CONTENTS

THE AMERICAN PHYSIOLOGICAL SOCIETY

Founded December 30, 1887; Incorporated June 2, 1923

OFFICERS, 1963-1964

President - H. Rahn, University of Buffalo, Buffalo, New York
President-Elect - J.R. Pappenheimer, Harvard University, Boston, Massachusetts
Past-President - H.S. Mayerson, Tulane University, New Orleans, Louisiana
Council - H. Rahn (1965), H.S. Mayerson (1964), J.R. Pappenheimer (1966), J.D. Hardy (1964), J.M. Brookhart (1966), K.S. Cole (1967), R.E. Forster (1965)
Executive Secretary-Treasurer - R.G. Daggs, 9650 Wisconsin Avenue, Washington, D.C. 20014

STANDING COMMITTEES

Publications - R.W. Berliner (1964), Chairman; C.N. Woolsey (1965), R.E. Forster (1966)
Finance - A.W. Martin (1964), Chairman; L.N. Katz (1965), H.E. Essex (1966)
Membership Advisory - L.D. Carlson (1965), Chairman; R.B. Tschirgi (1964), D.S. Farner (1965), R.L. Riley (1965), C.P. Lyman (1965), H.D. Green (1966)
Education - R.B. Tschirgi (1967), Chairman; P.R. Morrison (1964), L.H. Marshall (1965), C.G. Wilber (1967), W.C. Randall (1967); Representatives of Society of General Physiolcgists - R.R. Ronkin (1967), D.C. Tosteson (1964); Representatives of Comparative Physiology Division of the American Society of Zoologists - R.P. Forster (1965), D.M. Maynard, Jr. (1965)
Use and Care of Animals - B.J. Cohen (1964), Chairman; E. Knobil (1965), P.D. MacLean (1966)
Program Advisory - L.L. Langley (1965), Chairman; W.R. Anslow, Jr. (1964), R.M. Berne (1966)
Porter Fellowship - J.K. Hampton (1964), Chairman; J.F. Perkins (1965), D.W. Rennie (1966)
Senior Physiologists - D.B. Dill (1965), Chairman; W.F. Hamilton (1965), E.F. Adolph (1966), P. Bard (1966)
International Physiology - M.B. Visscher (1965), H.S. Mayerson (1967), E.M. Landis (1969)

REPRESENTATIVES TO OTHER ORGANIZATIONS

American Association for the Advancement of Science - R.E. Smith (1964), R.G. Daggs
American Institute of Biological Sciences - J.R. Pappenheimer (1966)
American Documentation Institute - M.O. Lee (1964)
National Research Council - Division of Medical Sciences - R.W. Gerard (1964; Division of Biology and Agriculture - J.H. Leathem (1964)
Council on Medical Education and Hospitals, A.M.A. - J.S. Gray (1964)
APS Members of the U.S. National Committee for IUPS - M.B. Visscher

(1965), H. S. Mayerson (1967), E. M. Landis (1969)
APS Members on the Federation Board - H. S. Mayerson (1964), Chairman of the Board; H. Rahn (1965), J. R. Pappenheimer (1966)
Federation Advisory Committee - H. S. Mayerson (1964), Chairman of the Committee
Federation Secretaries Committee - J. R. Pappenheimer (1964) Chairman of the Committee
Federation Public Information Committee - A. C. Guyton (1964), Chairman of the Committee

PUBLICATIONS

Publications Committee - R. W. Berliner (1964), Chairman; C. N. Woolsey (1965), R. E. Forster (1966)
Managing Editor - M. O. Lee
Executive Editor - Sara F. Leslie
Chief Editor of Journal of Neurophysiology - V. B. Mountcastle
Editor of The Physiologist - R. G. Daggs
Associate Editor of Physiological Reviews - R. G. Daggs
Associate Editor of American Journal of Physiology and Journal of Applied Physiology - R. L. Zwemer

EDITORIAL BOARDS

American Journal of Physiology and Journal of Applied Physiology -
Section Editors - D. E. Gregg (Circulation), A. B. Otis (Respiration), W. D. Lotspeich (Renal and Electrolyte Physiology), Franklin Hollander (Gastrointestinal Physiology), Jane A. Russell (Endocrinology and Metabolism), L. D. Carlson (Environmental Physiology), Knut Schmidt-Nielsen (Comparative and General Physiology), E. V. Evarts (Neurophysiology)

Editors - R. S. Alexander (1964), S. B. Barker (1964), L. M. Beidler (1966), H. S. Belding (1966), W. J. Bowen (1966), R. W. Brauer (1966), W. A. Briscoe (1966), F. P. Brooks (1965), V. B. Brooks (1965), F. P. Chinard (1965), J. A. Clements (1966), V. P. Dole (1966), A. B. DuBois (1965), R. W. Eckstein (1966), R. P. Forster (1966), W. H. Freygang, Jr. (1965), C. W. Gottschalk (1964), Eugene Grim (1965), Arthur Grollman (1966), M. I. Grossman (1966), A. C. Guyton (1964), F. J. Haddy (1966), Allan Hemingway (1966), B. F. Hoffman (1966), L. B. Jaques (1964), F. H. Johnson (1964), R. E. Johnson (1964), R. H. Kellogg (1966), Ernst Knobil (1966), W. J. Kolff (1964), B. R. Landau (1965), F. N. LeBaron (1965), Jean Mayer (1966), Jere Mead (1966), Jack Orloff (1965), L. H. Peterson (1966), K. H. Pribram (1965), J. W. Remington (1966), Sid Robinson (1965), Aser Rothstein (1965), R. F. Rushmer (1966), P. F. Salisbury (1964), G. M. Schoepfle (1965), R. O. Scow (1965), E. A. Sellers (1966), J. W. Severinghaus (1966), J. T. Shepherd (1966), C. W. Sheppard (1966), R. E. Smith (1965), S. M. Tenney (1965), Jay Tepperman (1965), C. A. Terzuolo (1966), U. G. Trendelenburg (1965), E. H. Wood (1965), J. W. Woodbury (1966). Consultant Editors - A. F. Cournand (1965), Hermann Rahn (1966), E. E. Selkurt (1966)
Physiological Reviews - J. R. Brobeck (1966), Chairman; A. P. Fishman

(1964), C.W. Gottschalk (1966), W.L. Nastuk (1966), J.R. Pappenheimer (1965), J.E. Rose (1965), R.C. Swan (1966), J.V. Taggart (1964). Appointed from the Society of General Physiologists - T.H. Bullock (1966), I.M. Klotz (1965). Appointed from the Society of Biological Chemists - DeWitt Stetten, Jr. (1964), A.E. Wilhelmi (1966). Appointed from the American Institute of Nutrition - Grace A. Goldsmith (1964). European Editorial Committee - Eric Neil, Chairman; E.M. Crook, N. Emmelin, R.A. Gregory, Y. LaPorte, G. Moruzzi.

Journal of Neurophysiology - J.M. Brookhart, C.McC. Brooks, T.H. Bullock, R. Granit, B. Katz, S.W. Kuffler, W.D. Neff, H.D. Patton, J.E. Rose.

Handbook of Physiology, Editorial Committee - M.B. Visscher, Chairman; A.B. Hastings (1966), H. Rahn (1964), J.R. Pappenheimer (1965).

Physiology for Physicians - J.H. Comroe, Jr., Chairman; F.L. Engel, M.I. Grossman, I.M. London, I.H. Page, R.F. Pitts, Stewart Wolf.

PAST OFFICERS

Presidents - 1888 H.P. Bowditch, 1889-90 S.W. Mitchell, 1891-95 H.P. Bowditch, 1896-1904 R.H. Chittenden, 1905-10 W.H. Howell, 1911-13 S.J. Meltzer, 1914-16 W.B. Cannon, 1917-18 F.S. Lee, 1919-20 W.P. Lombard, 1921-22 J.J. MacLeod, 1923-25 A.J. Carlson, 1926-29 J. Erlanger, 1930-32 W.J. Meek, 1933-34 A.B. Luckhardt, 1935 C.W. Greene, 1936-37 F.C. Mann, 1938-39 W.E. Garrey, 1938 W.T. Porter Honorary President, 1940-41 A.C. Ivy, 1942-45 P. Bard, 1946-47 W.O. Fenn, 1948 M.B. Visscher, 1949 C.J. Wiggers, 1950 H.C. Bazett (April to July) D.B. Dill, 1951 R.W. Gerard, 1952 E. M. Landis, 1953 E.F. Adolph, 1954 H.E. Essex, 1955 W.F. Hamilton, 1956 A.C. Burton, 1957 L.N. Katz, 1958 Hallowell Davis, 1959 R.F. Pitts, 1960 J.H. Comroe, Jr., 1961 H.W. Davenport, 1962 H.S. Mayerson.

Secretaries - 1888-92 H.N. Martin, 1893-94 W.P. Lombard, 1895-1903 F.S. Lee, 1904 W.T. Porter, 1905-07 L.B. Mendel, 1908-09 R. Hunt, 1910-14 A.J. Carlson, 1915-23 C.W. Greene, 1924-29 W.J. Meek, 1930 A.C. Redfield, 1931-32 A.B. Luckhardt, 1933-35 F.C. Mann, 1936-39 A.C. Ivy, 1940-41 P. Bard, 1942 C.J. Wiggers, 1943-46 W.O. Fenn, 1947 M.B. Visscher.

Treasurers - 1888-92 H.N. Martin, 1893-94 W.P. Lombard, 1895-1903 F.S. Lee, 1904 W.T. Porter, 1905-12 W.B. Cannon, 1913-23 J. Erlanger, 1924-26 C.K. Drinker, 1927-36 A. Forbes, 1937-40 W.O. Fenn, 1941 C.J. Wiggers, 1942-46 Hallowell Davis, 1947 D.B. Dill.

Executive Secretary-Treasurer - 1948-56 M.O. Lee, 1956 - R.G. Daggs.

CONSTITUTION AND BYLAWS

Adopted at the 1953 Spring Meeting

CONSTITUTION

ARTICLE I. Name

The name of this organization is THE AMERICAN PHYSIOLOGICAL SOCIETY.

ARTICLE II. Purpose

The purpose of the Society is to promote the increase of physiological knowledge and its utilization.

BYLAWS

(Amended April 1961)

ARTICLE I. Membership

Section 1. The Society shall consist of members, honorary members, associate members, and sustaining associates.

Section 2. Members. Any person who has conducted and published meritorious original research in physiology and/or biophysics and who is a resident of North America shall be eligible for membership in the Society.

Section 3. Honorary Members. Distinguished scientists of any country who have contributed to the advance of physiology shall be eligible for proposal as honorary members of the Society.

Section 4. Associate Members. Advanced graduate students in physiology at a predoctoral level, teachers of physiology, and investigators who have not yet had the opportunity or time to satisfy the requirements for full membership shall be eligible for associate membership in the Society provided they are residents of North America.

Section 5. Sustaining Associates. Individuals and organizations who have an interest in the advancement of biological or biophysical investigation, may be invited by the President, with the approval of Council, to become sustaining associates.

ARTICLE II. Officers

Section 1. The management of the Society shall be vested in a Council consisting of the President, the President-Elect, the Past-President for the previous year, and four other members. The terms of the President and of the President-Elect shall be one year. The terms of the four additional Councilors shall be four years each and they shall not be eligible for immediate reelection except those who have served for two years or less in filling interim vacancies. A person may serve only one term as President, except that if the President-Elect becomes President after September 30 he shall continue as President for the year beginning the next July 1st.

Section 2. Nomination and election of a President-Elect and Councilor(s) shall be by ballot at the Spring meeting of the Society. They shall assume office on July 1 following their election.

Section 3. The President-Elect shall serve as Vice-President and Secretary. Should he have to function as President prematurely, the Council shall select from among its own members a Secretary.

Section 4. The Council shall be empowered to appoint and compensate an Executive Secretary-Treasurer who shall assist it in carrying on the functions of the Society, including the receipt and disbursement of funds under the direction of the Council.

Section 5. The Council may fill any interim vacancies in its membership or vacancies on any Board or Committee of the Society, unless otherwise provided.

ARTICLE III. Dues

Section 1. The annual assessment on members and on associate members shall be determined by the Council and shall be due in advance on July 1.

Section 2. A member whose dues are two years in arrears shall cease to be a member of the Society, unless after payment of his dues in arrears and application to the Council, he shall be reinstated at the next Spring meeting by special vote of the Council. It shall be the duty of the Secretary to notify the delinquent of his right to request reinstatement.

Section 3. A member who has retired from employment because of illness or age may, upon application to the Council, be relieved from the payment of the annual member assessment.

ARTICLE IV. Meetings

Section 1. A meeting of the Society for transacting business, electing officers and members, presenting communications, and related activities, shall be held in the Spring of each year, with other member Societies of the Federation of American Societies for Experimental Biology, except that under exceptional circumstances the Council may cancel such a meeting.

Section 2. A Fall meeting of the Society shall be held at a time and place determined by the Council, for presenting communications and for transacting business except the election of officers.

Section 3. Special meetings of the Society or of the Council may be held at such times and places as the Council may determine.

Section 4. Regional meetings of the Society, for the purpose of presenting scientific communications, may be authorized by the Council.

ARTICLE V. Publications

Section 1. The official organs of the Society shall be the American Journal of Physiology, the Journal of Applied Physiology, Physiological Reviews and such other publications as the Society may own.

Section 2. A Publications Committee composed of three members of the Society appointed by the Council shall be responsible for the management of all of the publications of the Society; the Managing Editor, Executive Secretary and President of the Society shall be members ex-officio, without vote. The Committee shall have the power to appoint a Managing Editor and editorial boards for the Society's publications. The term of each member of the Publications Committee shall be three years; a member may not serve more than two consecutive terms. The Council shall designate the Chairman of the Committee who shall be an ex-officio mem-

ber of the Council, without vote. The Committee shall present an annual report on publications and policies to the Council for approval and an annual budget to the Finance Committee for its approval.

ARTICLE VI. Committees and Representatives

Section 1. The Council may appoint such special and standing committees as it deems necessary or that are voted by the Society.

The Council may name members of the Society as representatives to other organizations whenever it deems such action desirable.

Section 2. A Finance Committee, composed of three members of the Society appointed by the Council, shall receive budget proposals annually from the Committees, the Council and the Executive Secretary of the Society and shall determine the annual budget, reserve funds and investments of the Society, subject to approval by the Council.

The capital fund of the present Board of Publication Trustees (defined as the investments and unencumbered funds of that Board as of April 1, 1961) shall be a reserve fund for publications and may be used by the Publications Committee to finance new or established publications without authorization of the Finance Committee (though subject to approval by Council). The Finance Committee shall not approve the expenditure of any of this capital fund for nonpublication purposes without the consent of the Publications Committee. The Finance Committee shall be responsible for the separate investment of the reserve fund for publications; any capital gains from such investment shall accrue to the fund (capital losses will, however, reduce the value of it). Annual income from the investment of the fund may be used for any of the activities of the Society including publications.

The term of each member of the Finance Committee shall be three years; a member may not serve more than two consecutive terms. The Managing Editor, the President and the Executive Secretary shall be ex-officio members, without vote. The Council shall designate the Chairman of the Committee who shall be an ex-officio member of the Council, without vote.

ARTICLE VII. Standing Rules

1. Election to Membership. Two members of the Society must join in proposing a person for membership, in writing and with a statement of his qualifications. The Council may, from the persons so proposed, nominate candidates for election to membership. Nominations shall be presented at Spring and Fall meetings; a two-thirds majority vote of the members present and voting at the next following Fall or Spring meeting shall be necessary for election.

If a Spring or Fall meeting of the Society is not held, the procedures of nomination and/or election of new members may be effected by mail.

