., University of Pennsylvania.
HARDING, DRUSILLA, University of Pennsylvania.
HAY, ELIZABETH D., Student, Johns Hopkins Medical School.
HIMMELFARB, SYLVIA, University of Maryland Medical School.
HIRSCHFIELD, HENRY I., Research Associate, University of Missouri.
HOPFMAN, JOSEPH F., Graduate Student, Princeton University.
Honegger, Carol M., Instructor, Temple University.
Hopkins, Amos L., Graduate Student, University of Pennsylvania.
Houlihan, Robert K., Graduate Assistant, Boston College.
Jacobs, Bertrand R., Student, University of Pennsylvania School of Medicine.
Kaplan, Ann Esther, Mount Holyoke College.
Kayhart, Marion, University of Pennsylvania.
Kelly, Elizabeth M., Graduate Assistant, University of Delaware.
Kelly, John W., Graduate Student, University of Pennsylvania.
Kirschner, Leonard B., University of Wisconsin.
Love, Warner E., University of Pennsylvania.
Malan, Martha, University of Pennsylvania.
McCay, Paul B., University of Oklahoma.
McCulloch, David, Teaching Fellow, Massachusetts Institute of Technology.
McKeenan, Morris S., Zoology Assistant, University of Chicago.
Miller, Tilford D., Amherst University.
Mitchell, Ruth, Columbia University.
Moskovic, Samuel, Teaching Fellow, New York University.
Moulton, James Malcolm, Teaching Fellow, Harvard University.
O'Malley, Benedict B., Graduate Student, Fordham University.
Pfister, Ronald R., Columbia Medical School.
Proctor, Nathaniel K., Graduate Student, University of Pennsylvania.
Rawley, June, Instructor, Kent State University.
Saltz, Myron, Student, Amherst College.
Schreiber, Irving, University of Pennsylvania.
Schulman, Evelyn, Graduate Student, Bryn Mawr College.
 Seki, Sada L., Graduate Assistant, Mount Holyoke College.
Stiegitz, Alice A., Student, University of Pennsylvania.
Strittmatter, Cornelius F., Harvard University Medical School.
Tietze, Frank, Research Fellow, Northwestern University.
Vogel, Martin L., Amherst College.
Wilson, Thomas H., Instructor in Physiology, University of Pennsylvania.

Research Assistants, 1949

Abramsky, Tess, Georgetown University.
Benson, Eleanor, University of Missouri.
Bernatowicz, Albert J., University of Michigan.
Blumenthal, Gertrude, University of Missouri.
Brumm, Anne F., New York University.
Bullock, Jane A., University of Oklahoma.
Burke, Dean, National Cancer Institute.
Curtis, Paul, Oberlin College.
Davidson, Margaret E., McGill University.
Fass, Jerome S., Rockefeller Institute.
Foley, Mary T., Yale University.
Friedler, Gladys, University of Pennsylvania.
Fromberg, Vivian, Woman's Medical College of Pennsylvania.
Garnic, Justine, Northwestern University.
Golding, Roberta, Vassar College.
Gourevitch, Harry G., University of Chicago.
Grim, Madelein R., Amherst College.
Holland, Bert, University of Chicago.
Howard, Robert S., University of Miami.
Hsu, Dorothy L., University of Pennsylvania.
Jaffe, Oscar, Graduate School of Arts and Science, New York University.
Kun, Ernest, University of Chicago.
LEE, Lois E., Southwest Missouri State College.
LEONARD, Lawrence, Haverford College.
LITT, Mortimer, University of Rochester Medical School.
LOEFFLER, Robert J., University of Wisconsin.
LYNN, Francis, Stanford University.
MILLER, Faith S., Emory University.
MITCHELL, Constance J., University of Delaware.
MOOS, Carl, Massachusetts Institute of Technology.
ORSKI, Barbara M., Harvard Medical School.
ROSENBLUTH, Raja, Columbia University.
SANDEEN, Muriel L., Northwestern University.
SLATTERY, Leo F., University of Chicago.
STAPLETON, R. H., United States Public Health Service.
STOUT, Carolyn M., University of Pennsylvania.
TALPEY, William B., Washington University.
WALTERS, C. Patricia, Eli Lilly and Company.
WEBB, H. Marguerite, Northwestern University.
WEBER, Patricia, St. Louis University.
WEST, Alice, Radcliffe College.
WILSON, Marie, Northwestern University.
WINBLAD, James N., University of Kansas.

