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THE
AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA
FOR PROMOTING USEFUL KNOWLEDGE

YEAR BOOK 1946

JANUARY 1, 1946 – DECEMBER 31, 1946

THE AMERICAN PHILOSOPHICAL SOCIETY
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A PROPOSAL for Promoting USEFUL KNOWLEDGE among the *Britiſh Plantations* in *America.*

THE *Engliſh* are poſſeſs'd of a long Tract of Continent, from *Nova Scotia* to *Georgia*, extending North and South thro' different Climates, having different Soils, producing different Plants, Mines and Minerals, and capable of different Improvements, Manufactures, *&c.*

The firſt Drudgery of Settling new Colonies, which confines the Attention of People to mere Neceſſaries, is now pretty well over; and there are many in every Province in Circumſtances that ſet them at Eaſe, and afford Leiſure to cultivate the finer Arts, and improve the common Stock of Knowledge. To ſuch of theſe who are Men of Speculation, many Hints muſt from time to time ariſe, many Obſervations occur, which if well-examined, purſued and improved, might produce Diſcoveries to the Advantage of ſome or all of the *Britiſh* Plantations, or to the Benefit of Mankind in general.

But as from the Extent of the Country, ſuch Perſons are widely ſeparated, and ſeldom can ſee and converſe, or be acquainted with each other, ſo that many uſeful Particulars remain uncommunicated, die with the Diſcoverers, and are loſt to Mankind; it is, to remedy this Inconvenience for the future, propoſed,

That One Society be formed of Virtuoſi or ingenious Men reſiding in the ſeveral Colonies, to be called *The American Philoſophical Society* who are to maintain a conſtant Correſpondence.

That *Philadelphia* being the City neareſt the Centre of the Continent-Colonies, communicating with all of them northward and ſouthward by Poſt, and with all the Iſlands by Sea, and having the Advantage of a good growing Library, be the Centre of the Society.

That at *Philadelphia* there be always at leaſt ſeven Members, *viz.* a Phyſician, a Botaniſt, a Mathematician, a Chemiſt, a Mechanician, a Geographer, and a general Natural Philoſopher, beſides a Preſident, Treaſurer and Secretary.

That theſe Members meet once a Month, or oftner, at their own Expence, to communicate to each other their Obſervations, Experiments, *&c.* to receive, read and conſider ſuch Letters, Communications, or Queries as ſhall be ſent from diſtant Members; to direct the Diſperſing of Copies of ſuch Communications as are valuable, to other diſtant Members, in order to procure their Sentiments thereupon, *&c.*

That the Subjects of the Correſpondence be, All new-diſcovered Plants, Herbs, Trees, Roots, *&c.* their Virtues, Uſes, *&c.*; Methods of Propagating them, and making ſuch as are uſeful, but particular to ſome Plantations, more general, Improvements of vegetable Juices, as Cyders, Wines, *&c.*; New Methods of Curing or Preventing Diſeaſes. All new-diſcovered Foſſils in different Countries, as Mines, Minerals, Quarries; *&c.* New and uſeful Improvements in any Branch of Mathematicks; New Diſcoveries in Chemiſtry, ſuch as Improvements in Diſtillation, Brewing, Aſſaying of Ores; *&c.* New Mechanical Inventions for ſaving Labour; as Mills, Carriages, *&c.* and for Raiſing and Conveying of Water, Draining of Meadows, *&c.*; All

new

new Arts, Trades, Manufactures, *&c.* that may be propoſed or thought of Surveys, Maps and Charts of particular Parts of the Sea-coaſts, or Inland Countries; Courſe and Junction of Rivers and great Roads, Situation of Lakes and Mountains, Nature of the Soil and Productions; *&c.* New Methods of Improving the Breed of uſeful Animals, Introducing other Sorts from foreign Countries. New Improvements in Planting, Gardening, Clearing Land, *&c.*; And all philoſophical Experiments that let Light into the Nature of Things, tend to increaſe the Power of Man over Matter, and multiply the Conveniencies or Pleaſures of Life.

That a Correſpondence already begun by ſome intended Members, ſhall be kept up by this Society with the ROYAL SOCIETY of *London*, and with the DUBLIN SOCIETY.

That every Member ſhall have Abſtracts ſent him Quarterly, of every Thing valuable communicated to the Society's Secretary at *Philadelphia*; free of all Charge except the Yearly Payment hereafter mentioned.

That, by Permiſſion of the Poſtmaſter-General, ſuch Communications paſs between the Secretary of the Society and the Members, Poſtage-free.

That, for defraying the Expence of ſuch Experiments as the Society ſhall judge proper to cauſe to be made, and other contingent Charges for the common Good, every Member ſend a Piece of Eight *per Annum* to the Treaſurer, at *Philadelphia*, to form a Common Stock, to be diſburs'd by Order of the Preſident with the Conſent of the Majority of the Members that can conveniently be conſulted thereupon, to ſuch Perſons and Places where and by whom the Experiments are to be made, and otherwiſe as there ſhall be Occaſion; of which Diſburſements an exact Account ſhall be kept, and communicated yearly to every Member.

That at the firſt Meetings of the Members at *Philadelphia*, ſuch Rules be formed for Regulating their Meetings and Tranſactions for the General Benefit, as ſhall be convenient and neceſſary; to be afterwards changed and improv'd as there ſhall be Occaſion, wherein due Regard is to be had to the Advice of diſtant Members.

That at the End of every Year, Collections be made and printed, of ſuch Experiments, Diſcoveries, Improvements, *&c.* as may be thought of publick Advantage. And that every Member have a Copy ſent him.

That the Buſineſs and Duty of the Secretary be, To receive all Letters intended for the Society, and lay them before the Preſident and Members at their Meetings; to abſtract, correct and methodize ſuch Papers, *&c.* as require it, and as he ſhall be directed to do by the Preſident, after they have been conſidered, debated, and digeſted in the Society; to enter Copies thereof in the Society's Books, and make out Copies for diſtant Members; to anſwer their Letters by Direction of the Preſident, and keep Records of all material Tranſactions of the Society, *&c.*

Benjamin Franklin, the Writer of this Propoſal, offers himſelf to ſerve the Society as their Secretary, 'till they ſhall be provided with one more capable.

Philadelphia, May 14. 1743.

(Courtesy of the Yale University Library from the original in its Benjamin Franklin Collection.)

I

A BRIEF HISTORY OF THE AMERICAN PHILOSOPHICAL SOCIETY

EDWIN G. CONKLIN

1. FOUNDATION AND ORGANIZATION

The American Philosophical Society is the oldest and one of the most distinguished learned societies in America. It was started by Benjamin Franklin in 1743 in a "Proposal," reproduced on the preceding pages. Some of the principal items of this Proposal are:

That one Society be formed of Virtuosi or ingenious Men residing in the several Colonies, to be called *The American Philosophical Society* who are to maintain a constant Correspondence.

That *Philadelphia* being the City nearest the Centre of the Continent-Colonies . . . be the Centre of the Society.

That at *Philadelphia* there be always at least seven Members, *viz.* a Physician, a Botanist, a Mathematician, a Chemist, a Mechanician, a Geographer, and a general Natural Philosopher, besides a President, Treasurer and Secretary. . . .

That a Correspondence already begun by some intended Members, shall be kept up by this Society with the ROYAL SOCIETY of *London*, and with the DUBLIN SOCIETY. . . .

Benjamin Franklin, the Writer of this Proposal, offers himself to serve the Society as their Secretary, 'till they shall be provided with one more capable.

This Proposal was sent to a carefully selected number of "ingenious men" in Pennsylvania and other Colonies, and about one year later Franklin reported in a letter to a member in New York that "the Society so far as relates to Philadelphia, is actually formed, and has had several Meetings to mutual Satisfaction." He then named seven Philadelphia members, representing the sciences listed in his Proposal, together with the President, Treasurer, and Secretary, and five others from New York and the Jerseys, and then adds: "And there are a number of others in Virginia, Maryland, Carolina and the New England Colonies who we expect to join us as soon as they are acquainted that the Society has begun to form itself."