The names of the candidates nominated by the Council for membership and statements of their qualifications signed by their proposers shall be available for inspection by members during the Society meetings at which their election is considered.

2. Election to Honorary Membership. The proposal of an honorary member shall be made by two members of the Society to the Council in writing. The Council may, from the candidates so proposed, make nom-

inations to the Society at a Spring meeting. A two-thirds majority vote of the members present shall be necessary for election.

Honorary members shall have the privilege of attending business sessions of the Society but shall have no vote. They shall pay no membership dues.

3. Election to Associate Membership. Associate members shall be proposed, nominated and elected in the same manner as full members.

Associate members shall have the privilege of attending business sessions of the Society but shall have no vote. Associate members may be nominated for full membership.

4. Presentation of Papers. At a Spring meeting of the Society, held in conjunction with the Federation meetings, a member or honorary member may present orally or by title, be co-author of, or introduce not more than one scientific paper, except upon invitation of the Council. An associate member or a non-member may present orally one scientific paper only if sponsored by a full member of the Society. At a Fall meeting, a member, honorary member, or associate member may present orally not more than one paper, except upon invitation of the Council.

Upon invitation by the Council, a member may contribute papers to specially designated sessions of the Society without forfeit of his privilege of presenting a regular scientific communication.

5. There shall be a Committee on Membership appointed by and advisory to the Council.

6. There shall be a Program Advisory Committee appointed by the Council.

ARTICLE VIII. General

Section 1. Amendments. These Bylaws, except Article VII, may be amended at any Spring meeting of the Society by a three-fourths majority vote of the members present.

The Standing Rules of Article VII may be amended by a majority vote of the members present at either a Spring or Fall meeting of the Society.

Section 2. Quorum. At all business meetings of the Society fifty members shall constitute a quorum.

Section 3. Parliamentary Authority. The rules contained in Roberts Rules of Order shall govern the conduct of the business meetings of the Society in all cases to which they are applicable and in which they are not inconsistent with the Bylaws or special rules of order of the Society.

APS MEMBERSHIP STATUS

OCTOBER 1963

Regular members	2189
Associate members	166
Retired members	126
Honorary members	17
Total membership	2498

SUSTAINING ASSOCIATES

Abbott Laboratories
Ayerst Laboratories
Beckman Instruments, Inc.
Burroughs Wellcome and Co.
CIBA Pharmaceutical Products, Inc.
Ethicon, Inc.
Gilford Instrument Laboratories, Inc.
Gilson Medical Electronics
Grass Instrument Co.
Harvard Apparatus Co.
Hoffman-La Roche, Inc.
Lakeside Laboratories
Eli Lilly and Co.
Merck Sharp and Dohme Research Laboratories
The Norwich Pharmacal Co.
Chas. Pfizer and Co., Inc.
Phipps and Bird, Inc.
Precision Scientific Co.
Riker Laboratories, Inc.
A. H. Robins Co., Inc.
Sherman Laboratories
Smith Kline and French Laboratories
The Squibb Institute for Medical Research
Tektronix, Inc.
The Upjohn Co.
Warner-Lambert Research Institute
Wyeth Laboratories

DECEASED MEMBERS

The following deaths were reported since the 1963 Spring meeting.

Julius Blumenstock - May 23, 1963
Robert S. Cunningham (R) - May 24, 1963
Frank L. Engel - July 10, 1963
Herbert S. Gasser (R) - May 11, 1963
Francis X. Gassner - April 21, 1963
Charles C. Guthrie (R) - June 17, 1963
O. G. Harne (R) - July 12, 1963
James W. Mavor (R) - March 16, 1963
Harry Shay - July 30, 1963

Shiro Tashiro (R) - June 12, 1963
P. P. Vishwakarma - June 18, 1963
George F. Warner - April 25, 1963
Frank W. Weymouth (R) - March 19, 1963
Carl J. Wiggers (R) - April 28, 1963
Alan H. Woodcock - May 26, 1963
Winfrey Wynn - May 3, 1963

NEWLY ELECTED MEMBERS

The following, nominated by the Council, were elected to membership in the American Physiological Society at the Fall meeting, 1963.

FULL MEMBERS

ABEL, Francis L.: Asst. Prof. Physiol., Univ. Indiana Med. Ctr.
ANDY, Orlando J.: Prof. Neurosurgery, Univ. Mississippi
ARIAS, Irwin M.: Asst. Prof. Med., Albert Einstein Coll. Med.
ASDELL, Sydney A.: Prof. Animal Physiol., Cornell Univ.
AUCHINCLOSS, J. H., Jr.: Assoc. Prof. Med., State Univ. New York
BALDINI, Mario G.: Assoc. Prof. Med., Tufts Univ.
BALINT, John A.: Asst. Prof. Med., Univ. Alabama Med. Ctr.
BARNETT, G. O.: Investigator, Am. Heart Assoc., Harvard Med. Sch.
BENDER, A. D.: Sr. Scientist, Smith Kline & French Labs.
BERGOFSKY, Edward H.: Asst. Prof. Physiol., New York Univ.
BERLINER, David L.: Assoc. Prof. Anat., Univ. Utah
BERNSTEIN, Jerald J.: Res. Biologist, NIH, NINDB
BITMAN, Joel: Res. Chemist, Physiol. Invest., U.S. Dept. Agri.
BLUMENTHAL, Marvin R.: Res. Assoc. Pharmacol., Columbia Univ.
BODA, James M.: Assoc. Prof. Animal Husb., Univ. California, Davis
BOOTH, Nicholas H.: Prof. Physiol., Colorado State Univ.
BRODIE, David A.: Res. Assoc. Physiol., Merck Inst. Therap. Res.
BROWN, John L.: Assoc. Prof. Physiol., Univ. Pennsylvania
BUCHWALD, Jennifer S.: Asst. Res. Anatomist, UCLA
BURROWS, Benjamin: Assoc. Prof. Med., Univ. of Chicago
BUTLER, John: Assoc. Prof. Med., Univ. California Med. Ctr.
CASTILLO, Cesar A.: Instr. Med., Univ. of Wisconsin
CHEN, Philip S., Jr: Asst. Prof. Rad. Biol. & Pharmacol., Univ. of Rochester
COHEN, Bernard: Asst. Attending Neurol., Mt. Sinai Hosp, New York
COHEN, Morton I.: Asst. Prof. Physiol., Albert Einstein Coll. Med.
DAVIES, Robert E.: Prof. Biochem, Animal Biol., Univ. Pennsylvania
DOEMLING, Donald B.: Asst. Prof. Physiol., Jefferson Med. Coll.
DUMONT, Allan E.: Assoc. Prof. Surg., New York Univ. Med. Ctr.
DUNCAN, Charles H.: Assoc. Prof. Med., Univ. of Louisville
EAGAN, Charles J.: Res. Physiol., USAF Arctic Aeromed. Lab.
EDELMANN, Chester M.: Asst. Prof. Pediat., Albert Einstein Coll. Med.
EVONUK, Eugene: Chief, Physiol., Arctic Aeromed. Lab.
FINLEY, Theodore N.: Asst. Prof. Anesthesiol., Physiol., Univ. of Washington
FLOREY, Ernst: Assoc. Prof. Zool., Univ. of Washington
FOX, Irwin J.: Asst. Prof. Physiol., Univ. of Minnesota
FRANKEL, Harry M.: Asst. Prof. Physiol., Biochem., Rutgers Univ.

FRIDHANDLER, Louis: Staff Scientist, Worcester Fndn.
FROEB, Herman F.: Chief, Pul. Physiol. Lab., Scripps Res. Fndn.
FURSHPAN, Edwin J.: Asst. Prof. Neurophysiol., Harvard Med. Sch.
GAINER, Harold: Spec. Res. Fellow, NIH, Columbia Univ.
GARCIA, Celso-R.: Sr. Scientist, Worcester Fndn.
GERST, Paul H.: Instr. Surgery, Columbia Univ.
GHYS, Roger: Asst. Prof. Biochem, Laval Univ.
GLOMSET, John A.: Res. Asst. Prof. Med., Univ. of Washington
GOODMAN, Henry M.: Assoc. Physiol., Harvard Med. Sch.
GRAY, Irving: Chief, Phys. Sci. Div., US Army Med. Unit, Ft. Detrick
GREENFIELD, Joseph C., Jr.: Assoc. Med., Duke Univ.
GRINDELAND, Richard E.: Res. Sci., Neuroendocrinol., Ames Res. Ctr.
HAFS, Harold D.: Asst. Prof. Res., Michigan State Univ.
HALPERN, Bruce P.: Asst. Prof. Physiol., State Univ. of New York
HANSEN, Carl L., Jr.: Deputy Dir. Biol. Sci., Natl. Naval Med. Ctr.
HOPWOOD, Mortimer L.: Assoc. Prof. Chem. & Physiol., Colorado State Univ.
HULET, William H.: Asst. Prof. Med. & Physiol., Univ. of Miami
JACKSON, Kenneth L.: Sr. Bioscientist, Boeing Co.
JACOBSON, Eugene D.: Dep. Chief, Appl. Immunol., Walter Reed Army Res. Inst.
JEAN, Pierre: Res. Asst., Univ. of Montreal
JULIAN, Logan M.: Prof. Anat., Univ. of California, Davis
KATZ, Arnold M.: Res. Fellow Med., UCLA
KWAAN, Hau C.: Res. Sci., James F. Mitchell Fndn., Washington, D.C.
KYDD, George H.: Assoc. Physiol., Univ. of Pennsylvania
LEEMAN, Susan E.: Sr. Res. Assoc., Grad. Dept., Brandeis Univ.
LEVINSON, Gilbert E.: Asst. Prof. Med., Seton Hall Coll. Med.
LINDE, Leonard M.: Asst. Prof. Pediat., Physiol., UCLA
LIPSKY, Joseph A.: Asst. Prof. Physiol., Ohio State Univ.
LUTWAK, Leo: Sr. Invest., NIH, NIAMD
LUKIN, Larissa: Asst. Prof. Physiol., Ohio State Univ.
LYON, Irving: Asst. Prof. Biochem., Chicago Med. Sch.
McAFEE, Robert D.: Assoc. Physiol., Tulane Univ. Sch. Med.
MEEHAN, John P.: Assoc. Prof. Physiol., Univ. Southern California
MILLER, Harvey I.: Res. Assoc., Physiol., Lankenau Hosp.
MITCHELL, Robert A.: Asst. Res., Univ. California Med. Ctr.
MOZELL, Maxwell M.: Asst. Prof. Physiol., State Univ. New York
NELSON, Ralph A.: Assoc. Physiol., Western Reserve Univ.
NELSON, Clifford V.: Dir. Basic Res., Cardiol. Dept., Maine Med. Ctr.
NEWMAN, Howard A.I.: Asst. Prof. Physiol., Univ. of Tennessee
OLINER, Leo: Assoc. Prof. Med., Indiana Univ.
PAGE, Ernest: Instr. Biophysics, Harvard Med. Sch.
PEARL, William: Physiol., Res., New York Univ. Sch. Med.
PERRY, Horace M.: Asst. Prof. Med., Washington Univ.
PHILLIPS, Richard E.: Asst. Prof. Zool., Virginia Polytechnic Inst.
POTTER, David D.: Assoc. Neurophysiol., Harvard Med. Sch.
REICHARD, Sherwood M.: Asst. Prof. Physiol., Florida State Univ.
REUBEN, John P.: Asst. Prof. Neurol., Columbia Univ.
RICHARDSON, Travis Q.: Instr. Physiol., Univ. Mississippi Med. Ctr.
ROSS, John, Jr.: Chief, Cardiovascular Diag. Sect., NHI, NIH
RUSSEK, Mauricio B.: Head, Lab. Comp. Physiol., Natl. Sch. Biol., Mexico

SANUI, Hisashi: Asst. Res. Physiol., Univ. California, Berkeley
SCARPELLI, Emile M.: Res. Instr. Pediat., Albert Einstein Coll. Med.
SCHLOERB, Paul R.: Assoc. Prof. Surg., Univ. of Kansas
SCHMID, Herman E., Jr.: Asst. Prof. Physiol., Bowman Gray Sch. Med.
SIMMONS, F. Blair: Asst. Prof. Surg., Stanford Univ.
SMITH, Charles W.: Asst. Prof. Physiol., Seton Hall Coll. Med.
STEIN, Larry: Senior Res. Scientist, Wyeth Labs.
STONE, Daniel J.: Asst. Prof. Clin. Med., Columbia Univ.
STRAND, Fleur L.: Asst. Prof. Biol., New York Univ.
STRIKE, Thomas A.: Head, Endocrinol. Br., Naval Med. Ctr.
SPENCER, William A.: Asst. Prof. Physiol., Univ. Oregon Med. Ctr.
SUDAK, Frederick N.: Asst. Prof. Physiol., Albert Einstein Coll. Med.
SWANSON, Robert E.: Assoc. Prof. Physiol., Univ. of Oregon
SWETT, John E.: Asst. Clin. Prof. Anat., Univ. of Oregon
TAYLOR, Anna N.: Instr. Physiol., Western Reserve Univ.
THOMPSON, James C.: Asst. Prof. Surg., Univ. Pennsylvania
THOMPSON, Ronald H.: Sr. Scientist, USPHS, NIH
TONG, Winton: Asst. Prof. Physiol., Univ. of Pittsburgh
TUTTLE, Richard S.: Res. Scientist, Masonic Fndn. Med. Res.
TYLER, Walter S.: Assoc. Prof. Anat., Univ. California, Davis
WALKER, W. Gordon: Asst. Prof. Med., Johns Hopkins Univ.
WALLER, Hardress J.: Asst. Prof. Physiol., Albert Einstein Coll. Med.
WEED, Robert I.: Asst. Prof. Rad. Biol.& Med., Univ. of Rochester
WEIL, Max H.: Asst. Prof. Med., Univ. Southern California
WIESEL, Torsten: Asst. Prof. Neurophysiol., Neuropharmacal., Harvard Med. Sch.
WILLARD, Paul W.: Senior Pharmacologist, Eli Lilly & Co.
WINEGRAD, Albert I.: Asst. Prof. Med., Univ. of Pennsylvania
WITTENBERG, Jonathan B.: Assoc. Prof. Physiol., Albert Einstein Coll. Med.
YOUNG, Wei: Biophysicist, Med. Physics, Univ. California, Berkeley
ZOMZELY, Claire E.: Asst. Res. Physiol. Chem., UCLA

ASSOCIATE MEMBERS

COLE, Wilbur V.: Dir. Res., Assoc. Prof. Anat., Kansas City Coll.
CORBIN, Alan: Instr. Anat., Albert Einstein Coll. Med.
DEAVERS, Stephanie I.: Res. Asst., Baylor Univ. Coll. Med.
DOWNING, S. Evans: Lab. of Cardiovascular Physiol., NHI
DUNCAN, Gordon W.: Res. Assoc., Metabolic Dis. Res., Upjohn Co.
SCHWARTZ, Susan T.: Predoct. Fell. Physiol., Albert Einstein Coll. Med.
GOLDMAN, Ralph F.: Res. Physiol., US Army Res. Inst. Environ. Med.
JOY, Robert J. T.: Res. Internist, Major, Med. Corp., USARIEM
KNUTTGEN, Howard G.: Asst. Prof., Boston Univ.
NIELSON, Read R.: Asst. Prof. Zool. & Physiol., Miami Univ.
OGDEN, Thomas E.: Res. Instr., Neurol., Univ. Utah Med. Sch.
POTTER, H. David: NIH Predoct. Fellow, Univ. of Wisconsin
SHAMOIAN, Charles A.: Instr. Physiol., Tufts Univ. Sch. Med.
STONE, Hubert L.: Instr. & Post doct. Fell., Physiol., Univ. of Mississippi
TALBOT, Richard B.: Asst. Prof. Physiol., Pharmacol., Iowa State Univ.