Library Readers, 1949

ADLER, Francis H., Professor of Ophthalmology, University of Pennsylvania.
BARTLETT, James H., Professor of Physics, University of Illinois.
BLOCH, Robert, Research Associate, Yale University.
BODIAN, David, Associate Professor in Epidemiology, Johns Hopkins University.
CANTY, G. L., New York University.
CASE, James F., Graduate Student, Johns Hopkins University.
CLENDENNING, Kenneth A., Associate Research Biologist, National Research Council, Canada.
COLLIER, Albert, Marine Biologist, Gulf Oil Corporation.
CONKLIN, Ruth E., Professor of Physiology, Vassar College.
CSAKY, Tibor Z., Research Associate, Duke Hospital.
DEMPSEY, Edward W., Harvard Medical School.
EDSALL, Geoffrey, Professor of Bacteriology, Boston University School of Medicine.
EICHEL, Bertram, Assistant Professor, Rutgers University.
EICHEL, Herbert J., Teaching Assistant in Physiology, Rutgers University.
FLAGLER, Elizabeth A., Princeton University.
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HAUSLER, Hans F., Head of Pharmacological Department, University of Graz.
HOBSON, Lawrence B., Associate Medical Director, E. R. Squibb and Sons.
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KELLEY, Rudolph, Director of Research, Madison Foundation.
KOEHN, John, Professor of Biology, Newark College, Rutgers University.
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LING, Gilbert N., Postdoctorate Fellow, University of Chicago.
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WAINIO, WALTER W., Assistant Research Specialist, Rutgers University.
WITTMENBERG, JONATHAN, Graduate Student, Columbia University.
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BARKER, FRANCES M., Assistant in Bacteriology, Wellesley College.
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PUTALA, EUGENE C., Student, University of Massachusetts.
RIEGER, CECILIA A., Hofstra College.
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STONIER, TOM T., Student, Drew University.
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CHIGIDINE, A. DUNCAN, Cornell University.
COHEN, ADOLPH I., Graduate Student, Columbia University.
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GAGE, MARGARET E., Student, DePauw University.
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REPORT OF THE DIRECTOR

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OSTI, Ernest V., Student, Fordham University.
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Swift, Paul A., Stanford University.
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Thornburg, Wayne, Student, University of Illinois.
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INVERTEBRATE ZOOLOGY

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ANDERSON, Betsy J., Student, Drury College.
ANDERSON, Victor Elving, Student, University of Minnesota.
AUERBACH, Earl, Graduate Student, Northwestern University.
BARBER, Saul B., Graduate Student, Yale University.
BELLISARIO, Joseph, Laboratory Instructor, Washington and Jefferson College.
Birch, Robert Lee, Instructor in Zoology, West Virginia University.
Bouwman, Frederick L., Jr., Graduate Assistant, Michigan State College.
Bullock, Jane Ann, Graduate Student, University of Oklahoma.
Burnett, Frances L., Cornell University.
Chart, Alfred B., Student, University of Massachusetts.
Currier, Joanne E., Graduate Assistant in Zoology, Vassar College.
D'Ambrosio, Gloria, Student, Northwestern University.
Davis, Earle A., Jr., Graduate Student, University of Illinois.
Dawson, William A., Student, Swarthmore College.
Donnelly, Orville W., Graduate Assistant, Williams College.
Fiene mann, Barbara J., Teaching Fellow, Smith College.
Fingerman, Milton, Graduate Assistant, Northwestern University.
Foster, Richard W., Assistant Curator of Mollusks, Harvard College.
Frost, Robert C., Graduate Student, Rice Institute.
Gerold, Nicolas J., Jr., Assistant, Cornell University.
Getman, Herbert C., Graduate Student, Brown University.
Gilmartin, Rosemary T., Graduate Student, Yale University.
Godfrey, Robert R., Graduate Assistant, New York University.
Goldstein, Lester, Graduate Student, University of Pennsylvania.
Grant, William C., Dartmouth College.
Grun, John, Student, Brooklyn College.
Hanks, Robert M., Research Assistant, University of Kansas.
Hansen, Bruce W., Student, Monmouth College.
Holle, Paul A., Graduate Student, University of Notre Dame.
James, Carolyn L., Vassar College.
Jones, Elizabeth J., Undergraduate, Oberlin College.
Kallen, Eugene J., Student, Columbia University.
Leonard, Barbara H., Instructor, Smith College.
Mabel, Judith B., Student, Goucher College.
Most, Sylvia A., Graduate Student, University of Pennsylvania.
Nanney, David, Research Fellow, Indiana University.
Patten, John A., New York University.
Pick, Harry D., Student, Wesleyan University.
Pingley, Thomas E., Assistant Professor, University of Houston.
Rieck, Alvin F., Marquette University.
Said, Rushdi, Student, Harvard University.
Schneiderman, Howard A., Fellow in Biology, Harvard University.
Sedar, Albert W., Student, State University of Iowa.
Sengbusch, Howard G., Graduate Assistant, New York University.
Sindermann, Carl J., University of Massachusetts.
Sippel, Theodore O., Laboratory Assistant in Zoology, Yale University.
Spiegel, Melvin, Graduate Student, University of Rochester.
Stafford, Nancy J., Teaching Fellow, Tufts College.
Telfer, William H., Graduate Student, Harvard University.
Tinker, Milton E., Teaching Assistant, University of Minnesota.
Weyl, Hilda, Student, Hunter College.
Williams, Austin B., Assistant Instructor, Kansas University.
Wilson, Katherine, Graduate Assistant, Washington University.