It is evident that Franklin had in mind an American society more or less like the Royal Society of London, chartered in 1662, in which the members were also characterized as "Virtuosi," and the business and design of which were, in the words of their first Curator, Robert Hooke, "To improve the knowledge of naturall things and all useful Arts, Manufactures, Mechanick practices, Engynes and Inventions by Experiments (not meddling with Divinity, Metaphysics, Moralls, Politicks, Grammar, Rhetorick or Logick)."[1]

In Franklin's Proposal the "Subjects of Correspondence" were to be, improvements in the practical arts of agriculture, engineering, trades, and manufactures; all new discoveries in science; "And all philosophical Experiments that let Light into the Nature of Things, tend to increase the Power of Man over Matter, and multiply the Conveniences and Pleasures of Life."

The very subjects that now go under the specific name "philosophy" were generally excluded from the field of the philosophical societies of the seventeenth and eighteenth centuries, and the word "philosophy" was used in its original meaning, love of knowledge, and as the essential equivalent of what is now called "science."

Throughout its long history the Royal Society has retained this restriction of its field to the observational and experimental sciences. The American Philosophical Society followed the same course in its early history; in its Laws, first adopted in 1769, six Committees or Sections were established, viz.:

1. Geography, Mathematics, Natural Philosophy & Astronomy.
2. Medicine and Anatomy.
3. Natural History and Chemistry.
4. Trade and Commerce.
5. Mechanics and Architecture.
6. Husbandry and American Improvements.

A seventh Committee, on History, Moral Science, and General Literature, was added to the original six in 1815, thus including what are now called "social sciences" and "humanities." Since 1936 these subjects have been assembled in four classes, viz.:

I. Mathematical and Physical Sciences
II. Geological and Biological Sciences
III. Social Sciences
IV. Humanities

[1] Weld, C. R., A History of the Royal Society with Memoirs of the Presidents I:146, London, 1848.

The business and duties of the Secretary of the Society, as described in the last paragraph of Franklin's Proposal, were heavy and responsible and were essentially like those of Henry Oldenburg, Secretary of the Royal Society in its early years, to whom that society and the world of science owes so much. Franklin offered to assume these duties in the new society, but he was at that time a very active publisher, inventor, and scientific investigator; deputy postmaster, member of the City Council, and leading citizen of Philadelphia and Clerk of the General Assembly. Soon thereafter he was elected a member of the General Assembly of Pennsylvania, and was appointed Deputy Postmaster General of the Continental Colonies, and member of important Continental commissions; from 1757 to 1775 he was almost constantly in Europe, chiefly in London, as Agent of Pennsylvania and later of other Colonies in their relations with the British Government. Consequently these vital duties of the Secretary of the newly-formed Society necessarily devolved upon others less active than himself.

In 1745 Franklin confessed: "The members of our Society here are very idle gentlemen, they will take no pains." And John Bartram, second on the list of members, wrote to a friend, "Franklin, Dr. Bond and I talk of carrying it on with more diligence than ever." But interest in the Society languished. No minutes of meetings of the Society between 1744 and 1768 are now extant and it is probable that the organization was relatively inactive during that period.

Regular minutes of the American Philosophical Society begin on January 19, 1768 with a meeting of three original members of 1743, one elected in 1767, and five chosen on January 12, 1768. They proceeded at once to elect eighteen new members and to invite John Penn, Lieutenant Governor of the Province and grandson of William Penn, to become Patron of the Society, and James Hamilton, former Governor, and Hon. William Allen, Chief Justice of Pennsylvania, to become members. All accepted and thus the Philosophical Society allied itself with the Proprietary Party, and thereafter during that year meetings were held in the State House (the present Independence Hall).

On February 2, 1768 a paper was received proposing the union of the American Philosophical Society with another society known as "The American Society, held at Philadelphia for promoting

and propagating useful Knowledge." This proposal listed the names of twenty-three members, and the American Philosophical Society proceeded at once to elect all of them to its membership. This was regarded as predatory union by the American Society, and it was refused, but Committees of Conference between the two societies were later appointed and a treaty of union was adopted on December 20, 1768.

In the meantime the American Philosophical Society held twelve very active meetings, at the first of which (February 9, 1768) its organization was completed by the election of Hon. James Hamilton as President, Drs. William Shippen and Thomas Bond, Vice Presidents, Philip Syng, Treasurer, and Dr. William Smith, Provost of the College of Philadelphia, Rev. John Ewing, and Dr. Charles Moore, Secretaries. At these meetings, in addition to the election of members, scientific discoveries were announced, inventions were described, and models exhibited; and the Secretaries laid before the Society a project to erect an observatory, obtain instruments, and make preparations to observe the transit of the planet Venus across the disk of the sun on June 3, 1769.

This relatively rare phenomenon had excited great interest throughout the scientific world, since among other things the results of careful observations and calculations would help to determine more accurately the distance of the earth from the sun. The Royal Society sent observers to Fort Prince of Wales on Hudson Bay and to places in Ireland and Norway, and Lieutenant (later Captain) James Cook, with a company of scientists, was sent on H.M.S. *Endeavour* to Otahiti in the Pacific to observe this transit of June 3, 1769; this was the first of Captain Cook's famous voyages of discovery. The recently revived American Philosophical Society appealed to the House of Assembly of the Province of Pennsylvania for financial assistance in this large undertaking and it was granted £100 sterling to purchase a telescope and micrometer, and was given permission to erect an observatory platform in the State House Yard.

This burst of activity on the part of a society that had been dormant for twenty-four years was stimulated by rivalry with another society, which was the outgrowth of a local club or Junto (whose earliest members are listed as of 1758) which may have

taken its name from the Junto started by Franklin in 1727.[2] Its membership was limited to twelve and only nine were listed in its minutes as members in 1766. It met weekly for mutual improvement and discussion and was local and social in character, but on December 13, 1766 it enlarged its purposes and membership and took the name of "The American Society for promoting and propagating useful knowledge, held at Philadelphia." Its activity during 1767 served to revive the American Philosophical Society and during that year and 1768 both societies were quite active, although the Philosophical Society, enjoying Proprietary and aristocratic favor, made the better showing, while the American Society, representing the Popular or democratic party, was poor but proud.

On September 23, 1768 the American Society modified its name to "The American Society, held at Philadelphia, for promoting useful Knowledge," and on November 4 of that year Benjamin Franklin was elected its President, although he was then in Europe. At the same time the proposal of union of the two societies was revived and Committees of Conference met and formulated articles of union, "on terms of perfect equality," which were adopted on December 20, 1768. These terms provided, among many other things, that the name of the united society should combine the former names of both, viz.: "The American Philosophical Society, held at Philadelphia, for promoting useful knowledge;" that all members of each society at the end of the year 1768 should become members of the united society; and that its first meeting should be

[2] In 1914 a Committee of nine distinguished members made an extensive "Report on the Date of the Foundation of the Society" (published in "An Historical Account of the Origin and Formation of the American Philosophical Society," Philadelphia, 1914), and seven of them agreed on adopting 1727, the date of the starting of Franklin's Junto, as the date of the foundation of the Society. This report was accepted by the Society on May 1, 1914 and the date of the Society's seal and stationery was ordered changed from 1743 to 1727. The probable error of this decision (whatever the rule of the Carnegie Foundation for the Advancement of Teaching for determining the date of origin of colleges and universities, upon which it was based) is apparent when it is remembered that the Junto was a local and social club of not more than twelve members, while the American Philosophical Society was to be a continental and international learned society; and its futility is evident for if dated from Franklin's Proposal of 1743 the American Philosophical Society is acknowledged to be thirty-seven years older than the American Academy of Arts and Sciences of Boston, which is the next oldest learned society in America, and even if dated from 1769 the Society is still eleven years older than the Academy. "The priority complex is a sub-species of the inferiority complex."

held on neutral ground, the College [of Philadelphia], on January 2, 1769, at which time officers should be chosen by ballot and Governor John Penn be requested to serve as Patron.