75th ANNIVERSARY CELEBRATION

On August 27, 1963, at the time of the Fall meeting in Miami, a special evening program was arranged by President Rahn to commemorate the 75th anniversary of the Society. All the living presidents of the last 25 years were invited to attend and give short talks. Twelve of the past-presidents responded. The session started with a brief resume of the last quarter century by Dr. Fenn. Topics of the brief talks that followed are:

Teaching of Physiology during the First Half of the 20th Century - A. C. Ivy

APS Publications - P. Bard

Retrieval and Evaluation of Information - M. B. Visscher

Physiologists in World War II - D. B. Dill

International Physiology - R. W. Gerard

APS and Youth - E. M. Landis

Tasks of Physiologists - E. F. Adolph

Enemies of Physiology - H. E. Essex

A Bit of Reminiscing - W. F. Hamilton

Fashions in American Physiology - A. C. Burton

The Relation of the Physiologist to the Public - L. N. Katz

Organization and Communication of Scientific Information - H. Davis

Many of these talks will be published in THE PHYSIOLOGIST over the next few issues.

The picture of the past-presidents in attendance does not include A. C. Ivy who unfortunately was not present at the time the picture was taken.

Front Row - E. F. Adolph; E. M. Landis; R. W. Gerard; D. B. Dill; M. B. Visscher; W. O. Fenn; and P. Bard

Back Row - H. S. Mayerson; H. Davis; L. N. Katz; A. C. Burton; W. F. Hamilton; and H. E. Essex

CHANGE IN RULES FOR PRESENTATION OF PAPERS AT 1964 SPRING MEETING

The Society at its business meeting in August 1963, voted the following:

"A person's name can appear only once."

"An APS regular, retired or honorary member must be one of the authors." (An associate member must have a full (regular) member as a co-author).

These rules were adopted as a temporary measure for the 1964 Spring meeting in Chicago. Meeting rooms are limited in the Morrison Hotel, headquarters for APS, and only so many sessions can be accommodated. The Program Committee has been instructed by Council to prepare more permanent recommendations for limiting the number of ten-minute papers for future Federation meetings.

The above quoted rules for 1964 will be strictly enforced. Detailed instructions and abstract forms will be mailed to members.

FUTURE MEETINGS

1964 Spring - April 13-17, Chicago, Ill.
1964 Fall - September 8-11, Brown Univ., Providence, R.I.
1965 Spring - April 10-14, Atlantic City, N.J.
1965 Fall - Late August, UCLA, Los Angeles, Calif.
1965 Fall - September 1-9, Physiological Congress, Tokyo, Japan
1966 Spring - April 12-16, Atlantic City, N.J.
1966 Fall - ----------, Baylor Univ., Houston, Texas
1967 Spring - April 17-21, Chicago, Ill.
1967 Fall - ----------, Howard Univ., Washington, D.C.
1968 Spring - April 7-12, New York, N.Y.

FASHIONS IN AMERICAN PHYSIOLOGY

A. C. BURTON AND G. J. CROPP

Attendance, year after year, at the annual meetings of the American Physiological Society certainly gives the impression that different groups, interested in different aspects of physiology, rise to dominance and then fall to relative unpopularity in the Society. For example, between 1935 and 1940, it seemed to me that those who worked on the action potential of nerve and muscle, (they called themselves the "Axologists") strode about the corridors outside the meeting rooms with head held high, (even if not with "nose in air".) Invitations to attend the Axologists' Dinner were eagerly sought after, and the sessions on neurophysiology were crowded by those who had heard about the battle of the giants, "Electronists" vs. "Neurohumorists". Yet, as far as I know, the "Axologists" as a group, just faded away a few years later, probably because they ran out of new ideas. There were no more Axologists' dinners.

To preserve my reputation as a scientists, such as it is, who decides on evidence rather than impressions, I asked Dr. G. Cropp, in my laboratory, to supply some data as to the existence of waves of popularity, or fashions, in different branches of physiological research in our Society. He went through all of the volumes of the "American Journal of Physiology" from 1930-1960, placing each paper in one of the nine categories he had chosen. In the years after the "Journal of Applied Physiology" was established (1948) he added data from this. Since fashions are essentially competitive, he expressed the result as a percentage of all papers which belonged to a specific category in a given year of these journals.

Of course some members of the Society publish their work in journals other than those of our own Society, for reasons that may seem good to them. Again, some papers could be put into more than one of his categories and Dr. Cropp's choice was his own, not the authors'. Again, the editor may have consistently rejected more papers that were submitted of one category than of other categories. Admit all this, but still the data allows me to show you some scientific-looking graphs, and to make a few wisecracks. If the graphs show significant trends of popularity, it means something, if only that there have been fashions in publication in these particular journals.

Figures 1 and 2 show the results, in 5 year averages. Our first category, "blood and clots" includes those faithful members, who year after year after year work on coagulation. Here is surely the most conservative of all branches of physiology. I know some of the experts on clotting who have for 30 years or more directed large departments, in which it was unheard of that anyone in the department should work on any other subject in physiology. No whims of physiological fashion affect this group. I predict that 30 years from now their percentage of popularity will still be within these narrow limits of 7 to 9 per cent though I suppose there will have to be new faces in the intersociety sessions in clotting, probably of the children and grandchildren of the present group. Old coagulatists must eventually die, or simply fade away. Clots are notoriously hard to dissolve. Will there ever be a spark here, and a rise in

interest in this subject by the rest of the Society?

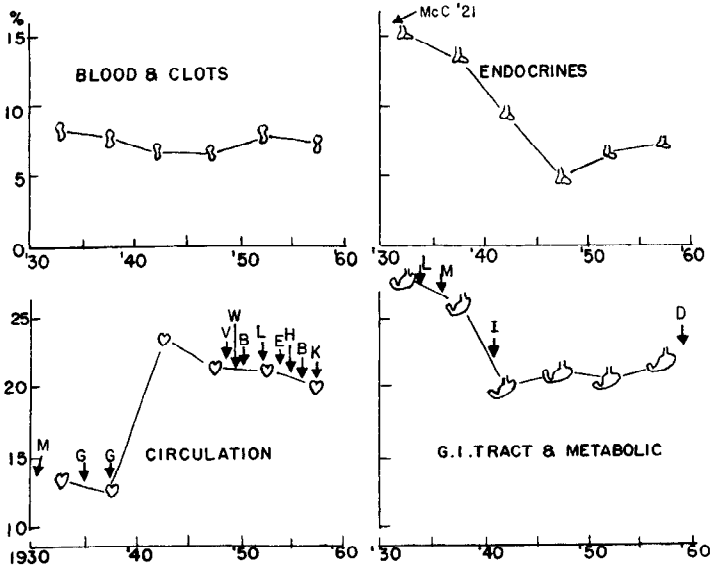

Fig. 1.

Endocrines - McC - MacLeod
Circulation - M - Meek; G - Greene; G - Garrey; V - Visscher
W - Wiggers; B - Bazzett; L - Landis; E - Essex
H - Hamilton; B - Burton; K - Katz
GI and Metabolic - L - Luckhardt; M - Mann; I - Ivy; D - Davenport

Endocrinology and reproduction suffered a severe depression in the '40's from which there are significant signs of slow recovery. perhaps during the war the authorities thought that endocrines were not important to survival. I could not find in the list of Presidents any that I would say had endocrinology as his chief interest, since MacLeod in 1921. I think the group should sprout into Presidents before very long.

Everyone must have been aware of the dominance of the Circulation Group (they once called themselves "The Hearties") from 1940 to 1960, which is only now beginning to decline. I managed to get in while the dynasty was still strong, but after Louis Katz the party machine evidently fell apart. There were no less than nine "Hearty" Presidents elected in 15 years, which seems to be a bit too much of a good thing. G.I. Tractarians suffered much the same depression during the war as did the Endocrinologists. In spite of the famous dictum of Napoleon that

"An army moves on its stomach", apparently the Pentagon didn't think so.

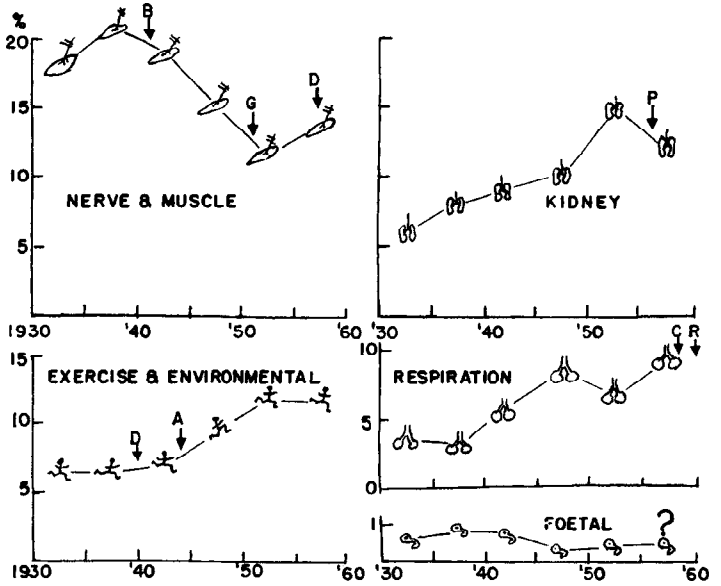

Fig. 2.
Nerve & Muscle - B - Bard; G - Gerard; D - Davis
Kidney - P - Pitts
Exercise & Environmental - D - Dill; A - Adolph
Respiration - C - Comroe; R - Rahn

Neurophysiology shows practically a full wave-length of sinusoidal fluctuation (λ= 29.32 years). My guess is that lack of new ideas until after the war (and then the spark came from England) was responsible. The group "Kidney and Ions" includes the members in good standing of the "Active Transport Workers Union". They grew in strength steadily until finally they blossomed (or should it be "fruited") in President Pitts. It looks as if a "counter current" may now have set in.

The hump on the graph for environmental physiology is undoubtedly due to the war, and soon threw up two Presidents (Dill and Adolph).

Respiration was a slowly-fruiting plant, though probably its final budding in Comroe and in Rahn was worth waiting for.

The case of Fetal and Placental Physiology is a sad one. Surely this fascinating part of physiology deserved the separate category we gave it, yet its percentage never exceeded one per cent. Will the fetus never be

born, with explosive growth to follow? Why are not American physiologists interested in their own original environment?

Analysis of the Data

From this data emerges a most important rule concerning "politics" in the Society. Except for really extraordinary individuals (Dr. Gerard was the best example), no one has much of a chance of being elected until his particular subject attains a high percentage of the papers published in the Journal of the Society. The probability of being President is proportional to the percentage of papers. This rule is beautifully illustrated by the graph for the G.I. Tract. Before the rot set in, in the 40's, they had three Presidents, Luckhardt, F.C. Mann, and Ivy. In their depression that followed, no Presidents emerged, but as soon as recovery was complete, they secreted Horace Davenport. There is a possibility here that there is a disturbing factor, as in the case of my election. In the business meeting of the Society, people look around to see anyone they might nominate, and Horace and I were always head and shoulders above everyone else.

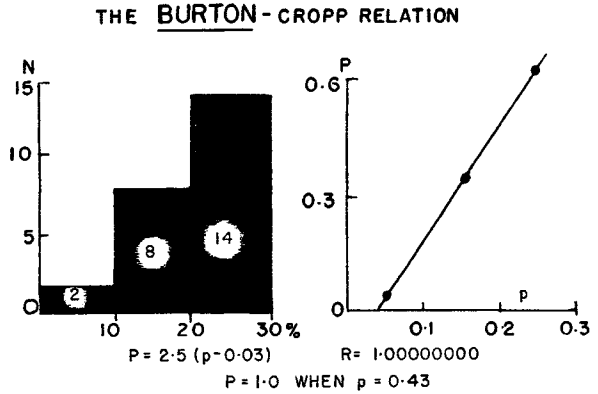

Fig. 3.

With such a wealth of scientific data, a biophysicist must derive mathematical equations. In the process we discovered what may be a very important law (Fig. 3), which I have modestly called the Burton-Cropp relation. (Modestly, because I could have chosen the name Burton's law, instead of leaving this to posterity). We counted the number of Presidents that had emerged, in the last 30 years, when their particular group had 0-10%, 10-20%, or 20-30% of the papers in the Society's journals. On the left of Fig. 3 is the usual histogram. On the right, the same data is shown on a "frequency diagram". P is a dimensionless number, obtained by dividing the number of Presidents by the total number (24) in the 30 years. P could be called the "presidential probability" or, perhaps, the "propensity to elect". As the graph shows, the relation between P and p, the fraction of papers in the journals, is strictly linear.

I asked our university's Computing Centre to feed this data into the I. B. M. machine, and they tell us that the coefficient of correlation R is very high, remarkably so, you will agree, in view of the uncorrected nature of the raw data.

The relevant equation is given in the figure. It reveals two features of great interest.

a) There is definitely an "absolute threshold" amounting to 3 per cent of the papers in the journals, below which it would be impossible for any group to elect a President.

b) Since the correlation coefficient is so very high, extrapolation is obviously justified. The probability P can, of course, never exceed unity. P would reach unity when any group reached 43 per cent of the papers in the journals, and from then on, all Presidents would belong to this group, ensuring a monopoly of influence in the Society of one particular aspect of physiology. Perhaps this is a danger that our future councils must consider, even to the drastic step of repealing Burton's law by a 2/3 majority of members present in any one annual Business Meeting.

However, one of my colleagues, Dr. J. Faber, has pointed out to me an alternative interpretation of the extrapolation of the equation. It may mean that it is absolutely impossible, by some natural law, to monopolize more than 43 per cent of the journals with any one branch of physiology. To settle which interpretation is correct, further research will be necessary, and we are considering application for funds either to NIH, or to the Society Council as a reactivation of Dr. Gerard's "Survey of Physiology".

Remembering the criticism leveled at the sponsors of the Gallup polls that they had affected the outcome of elections, Dr. Cropp and I have refrained from analysis of the data of the last three years, by which a firm prediction of who will be our next President-Elect can be made. Any of you can do this, from the formula.

Conclusions

1. Significant waves of fashion in American physiology occur, with a period (or wave-length) of about 30 years.
2. In general, Presidents of the APS are elected, not, as they imagine, on their own pre-eminence in physiology, but riding the crest of such a wave of fashion. In this sense they are, indeed, the People's Choice".
3. The election of Society Presidents is strictly governed by a mathematical law (Burton's law).
4. This interesting, important, and challenging paper deserved much more than the five minutes allotted to it by the Chairman.

Literature not Cited

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2. Kelly, Walt. Proc. Okinfenokee Swamp. (Pogo Editor). Cited by Kennedy, Caroline.
3. Survey of Physiology. Chapter 57. Am. Physiol. Soc. Publication.

LIMBIC ELEMENTS IN THE PUBLICATION POLICIES OF THE APS*

PHILIP BARD

The history of the publications of the Society has been well presented by Wallace Fenn in his account of the last twenty-five years of the Society. Three years ago Maurice Visscher wrote for THE PHYSIOLOGIST (Vol. 3, No. 2: 15, 1960) a most useful account of our publications and the policies by which they had been governed up to that time. Accordingly, when President Rahn suggested that I speak briefly on this subject, I found it difficult to select a topic that could in any way be novel and interesting. Finally it occurred to me that I might consider two episodes in the history of our publication policies in terms of my interest in the neurophysiology of emotional behavior. When I began to recall some personal experiences I had as an officer of the Society and as a committee member, I soon realized that I had witnessed certain phenomena that can only be regarded as outward manifestations of the activation of certain limbic mechanisms within the brains of some of our best members. I propose to mention one recent episode of this type and to be a little more expansive about an even more passionate event that occurred twenty-two years ago.