5. The Lalor Fellows, 1949

Albert W. Frenkel, University of Minnesota.
C. Albert Kind, University of Connecticut.
Albert I. Lansing, Washington University School of Medicine.
Jerre L. Noland, University of Wisconsin.
Verner J. Wulff, University of Illinois.
REPORT OF THE DIRECTOR

6. The Atomic Energy Commission Fellows

Richard Abrams, University of Chicago.
Felix Friedberg, Howard University.
Marion Kayhart, University of Pennsylvania.
Jay S. Roth, Rutgers University.
Frank H. Rudenberg, Harvard University.

7. Tabular View of Attendance, 1945-1949

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<tr>
<th>Year</th>
<th>1945</th>
<th>1946</th>
<th>1947</th>
<th>1948</th>
<th>1949</th>
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<td>Investigators—Total</td>
<td>212</td>
<td>267</td>
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<tr>
<td>Independent</td>
<td>138</td>
<td>175</td>
<td>182</td>
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<tr>
<td>Under instruction</td>
<td>10</td>
<td>29</td>
<td>36</td>
<td>42</td>
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<td>Library readers</td>
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<td>36</td>
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<td>Research Assistants</td>
<td>26</td>
<td>25</td>
<td>45</td>
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<tr>
<td>Students—Total</td>
<td>96</td>
<td>122</td>
<td>131</td>
<td>123</td>
<td>128</td>
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<td>30</td>
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<td>Physiology</td>
<td>13</td>
<td>26</td>
<td>26</td>
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<tr>
<td>Botany</td>
<td>5</td>
<td>9</td>
<td>17</td>
<td>15</td>
<td>15</td>
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<tr>
<td>Total Attendance</td>
<td>308</td>
<td>389</td>
<td>430</td>
<td>449</td>
<td>472</td>
</tr>
<tr>
<td>Less persons registered as both students and investigators</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td></td>
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</tr>
</tbody>
</table>

| Institutions Represented—Total | 124 | 141 | 148 | 158 | 155 |
| By investigators | 100 | 102 | 114 | 117 | 114 |
| By students | 49 | 56 | 56 | 68 | 68 |

| Schools and Academies Represented |
| By investigators | 2 | 2 | 1 | 1 | 1 |
| By students | 2 | | | 1 | |

| Foreign Institutions Represented |
| By investigators | 1 | 7 | 7 | 8 | 6 |
| By students | 5 | 3 | 4 | 3 | |

8. Subscribing and Cooperating Institutions, 1949

Subscribing Institutions

Argonne National Laboratory
Boston University
George Washington University Medical School
Georgetown University Medical School
Indiana University
Institute for Cancer Research, Lankenau Hospital
Institute of Pennsylvania Hospital
Long Island Medical College
Marquette University
Morgan State College
National Research Council
National Research Council of Canada
Northwestern University
Ohio State University, Graduate School
Public Health Research Institute of New York City
Radcliffe College
Russell Sage College
Rutgers University
St. Louis University
Southwestern Medical College
Tulane University School of Medicine
U. S. Public Health Service
University of New Hampshire
University of Oklahoma
University of Pittsburgh
University of South Dakota
University of Wisconsin
Wellesley College
9. Evening Lectures

The Friday Evening Lectures, 1949

Friday, July 1
Dr. Albert Tyler ..................................“Serological Aspects of Fertilization.”