It is evident that both societies, in anticipation of this union, endeavored to have a large and equal number of members. The Philosophical Society listed at that time eight original members of 1743, three who had been elected in 1767 and one hundred and seventeen who were elected at eight meetings in 1768, or a total of one hundred and twenty-eight. The American Society listed two elected in 1758, ten "existing members," time of election unknown, thirteen elected between 1758 and 1768, and one hundred and twenty-four elected at twenty-four different meetings during the year 1768, or a total of one hundred and forty-nine of which number twenty-six were also members of the American Philosophical Society. Thus the total membership of the two societies at the time of the union, excluding duplications, was two hundred and fifty-one.[3]

At the election of officers on January 2, 1769 former Governor James Hamilton, lately President of the Philosophical Society, and Benjamin Franklin, President of the American Society, were candidates for the presidency of the united society and rivalry ran high between the supporters of these two, representing the Proprietary and the Popular parties of the Commonwealth. Although Franklin was at that time, and for several years later, absent in Europe, he was elected President, and thereafter continued to be elected annually until after his death in 1790. Additional officers elected and their membership in the former societies (indicated by *"A"* for American and *"P"* for Philosophical) were:

Vice-Presidents, Dr. Thomas Cadwalader *A*, Dr. Thomas Bond *P*, Joseph Galloway, Esq. *P*. Treasurer, Mr. Philip Syng *P*. Secretaries, Mr. Charles Thomson *A*, Rev. Dr. William Smith *P*, Mr. Thomas Mifflin *A*, Rev. John Ewing *P*. Curators, Dr. Adam Kuhn *P*, Dr. John Morgan *A*, Mr. Lewis Nicola *A*.

A Council was not established until several years later; on December 17, 1774 "Mr. Biddle proposed to the Society the appoint-

[3] Of this number 170 were from Pennsylvania, 52 from other Colonies from South Carolina to Massachusetts Bay, and 29 were from foreign lands. Of the latter 9 were from the British West Indies and Nova Scotia, 4 were British officers in the Colonies, 10 were British scientists and physicians, and 7 were from five different countries of Europe.

ment of a Council of twelve persons," but such a Council was not elected until January 5, 1781, at which time twelve Councillors were chosen, four to serve for one year, four for two, and four for three years. Thereafter four Councillors were chosen at each annual election.

The Governor, John Penn, took seriously the defeat of Hamilton in the election and refused to be Patron of the Society, but two years later his successor, Richard Penn, accepted the invitation to be Patron. Since that time, by provision of the Charter (Section III), the Patron has been "his Excellency the President of the Supreme Council [now the Governor] of this Commonwealth." The united society thus began its existence under its present name on January 2, 1769.

The Charter of the Society was not granted by the Commonwealth of Pennsylvania until 1780, after the end of Proprietary government and in the midst of the War for Independence. Certain portions of this Charter are notable for their breadth of view and generous internationalism, applicable then as now. In particular, attention may be called to the third "Whereas" of the preamble:

And Whereas the experience of ages shows that improvements of a public nature are best carried on by societies of liberal and ingenious men, uniting their labours, without regard to nation, sect, or party, in one grand pursuit, alike interesting to all, whereby mutual prejudices are worn off, a humane and philosophical spirit is cherished, and youth are stimulated to a laudable diligence and emulation in the pursuit of wisdom, . . .

Attention is also directed to the final section of the Charter, with the reminder that it was written in the midst of a seven year war when national antagonisms were intense:

And Whereas nations truly civilized (however unhappily at variance on other accounts) will never wage war with the Arts and Sciences, and the common Interests of humanity:

Be it further enacted by the authority aforesaid, That it shall and may be lawful for the said Society by their proper officers, at all times, whether in peace or war, to correspond with learned Societies, as well as individual learned men, of any nation or country, upon matters merely belonging to the business of the said Society, such as the mutual communication of their discoveries and proceedings in Philosophy and Science; the procuring books, apparatus, natural curiosities, and such

other articles and intelligence as are usually exchanged between learned bodies, for furthering their common pursuits; *Provided always,* That such correspondence of the said Society be at all times open to the inspection of the Supreme Executive Council of this Commonwealth.

This Charter is signed by John Bayard, Speaker, and Thomas Paine, Clerk of the General Assembly.[4]

2. MEETINGS AND PUBLICATIONS

Fortnightly meetings were held regularly for more than 175 years, except for an interruption from January 1776 to March 1779 during the American Revolution, during part of which time Philadelphia was occupied by British forces. At these meetings "communications" were presented, either in person or by letter, on a bewildering variety of subjects, for in its early years the Society represented all fields of pure and applied science, and was in addition a museum of natural and archaeological objects, and a kind of patent office for the exhibition and description of inventions such as new forms of plows, machines for mowing with a horse, a model of John Fitch's steamboat which antedated Robert Fulton's by more than twenty-five years, the electrical apparatus of Franklin and Rittenhouse, models of smoke-consuming stoves, etc. Papers were presented on the cultivation of native grapes, the making of wine, the protection of peach trees from blight, and of wheat from the ravages of the Hessian fly, and, one of Franklin's favorite topics, the cure of smoky chimneys. Another enterprise which occupied the attention of the Society for many years and which had the active support of Franklin was the establishment of silk culture and filiatures in America. The Society took stock in a Silk Society and lost all of its investment. Large scale projects for the construction of a ship canal between the head waters of Delaware and Chesapeake Bays occupied the attention of the Society for many years, and other projects concerned the improvement of navigation in the Susquehanna and Schuylkill Rivers. Many of these inventions, descriptions and projects were referred to appropriate committees and such as were thought worthy were recommended for publication in the *Pennsylvania Gazette* in order to bring them

[4] The same Thomas Paine who was author of the stirring call to arms in the pamphlets *Common Sense,* and *The Crisis,* and later author of the defense of revolution in *The Rights of Man,* and of freedom of thought and belief in *The Age of Reason.*

at once to the attention of farmers and industrialists, while papers of more general interest were published in the *American Magazine*.[5]

In 1786 John Hyacinth de Magellan of London gave 200 guineas to the Society to establish a gold medal to be annually awarded, under prescribed terms, to the author of the best discovery or most useful invention relating to navigation, astronomy, or natural philosophy (mere natural history [taxonomy] only excepted). And in 1795 the Society established from its own funds premiums for essays on the following topics:

1. On a system of liberal education and literary instruction adapted to the genius of the government, and best calculated to promote the general welfare of the United States: Comprehending also, a plan for instituting and conducting public schools in this country on principles of the most extensive utility, $100.
2. The easiest and most expeditious method of computing the longitude from lunar observation, $70.
3. Improvements on ship's pumps, $70.
4. For the best construction of stoves or fireplaces, $60.
5. On preservation of peach trees from premature decay, $60.
6. On American vegetable dies [*sic*] $90.
7. For the best construction or improvement of lamps, especially for lighting streets, $50.

Again in 1799 it was voted "That a premium of $100 be offered, with the usual conditions of secrecy, &c., to the author of the best Dissertation upon the following question: How far is it the duty and interest of the Community, to provide for the Education of Youth?" Finally in 1800 the following subjects for premiums were approved:

1. For the most simple, convenient and effective method of ventilating a ship at sea, without manual labor, $100.
2. For the cheapest and most effectual method of rendering Common Oil fit to be burned in the Argand-lamp, either by purifying the oil, or by improvement in the lamp, $35.
3. For any simple and effectual method of rendering Turpentine or any other cheap inflamable substance, a fit fuel for street or house lamps, or a proper material for candles, $40.
4. For the best experimental Essay on the native red dies [*sic*], of the U. S., accompanied with small specimens of the dyed stuffs, $150.

[5] A supplement to the *American Magazine* of 1769 contains "The Transactions of The American Philosophical Society, &c."