The Revision of the Bylaws, 1961

You all remember clearly and perhaps with only a trace of passion the reorganization that occurred at the 1961 meeting in Atlantic City. It was then that the Board of Publication Trustees, after functioning well for 27 years, was abolished. Dr. Fenn has described how the Council had become "more and more convinced that the trusteeship principle was not appropriate for a democratic Society" and how several Councillors came to feel "that they should have full control of all the activities and funds of the Society." He is correct in stating that the debate became more and more emotional. As Chairman of the last Board of Publication Trustees and as the first Chairman of the Publications Committee, I was in a position to observe, evoke and display reactions of aggression and defense that preceded, attended and, for a time, followed this change. After this rather heated controversy was resolved by an alteration in the Bylaws that ended the BPT and set up two new committees, one for Finance and one for Publication, each unmistakably responsible to the Council, for better or worse, it required only a little time for the overall management of our journals to operate in a reasonably harmonious manner. As far as I can judge, the present operations of our publications and the attendant financing have their chief bases in cerebral mechanisms that are pretty much supralimbic and I hope that they will stay that way. But my experience leads me to predict the future will find both the Council and the Membership occasionally advocating changes neither would support after a period of

*Address given at the Convocation celebrating the 75th Anniversary of APS, August 27, 1963, Coral Gables, Florida.

relatively unemotional cerebration.

The Raid of 1941

Because many of you were not members in 1941 when the famous "raid" on our publication funds took place, I shall set forth some of the salient features of that event and I do so with the suggestion that it showed clearly how in the absence of essential factual knowledge of the subject under discussion a display of emotion at a business meeting can lead to unwise or inappropriate action. But more important, it raised the questions: Who controls the publication funds and for what purpose may they be used? This episode occurred at a time of great national tension when our Government was doing much to aid Britain in its desperate plight. The majority of Americans - and certainly a very great majority of our membership - were in sympathy with this policy. A small minority of our fellow citizens, foremost among them the "America First" group, were violently and vocatively opposed not only to intervention but also to any measure that aided England and her few remaining allies. Such was the national climate when the members went to the annual meeting of 1941.

At the business meeting of the Society held April 18, 1941 at Chicago, with President Ivy in the chair and the present writer serving as Secretary, the suggestion was made by a prominent member with conspicuous anglophilic tendencies that we follow the example of the American Philosophical Society in giving a substantial sum of money to the Royal Society of London, possibly with the restriction that it be used for the support of scientific publications. He stated that our colleagues in the British Physiological Society were in urgent need of funds, the publication needs being among the most important, and that the "Journal of Physiology" was in difficulties because of curtailment of income. Later he explained that any gift should go to the Royal Society since the funds of all scientific societies in England were under its supervision. The discussion that followed was long, heated and not easy to follow since it took place during the balloting for officers. Fortunately I had engaged a professional stenographer to take down the discussion. Consequently the minutes of this meeting reflect with accuracy just what was said.

The member who introduced this subject stated that the Philosophical Society had made a gift of $20,000 and suggested that we "contribute a similar sum, say, $25,000." At least one member expressed general agreement with this proposal. The chairman of the BPT, Dr. Meek, expressed great sympathy with the British needs, but pointed out that the Society had urgent needs of its own and its reserve funds did not compare with those of the Philosophical Society. These reserve funds (the Publication Funds, amounting then to about $200,000) were the only available source of a gift. The Managing Editor of the Journals, Dr. D. R. Hooker, stated that they had been built up, not from contributions of the members, but from subscribers (member subscribers being a small minority) and therefore this money was in the nature of a trust fund. He urged that the Society "be realistic, not emotional, in its consideration of the question." He pointed out that if it voted the donation from the Publication Funds, it would not have the money necessary to

produce an income for the salary of a Managing Editor of the"American Journal of Physiology", unless the subscription price is raised, and this would endanger our own program. Actually the reserves then in hand were almost wholly the result of the wise and careful management of Dr. Hooker who had only recently accepted a modest honorarium, largely to establish the principle that his successor should be compensated. On April 26, 1941, he wrote me that many who spoke at the meeting "were not altogether coherent because we were caught between two conflicting emotions; a desire to give all-out aid to Britain and a desire to cherish the publications funds for which we have made considerable effort and sacrifice over a number of years." I believe this became the reasoned opinion of most of those who attended that hectic meeting.

In the middle of the discussion the following motion was made and seconded by several voices: "That the Council be authorized to make, according to its best judgment, a contribution to the Royal Society of London, for scientific publications, in any sum up to $20,000." Finally, it was put to a vote and carried 63 to 23.

Immediately thereafter it became my duty, as the newly elected President, to determine the "best judgment" of the Council, and it had to be done by mail. At once Dr. Wiggers, the new Secretary, and I sought factual information that might serve as a basis for Council action. About all we learned was that the gift of the Philosophical Society was not $20,000 but one-half that amount and that no one knew the actual situation of the English physiologists. By May 28 Council had voted unanimously 1) to make at once a donation of $5,000, this sum to be taken from the current income of the Publication Funds and 2) to ask the membership of the Society for voluntary contributions, the sum collected to be used to reimburse the Publication Funds. The latter action was based in part on the fact that at the meeting two speakers had strongly advocated the building up of a sum by individual contributions and no one had opposed this proposal. (On January 19, 1942, the Treasurer reported to Council that a total of $1,392.20 had been received from 213 members and that the largest contribution came from Dr. Hooker!) The amount of the gift was determined by: 1) lack of evidence that the English physiologists needed a greater sum; 2) a strong feeling that our gift, whatever its size, would be important chiefly as a gesture of sympathy; and 3) conviction that a greater donation, even $10,000, would be out of all proportion to the size of our reserves.

On authorization of the BPT Dr. Hooker sent me a check for $5,000 and immediately, on June 14, 1941, I transmitted this sum by cable to the Royal Society with the message that it was for support of British scientific publications, especially in physiology. A radiogram from Sir Henry Dale, President of the Royal Society, expressed grateful acknowledgments. This was followed by two letters, one official, the other personal. In the latter Sir Henry wrote: "I should like our colleagues in your Society to know that we are profoundly touched by their generous impulse, and by this very tangible and welcome evidence that their thoughts and their sympathies are with us. We British physiologists know that your Physiological Society is like ours - not a wealthily

endowed corporation, but a working union of modest men of science, supported by their own contributions. We are the more deeply sensible of the significance of their gift."

In view of the possibility that the Council had been wrong in its estimate of the situation in England, both Dr. Wiggers and I asked Sir Henry to keep us informed as to the need of further support and, during the later months of 1941, we secured first hand information that sufficient funds were available for physiological research in England and that the only publication problem was a shortage of paper, a problem that was rendered less acute by the "classification" of research projects and the reduction in the number of those who could still carry on in "unclassified" areas of research. Final proof that the amount of our gift had been sufficient came in 1945 when A. V. Hill, then Secretary of the Royal Society, reported to Dr. Fenn that there remained of the donation a balance of $933. He sought and obtained our permission to use this to supply physiological publications to colleagues in countries recently occupied and devastated by the Germans.

Thus it became clear that the action of the Council in limiting the gift to $5,000 was a wise one. But the passions of a few members were aroused when they learned that the Council had reduced the donation to one-fourth the amount authorized by the Society. They had a low opinion of that body's "best judgment." We received four or five letters of bitter protest. Characteristic of these was one to Dr. Wiggers in which a distinguished physiologist stated that "the Council has let the Society down in their quibbling, legalistic interpretation of the Society's vote of last April" and then he went on to make a remark I shall not quote, for I am sure he later regretted it. Wiggers and I were unable at once to placate these people, but when, at the next annual meeting (Boston, April, 1942), I reported on our actions and the reasons for them they were not openly criticized and a motion "that the Council be commended for the manner in which this was handled and also the sum that was given" was carried unanimously. It appeared that with the passage of time, there had been a regression of limbic dominance.

APS HISTORY

The history of the last 25 years of the American Physiological Society was written by Wallace O. Fenn. It was distributed free to all members attending the Miami Fall meeting. Copies will be mailed free to the remaining members. Non-members and institutions can purchase the history by sending $4.95 to The American Physiological Society, 9650 Wisconsin Avenue, Washington, D.C., 20014.

RELATION OF THE PHYSIOLOGIST TO THE PUBLIC*

LOUIS N. KATZ

President Rahn, ladies and gentlemen, others at this convocation have dealt with the professional side of physiology and with the role of the Physiological Society. However, there is a need to consider the physiologist as a citizen and as a member in the American society of free men. This consideration requires the recognition of two facts by the physiologist. First, he must be aware of the forces at work which make such a free society effective for the common good and knowing this, he must help to make this free society operative and vital. He cannot shirk these responsibilities and leave the task to his Dean, his University President and the Board of Overseers of his institution, because he regards them as more wordly than himself, more imbued with the will to deal with mundane affairs than he cares to exercise and more sophisticated than he judges himself to be in such matters. After all, he cannot simply say, this is not what interests him because he is a teacher, a professor, an investigator, and therefore, concern with his community and nation somehow is besmirching and beneath his dignity.

This viewpoint, regrettably held by too many distinguished physiologists in my opinion, is wrong. Science latterly has had a tremendous impact on our community and the effect of science on everyday affairs has not yet crested. The changes in our community have been tremendously altered by new scientific discoveries, derived not only from the physical and chemical sciences but more and more from the life science and physiology is at the hub of the latter. It is apparent, therefore, that the physiologist must become aware of the impact of these new developments on our way of life and, with others, he must participate in translating these discoveries into an orderly evolution of our American social group towards its ideal goal. Why should this latter function be left only to administrators, business men, lawyers, promoters and professional politicians? Why should not the scientists themselves share in this activity? Those in the physical and chemical sciences are beginning to recognize this responsibility, but I am convinced that the life scientists are lagging behind, especially those in the universities and research institutions.

Since scientists are creating the new problems in our daily life, they must, in all fairness, share in their solution. It is my hope that physiologists will begin to recognize that they must come out of their ivory towers and mix with their fellow citizens in developing the direction along which our way of life must go. We are a democracy and that means that everyone must participate, not only the masses who are the least educated and often most easily swayed by demagogues, but also the more educated and presumably less emotional and more rational members of our community. It is not demeaning to enter into the politics of the school

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district, the local community, the state and the nation.

Every citizen should participate in politics especially when he has something special to contribute. The physiologist is among the latter since he can best interpret and advise how the new advances in the life sciences may affect our political life. He should not dominate this enterprise but share it with others. Nor should he sidestep his responsibility. I fear this latter is the greater risk which he can not afford, for everyone's sake including his own. Citizenship is a dignified attribute of modern society which the scientist, the scholar and the teacher must actively share with the common man and the politician. Failure to do so has obvious hazards which it is unnecessary for me to delineate. These hazards are increasing as science modifies ordinary existence and the interrelationship among men more and more.

Second, and closely allied with the foregoing role of citizenship, is the need of the physiologist to inform the public of what he as an individual and as a member of a specialty group is doing and accomplishing. It is the function of the fourth estate, the reporters of all media, to seek out these facts and the physiologist must cooperate with him if not cheerfully at least pleasantly.

There is a proper way to do this, it seems to me. Scientific facts should first be presented in a scientific journal, in a scientific review or at a scientific meeting. Only after this has been done is it proper to present the facts to the public. There is no harm in preparing an advanced release for the public to be used at the time of the meeting or of publication. It is only rarely that a science reporter will not honor the release date.

The physiologist is not in a position to judge how newsworthy his work is, this is the task of the public relation expert of his institution, but the physiologist can prevent sensationalism by cooperating with the fourth estate. After all, there is no way of stopping a reporter from getting the news if he is determined to get it. Cooperation will ensure that the story is more nearly like that which the physiologist desires.

Finally, the physiologist should be available for press conferences and to supply background information to particular reporters when asked. Only in this way can the quality of the information reaching the public be kept at a high level. And in addition, these contacts serve to pass on to the public a proper image of physiologists, their aims, their aspirations, their motivation, their moods and their real accomplishments. Only in this way can the public get a true picture of the life scientist instead of the caricatures too often presented. After all it is essential to appear in our proper aspect if for no other reason than that, in the last analysis, we too are servants of our free society.

ENEMIES OF PHYSIOLOGY*

HIRAM E. ESSEX

Who are the enemies of physiology?

1. Those who profess friendship for us but place barriers in our path such as making the supply of animals both difficult and expensive.

2. Those who would deny students of physiology the use of higher vertebrates in their education and thus have us return to the dark ages in training physicians and surgeons. Dr. William T. Porter of esteemed memory described in 1906 his new approach to the teaching of physiology in the following words, "Its leading principle is that the student shall perform for himself the classical experiments which are the essence of the science. Personal observation of nature is the dominant note. It is the function of the instructor to discuss these fundamental observations with the student and to add such related facts as shall widen the student's view".

3. Those who would presume to tell an investigator the number of animals he should use to solve a biological problem.

4. Those who would impose upon us the Victorian British system of 1876. I invite you to join me in a second Declaration of Independence on this proposal.

5. Those who advocate Federal control of biological researchers putting them under special surveillance and limitation in spite of the fact that adequate statutes against cruelty to animals already exist in every one of the 50 states.

6. Those who place the lives of dogs and cats on an equality with those of people.

Much emphasis has been given in certain quarters to the doctrine called "Reverence for Life" which was enunciated by Dr. Albert Schweitzer a few years ago. We have been informed of the exact point on an African river where the idea first occurred to him. This doctrine has been espoused by some of the detractors of animal research with an enthusiasm comparable to religious fervor.

A study of Egyptian civilization and the practices of certain contemporary Indian sects reveals that reverence for the lives of some of the lower animals is of ancient origin. Early Eqyptians held the scarab beetle, the cat and the cow in such esteem that these animals

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were thought sacred or holy.

Among the ruins of the temple of Karnack stands a huge granite sculpture of the scarab or dung beetle, commanding a place of equal prominence among the statues of the Pharaohs who were also worshiped as Gods. In contemporary India, cattle roam the cities and countryside in such numbers as to impoverish the nation's agriculture, yet being reverenced they are tabooed for food, and many of the people hunger and suffer protein lack. This reverence for life has become so extreme among certain sects that they wear masks over their mouths and noses to prevent insects entering and thus meeting destruction.

I do not quarrel with those who follow such beliefs and practices as long as they do not try to force their acceptance on others.

Personally, I do not reverence the lives of the lower animals. They have never been and never will be sacred to me. At the same time, I yield to no one in my deep regard for their well-being and give those I own or use every reasonable consideration. The Holstein cows on my farm are not holy or sacred cows. My attitude is the same toward all the lower animals. I reserve my reverence for God and man. Those who give the lives of the lower animals equality with man are not only enemies of physiology, but enemies of humanity as well. If we allow ourselves to be decoyed far down the road of "Reverence for Life," we shall be led into the absurd position that using animals for our benefit or the well-being of mankind is immoral. We should hold firmly to the thesis that whether few or many animals are used in our experiments is not a moral but an economic question. To use fewer animals than necessary for the solution of biological problems could indeed involve the issue of morality. It is the duty of scientists to seek the truth. But, if robbed of the freedom (by unnecessary government restrictions) to use their judgment as to means, important discoveries may be delayed and avoidable human misery and death result. This would clearly become a moral issue. For example, Dr. Banting asked Dr. McCleod for ten dogs to test whether he could demonstrate an internal secretion of the pancreas. After the first promising results, had the additional dogs needed for further experiments been denied or had inordinate delay in sypplying them been occasioned for whatever reason, the number of unnecessary deaths from diabetes would have been greatly increased and chargeable to those responsible for delaying the development of the discovery.