Friday, July 8
Dr. Hans Gaffron .................................“Problems in Photosynthesis.”

Friday, July 15
Dr. J. H. Quastel .................................“Soil as a Medium for Biochemical Investigations.”

Friday, July 22
Dr. Erik Zeuthen ..................................“Recent Developments in the Cartesian Diver Technique, and Its Application to the Study of Respiration During Mitosis.”

Friday, July 29
Dr. T. M. Sonneborn .............................“Environment, Cytoplasm, and Genes in the Control of Heredity in Paramoecium.”

Friday, August 5
Dr. J. S. Fruton ..................................“The Metabolism of Peptides.”

Friday, August 12
Dr. F. A. Brown, Jr. ..............................“The Mechanism of Color Changes in Crustacea.”

Friday, August 19
Dr. M. E. Krais ..................................“Metabolic Activities of the Arbacia Egg.”

Friday, August 26
Dr. S. Gross ......................................“Experiments in Marine Fish Culture.”
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Other Lectures

Wednesday, June 15
DR. GUNNAR THORSON .......... "Reproductive and Larval Ecology of Marine Bottom Invertebrates."

Monday, July 18
DR. PERIHAN CAMBEL .......... "Problems of Modern Turkey."

Wednesday, July 27
L. V. FOSTER .................. "Microscope Optics."

Wednesday, August 24
DR. HOWARD A. MEYERHOFF ..... "Recent Marine Research in the Arctic."

Tuesday, August 30
DR. MICHAEL GRAHAM .......... "Recent Marine Research in the Arctic."

10. SEMINARS, 1949

July 12
ANNA R. WHITING ............... "Evidence that Response to Fractionation of X-ray Dose in Habrobracon Eggs is Cytoplasmic."
H. H. PLOUGH, MADELON R. GRIMM
AND M. L. VOGEL ................ "Minus and Plus Mutations in Biochemical Requirements in Salmonella typhimurium."
P. W. WHITING AND MARION E.
KAYHART ....................... "X-ray Mutations and Fecundity of Mononiella."

July 19
ALBERT FRENKEL ................. "The Effect of Ultra-Violet Light (2537 Å) on the Catalase Activity and on Photosynthesis of Chlorella pyrenoidosa."
ERNEST KUN .................... "Biochemical Properties of Succinoxidase from Salmonella aertrycke."
ALFRED BLISS .................. "Reversible Enzymic Reduction of Retinene to Vitamin A."
DAVID NACHMANSOHN, S. HESTRIN
AND H. VORIPAIEFF ............. "An Enzymatic Product with Acetylcholine-like Activity, Derived from Brain Extracts."

July 26
ETHEL BROWNE HARVEY .......... "Growth and Metamorphosis of the Pluteus of Arbacia punctulata."
JAMES A. MILLER ............... "Effects of Temperature upon Survival of Newborn Guinea Figs Subjected to Anoxia."
ALFRED MARSHAK ................. "Evidence for Activity of Desoxy-ribonuclease in Nuclear Fusion and Mitosis by the Use of d-Uronic Acid."
CARL C. SPEIDEL ............... "Motion Pictures Showing the Reactions of Cells in Frog Tadpoles to Implants of Tantalum."

August 2
ANDREW G. SZENT-GYORGYI ....... "Investigations on Muscle Fibers."
E. L. Chambers and W. E. White — "The Accumulation of Orthophosphate and its Relation to Adenosine Triphosphate in the Fertilized Echinoderm Egg."


Elemer Mihalyi — "On the Structure of Fibrin Clots."

Brian A. Cookson — "Some Methods of Producing Traveling Contraction Nodes in Adult Frog Skeletal Muscle Fibers."

August 9

F. R. Hunter — "An Analysis of the Photoelectric Method of Measuring Permeability."

M. H. Jacobs, Carolyn M. Stout, Marion W. LeFèvre and W. E. Love — "How Simple Are the So-called Simple Hemolysins?"

Lois H. Love — "Hemolytic Action of Anionic Detergents."

A. K. Parpart and J. W. Green — "Potassium and Sodium Exchange in Rabbit Erythrocytes Treated with Butyl Alcohol."

August 16

Dorothy Wrinch — "Structure of Insulin."