As more specialized agencies were established to deal with these applications of science to agriculture and industry, the work of the Society turned more and more to "philosophical experiments that let Light into the Nature of Things" or what is now called "basic research." The leading project of this kind was the transit of Venus on June 3, 1769. Telescopes, clocks, and other instruments were brought, borrowed, or constructed (by David Rittenhouse) and an observatory platform was built in State House Yard and others at Norriton, northwest of Philadelphia, and at Cape Henlopen at the entrance to Delaware Bay. Weather conditions on June 3 were especially favorable and the reports on the observations, and calculations of the results occupy most of the first number of the newly-established TRANSACTIONS of the American Philosophical Society, which began publication in the same year, 1769. The first volume, containing articles on additional subjects of philosophical importance, was completed in 1771 and copies were sent to several colleges and universities here and abroad and to a selected list of twenty-three of the "more considerable philosophical societies of Europe," while Franklin, then in England, served as distributing agent by supplying copies to learned individuals and societies not otherwise reached.

The "Advertisement" (Preface) of this volume, after stating that its editors were following the rules of publication adopted by "that illustrious Body, the Royal Society of London, whose example the American Philosophical Society, think it their honor to follow," modestly adds: "And though, in countries where the Arts and all useful Improvements have arrived almost at their maturity, the following work may scarce be considered as a mite thrown into the common treasury; yet here, where they are but in their infancy, it may be received as some accession to our smaller Stock." This volume had been carefully prepared and was "well received by the Royal Society," and drew praise from leading scientists of Europe.

The cost of the observation of the transit and of the publication of this volume of TRANSACTIONS had exhausted the funds of the Society and an appeal to the General Assembly was made for financial support. As a result a grant of £250 was made in 1773, and this, together with the grant of £100 in 1768 for a telescope, and the later grant of land in State House Yard as a site for the Society's Hall, was all the financial aid given by the State to this

infant society. Other appeals, at a later time, were made to the Legislature for financial support, but without success.

A second volume of the TRANSACTIONS did not appear until 1786 after the War for Independence, a third in 1793, and a fourth in 1799. Sets of these four volumes were sent to foreign academies and societies, as well as to principal colleges and universities in this and foreign lands, and valuable exchanges of publications were thus early established. A second edition of the first volume was printed in 1789 and some of the volumes were reprinted in Europe. A fifth volume of TRANSACTIONS appeared in 1802 and a sixth in 1809. In 1818 a new series of the TRANSACTIONS, in larger format, was started and this has been continued until at present (1946) thirty-five volumes of the new series have been completed. The TRANSACTIONS of the American Philosophical Society is the oldest scientific periodical in America, and contains contributions and monographs by leading scholars of this and other lands. It is now employed largely for the publication of the more highly specialized results of research, and particularly for large monographs.

In 1838 the Society established another series, the PROCEEDINGS of the American Philosophical Society, which is now (1946) in its ninetieth volume. This series contains many of the papers and symposia offered at the meetings, as well as contributions from other sources. Until the establishment of the YEAR BOOK in 1937, it also contained the minutes of the business sessions of the Society, obituaries of deceased members, etc. The YEAR BOOK was started not only to record annually the news and activities of the Society and to separate such records from the scientific contributions, but also and chiefly to present reports from the recipients of research grants, and thus to inform the world of what researches are being supported by the Society, and at the same time to impress a sense of responsibility on the part of the recipients of grants. In 1935 another new series of publications was initiated, the MEMOIRS, for scholarly books in all fields of learning. Already twenty-two volumes of this series have been issued.

These publications are rather widely distributed throughout the world to learned societies, scientific institutions, universities, and public libraries, as well as to individuals. They are sent in exchange to such organizations as supply the Society with equivalent publications that are desired for our Library, and are furnished to others at cost.

Stated meetings continued to be held fortnightly until 1902 when a system of Annual General Meetings extending over three days was instituted and the fortnightly meetings were replaced by monthly ones in 1911. Before the advent of these general meetings the only occasion when the scattered members of the Society were brought together were when special celebrations or memorial meetings were held such as the one-hundredth anniversary of the founding of the Society, held in 1843, its sesquicentennial in 1893, the centennial of the Charter in 1880, of the first occupation of the Hall in 1889, and of the death of Franklin in 1890. The greatest of these celebrations was the bicentennial of the birth of Franklin in 1906 which was held in connection with the general meeting in April of that year. Other special celebrations have been held in connection with the general meetings, such as the bicentennial of Franklin's Junto (miscalled the bicentennial of the founding of the Society) in 1927, and the bicentennial of the birth of Jefferson, and of Franklin's "Proposal" in 1943.

The Annual General Meetings at once brought about great improvements. Members came from a distance and programs of papers were given mornings and evenings, with luncheons between programs, and an annual dinner at the close of the meeting. The stated meetings had been reduced from fortnightly to monthly events but often they were poorly attended, in spite of receptions and refreshments, and they were pale events as compared with the general meetings. Finally, in 1936 an Autumn General Meeting of two or three days duration was established, primarily to hear reports from recipients of research grants, and the stated monthly meetings were abandoned. This change from an evening meeting at fortnightly or monthly intervals to general meetings lasting two or three days brought about marked changes in the character of the Society, for at once it increased its national and international significance and decreased its prevailingly local nature.

3. MEMBERS AND ELECTIONS

The character of a society of scholars is best indicated by the representation in its membership of leading scientists, scholars, and philosophers regardless of place of residence or nationality, and its reputation is proportional to its wise selectivity in choice of members. This has usually been recognized by the American

Philosophical Society for after the hectic elections of 1768 before the union of the constituent societies, the number of members elected each year was narrowly limited. During the remainder of the eighteenth century the average number elected each year was less than 13 and throughout the nineteenth century slightly more than 17. Omitting the 251 members of the two societies at their union in 1769, the total number of persons elected up to and including 1946 was 3,166, or an average of nearly 20 each year for the 177 years between 1769 and 1946.

By common consent rather than by law, the total number of living members at any one time was always small, although it is not now possible to give that number for particular years, except in a few cases. On October 17, 1834, the Secretaries reported the number of living members

Residing within ten miles of the Hall as.....	110
Residing in the United States beyond that limit	93
Residing in foreign countries.....	98
Total	301

Before 1902 elections were held four times a year, once in each quarter, and consequently they were largely in the hands of Philadelphia members. With the establishment of Annual General Meetings in that year, elections of officers and members were limited to this one general meeting and at once they assumed greater importance. The laws were amended in 1902 to limit the number of residents of the United States that could be elected in any one year to 15, and of foreign members to 5. In 1918 the total number of members living in the United States was limited by the laws to 400, and of foreign members to 75. The present limit of residents is 500, while the limit on foreign members, although at one time reduced to 60, is now again 75. These limits have now been nearly reached, with the result that members are elected only to replace those who have died, for, since all annual dues and initiation fees were abolished in 1936, membership is wholly honorary and no one ever resigns.

Before the limitations established in 1902 about 30 per cent of all members resided outside the present boundaries of the United States, 40 per cent were from Philadelphia and vicinity, and 30 per cent were from more distant parts of this

country. At present (1946) about 87 per cent of the members reside within the United States and 13 per cent are foreign. At the same time the resident membership is more widely distributed, about 13 per cent living in the Philadelphia area and 87 per cent in other cities and states.

The present method of nomination and election is intended to insure great care in selection of members. A Committee on Membership in each of the four classes, after receiving proposals from members, submits to all members in that class a list of nominees in the class and calls for a *preliminary ballot* of the class. On the basis of this ballot each committee submits to the whole Society its choices, and the nominations of each class then go to all members of the Society for the *preference ballot.* The results of this ballot are then canvassed by the Council and as a result of the Council's ballot a ticket is prepared to be submitted to the members at the Annual General Meeting; thus new members are elected as a result of three previous and one final ballot.