My remarks will close with the expression of a hope: May future scientists when awakening from a real dream or a daydream with a bright new physiological concept be able to go at once to the laboratory like Otto Loewe and test it by a crucial experiment without applying for a license, without submitting an experimental design, and without predicting what will probably be discovered and finally without obtaining approval of a remote and possibly indifferent bureaucrat in Washington.

Let us fight for our freedom, let us be worthy of the confidence that fair-minded people have in us. Let us, in the words of Dr. A. J. Carlson, meet the big lies of our enemies with the Bigger Truth.

INTERNATIONAL PHYSIOLOGY*

R. W. GERARD

International physiology really began for me in January 1926, when our ship came in sight of the unexpectedly green fields of England. Two years on a National Research Fellowship, mostly with Hill in London and with Meyerhoff in Berlin, but with important added experiences with Adrian, Sherrington, Starling, and Lovett Evans, to name a few in England, and with Warburg, Höber, and Lohmann in Germany, was neatly divided by the 1926 International Physiological Congress at Stockholm. There were assembled nearly all the world great in our science, and physiology was nearly set back a generation when an excursion boat carrying most of them hit a rock in the Stockholm archipelago-- fortunately only a glancing blow. Only some 300, as I recall, were gathered and a young man could soon come to know his colleagues. The banquet, at the lovely city hall, and attended by the King and Queen, was an affair of glitter and gusto: white tie and tails, of course; descending from a coach to a red carpet in the courtyard; the laden tables with an octave of goblets before each place, that soon had a German, a Frenchman, and an American, none of whom spoke the other's language, conversing freely and amiably; the gala dance in which bare bosoms were scratched by jewel-encrusted medals, and, most unforgettably, speeches in the three accepted languages of the day. Starling spoke wisely of physiological matters and Bethe, I believe it was, also spoke profoundly on some important topic; but it was Gley who, with an impassioned address on I know not what, had me weeping along with everyone else in the room, despite its complete incomprehensibility to many of us. At a major scientific session, Gowland-Hopkins spoke brilliantly of chemical kinetics; at a business session, Erlanger, as President of the American Physiological Society, invited the 1929 congress to meet in the United Sates. Those were heroic days!

In 1926 the 75 years we are celebrating tonight was just half-way through, and I need hardly dwell with you on the vast changes that have overtaken international affairs, physiological and otherwise, in the nearly four decades that have passed since then. In 1960, the pharmacologists alone, at what was intended to be a limited specialized gathering, attracted to Stockholm over ten times the number there in 1926-- and the banquet in the city hall was attended in business clothes. International meetings began at the Copenhagen Congress in 1950 to shift from the hands of an informal, self-perpetuating committee, to the more formal International Union of Physiological Sciences, with its appointed national commissions and delegates. The great event of a foreign trip every three years, often associated with a summer holiday for the family, has proliferated into the monthly opportunity to fly somewhere in the world for a hectic week or even weekend of special meetings on every conceivable sub-topic in our broad field. Neurophysiologists are now

*Address given at the Convocation celebrating the 75th Anniversary of APS, August 27, 1963, Coral Gables, Florida.

more likely to interact with other workers on the nervous system-- at international neurochemical or psychopharmacological or ethological or bionomic meetings or the International Brain Research Organization-- than with their own physiological colleagues interested in digestion. And, perhaps most important, greatly increased physiological activity, involving many new countries and regions, has developed all over the world.

Much of this it has been my privilege to see first-hand. In 1936, a survey of research on the nervous system for the Rockefeller Foundation took me into every country in Europe (excluding Spain and Portugal but including Russia), and I should like to recall two impressive observations. First, the number of outstanding scientists in this rather wide area, per unit of total population of the country, was strikingly higher in all the small countries than in the large ones. The ratio was some two or three times as great for Scandinavia, Holland, Switzerland than for England, France, or Germany. Russia at that time, having lost nearly all its intelligentia in the revolution, was struggling to recreate the critical judgment and technical skills essential to serious science; a problem that it has only recently solved. The other point deserving mention has to do with the great consequences of relatively minor decisions. As one went eastward on the European continent, the quantity and quality of physiology tended to decline, but a remarkable intellectual oasis was Hungary, with four universities, each well equiped and well manned with exciting biologists. Even allowing for the high talents of this gifted people, the contrast with neighboring groups was too dramatic for a general explanation, and I inquired as to the background. It appeared that, at the end of World War I, the minister of education in Hungary was Count Klebelsburg, a man of great scholarship and wisdom and influence. He managed to secure an unusually large amount of support from government for the Hungarian universities; the dramatically good consequences of this constituted a remarkable experimental demonstration of scientific oaks from acorns. A more personal footnote of this trip resulted from meetings with Pavlov and, a few days later, with Freud. Pavlov mentioned that his dramatic experiments on experimental neurosis in dogs had been stimulated by reading Freud's work; when I mentioned this to the latter, he harrumphed and said "It would have helped if he'd said that some decades ago!"

In the last quarter century, various missions and meetings have taken me to all the continents, (although Africa is still mostly blank), and everywhere there are individuals or small foci or large groups doing good research and teaching in our subject and eager to improve. Few countries, indeed, boast our excellent laboratory resources, but this has in no way prevented the carrying out of first-rate investigations. A trip around the world three years ago revealed especially good neurophysiology in Israel and in Japan, as had an earlier visit to Latin America shown a particularly strong focus in Chile. Incidentally, I was at a party with some Japanese colleagues when word reached Tokyo that nearly assured Japan of the 1965 Congress. Stoic orientals! They literally danced with joy, especially Kato!

This is not the occasion for a detailed consideration of world

physiology, although I might remind you of the volume, "Perspectives in Physiology," edited by Ilse Vieth from a symposium on international physiology at the Montreal Congress and published by our Society. So let me close with, perhaps, the most important observation of all. Though our numbers have multiplied and our field divided, physiologists --all scientists--remain a goodly international fellowship. I have encountered good friends and warm hospitality everywhere, often on the part of colleagues whom I had never met personally. A visit to Australia 15 years ago developed from something I had published and I expect to return there in a couple of weeks and revisit many colleagues who have become close personal friends. A story that Joe Erlanger told me is a perfect illustration of the point. He came to the laboratory of Laugier in Paris, unannounced. The reception by the secretary was cool; Professor Laugier was very busy, etc., etc. Finally Erlanger got into the presence and was asked politely about where he worked, what his research was, etc. Suddenly a light flashed, Laugier threw his arms around his visitor, exclaimed "Vous et Erlangér," insisted on Joe being his guest, and took charge of him for the next couple of days.

Yes, as the Sigma Xi motto has it, we are all "companions in zealous research"; but more than that, we are a great brotherhood of adventurers and, mostly, of men of good will. International physiology, all international science, must contribute not only to man's improved understanding of his world but to an improved living together in it.

GUIDE FOR LABORATORY ANIMAL FACILITIES AND CARE

A copy of the Guide for Laboratory Animal Facilities and Care prepared by the Animal Care Panel has been sent to every member of the Federation. It has been adopted by the Institute of Laboratory Animal Resources of the National Research Council. It is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., for 20 cents.

The American Physiological Society Council has endorsed the Guide and strongly recommends that members of the Society bring this excellent brochure to the attention of their universities and institutions.

IUPS NEWS NOTES*

The International Union of Physiological Sciences is presently made up of the following countries:

Argentina	Netherlands
Belgium	Poland
Bulgaria	Rumania
Canada	Scandinavia
Chile	Spain
Czechoslovakia	Sweden
Finland	Switzerland
France	Taiwan
Germany	Turkey
Hungary	United Arab Republic
India	United Kingdom
Israel	U. S. A.
Italy	U. S. S. R.
Japan	Yugoslavia

The XXII International Congress was held in Leiden, The Netherlands in 1962. There were about 2,500 active members present. There were 1,250 free communications, 50 demonstrations and about 20 films. In 1965 the XXIII Congress will be held in Tokyo, Japan, September 1-9, 1965 with Dr. Genichi Kato of Keio University as chairman. The various national secretaries will be requested to act as agents for forwarding all materials, collecting the completed forms and returning the necessary papers to Tokyo. The secretaries will also certify the eligibility of applicants for Congress membership.

The 1968 Congress will be held in the United States, either Washington, D.C. or New York City. International Physiological Congresses have been held every three years (except during war years) since 1889.

News Notes from Physiological Societies

Finnish Physiological Society

The Society was founded in 1961. There are six institutes for physiological research in Finland. The oldest is the Institute of Physiology of the University of Helsinki. The main activities of this institute are concerned with:- sensory-physiology; physiology of the developing central nervous system; metabolism of brain proteins; erythropoiesis; and gerontological research.

The Department of Physiology at the University of Turku concerns itself with research on gastroenterological and cardiological problems

*Crganization and activities of the IUPS were set forth in an article by W. O. Fenn, THE PHYSIOLOGIST, Vol. 6, p. 44, 1963. News items from the IUPS News Letters edited by the IUPS Secretary, Professor W. O. Fenn will be published in THE PHYSIOLOGIST from time to time.

as well as the physiology of sports and athletics.

The Department of Zoology of the University of Helsinki is involved in physiological research on hibernation and hypothermia.

The Research Laboratory of the State Alcohol Monopoly at Helsinki is studying the effects of alcohol on the metabolism of the brain.

The Sauna Society and Laboratory for Research in Balneology at Helsinki carries out research on problems related to physiological and technical aspects of air and water bathing. Studies have been directed toward the establishment of quantitative data on heat exchange in man at extremely high environmental temperatures. Temperatures, and their rates of change, in various body organs during exposures to high and low air temperatures, as well as during muscular exercise, have been studied.

In connection with Oulu University, a Scandinavian Arctic, Institute of Health will be founded in the north of Finland. The functions of the Institute will be to study problems associated with the health of man living in the arctic climate, such as the effects of cold, light and ionizing radiation.

Deutsche Physiologische Gesellschaft

Some new appointments of interest to physiologists have been announced as follows:

Prof. O. H. Gauer appointed as Ordinarius in the Chair of Physiology of the Free University of Berlin.

Prof. H. Reichel has accepted the appointment in the University of Hamburg.

Dr. Hirsch has been appointed "planm. a.o. Professor" of Physiology in the University at Köln.

Dr. Wittke has been appointed to the Chair of Veterinary Physiology in the Free University of Berlin.

The Feldberg Prize was awarded this year by the English to Herr Professor Ullrich and by the Germans to Professor Dr. Whitteridge of Edinburgh. Professor Whitteridge gave his Feldberg Lecture in Berlin and Professor Ullrich gave his lecture in Oxford.

Australian Physiological Society

Professor Sir John Eccles of the Australian National University, Canberra, was awarded the Gold Medal of the Royal Society for his work on the electrophysiology of neurons.

Czechoslovak Physiological Society

In January of 1964 a symposium on the comparative physiology of skeletal and cardiac muscles will be held in Prague. Foreign guests will be welcome.

Hungarian Physiological Society

A conference on modern trends in neurohistology was held in Budapest in July 1963. It was organized in memory of Michael Lenhossek, the great Hungarian neurohistologist, and held on the occasion of the 100th anniversary of his birth.

The Israel Physiological and Pharmacological Society

The Society was organized in July 1962 and has 50 members, the majority of which represent the Hebrew University, Hadassah Medical School in Jerusalem; the Weizmann Institute at Rehovoth; the Beilinson Hospital, Petach Tikvah; and the Biological Institute, Neso Zionah. Dr. M. C. Shelesnyak of the Weizmann Institute, who is a member of the American Physiological Society is a member of the Council of the new Israel society.

Professor Bernardo A. Houssay of Argentina was elected the first Honorary Member of the Society at the time of his recent visit to Jerusalem.

The Physiological Society on Taiwan

During the academic year of 1962, the Physiological Society on Taiwan entertained many distinguished visitors, including Drs. Donald D. Van Slyke and Baird Hastings of the United States.

Dr. John R. Brobeck of the University of Pennsylvania served as visiting professor in the Department of Biophysics, National Defense Medical Center, Taipei during the 1962 academic year. Dr. Harry B. van Dyke is serving in this capacity in 1963.

The Physiological Society (Great Britain)

The first Bayliss-Starling Lecture was delivered at University College in London in March 1963 by Sir Charles Lovatt Evans. This lectureship arose from a suggestion by IUPS that the centenary of the birth of E. H. Starling should be commemorated. The Committee of the Society realizing that the dates of birth of Bayliss and Starling so nearly coincided and also that their lives and work were so intermingled, decided that the names of both should be coupled in any such recognition. The Committee therefore donated a sum of 1000 pounds to found a triennial Bayliss-Starling lecture.

Postscript

At an international gathering, toasts were being offered after dinner. An Englishman arose and offered a toast, "to the ladies of the western hemisphere." An American then countered with a toast "to the ladies of the eastern hemisphere." Finally, a European, not familiar with English offered his toast, "to both hemispheres of the ladies."

PAST-PRESIDENT'S ADDRESS

H. S. MAYERSON

Physiology and Physiologists in the Gay Nineties

The 75th anniversary meeting of our Society is drawing to a close. The special convocation on Tuesday night was an occasion for review of the history of the Society, masterfully presented by Dr. Fenn. It was a time for reminiscence and for nostalgia. President Rahn gave me the choice of joining our other past-presidents on that occasion or presenting to you tonight the customary past-president's address. I selfishly chose to talk to you tonight since this will probably be the last time that I will be given the privilege of talking to you for any length of time as a captive audience and because I am mindful of the admonition of my friend, "Coke" Andrus of Hopkins, that "there is nothing that gets paster faster than a past-president."

I should like to talk to you tonight on "Physiology and Physiologists in the Gay Nineties" as judged particularly from the papers included in the first volume of the American Journal of Physiology, published in 1898. The first volume of the American Journal of Physiology was published by Ginn and Company in Boston. It carries the inscription "Edited for the American Physiological Society by H. P. Bowditch, M.D., Boston; R. H. Chittenden, Ph.D., New Haven; W. H. Howell, M.D., Baltimore; Frederick S. Lee, Ph.D., New York; Jacques Loeb, M.D., Chicago; W. P. Lombard, M.D., Ann Arbor; and W. T. Porter, M.D., Boston." The editors, as you will recognize, represented the principle active laboratories of the period and it is not surprising, therefore, to find that of the 32 articles which the volume contained, 10 came from Harvard, 9 from Yale, 5 from Columbia, 2 each from Hopkins and Chicago and 1 from Michigan. The remaining 3 articles came from Clark University, Pennsylvania and Syracuse respectively. The paper from Syracuse by Gaylord Clark actually reported work on pressure sensations of human skin done under the guidance of Professor Von Frey in the Physiological Institute at Leipzig.

The papers from Harvard reflect the interests of the laboratory in the heart and circulation and the inspiration of Dr. Bowditch and of Dr. Porter. As most of you recall, Dr. Porter edited, published and personally financed the journal for the first 16 years. His enthusiasm, loyalty and enterprise is magnificently emphasized in this first volume in which he wrote 3 articles himself -- on the recovery of the heart from fibrillary contractions, on the influence of the heart beat on the flow of blood through the walls of the heart and on a new method for studying the isolated mammalian heart. L. J. H. Muskens presented an analysis of the action of the vagus nerve on the heart and F. H. Pratt discussed the nutrition of the heart through the Thebesian and coronary veins. F. W. Bancroft reported a study, inspired by Dr. Porter, on the venomotor nerves of the hind limb.