J. M. Moulton — "The Development of Menidia-Fundulus Hybrids."

Ezra Allen — "Analysis of Degeneration in Primordial Germ Cells and a Hitherto Undescribed Germ Cell in Albino Male Rats."

C. G. Wilber — "Fat Metabolism in Arctic Fish as Compared with Temperate Form."

11. Members of the Corporation, 1949

I. Life Members

Beckwith, Dr. Cora J., Vassar College, Poughkeepsie, New York.
Billings, Mr. R. C., 66 Franklin Street, Boston, Massachusetts.
Calvert, Dr. Philip P., University of Pennsylvania, Philadelphia, Pennsylvania.
Cole, Dr. Leon J., College of Agriculture, Madison, Wisconsin.
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.
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.
Porter, Dr. H. C., University of Pennsylvania, Philadelphia, Pennsylvania.
Scott, Dr. Ernest L., Columbia University, New York City, New York.
Sears, Dr. Henry F., 86 Beacon Street, Boston, Massachusetts.
Shedd, Mr. E. A.
REPORT OF THE DIRECTOR

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.

2. REGULAR MEMBERS

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, Baltimore, Md.
ANDERSON, DR. RUBERT S., Department of Physiology, University of South Dakota, Vermillion, South Dakota.
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.
BAITSELL, DR. GEORGE A., Yale University, New Haven, Connecticut.
BALL, DR. ERIC G., Department of Biological Chemistry, Harvard University Medical School, Boston, Massachusetts.
BALLARD, DR. WILLIAM W., Dartmouth College, Hanover, New Hampshire.
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.
BEADLE, DR. G. W., California Institute of Technology, Pasadena, California.
BEAMS, DR. HAROLD W., Department of Zoology, State University of Iowa, Iowa City, Iowa.
BECK, DR. L. V., 5609 Roosevelt St., Bethesda, Maryland.
BEERS, C. D., University of North Carolina, Chapel Hill, North Carolina.
BEHRE, DR. ELINOR H., Louisiana State University, Baton Rouge, Louisiana.
BERTHOLF, DR. LLOYD M., College of the Pacific, Stockton, California.
BEVELANDER, DR. GERRIT, New York University School of Medicine, New York City, New York.
BIGelow, DR. H. B., Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.
BIGELOW, 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.

BLISS, DR. ALFRED F., Department of Physiology, Tufts College Medical School, Boston, Mass.

BLUM, DR. HAROLD F., Department of Biology, Princeton University, Princeton, New Jersey.

BODIAN, DR. DAVID, Department of Epidemiology, Johns Hopkins University, Baltimore, Maryland.

BODINE, DR. J. H., Department of Zoology, State University of Iowa, Iowa City, Iowa.

BOEILL, DR. EDGAR J., Yale University, New Haven, Connecticut.

BONNER, DR. JOHN T., Department of Biology, Princeton University, Princeton, New Jersey.

BORING, DR. ALICE M., Yenching University, Peiping, China.

BRADLEY, PROF. HAROLD C., 2639 Durant Avenue, Berkeley 4, California.

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

BRONFENBRENNER, DR. JACQUES J., Department of Bacteriology, Washington University Medical School, St. Louis, Missouri.

BRONK, DR. DETLEV W., Johns Hopkins University, Baltimore, Maryland.

BROOKS, DR. MATILDA M., University of California, Department of Zoology, Berkeley, California.

BROWN, DR. DUGALD E. S., Department of Zoology, University of Michigan, Ann Arbor, Michigan.

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.

BUDINGTON, PROF. R. A., Winter Park, Box 944, Florida.

BULLINGTON, DR. W. E., Randolph-Macon College, Ashland, Virginia.

BULLOCK, DR. T. H., University of California, Los Angeles 24, California.

BURBANK, DR. WILLIAM D., Department of Biology, Drury College, Springfield, Missouri.

BURKENROAD, DR. M. D., Bogue Sound Road, Newport, North Carolina.

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.

CARLSON, PROF. A. J., Department of Physiology, The University of Chicago, Chicago, Illinois.

CAROTHERS, DR. E. ELEANOR, 134 Avenue C. East, Kingman, Kansas.

CARPENTER, DR. RUSSELL L., Tufts College, Tufts College, Massachusetts.

CARVER, PROF. GAIL L., Mercer University, Macon, Georgia.