The roll of early members in this country includes most of the leaders in the formation of our government as well as in philosophy and science. Fifteen members were signers of the Declaration of Independence, including its author, Thomas Jefferson. Eighteen were members of the Constitutional Convention. Thirteen Presidents of the United States have been members of the Society, among them the first four, Washington, Adams, Jefferson, and Madison. Jefferson was for eighteen years (1798-1815) President of the Society, and in accepting the office in the year first named he wrote:

> The suffrage of a body which comprehends whatever the American world has of distinction in philosophy and science in general, is the most flattering incident of my life, and that to which I am the most sensible. My satisfaction would be complete were it not for the consciousness that it is far beyond my titles.

It was through Jefferson's initiative that the French botanist André Michaux, a member of the Society, was sent out to explore the plant resources of the interior of this continent. His son, François André Michaux, also a member, bequeathed to the Society a fund for the extension and improvement of agriculture and sylviculture in the United States. It was also by Jefferson's orders while he was President of the United States and also of

the American Philosophical Society that the Lewis and Clark Expedition was sent out to explore the country between the Mississippi and the Pacific. The original manuscript journals of this famous expedition were deposited, by request of Jefferson, in the Library of this Society.

The history of the American Philosophical Society is so closely interwoven with the educational, scientific, cultural, and political history of this nation that it is impossible in a brief review even to touch upon the contributions of the Society and its members to the many developments in all these fields. Suffice it to say that it has played an important part in all of them, and that it has been the mother, or midwife, or at least nurse, of very many of the scientific and cultural societies of America.

4. "PHILOSOPHICAL HALL" AND LIBRARY

The early publications of the Society began to bring to it by way of exchange many volumes from other societies and individuals, as well as specimens of natural history, archaeology, charts, maps, models of instruments and machines, etc. The Society had no place to exhibit or even store these, except in the homes of the librarian and curators. The stated meetings on alternate Fridays were held at the College, the Church Schoolhouse, Carpenter's Hall, or the homes of officers, and it became necessary to provide a home for these activities. The Society petitioned the Assembly for a lot of ground in the State House Square for the purpose of erecting thereon a suitable building and in 1785 this was granted, plans were prepared, subscriptions for the building secured, and the building begun. But the money available was soon expended and building operations suspended while strenuous efforts were made to secure additional funds. Donations came from members near and far among whom Franklin was the chief contributor. He made two gifts of £100 each and finally offered a "loan of what money may be requisite to raise and cover the building upon legal interest"; a bond to Franklin of £500 payable in one year, with legal interest, was authorized by the Society. The building was thus "raised and covered" but not finished within nor furnished, and efforts were made to rent all rooms in the building except the two south rooms on the second floor, which were retained for the Society. Next after Independence Hall, Philosophical Hall is the oldest building on Independence Square.

The Officers and Council met in the new building for the first time on November 13, 1789 and one week later the first regular meeting of the Society was held there. Meetings have been held there regularly ever since except for a few months in the summers of 1793 and 1798 when yellow fever was epidemic in Philadelphia. Until 1932 the basement and first floor of the hall were occupied by tenants, first by the University of Pennsylvania, then by the College of Physicians, Peale's Museum, the artists Charles Willson Peale and Thomas Sully, the Athenaeum, the Agricultural Society, the Municipal Court, and finally by brokers and insurance agents. These rentals and the annual dues of members were for a long time the only regular income of the Society.

In 1814 the City of Philadelphia purchased from the State, Independence Square and all its buildings except the property of the American Philosophical Society, and in 1835 it offered to buy the Society's lot and building, the price to be determined by referees. However the referees were unable to agree on a price and in the financial depression of 1837-1842 that followed, the city withdrew its proposal. While these negotiations were going on and in anticipation of a favorable outcome, the Society had bought property at Ninth and Chestnut Streets and in paying for it had mortgaged practically all its property including its library and scientific and artistic collections. The sheriff levied on these and the Society was near bankruptcy and ruin. Fortunately the members rallied to its support and the Society and its treasures were saved.[6]

For one hundred years the exterior appearance of the hall remained as it was when built, although it underwent many internal changes, but in 1890 a third story was added to the original building to accommodate the library. To strengthen the building for this increased load, iron posts and girders were introduced and the walls, floors, and stairs were rendered as safe and as nearly fire-proof as possible. However, the additional space provided by the third story was quite inadequate for the library which was greatly overcrowded. Furthermore, this third story with its flat roof was out of architectural harmony with the other buildings in the Square and it is generally agreed that it should be removed.

In 1911 the Society again entered into a tentative agreement

[6] Presidential Address of Frederick Fraley, March 15, 1880. *Proc. Amer. Philos. Soc.* **18**: 530-533, 1880.

with the City to exchange at some future time its property on Independence Square for a commodious lot on the Benjamin Franklin Parkway. In 1913 a "Plea" for funds for a new building yielded inadequate results and in 1928 a campaign was started to raise a large sum for a monumental building on this new site. Subscriptions for nearly one million dollars were secured and elaborate plans for the new building were prepared, but the estimated cost of this building was found to be greater than the sum subscribed and in addition it was found difficult to secure clear title to the whole of the lot on the Parkway.

Meanwhile a sentiment of attachment to the historic hall increased among members to such an extent that they finally voted in 1936 to abandon the plans for the building on the Parkway and to remain in the original home of the Society which in nearly one hundred and fifty years had become a shrine of science and learning as Independence Hall was a shrine of patriotism. Subscribers to the new building fund agreed to the transfer of their contributions to general endowment. In 1934 new quarters for the library were rented in the Drexel Building directly opposite the hall on Fifth Street; all leases in the hall were terminated and for the first time in nearly a century and a half the Society occupied the whole of its building.

However it is recognized that this old building is not large enough for the general meetings and the greatly increased activities of the Society, and the rented space in the Drexel Building is not ideal for the safety, satisfactory use, or exhibition of the priceless treasures of the archives and library. Sooner or later an additional building, as near as possible to the old hall, must be built or acquired.[7]

In 1941 the library consisted of more than 100,000 volumes, and nearly 37,000 pamphlets in practically all fields represented by the membership of the Society, but it was not extensively used and there were several other general libraries in Philadelphia. In that year a special committee brought in a report recommending that duplication with other libraries in Philadelphia be avoided as far as possible and that the Society limit its accessions to fields in which its chief collections lay, and especially to the early history

[7] For a more complete history of the Library of the American Philosophical Society see the article with that title by the Librarian, William E. Lingelbach, in the *William and Mary Quarterly*, ser. 3, 3(1), January 1946.

of science and learning in America, with a view to building up special research collections to a point of superiority rather than the maintenance of a general library. This report was adopted at the general meeting, April 25, 1941, and as a result of this policy, certain holdings, no longer wanted, have been distributed to other libraries where they were needed, while those in the special fields retained are being strengthened.

The Society's archives are especially rich in letters, manuscripts, and documents concerning the early history of the colonies and the development of science and learning in America. Here is the original Charter of Privileges granted by William Penn to the colonists in 1701. Here are many historic manuscripts and letters of the founders of this Government, including the largest collection of Franklin letters and documents to be found anywhere; letters from Washington, Adams, Jefferson; Penn's Cash Book and many of his important papers, including his Commission to the Council of all his powers as Proprietor during his first visit to England in 1684; here is a manuscript volume of the original Laws of Pennsylvania prior to 1700; the original manuscript minutes of the Provincial Council of Pennsylvania; much valuable material relating to the boundary controversy between Penn and Lord Baltimore, including the minutes of the Commissioners to determine the boundary between Pennsylvania and Maryland, the so called Mason and Dixon Line of 1760–1768; a set of Indian Treaties of Pennsylvania and many manuscripts relating to Indian affairs, inciuding several Indian vocabularies prepared by Thomas Jefferson.