One of the papers from Harvard is by Ida H. Hyde on the effect of distention of the ventricle on the flow of blood through the walls of the

heart. Dr. Hyde was elected to the Society four years later in 1902 and was the first woman member to be elected to the Society. In the history of the Society for the first 25 years, Dr. Meek proudly emphasized the fact "that the American Society was more prompt than the British Society in giving recognition to women workers in physiology. It was not until 1915 that the British Society admitted women to membership and its action then was far from unanimous. A referendum disclosed that out of a total vote of one hundred and sixty-one, thirty-one were definitely opposed to the innovation, and thirty-six were in favor of a limited connection only, under the designation of associate member." Actually, as Dr. Meek was honest enough to point out later, Dr. Hyde remained the only woman member in the American Society until 1913, when Mabel P. Fitzgerald was elected. Miss Fitzgerald is now living in England and could not be here. We send her our best wishes on this, the 50th anniversary of her election to membership.

Three papers from Harvard departed from the laboratory's main interest in circulation. One was a paper by Allen Cleghorn on "The reinforcement of voluntary muscular contractions," an extension of the earlier work of Bowditch on the knee jerk. The remaining 2 papers, blazing a new trail, were by a 29 year old medical student, Walter B. Cannon. Cannon is careful to emphasize that Dr. Bowditch, in the autumn of 1896, suggested the use of Röntgen rays as a means of watching the gastric motor activities under normal circumstances. This was the year in which Cannon obtained his B. S. degree. The first paper, with Cannon as the sole author, is entitled "The movements of the stomach studied by means of the Röntgen rays." It is written in the simple but beautiful expository style with which we all were later to become very familiar. The paper is divided into 8 parts, the last part dealing with the inhibition of stomach movements during emotion, observations which triggered ideas and experiments that led, in subsequent years, to the elucidation of the role of the sympathetic system in the body economy. The second paper, with A. Moser, is on the movements of the food in the esophagus. Their first experiments were on the goose. Later they used cats, dogs, horses, and humans. I like the mental picture of a goose fitted with a tall paste-board collar to hold the head and neck stationary and being fed corn meal mush or molasses mixed with bismuth by Moser while Cannon watched the progress of the bolus or drop on the fluorescent screen.

Two of the 9 papers from Yale in the first volume came from the Physiological Laboratory of the Medical School, one written by S. J. Ferris and Graham Lusk on "The gastric inversion of cane sugar by HCl and the second by Lusk with F. H. Reilly and F. W. Nolan, the now classic paper on phlorizin diabetes in dogs. The other 7 papers came from the Sheffield Laboratory of Physiological Chemistry of which Dr. Chittenden was the director. They covered a variety of subjects: the influence of boric acid on nutrition; nutritive value of edible American fungi; papain proteolysis; the influence of bile and bile salts on pancreatic proteolysis; etc. One paper was by Chittenden and A. N. Richards, then the proud possessor of an A. B. degree, entitled "Variations in the amylolytic power and chemical composition of human mixed saliva." Those of you who have admired Richards' later meticulous and sophisti-

cated work on the kidney tubule, as I have, will be interested in knowing that, in this first paper, he was content to collect saliva as it dripped from a subject chewing rubber.

I was particularly interested in one of the papers by Chittenden, Lafayette Mendel (my old chief) and Holmes C. Jackson on the influence of alcohol and alcoholic drinks upon digestion. It was comforting, in retrospect, to learn that, if I wanted alcohol to stimulate my salivary secretion, I needed to introduce alcohol into the mouth and not directly into the stomach. It was also refreshing to know that although alcohol retarded proteolysis, there was a balancing stimulation of gastric secretion "rich in acid and of unquestionable digestive power" and that all of this took place with the consumption of either whiskey, brandy, sherry, claret, beer or porter. What interested me most, however, was the fact that in this 45 page paper, there were 35 tables. The data from each of 22 experiments were individually presented and the authors leisurely summarized their results in 3 pages. These were the good old days -- and unquestionably, for better or for worse, they are gone forever!

Interest in alcohol was not confined to New Haven, for the first volume also contains a paper by Colin C. Stewart of Toronto, a fellow in physiology at Clark University, entitled "Variations in daily activity produced by alcohol and by changes in barometric pressure and diet, with a description of recording methods." Amongst other results, Stewart reported that voluntary activity of rats decreased when they ate rich diets or drank 30 to 60 per cent alcohol, conclusions since confirmed by personal observations and possibly by those of some of my colleagues in the audience.

The volume also contains the classic paper by Frederic S. Lee on the functions of the ear and the lateral line in fishes, a paper by George B. Wallace and Arthur R. Cushny on saline cathartics and one by R. H. Cunningham on restoration of coordinated volitional movement after nerve "crossing." Twenty-three of the papers are by single authors, six have 2 authors and only three have 3 authors. Contrast this with the June 1963 issue of the Journal which contains 35 papers, 4 by single authors, 17 papers by 2 authors and 14 by 3 or more authors.

The difference is more than a change in distribution. Somewhere, somehow during the 75 years, for reasons which are not always clear, we lost the natural personal touch in writing, the use of the first person singular and the active voice. For example, Lee in his discussion of audition in fishes writes: "In the summer of 1894 I tested a number of species as to their power of hearing, employing ordinary sounds, such as the human voice, clapping the hands, and striking stones together in the air and under water. I obtained no evidence whatever of the existence of a sense of hearing as the term is customarily employed, although I learned that fishes are exceedingly sensitive to gross shocks ..." In the June, 1963 number of the Journal, no author used the first person singular or the active voice. Instead, "The animals were killed", "the experiments were performed between January and August", "Systemic pressure was measured in the left common carotid artery", etc. One

reason for abandonment of the first person singular and the use of the innocuous editorial "we" and the passive voice may be the desire of authors to be honest. In 1898, when W.H. Howell, studying the effects of high arterial pressures upon the blood flow, wrote "Upon dogs, I have connected the arteries of the brain with reservoirs of blood, etc." there was no question but that Howell himself did this. He also probably cleaned the dog cages, washed the glassware, etc. It would be rare indeed, to find an author in these bountiful days who actually connected arteries to reservoirs or for that matter was in the laboratory when the experiment was done. He probably was in Washington on the day of the experiment, working with a study section to decide whether other investigators were competent to hire technicians who could connect arteries to reservoirs.

There are many other differences in style between papers written in 1898 and 1963. In bibliographic references, usually only surnames were used, no given names or initials. This probably created no great hardship at the time in view of the small number of investigators concerned, but it would be nice to know just which Smith it was who worked with Chittenden in 1885. Acknowledgments of assistance and inspiration are part of the text, as are personal communications. They are usually given at the beginning of the paper in a delightfully informal manner. I find this very satisfying and would urge that we return to this custom. For example when W. T. Porter refers to some of Pratt's work in his laboratory, he says "The emptying of the intramural vessels by the systolic squeeze of the fibres around them has been admirably demonstrated by my friend, Mr. F. H. Pratt....." or Lafayette Mendel acknowledges Dr. Chittenden's help as follows "In view of the increasing importance of fungi as articles of diet, the writer has gladly followed the suggestion of Professor Chittenden to ascertain something more definite regarding the composition of mushrooms, with particular reference to their nutritive qualities."

I have indicated briefly some of the differences between the writing of 75 years ago and of the present. But there is one area in which there fundamentally has been a minimum of change -- the depiction of apparatus used in experimental work. I have always felt that Rube Goldberg was inspired to draw his famous cartoons after accidently reading a copy of the American Journal of Physiology. I show you, for example, a drawing of the apparatus used by Ida Hyde in her article in the first volume in 1898 (Fig. 1). I'm sure most of you, gadgeteers at heart, will quickly see what the apparatus will do. Recall that Dr. Hyde was studying the effects of ventricular distention on the flow of blood through the walls of the heart. It is thus obvious that if you put a cannula into the right ventricle (through the pulmonary artery) the outflow will drop on this aluminum plate, the drop will cause an air wave in the tambour, this is transmitted to a very sensitive recording tambour, the lever of which writes on the kymograph. The next figure (Fig. 2) shows the set-up for feeding blood at normal temperature to the coronary vessels. Without going into the details of this drawing, I think it quite apparent why there was enthusiasm rather than opposition to bringing Dr. Hyde into the Society.

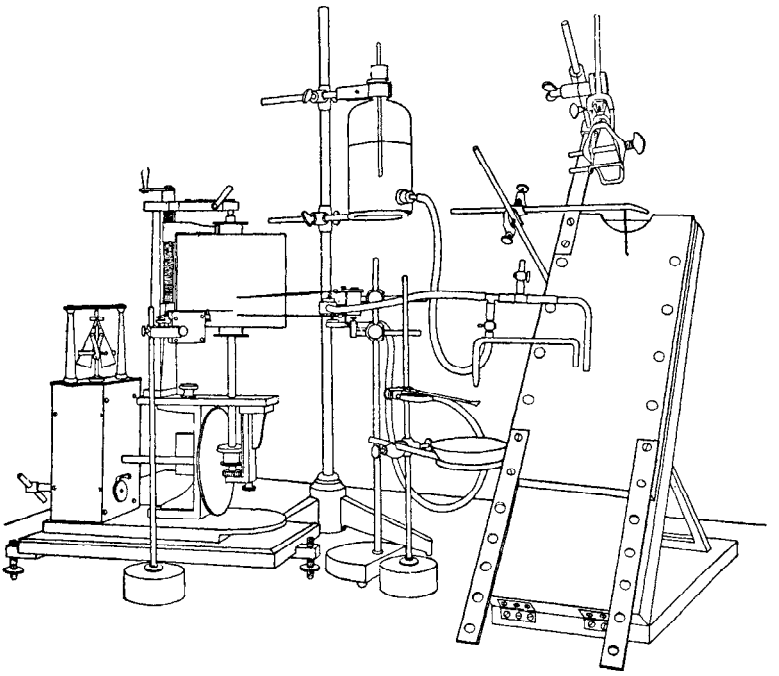

Figure 1.

Dr. Hyde started a tradition at Harvard which has persisted, as you can see from the next drawing (Fig. 3). This was made 50 years later, 1948, at Harvard. Some of you will unquestionably recognize it as coming from the classic paper written on protein osmotic pressure in mammalian capillaries by our next president, John Pappenheimer and his colleague, Dr. Armando Soto-Rivera. It is a much more sophisticated assembly of gadgets, with optical and electrical amplification, but I have a sneaking suspicion that some of the parts came from Dr. Hyde's original set-up. Whereas Dr. Hyde needed several pages to describe her set-up, John needed only a short paragraph to supplement the legend given with the figure. He did this by using the familiar but unpardonable device of referring the reader to publications of previous workers who had used a similar set-up, thus necessitating the requisition by the reader of 4 volumes from the library to find out why all the gadgets were really necessary. To their credit, I should emphasize that John and Armando obtained beautiful, quantitative data which they impressively summarized in a page and a half. It is obvious from their acknowledgments that most of the Harvard faculty were in on the fun of designing the set-up.

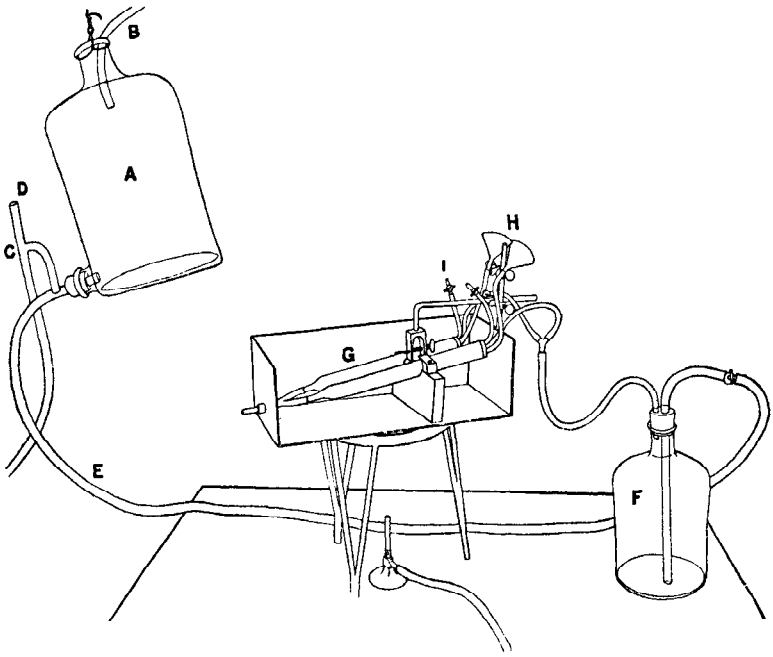

Figure 2.

I do not want to leave the impression that only Harvard investigators enjoy this pastime or that designing and using magnificently complicated set-ups has gone out of fashion. A glance at the next drawing (Fig. 4) taken from the May 1963 number of the Journal shows that the pastime is universal and perennial. This is from a paper by my friends, Drs. Rothe, Schwendenmann, and Selkurt from Indiana. It is a clearly-drawn schematic drawing which even I can follow with no difficulty. I am disappointed, however, that they side-stepped the challenge of drawing a "shock" dog as compared to a "donor" dog. This presented so many interesting possibilities. Drs. Gillette and Holm did much better in this regard as seen in the next drawing (Fig. 5) from their paper on uterine and abdominal contractions in cows in the June 1963 number of the Journal. This is visualization at its best. I like it.

While the first volume of the American Journal provided a good index of the work and main interests of American laboratories, some of our investigators were also publishing papers in the (British) Journal of Physiology. At this time (1898) the journal was being edited by Michael Foster and J. N. Langley with the help of an advisory board of 20 editors. Four of these editors were from the United States: Drs.

Bowditch, Chittenden, Howell, and H. C. Wood of Philadelphia. With the exception of Dr. Wood, they were also on the editorial board of the new American journal. This dual representation was short-lived. Our British colleagues understandably decided it would be the better part of valor to get rid of their American competitors and they were dropped within a few years. Unfortunately, Dr. Wood was also sacrificed in the process.

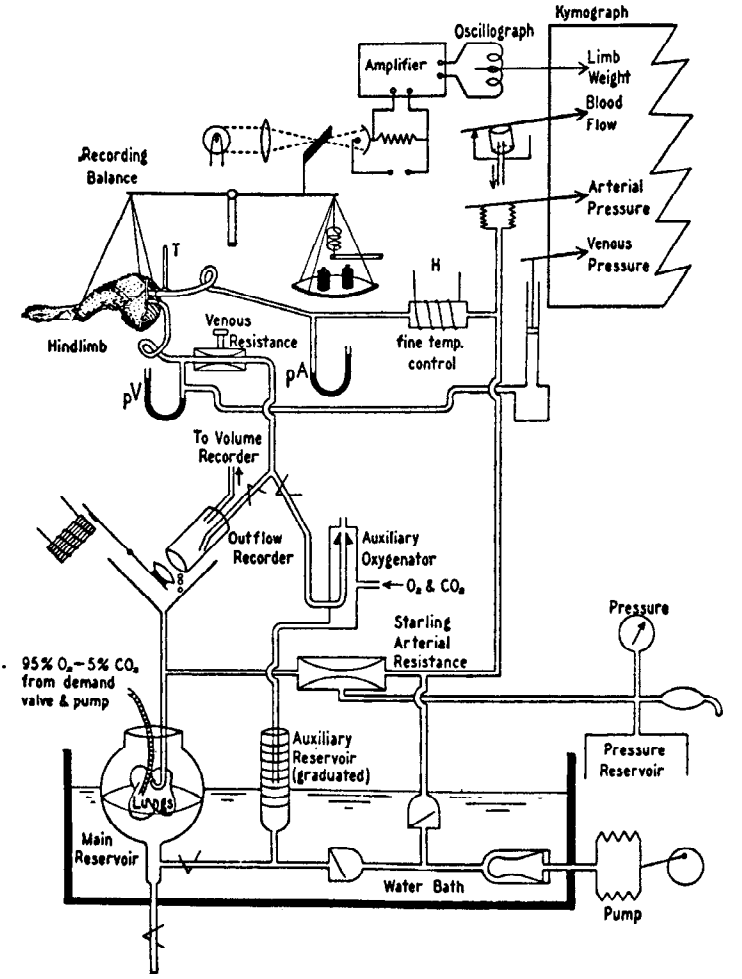

Figure 3.