CATTLEL, DR. MCKEEN, Cornell University Medical College, New York City, New York.
CATTCELL, MR. WARE, Cosmos Club, Washington, D. C.
CHAMBERS, DR. ROBERT, Woods Hole, Massachusetts.
CHASE, DR. AURIN M., Princeton University, Princeton, New Jersey.
CHENEY, 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, DR. A. M., Department of Biology, University of Delaware, Newark, Delaware.
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.
CLEMMENT, DR. A. C., Department of Biology, Emory University, Emory, Georgia.
COE, PROF. W. R., Scripps Institute of Oceanography, La Jolla, California.
COHN, DR. EDWIN J., 183 Brattle Street, Cambridge, Massachusetts.
COLE, DR. ELBERT C., Department of Biology, Williams College, Williamstown, Massachusetts.
COLE, DR. KENNETH S., Naval Medical Research Institute, Bethesda 14, Maryland.
COTLETT, DR. MARY E., Western Reserve University, Mather College, Cleveland, Ohio.
COTTON, PROF. H. S., Box 601, Flagstaff, Arizona.
COLWIN, DR. ARTHUR L., Queens College, Flushing, Long Island, New York.
COLWIN, DR. LAURA N. H., Department of Biology, Queens College, Flushing, 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.
COPELAND, PROF. MANTON, Bowdoin College, Brunswick, Maine.
CORNMAN, DR. IVOR, George Washington University, Warwick Memorial Clinic, Washington 5, D. C.
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.
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., Goucher College, Baltimore, Maryland.
CROWELL, DR. P. S., Jr., Department of Zoology, University of Indiana, Bloomington, Indiana.
CURTIS, DR. MAYNIE R., 4811 John R. Street, Detroit, Michigan.
CURTIS, PROF. W. C., University of Missouri, Columbia, Missouri.
DAN, DR. KATSUMA, Misaki Biological Station, Misaki, Japan.
DAVISON, DR. DONALD W., College of William and Mary, Williamsburg, Virginia.
DAWSON, DR. A. B., Harvard University, Cambridge, Massachusetts.
DILLER, DR. WILLIAM P., 205 Fairhill Avenue, Glenside, 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.
DRAKE, DR. CECIL K., Box 502, Falmouth, Massachusetts.
DUBoIS, DR. EUGENE F., Cornell University Medical College, New York City, New York.
DUGGAR, DR. BENJAMIN M., c/o Lederle Laboratories Inc., Pearl River, New York.
DUNGAN, DR. NEIL S., Carleton College, Northfield, Minnesota.
DURYEE, DR. WILLIAM R., Carnegie Institute, 5241 Broad Branch Rd. N.W., Washington 15, D. C.
EVANS, DR. TITUS C., State University of Iowa, Iowa City, Iowa.
FAILLA, DR. G., College of Physicians and Surgeons, New York City, New York.
FAURE-FREMIET, PROF. EMANUEL, Collège de France, Paris, France.
FERGUSON, DR. F. P., Department of Physiology, University of Maryland Medical School, Baltimore, Maryland.
FERGUSON, DR. JAMES K. W., Department of Pharmacology, University of Toronto, Ontario, Canada.
FIGG, DR. F. H. J., Lombard and Greene Streets, Baltimore, Maryland.
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, Biological Laboratories, Divinity Avenue, Cambridge, Massachusetts.
FRISCH, DR. JOHN A., Canisius College, Buffalo, New York.
Furth, Dr. Jacob, 201 Delaware Avenue, Oak Ridge, Tennessee.
Gaffron, Dr. Hans, Department of Biochemistry, University of Chicago, Chicago 37, Illinois.
Galtsoff, Dr. Paul S., 420 Cumberland Avenue, Somerset, Chevy Chase, Maryland.
Garré, Dr. Hans, Department of Biochemistry, University of Chicago, Chicago 37, Illinois.
Garré, Prof. W. E., Vanderbilt University Medical School, Nashville, Tennessee.
Gasser, Dr. Herbert, Director, Rockefeller Institute, New York City, New York.
Gates, Dr. Reginald R., Biological Laboratories, Harvard University, Cambridge, Massachusetts.
Geiser, Dr. S. W., Southern Methodist University, Dallas, Texas.
Gerard, Prof. R. W., The University of Chicago, Chicago, Illinois.
Gilman, Dr. L. C., Department of Zoology, University of Miami, Coral Gables, Florida.
Glaser, Prof. O. C., Amherst College, Amherst, Massachusetts.