The Society once had an important "cabinet" of scientific and historical objects, but with the growth of museums and of special academies and societies most of these objects have been distributed to these more specialized institutions. Among the articles that have been retained are certain memorabilia of Penn, Franklin, Rittenhouse, and Jefferson, such as Penn's theodolite used in surveying the streets of Philadelphia, the electrical apparatus of Franklin and Rittenhouse, the telescope and clock made by Rittenhouse and used in the observation of the transit of Venus in 1769, models of Franklin's and Peale's stoves designed to consume smoke, Franklin's library chair, and the arm chair in which Jefferson wrote the Declaration of Independence, together with a copy in his own

handwriting of that immortal document, as well as an original copy of the first printed broadside of the Declaration, which was read to the people for the first time on July 8, 1776 from the Society's observatory platform in State House Yard.

5. ENDOWMENTS AND RESEARCH

Throughout most of its history the regular income of the Society was derived largely from membership fees and rentals of portions of the Hall; these together with occasional donations and bequests from members and friends for specific purposes kept the Society going, but throughout the eighteenth and nineteenth centuries and well into the twentieth the income was very limited.

The Society now has twenty-one endowment funds which are listed and described each year in the Report of the Treasurer in the YEAR BOOK[8] and at another place in that report there is a statement of the financial condition of each fund. In general, the name associated with the fund is that of the donor.

Since the recent activity of the Society has depended largely upon the unrestricted funds, brief mention may be made of several of them. The largest fund of the Society is the Penrose Endowment; it represents a bequest of approximately $3,900,000, one-half of the residuary estate of Dr. Richard A. F. Penrose, Jr., of Philadelphia, who died in 1931. While its income may be used for any of the activities of the Society, it has been wisely determined that its chief use should be for "the increase of knowledge through investigation." The Johnson Endowment is the next most important unrestricted fund. It was established in 1937 when Mr. Eldridge Reeves Johnson removed a previous restriction on a gift of $500,000 and transferred it to general endowment; as in the case of the Penrose Fund its income is devoted primarily to research. The last of the unrestricted funds came to the Society in 1942 as the bequest of the residuary estate of Edward Whitfield of Philadelphia who died in 1930.

In addition to the unrestricted funds, the income from two of which is used largely for research, there are two other funds for research in specified fields. The first of these, and one of the earliest founded, is the Michaux Fund established in 1855 by François André Michaux of Paris with a bequest of 92,600 francs

[8] See p. 215.

for the extension and progress of agriculture and especially sylviculture in the United States. In the lack at that time of any organized research program of the Society, the income of this fund was first used for a variety of useful purposes in connection with sylviculture, and more recently for the purchase of books on that subject for the Library. Its income is now administered by the Committee on Research.

A second research fund in a specified field is the Daland Fund established by the bequest, of approximately $220,000, from the residuary estate of Dr. Judson Daland of Philadelphia, who died in 1937. Its income is to be used by the Society for research in clinical medicine.

All the funds of the Society are intended for the promotion of useful knowledge, and in the widest sense this includes the maintenance of the physical property and administration of the Society, its meetings and publications, library and research. But not until 1932 did the Society have any organized program for the support of research. With the receipt in that year of the munificent bequest of Dr. Penrose, a Committee on the Use of Funds for the Advancement of Knowledge through Investigation (later called Committee on Grants, and still later, the Committee on Research) was established, and it has since become one of the most active and important of the standing committees. It receives and passes judgment upon applications for grants-in-aid of research in any field. Each year there is published in the YEAR BOOK a list of the grants awarded during the year and a summary of grants awarded since 1933. All these grants are carefully administered, reports of progress are rendered every year, and when a project is finished or important results are reached a summary is published in the YEAR BOOK; oral reports are often made in the programs of the general meetings.

This support of research has greatly extended the influence of the Society and stimulated all of its activities. More than ever before in the two centuries of its existence the American Philosophical Society is living up to its original name and purpose "for promoting useful knowledge."

II

CHARTER *

STATUTES AT LARGE OF PENNSYLVANIA

CHAPTER DCCCXCIV.

AN ACT

for incorporating the American Philosophical Society held at Philadelphia for promoting useful knowledge.

Whereas the cultivation of useful knowledge, and the advancement of the liberal arts and sciences in any Country, have the most direct tendency towards the improvement of agriculture, the enlargement of trade, the ease and comfort of life, the ornament of society, and the encrease and happiness of mankind; **And whereas** this country of North America, which the goodness of Providence hath given us to inherit, from the vastness of its extent, the variety of its climate, the fertility of its soil, the yet unexplored treasures of its bowels, the multitude of its rivers, lakes, bays, inlets, and other conveniences of navigation, offers to these United States one of the richest subjects of cultivation, ever presented to any people upon earth; **And whereas** the experience of ages shows that improvements of a public nature, are best carried on by societies of liberal and ingenious men, uniting their labours, without regard to nation, sect or party, in one grand pursuit, alike interesting to all, whereby mutual prejudices are worn off, a humane and philosophical spirit is cherished, and youth are stimulated to a laudable diligence and emulation in the pursuit of wisdom; **And whereas,** upon these principles,

* Original Charter, Granted in 1780. Articles of Amendment added 1935.

divers public-spirited gentlemen of Pennsylvania and other American States did heretofore unite themselves, under certain regulations, into one voluntary Society, by the name of "The American Philosophical Society held at Philadelphia, for promoting useful knowledge," and by their successful labours and investigations, to the great credit of America, have extended their reputation so far, that men of the first eminence in the republic of letters in the most civilized nations of Europe have done honour to their publications, and desired to be enrolled among their members;

And whereas the said Society, after having been long interrupted in their laudable pursuits by the calamities of war, and the distresses of our Country, have found means to revive their design, in hopes of being able to prosecute the same with their former success, and being further encouraged therein by the public, for which purpose they have prayed us, "the Representatives of the Freemen of the Commonwealth of Pennsylvania," that they may be created One Body Politic and Corporate forever, with such powers, privileges, and immunities, as may be necessary for answering the valuable purposes which the said Society had originally in view.

Wherefore, in order to encourage the said Society in the prosecution and advancement of all useful branches of knowledge, for the benefit of their country and mankind.

[SECTION I.] **Be it enacted, and it is hereby enacted by the Representatives of the Freemen of the Commonwealth of Pennsylvania, in General Assembly met, and by the authority of the same,** That the Members of the said American Philosophical Society heretofore voluntarily associated for promoting useful knowledge, and such other persons as have been duly elected Members and Officers of the same, agreeably to the fundamental laws and regulations of the said Society, comprized in twelve sections, prefixed to their first volume of transactions, published in Philadelphia by William and Thomas Bradford in the year of our Lord one

thousand seven hundred and seventy-one, and who shall in all respects conform themselves to the said laws and regulations, and such other laws, regulations and ordinances, as shall hereafter be duly made and enacted by the said Society, according to the tenor hereof, be and forever hereafter shall be, One Body Corporate and Politic in Deed, by the name and style of "The American Philosophical Society held at Philadelphia, for promoting useful knowledge," and by the same name they are hereby constituted and confirmed One Body Corporate and Politic, to have perpetual succession, and by the same name they and their successors are hereby declared and made able and capable in law, to have, hold, receive, and enjoy lands, tenements, rents, franchises, hereditaments, gifts, and bequests of what nature so ever, in fee simple or for term of life, lives, years or otherwise, and also to give, grant, let, sell, alien, or assign the same lands, tenements, hereditaments, goods, chattels, and premises, according to the nature of the respective gifts, grants, and bequests, made to them the said Society, and of their estate therein. **Provided,** that the amount of the clear yearly value of such real estate do not exceed the value of ten thousand bushels of good merchantable wheat.

[Section II.] **And be it further enacted by the authority aforesaid,** That the said Society be, and shall be for ever hereafter able and capable in law to sue, and be sued, plead and be impleaded, answer and be answered unto, defend and be defended in all or any of the courts or other places, and before any Judges, Justices, and other person or persons, in all manner of actions, suits, complaints, pleas, causes, and matters, of what nature or kind so ever, within this Commonwealth; and that it shall and may be lawfull to and for the said Society, for ever hereafter to have and use one common seal in their affairs, and the same at their will and pleasure to break, change, alter and renew.