Volume 22 of the (British) Journal of Physiology for 1897-98 contains three papers by American investigators: 1) by Charles B. Davenport, who was then an instructor in zoology at Harvard, and one of his Radcliffe students, Helen Perkins, on geotaxis in higher animals; 2) by G. N. Stewart of Western Reserve on cardiac output and 3) by S. J. Meltzer of Columbia on the paths of absorption from the peritoneal cavity. Meltzer also had a paper in the first volume of the American Journal on the nature of the cardiopneumatic movements but he obviously felt it important to publish the work on absorption from the peritoneal cavity in the (British) Journal since he was then involved in vigorous argument with Starling. Starling and Tubby had done some simple experiments in which they reported that colored fluid introduced into the peritoneal cavity appeared first in the urine and only later in thoracic duct lymph. Meltzer claimed to have repeated the experiments, with better controls, of course, and to have obtained just the reverse. He now reports the results of these experiments and is devastating in his criticism of Starling's work. Starling, in turn, presented further results at the January 15, 1898 meeting of The Physiological Society in which he claimed to have taken all of Dr. Meltzer's criticisms to heart, had done four more experiments but had obtained the same results as

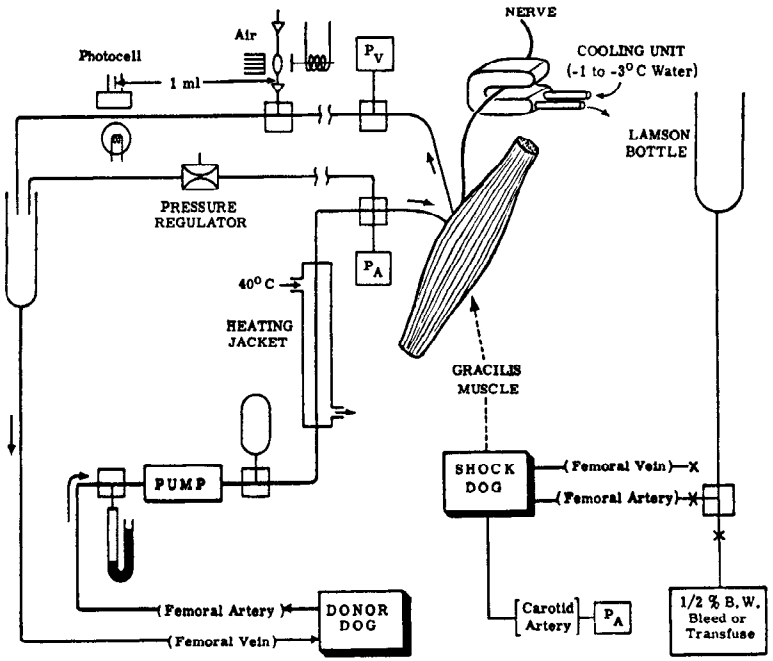

Figure 4.

before. He couldn't understand why so simple an experiment should produce different results in different laboratories. I suppose all we can say is that Starling's color vision and Meltzer's color vision were not the same and that there probably would not have been any argument if accurate spectrometers had been available for estimation of dye concentrations in the respective fluids and if even better controls had been used.

All of us, at some time or other, have yearned for the "good old days" when presumably life was simpler and experiments less complicated. Were they? Let's look in at Stewart's laboratory at Western Reserve in the nineties when he was doing his experiments on the estimation of cardiac output. Stewart was the first investigator to quantitatively measure a dilution indicator, Hamilton describes the method in the Handbook of Physiology as follows:

"He set up a length of artery as a part of a Wheatstone bridge so that when the blood in the artery changed its conductivity from the passage of the infused salt solution an alternating current signaled the event in a telephone receiver. On hearing the signal Stewart diverted a part of the arterial stream into a test tube thus sampling the diluted blood. The analysis consisted of diluting a sample of normal blood with the salt solution so that it equaled in conductivity the blood drawn during the sound. This would give the concentration of infused solution per liter of blood and the rate of infusion from which the rate of blood

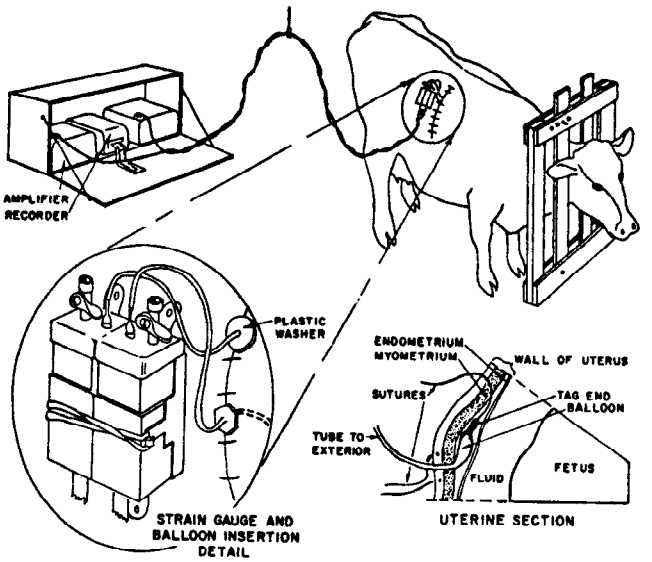

Figure 5.

flow could easily be calculated, provided of course that the basic assumptions that no indicator is lost and none recirculated are granted." But let us hear part of the description as Stewart wrote it: "A telephone was also connected in the bridge, according to Kohlrausch's well-known method for the measurement of the resistance of electrolytes. The bridge having been balanced, a sample of blood is drawn off, and immediately handed to an assistant to be defibrinated. Then at a given signal another assistant allows the salt solution to run in for a time previously agreed on, reading the time by a stop-watch graduated in fifths of a second, but capable of being read between the graduations. He also reads the burette, and notes the quantity which has run in. As soon as the solution reaches the electrodes the balance of the bridge is upset, and the sound in the telephone becomes louder. It usually reaches its maximum rapidly, maintains this maximum for the greater part of the time of passage, and then dies quickly away; and the increase and decline of the sound are somewhat more abrupt when injection is made into the left ventricle than when it is made into the right side of the heart. The observer, with his ear at the telephone and his eye on a stop-watch in his hand, gives the signal to collect and to stop collecting to a third assistant who sits with his fingers on the bull-dog forceps compressing the artery into which the collecting cannula is inserted." Parenthetically, I might add that Stewart had no grant funds and all his assistants were being paid "hard money" (or perhaps only love).

In passing, I may point out that this volume of the (British) Journal of Physiology includes the classic paper by Sherrington on "Decerebrate rigidity and reflex coordination of movements"; the early work of J. S. Haldane on the chemistry of hemoglobin and on oxygen absorption by the lungs; Langley's important paper on the regeneration of pre-ganglionic and of post-ganglionic visceral nerve fibers; and Swale Vincent's report on the general physiological effects of adrenal extracts.

I have presented a brief survey of physiology of 75 years ago. The American physiologists were chiefly concerned with problems in circulation, particularly the heart, and in digestion. English physiologists were interested in the same areas but there were the beginnings of work on the nervous system, in respiration and on the endocrines. These interests gradually made their way across the Atlantic and were soon being persued actively, as shown by publications of the nineteen-twenties. Vitamins came into the picture and physiologists were beginning to be curious of mechanisms of kidney and of cell function. At mid-century, the boom was pretty well under way. The wars had stimulated work on shock and fluid exchange, isotopes were available, and so was money. Physiology had now turned the corner. As is true of every science, it began at the descriptive level but description was now being supplemented by analysis, aided and abetted by mathematics, physics, and chemistry. Physiology has matured rapidly in the last 75 years and physiologists now properly, I think, can regard themselves as working in a sophisticated science.

What of the next 75 years? Is there more gold "in them thar hills?" Or are we, as my more cynical colleagues maintain, saying more and more about less and less? For my part, I agree with Stephen Hales

who in 1733 wrote in his preface to his volume on "Statical Essays": "In which we are assured that all things are wisely adjusted in number, weight and measure, yet with such complex circumstances as required many data from experiments, whereon to found just calculations: but though many of the following calculations are founded only on such inaccurate mensurations as the nature of the subject would allow of; yet may we thence fairly draw many rational deductions in relation to the animal economy.

"In which there is so just a symmetry of parts, such innumerable beauties and harmony in the uniform frame and texture of so vast a variety of solid and fluid parts, as must ever afford room for farther discoveries to the diligent inquirer; and thereby yield fresh instances to illustrate the wisdom of the divine architect; the traces of which are so plain as to be seen in everything, that the psalmist had good reason to call him a fool, who could be so senseless as to say in his heart, there is no God; whose masterly hand is so evident in every part of nature, that if there be any who pretend they cannot see it, it can be no breach of charity to say they are wilfully blind and therefore lyars."

PHYSIOLOGY FOR PHYSICIANS

The new monthly publication, Physiology for Physicians, is completing its first year with nearly 4500 subscribers. It has met with considerable success and will be continued.

It is felt that many APS members who are not physicians may wish to subscribe and/or have the publication sent to their personal physician, a physician friend, a medical student, or an intern. The subscription rate is $3.00 per year (12 issues). Subscriptions for 1963 are still being honored, with back issues being sent upon receipt of the yearly subscription price. Subscriptions for the calendar year 1964 are also being received, same price.

INTEGRATION OF NEURAL AND HORMONAL CONTROL OF GASTRIC SECRETION*

MORTON I. GROSSMAN

Pavlov (9) taught that both the cephalic and gastric phases of gastric secretion were under vagal control. With the discovery of gastrin by Edkins (1) it came to be accepted that the cephalic phase was mediated by nerves, the vagi, and the gastric phase by the hormone gastrin. It was Uvnas (12) who shattered this delightfully simple picture by showing that vagal stimulation of gastric secretion has two components, namely, a direct action on the acid-secreting glands and an indirect action by release of gastrin from the mucosa of the pyloric gland area of the stomach. The thesis that I shall attempt to develop here is that the gastric phase has the same dual mechanisms as the cephalic phase.

Demonstration of the Individual Components of the Dual Mechanism

In the intact animal, in response to a meal, the dual mechanisms of the cephalic and gastric phase occur essentially simultaneously. In appropriate experimental preparations the components of the phase can be isolated.

In animals with the gastrin-producing portion of the stomach resected and the remainder of the stomach, with the vagal innervation intact, formed into a fistula, insulin-induced hypoglycemia stimulates secretion of acid (Fig. 1). This is an example of the direct action of vagal impulses on the acid-secreting glands.

The hormonal component of the cephalic phase, that is, vagal release of gastrin, can be demonstrated in dogs with Heidenhain pouches and vagally innervated pouches of the pyloric gland area. Insulin-induced hypoglycemia causes acid to be secreted by the Heidenhain pouch (Fig. 2). Since this effect is abolished by resection of the pyloric pouch, it is reasonable to assume that it is mediated by vagal release of gastrin.

The direct component of the gastric phase, that is, stimulation of the acid-secreting glands directly by cholinergic impulses, has only recently been uncovered (2, 3). Distention of the acid-secreting portion of the stomach after resection of the gastrin-producing portion resulted in stimulation of secretion of acid (Fig. 3). The very high levels of pepsin in the juice support the view that this represents a vago-vagal reflex. Also consonant with the existence of such a vago-vagal reflex are the findings that distention of the stomach produces afferent impulses in the vagi (6) and that stimulation of the central end of the cut vagus causes secretion of acid and pepsin provided that the other vagus nerve is intact (5). Preoccupation with the hormone gastrin probably accounts for the lag of nearly 60 years between the postulation of gastric

* Taken from the introductory remarks given at the session on Gastric Secretion at the 1963 Federation Meetings.

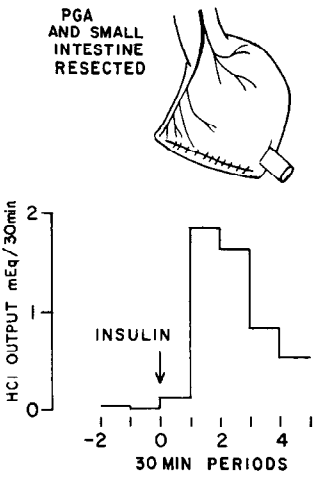

Fig. 1. Response of fundic gland area to insulin-induced hypoglycemia after resection of the pyloric gland area. This is a demonstration of the direct component of the cephalic phase. Adapted from Pevsner and Grossman, Gastroenterology, 28: 493, 1955.

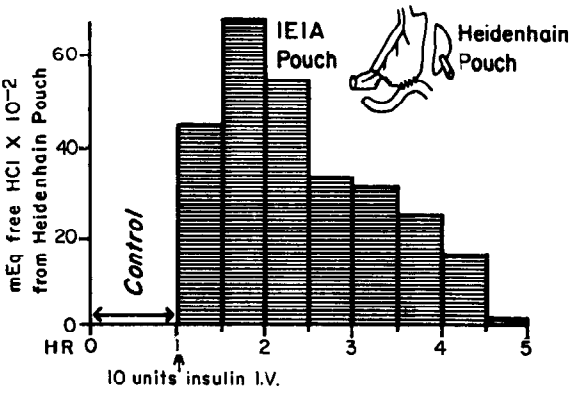

Fig. 2. Insulin-induced hypoglycemia caused secretion of acid by a Heidenhain pouch in a dog with vagally innervated pyloric pouch. This is an example of vagal release of gastrin during the cephalic phase. From Nyhus et al., Gastroenterology, 39: 582, 1960.

vago-vagal reflexes by Pavlov and the actual demonstration of the phenomenon.

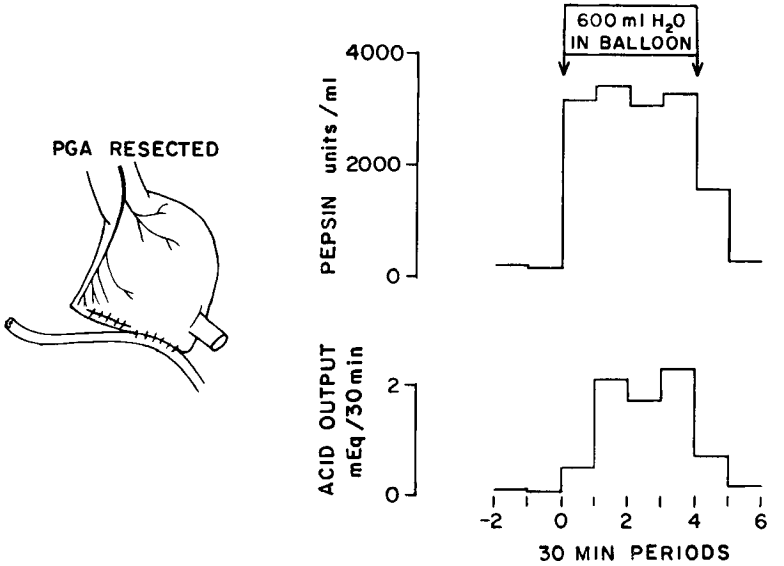

Fig. 3. Distention of the vagally innervated fundic gland area after resection of the pyloric gland area caused secretion of acid accompanied by high pepsin output. This is an example of the direct component of the gastric phase. Adapted from Grossman, Gastroenterology, 42: 718, 1962.