Goldforb, Prof. A. J., College of the City of New York, New York City, New York.
Goodchild, Dr. Chauncey G., Missouri State College, Springfield, Missouri.
Gottschall, Dr. Gertrude Y., 315 East 68th Street, New York 21, New York.
Gould, Dr. H. N., Newcomb College, New Orleans 18, Louisiana.
Grant, Dr. Madeleine P., Sarah Lawrence College, Bronxville, New York.
Gray, Prof. Irving E., Duke University, Durham, North Carolina.
Gregg, Dr. J. R., Department of Zoology, Columbia University, New York 27, New York.
Gregory, Dr. Louise H., 1160 Fifth Avenue, New York City, New York.
Grosch, Dr. Daniel S., Department of Zoology, North Carolina State College, Raleigh, North Carolina.
Grundfest, Dr. Harry, Columbia University College of Physicians and Surgeons, New York City, New York.
Gudernatsch, Dr. Frederick, 41 Fifth Avenue, New York 3, New York.
Guthrie, Dr. Mary J., University of Missouri, Columbia, Missouri.
Guyer, Prof. M. F., University of Wisconsin, Madison, Wisconsin.
Hague, Dr. Florence, Sweet Briar College, Sweet Briar, Virginia.
Hall, Prof. Frank G., Duke University, Durham, North Carolina.
Hamburger, 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.
Harnly, Dr. Morris H., Washington Square College, New York University, New York City, New York.
Harrison, Prof. Ross G., Yale University, New Haven, Connecticut.
Hartline, Dr. H. Keffer, 215 Mergenthaler Hall, Johns Hopkins University, Baltimore, Maryland.
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.
Hauschka, Dr. T. S., Institute for Cancer Research, Philadelphia 30, Pennsylvania.
Hayashi, Dr. Teru, Columbia University, New York City, New York.
Hayden, Dr. Margaret A., Wellesley College, Wellesley, Massachusetts.
Hayes, Dr. Frederick R., Zoological Laboratory, Dalhousie University, Halifax, Nova Scotia.
Haywood, Dr. Charlotte, Mount Holyoke College, South Hadley, Massachusetts.
Heilbrunn, Dr. L. V., Department of Zoology, University of Pennsylvania, Philadelphia, Pennsylvania.
Henley, Dr. Catherine, Department of Zoology, University of North Carolina, Chapel Hill, North Carolina.
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.
Hinkichs, Dr. Marie, University of Illinois Health Service, 807 South Wright, Champaign, Illinois.
Hisaw, Dr. F. L., Harvard University, Cambridge, Massachusetts.
Hoarley, Dr. Leigh, Biological Laboratories, Harvard University, Cambridge, Massachusetts.
Höber, Dr. Rudolf, University of Pennsylvania, Philadelphia, Pennsylvania.
Hodes, Dr. Robert, Tulane University School of Medicine, New Orleans, Louisiana.
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.
Hopkins, Dr. Dwight L., University of Illinois, Pier Branch—Navy Pier, Division of Biological Science, Chicago, Illinois.
Hopkins, Dr. Hoyt S., New York University, College of Dentistry, New York City, New York.
Hunter, Dr. Francis R., Department of Zoology, University of Oklahoma, Norman, Oklahoma.
Hutchens, Dr. John O., Department of Physiology, University of Chicago, Chicago 37, Illinois.
Hyman, Dr. Libbie H., American Museum of Natural History, New York City, New York.
Irving, Dr. Laurence, Swarthmore College, Department of Zoology, Swarthmore, Pennsylvania.
Iselin, Mr. Columbus O'D., Woods Hole, Massachusetts.
Jacobs, Prof. Merkel H., School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania.
Jenkins, Dr. George B., 1336 Parkwood Place, N.W., Washington, D.C.
Joehlin, Dr. J. M., Vanderbilt University Medical School, Nashville, Tennessee.
Jones, Dr. E. Ruffin, University of Florida, Gainesville, Florida.
REPORT OF THE DIRECTOR

KAAN, Dr. Helen W., National Research Council, 2101 Constitution Avenue, Washington, D. C.

KABAT, Dr. E. A., Neurological Institute, College of Physicians and Surgeons, New York City, N. Y.


KEMPTON, Prof. Rudolf T., Vassar College, Poughkeepsie, New York.

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