[Section III.] **And be it further enacted by the authority aforesaid,** That for the well governing of the said So-

ciety, and ordering their affairs, they shall have the following officers, that is to say, one Patron, who shall be his Excellency the President of the Supreme Executive Council * of this Commonwealth, for the time being, and likewise one President, three Vice Presidents, four Secretaries, three Curators, one Treasurer, together with a Council of twelve members; and that on the first Friday of January next, between the hours of two and five in the afternoon, as many of the members of the said Society as shall have paid up their arrears due to the Society, and shall declare their willingness to conform to the laws, regulations and ordinances of the Society then duly in force, according to the tenor hereof, by subscribing the same, and who shall attend in the Hall or place of meeting of the said Society, within the time aforesaid, shall chuse by ballot, agreeable to the fundamental laws and regulations herein before referred to, one President, three Vice Presidents, four Secretaries, three Curators, and one Treasurer, and at the same time and place, the members met and qualified as aforesaid shall in like manner chuse four members for the Council, to hold their offices for one year, four more members for the Council to hold their offices for two years, and four more members for the Council, to hold their offices for three years. And on the first Friday in January, which shall be in the year of our Lord one thousand seven hundred and eighty-two, and so likewise on the first Friday of January, yearly and every year thereafter, between the hours of two and five in the afternoon, the Members of the said Society met and qualified as aforesaid, shall chuse one President, three Vice Presidents, four Secretaries, three Curators and one Treasurer, to hold their respective offices for one year, and four Council Men to hold their offices for three years, *Provided* that no person residing within the United States shall be capable of being President, Vice President, Secretary, Curator, Treasurer, or member of the Council, or of

* [Now His Excellency the Governor of this Commonwealth.]

electing to any of the said offices, who is not capable of electing and being elected to civil offices within the State in which he resides. *Provided also,* that nothing herein contained shall be considered as intended to exclude any of the said Officers or Councillors, whose times shall be expired, from being re-elected, according to the pleasure of the said Society; and of the day, hours and place of all such elections, due notice shall be given by the Secretaries, or some one of them, in one or more of the public newspapers of this State, agreeable to the said fundamental laws and regulations before referred to.

[SECTION IV.] **And be it further enacted by the authority aforesaid,** That the Officers and Council of the said Society shall be capable of exercising such power for the well governing and ordering the affairs of the Society, and of holding such occasional meetings for that purpose, as shall be described, fixed, and determined by the statutes, laws, regulations and ordinances of the said Society, hereafter to be made. *Provided always,* that no statute, law, regulation or ordinance shall ever be made or passed by the said Society, or be binding upon the members thereof, or any of them, unless the same hath been duly proposed, and fairly drawn up in writing, at one stated meeting of the Society, and enacted or passed at a subsequent meeting at least the space of fourteen days after the former meeting, and upon due notice in some of the public newspapers, that the enacting of statutes and laws, or the making and passing ordinances and regulations, will be part of the business of such meeting; or shall any statute, law, regulation or ordinance be then or at any time enacted or passed, unless thirteen members of the said Society, or such greater number of members as may be afterwards fixed by the rules of the Society, be present, besides such quorum of the Officers and Council, as the laws of the Society for the time being may require, and unless the same be voted by two-thirds of the whole body then present; all which statutes, laws,

ordinances and regulations, so as aforesaid duly made, enacted and passed, shall be binding upon every member of the said Society, and be from time to time inviolably observed, according to the tenor and effect thereof; provided they be not repugnant or contrary to the laws of this Commonwealth, for the time being in force and effect.

And whereas nations truly civilized (however unhappily at variance on other accounts) will never wage war with the Arts and Sciences, and the common Interests of humanity:

[SECTION V.] **Be it further enacted by the authority aforesaid,** That it shall and may be lawful for the said Society by their proper officers, at all times, whether in peace or war, to correspond with learned Societies, as well as individual learned men, of any nation or country, upon matters merely belonging to the business of the said Society, such as the mutual communication of their discoveries and proceedings in Philosophy and Science; the procuring books, apparatus, natural curiosities, and such other articles and intelligence as are usually exchanged between learned bodies, for furthering their common pursuits; **Provided always,** That such correspondence of the said Society be at all times open to the inspection of the Supreme Executive Council of this Commonwealth.

[Signed] *JOHN BAYARD,*
Speaker.

Enacted into a Law at Philadelphia on Wednesday the fifteenth day of March anno Domini one thousand seven hundred and eighty.

[Signed] *THOMAS PAINE,*
Clerk of the General Assembly.

COMMISSION FOR THE COMPILATION OF THE LAWS OF PENNSYLVANIA PRIOR TO 1800.

CLERK'S OFFICE,
1211 BETZ BUILDING.

JAMES T. MITCHELL,
HENRY FLANDERS, } *Commissioners.*

CHAS. R. HILDEBURN, *Clerk.*

PHILADELPHIA, March 12, 1898.

Compared, revised and found to be a correct copy of the original enrollment in the archives of the Commonwealth, by me the custodian of the said original as clerk of the commissioners appointed under the act of May 19, 1887, entitled, AN ACT FOR THE COMPILATION AND PUBLICATION OF THE LAWS OF THE PROVINCE AND COMMONWEALTH OF PENNSYLVANIA PRIOR TO THE YEAR ONE THOUSAND EIGHT HUNDRED, P.L. 1887, pp. 129 and 130.

CHAS. R. HILDEBURN,
Clerk of the Commissioners.

Witness as to Chas. R. Hildeburn:

WM. NEWBOLD ELY,
JULIUS F. SACHSE.

SEAL Sworn to and subscribed before me this 19th day of May, 1898.

JAMES P. STERRETT,
Chief Justice of the Supreme Court of Pennsylvania.

ARTICLES OF AMENDMENT

Article I

Notwithstanding the Proviso at the end of the first paragraph following the preamble of this Charter, or any other proviso thereof, the Society shall have the capacity and authority without limitation by this Charter to purchase, take, receive, lease as lessee, take by gift, devise or bequest, or otherwise acquire, and to own, hold, use, and otherwise deal with any and all real or personal property, or any interest therein, wherever situated.

Article II

Any provisions of this Charter which are purely administrative in their nature, including those concerning the officers, the members of the council, and the date and time of meetings, may be altered by a law, regulation or ordinance of the Society duly adopted and not repugnant or contrary to the laws of this Commonwealth.

CERTIFICATE OF ACCEPTANCE

1. The name of the accepting corporation is The American Philosophical Society held at Philadelphia for promoting useful knowledge.

2. The American Philosophical Society was created by the Act of Assembly approved March 15, 1780, L.B. No. 1, 363.

3. The American Philosophical Society herewith accepts the Constitution of Pennsylvania and the provisions of the Nonprofit Corporation Law.

4. The acceptance made herewith was duly authorized by a meeting of the members called for that purpose, held in Philadelphia on the 6th day of December, 1935.

ROLAND S. MORRIS
President

SEAL

Filed this 12th day of December, 1935

C. F. SKINKER
Assistant Secretary

J. WARREN MICKLE
Deputy Secretary of the Commonwealth

Recorded in
Miscellaneous Corporation
Record Book 210, P. 125

III

LAWS

(As Amended April 24, 1936, April 22, November 19, 1938, November 18, 1939, November 21, 1942, April 23, 1943, and October 19, 1946)

CHAPTER I

Of the Members both resident and foreign: their classification, nomination, and election; suspension and forfeiture of membership.

ART. 1. The resident members of the Society are elected from among citizens or residents of the United States who have achieved distinction in the sciences or humanities, in letters, in the practice of the arts or of the learned professions, or in the administration of affairs. Their number may not exceed five hundred, nor may more than thirty be elected in any one year.