The direct component of the gastric phase can operate, albeit in much attentuated form, after the vagal innervation has been interrupted. Distention of a Heidenhain pouch with water produces very slight stimulation of acid secretion when acting alone but markedly augments the response to injected gastrin (Fig. 4). That this represents a local cholinergic reflex is suggested by the marked augmentation with gastrin, an effect that can be mimicked with cholinergic drugs, and also by the finding that it is accompanied by marked stimulation of pepsin secretion (Fig. 5).

The familiar component of the gastric phase is the hormonal one. Distention of the pyloric part of the stomach or bathing its mucosa with chemical stimuli such as amino acids causes release of gastrin as indicated by secretion from the Heidenhain pouch (Fig. 6). The unfamiliar note I now wish to introduce is to suggest that these effects are mediated by local and long (vago-vagal) reflexes fully analogous to those just

described for the fundic gland area. That acetylcholine can release gastrin has been demonstrated by bathing the mucosa of the pyloric gland area with solutions of it (11). The release of gastrin by vagal stimulation is therefore assumed to be cholinergic. It seems equally likely that release of gastrin caused by agents acting in the pyloric gland area is also cholinergically mediated. The most important piece of evidence supporting the view that local neural arcs participate in release of gastrin caused by local stimuli is that topical anesthetics applied to the mucosa prevent such responses. The local anesthetics do not act by intoxicating the gastrin-producing cell because they do not interfere with gastrin release by acetylcholine itself (10).

We can now put these various pieces together in a unified manner. Figure 7 is a schematic representation of how the same two cholinergic end effects, direct stimulation of parietal cells and release of gastrin from pyloric gland cells, can be brought about by both the cephalic and the gastric phases. The cephalic phase uses only long vagal paths; the gastric phase uses both long vagal and local intramural paths. In the case of the long reflexes the participation of the vagus nerves has been demonstrated by abolition of the reflexes where the nerves are cut. In the case of the local intramural reflexes, the assumption that these are indeed reflexes is based on analogy with the long reflexes and on appropriate pharmacologic evidence; the actual nerve paths have not been anatomically identified.

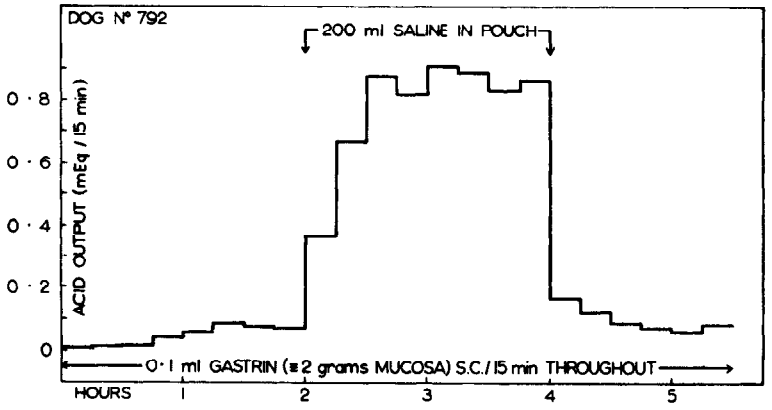

Fig. 4. Distention of a vagally denervated fundic pouch greatly augmented its response to injected gastrin. This is an example of the direct component of the gastric phase operating through intramural cholinergic arcs. From Grossman, Gastroenterology, 41: 385, 1961.

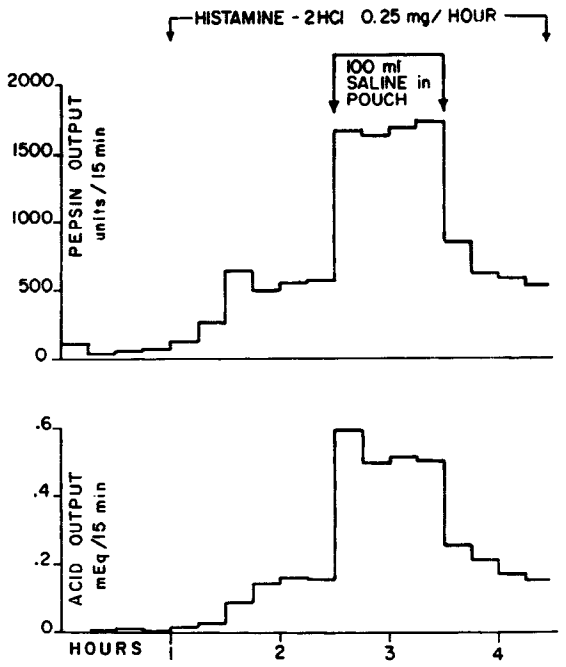

Fig. 5. Distention of a Heidenhain pouch augmented the rate of acid secretion in response to a low dose of histamine and also increased pepsin output. The effect on pepsin secretion is taken as evidence that distention produces cholinergic stimulation. Passaro and Grossman, unpublished study.

Potentiation Between Gastrin and Acetylcholine

There are two kinds of cooperation between gastrin and cholinergic mechanisms. Up to now we have been concerned with the first kind, that is, cholinergic release of gastrin. We now turn to the second kind, namely, potentiation between gastrin and cholinergic stimuli. Again it was Uvnas (12) who first called attention to this phenomenon.

When gastrin and cholinergic stimulation act simultaneously on the acid-secreting glands, as they do in the response of the intact stomach to a meal, the response is greater than would be expected to occur on the basis of simple addition of their stimulatory actions. Potentiation is the term applied to this synergism with greater than additive effects. To avoid spurious evidences of potentiation, namely, the kind that occur when one is working in the portion of the dose response curve for a

single agent in which doubling the dose more than doubles the response, sound criteria for existence of potentiation must be adopted. Two reliable criteria for potentiation are these: a) having found doses of the two agents that give equal responses when given separately, the response to half-doses of the two agents given together is shown to produce a higher response, and b) the maximal response to the agents given together is greater than the maximal response to either agent given alone. Combinations of injections of gastrin extracts with cholinergic drugs satisfy both of these criteria. Examples for maximal secretion from Heidenhain pouches are shown in Fig. 8 which also shows that the combination histamine and cholinergic drug also produces potentiation.

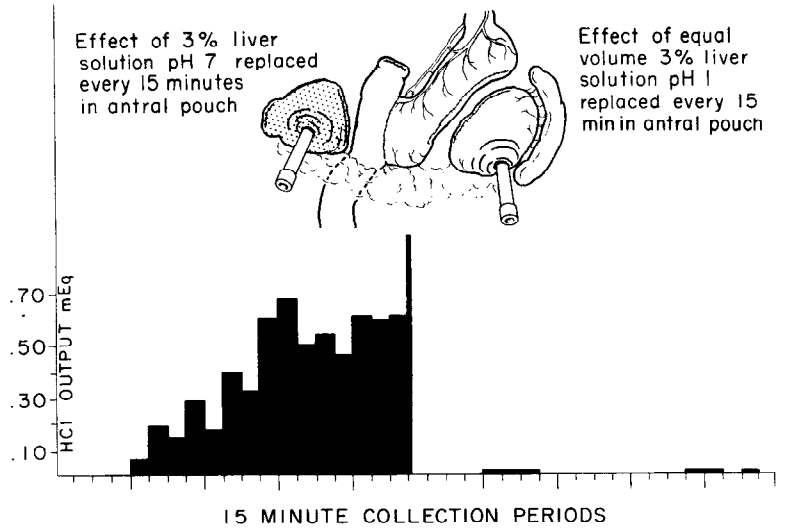

Fig. 6. Distention of the pyloric pouch caused secretion of acid by the Heidenhain pouch provided that the contents of the pyloric pouch were not acidified. This is an example of the hormonal component of the gastric phase. From Longhi et al., Am. J. Physiol., 191: 64, 1957.

There are three lines of evidence that indicate that the degree of potentiation between gastrin and cholinergic effects is greater than between histamine and cholinergic effects. First, the degree of augmentation of maximal response is greater when cholinergic drugs are added to gastrin than when added to histamine. Second, the depresssion of secretion caused by atropine is greater when acting against gastrin than when acting against histamine (4). Third, vagotomy reduces the response to gastrin much more than it reduces the response to histamine (8). The latter two observations indicate that tonic activity of the vagi, without overt phasic stimulation, causes enough background of cholinergic

activity to produce significant potentiation with gastrin. The converse is equally true; the release of gastrin from the "resting" pyloric gland area may significantly alter the response to direct cholinergic stimulation of the acid-secreting glands as recently demonstrated in the elegant studies of Olbe (7).

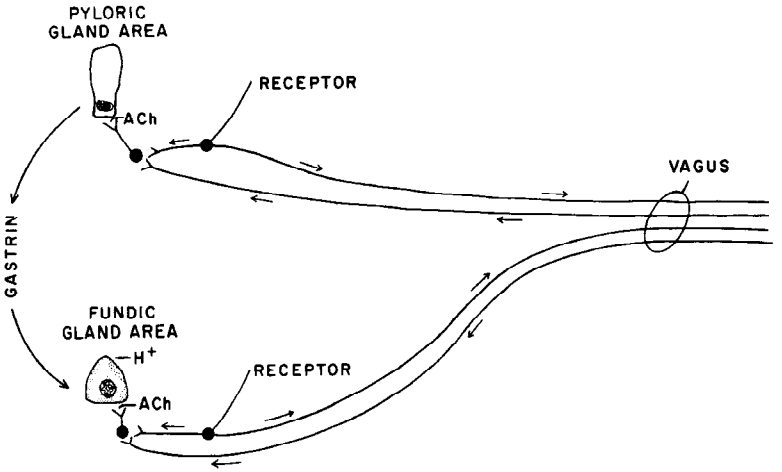

Fig. 7. A schematic representation of the dual cholinergic mechanisms that operate in the cephalic and gastric phases. Release of acetylcholine at the parietal cells and at the pyloric gland cells that produce gastrin can be brought about by a) vagal reflexes of the cephalic phase, b) vagal reflexes of the gastric phase, and c) local intramural reflexes of the gastric phase. The end effects, direct cholinergic stimulation of parietal cells and cholinergic release of gastrin, are the same for the cephalic and gastric phases.

Summary

1. Both the cephalic and the gastric phases of gastric secretion are mediated by cholinergic reflexes.

2. In both the cephalic and the gastric phases these reflexes are of two kinds: a) direct cholinergic stimulation of parietal cells, and b) cholinergic release of gastrin from pyloric gland cells.

3. Release of gastrin is under cholinergic control in both the cephalic and gastric phases. Gastrin is a hormonal link in a neural chain.

4. In the cephalic phase, reflexes are mediated solely by the vagi. In the gastric phase, reflexes are mediated both by the vagi (vago-vagal) and by local intramural paths.

5. The receptors for the gastric phase are distributed over the entire gastric mucosa, not just in the pyloric gland area.

6. The concomitant action of cholinergic stimuli and of gastrin on parietal cells causes greater stimulation than can be accounted for by summation. There is potentiation.

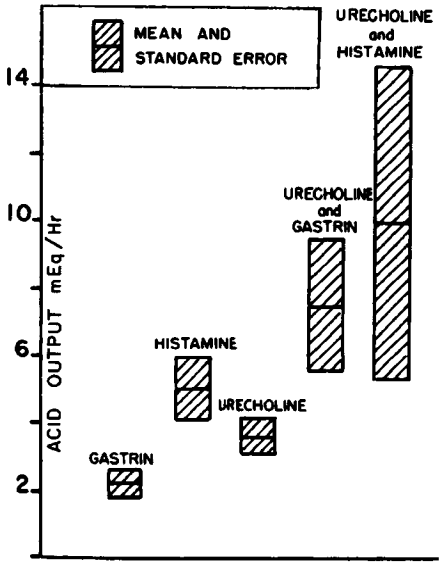

Fig. 8. Mean maximal responses of five dogs with Heidenhain pouches. Addition of Urecholine to gastrin or to histamine significantly increased the maximal responses. From Gillespie and Grossman, Gut, in press.

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CORRECTION

In my article entitled "Animal Experimentation Control Bills in the United States Congress" in the February 1963 issue of THE PHYSIOLOGIST, an error was made in reporting the facts concerning the court disposition of the Overholt Clinic case in 1958. Further investigation of the facts in connection with this case indicate that the farmer, Mr. Hawkins, won a suspension of his jail sentence imposed after the first trial but was not declared innocent. In other words, this is an instance in which an animal caretaker and a physician in a small hospital were convicted of cruelty in connection with the postoperative care of animals.

M. B. Visscher

ROMANCE OF A DROP OF BLOOD

By

JANET FRANK EGLESON

A young and handsome drop of virile blood
Once felt the need to seek his livelihood.
Bidding his dear mother not to grieve,
From the right atrium he took his leave.
Said he on parting, "Mother, do not fear--
"I shall return in twenty seconds, dear."

Then, passing the tricuspid, he set forth
With trusty compass to show south from north.
In foreign lands our hero now is found,
Standing firm on right ventricular ground.
And seeking shelter in a darkened cave
He wanders into the arterial nave.

In pulmonary pools Blood swims along
(He knows not if the route is right or wrong);
Then suddenly, a surging, raging throng
Draws helpless Blood into a pulpy lung!
The walls close in, the halls more narrow grow
(Oh, where, of where's the road to Jericho?)

Bewildered, of his senses near bereft,
Blood's swept into the atrium to the left.
Half-fainting, calling his dear mother's name,
He staggers to a ventricle again--
'Tis also left. And the land more placid seems
With capillaries and red, ruby streams.

What, ho? Another cave! With map in hands
Blood learns that here the Great Aorta stands.
Courageously, the valve-like door he grasps
As from within a voice like thunder rasps:
"Who passes here? Who dares to go this way?"
Our man replies, "Sir Blood, sire, if I may.

"My path lies through the artery systemic
To route 12-A, Superior Mesenteric."
The rasping voice Sir Blood permission spared.
On oxygen and bread our hero fared,
Small nourishment for such a red-blood mortal!--
Through intestinal vessels and the vena portal.

Through liver ducts, a small contorted maze,
The seconds seemed like minutes, hours, days.
Exhausted, Blood emerged at last;
Toward homeward-bound Hepatic he had passed.
Inferior Vena Cava, familiar sight,
Assured him that the path he chose was right.

Scarce upon this happy fact's beknown
Right atrium he spied--Sir Blood's maison!
But satisfied? His life has only started,
And next he plans a trip through the carotid.

SYMPOSIUM ON IMMUNITY

Section F (Zoological Sciences) of the AAAS will sponsor a one-session interdisciplinary symposium on Developmental Aspects of Immunity at the annual AAAS meetings in Cleveland on the morning of December 28, 1963, Sheraton-Cleveland Hotel. Titles and participants are as follows:

Introduction
James D. Ebert, Carnegie Institution of Washington

Sequential Nature of the Immune Process
Jonathan W. Uhr, New York University Medical Center

Relationship of Thymus to Development of Immunologic Responsiveness
J. F. A. P. Miller, Chester Beatty Research Institute

Phylogeny of the Immune Response
Robert A. Good, Variety Club Heart Hospital

Ontogeny of the Immune Response
Arthur M. Silverstein, Armed Forces Institute of Pathology

Further information can be obtained from David W. Bishop, Dept. of Embryology, Carnegie Institution of Washington, 115 W. University Parkway, Baltimore 10, Md.