ART. 2. The foreign members of the Society are elected from among persons who are neither citizens nor residents of the United States, and who are of the greatest eminence for their attainments in science, letters, or the liberal arts. Their number may not exceed seventy-five, nor may more than eight be elected in any one year.

ART. 3. Every member, whether resident or foreign, shall be classified according to his expressed wishes, or in accordance with his principal activities or contributions to knowledge, in one of the following four classes:*

* In accordance with general usage, the following more or less clearly defined fields of science and learning within the four classes have been recognized by the Society in recent years: Class I. Mathematics; Astronomy; Physics; Chemistry; Engineering. Class II. Geology, Paleontology, Geography; Zoology, Anatomy; Botany, Bacteriology; Anthropology, Psychology; Physiology, Pathology; Medicine, Pharmacology, Surgery. Class III. Political Science, Economics, Statistics and Sociology; Modern History; Jurisprudence; Administration, Government; Affairs. Class IV: Philosophy, Education; Ancient, Medieval, and Cultural History; Archaeology, History of Art, Architecture; Literary History; Languages; Letters, Fine Arts.

Class I. Mathematical and Physical Sciences
Class II. Geological and Biological Sciences
Class III. Social Sciences
Class IV. Humanities

ART. 4. In each of the four classes of members there shall be a Committee on Membership consisting of a Chairman and four other members, appointed by the President.

ART. 5. Nominations to membership shall be made in writing by the Committees on Membership, or they may be made by any five members of the Society. These nominations shall be known respectively as "Committee nominees," and "Member nominees," and shall be so listed in the *preliminary ballot.* These nominations must be in the Executive Office before December first. Nominations shall be on blank forms provided for that purpose and shall specify the qualifications and principal activities or fields of learning of the nominees. In case of non-election nominations may be continued by the written endorsement of three of the proposers filed in the Executive Office before November first following and shall be listed as "Continued nominations" in the *preliminary ballot;* these nominations may be continued a second time in similar manner, after which the names of the unsuccessful candidates will be dropped and all papers relating thereto destroyed. Such candidates may be considered again only by entirely new nominations.

ART. 6. Immediately after December first in each year the Chairman of each Committee on Membership shall submit to the members of his class a list of all the nominations in the class and shall request them to use this list as a *preliminary ballot* and to check on it the names of those persons, not more than twelve in number, whom they prefer for resident members, and not more than five whom they prefer for foreign members, and to sign and return this ballot to the Executive Office before January first.

ART. 7. Before February first each Committee on Membership shall select from among those nominees having a

high number of votes in the *preliminary ballot* not more than twelve for resident membership and not more than five for foreign membership in each class, due regard being given to a proper representation of the various subjects within the class.

ART. 8. Before February first, the Council may nominate not more than three persons in each year whose names shall be presented to the Society in the *preference ballot* as "Council nominees" together with their qualifications. These nominations shall be on the regular blank forms provided for that purpose.

ART. 9. It shall be the duty of each Committee on Membership to prepare, with such outside assistance as it may choose, a brief biographical sketch of each of the nominees so selected, listing his profession, position, qualifications, and important publications or contributions to science, literature, art or affairs. The names of these nominees, together with the biographical sketch of each, shall then be printed in alphabetical order under each class, and shall be sent confidentially to all members of the Society not later than March first. Members shall be invited to return to the Executive Office before April first a *preference ballot* on which they have checked the names of not more than thirty nominees for resident membership and of not more than eight for foreign membership.

ART. 10. The Council at the meeting next preceding the General Meeting of the Society in the month of April, notice of which shall be given at least two weeks in advance, shall select by ballot from the list of nominees residing within the United States a number not exceeding thirty, and of non-residents of the United States a number not exceeding eight, to be recommended to the Society for election. In this selection special weight shall be given to the votes of members in the preference ballot. The names of the nominees so chosen, arranged alphabetically in classes, shall be reported to the Society at its next ensuing session.

ART. 11. Election to membership, both resident and foreign, shall be by ballot at the General Meeting of the Society in the month of April. A two-thirds vote of those present and voting shall be necessary to elect.

ART. 12. The members are mutually pledged not to mention to non-members of the Society the name of any nominee proposed, or of any withdrawn or unsuccessful nominee.

ART. 13. Every person who is elected a resident or foreign member shall signify his acceptance in writing within one year after the mailing of notification of such election. In default of such acceptance the election shall be void.

ART. 14. The formal admission of a member into the Society shall be at his first attendance at a meeting of the Society after his election and in the manner and form following: He shall subscribe the Laws in the Roll Book and be introduced to the President, who, taking him by the hand, shall say:

"By the authority and in the name of the American Philosophical Society held at Philadelphia for Promoting Useful Knowledge, I do admit you a Member thereof."

ART. 15. The Society may from time to time assess membership dues in accordance with its needs and policies. Any person who shall refuse or neglect to pay such assessment for two years, after two or more notifications from the Treasurer, shall be reported to the Society as delinquent and his name shall be stricken from the roll of members.

ART. 16. The membership of any resident or foreign member may, for good and sufficient cause, and upon recommendation by the Council, be terminated by the Society at a General Meeting by a vote of two-thirds of the members attending, provided, however, that the total number of members so attending shall be not less than thirty.

Chapter II

Of the Patron and Elective Officers; qualifications, nominations and elections, terms of office, suspension or removal, vacancies.

Art. 1. The Governor of Pennsylvania shall be ex-officio the Patron of the Society.

Art. 2. The elective Officers of the Society shall be a President, three Vice-presidents, two Secretaries, a Curator, a Treasurer, and twelve Councillors.

Art. 3. No person save the Treasurer, who may be a Corporation, shall be capable of holding any elective office as defined above, who is not a citizen of the United States.

Art. 4. Nominations to the elective offices of the Society are made by the Committee on Nominations as hereinafter provided, and may also be made by petition signed by not less than twenty members, in such manner as may be prescribed by the Committee on Nominations and approved by the Council.

Art. 5. The election of Officers shall be held at the General Meeting in the month of April at a time duly announced in the program. The election shall be by ballot, a majority of all ballots cast being requisite for election. In the event that no candidate for a given office shall receive such a majority, a second ballot shall be taken and election shall be by plurality of votes cast.

Art. 6. The terms of all elective Officers, except Councillors, are of one year, commencing upon the close of the General Meeting at which they are elected. They shall serve until the election and acceptance of their successors and are eligible for reelection.

Art. 7. The terms of Councillors are of three years, commencing upon the close of the General Meeting at which they are elected. They shall serve until the election and acceptance of their successors, but are ineligible for reelection until one year after the expiration of their terms of office.

ART. 8. Any elective Officer may be suspended or removed from office, for good and sufficient cause, at a meeting of the Council, by a vote of two-thirds of all its members.

ART. 9. A vacancy occurring in any elective office may be filled for the unexpired term by a vote of a majority of the Council.

CHAPTER III

Of the Officers and their duties

ART. 1. The PRESIDENT shall preside at the meetings of the Society and Council; he shall appoint all committees, and designate their chairmen, except as otherwise provided in the Laws, and shall be ex-officio a member of all committees except the Committee on Nominations.

ART. 2. The VICE-PRESIDENTS shall preside at meetings of the Society and Council, in the absence of the President, in rotation in order of seniority of continuous service. In the event of the death or disability of the President, the senior Vice-president shall act as President until the vacancy shall be filled.

ART. 3. The SECRETARIES shall have the custody of the Seal of the Society, shall record the proceedings of the Society and the Council, shall notify all acts of the Society and the Council to those concerned, shall conduct the correspondence of the Society and Council, shall maintain the authentic list of resident and foreign members, and shall have the custody of the Society's files and records. The Secretaries shall arrange among themselves each year as to the distribution and performance of their duties, and shall report such arrangement to the Council; they shall also have power to delegate the performance of their duties to the Assistant Secretary or Executive Officer.

ART. 4. The CURATOR shall have charge of the Cabinet, and shall supervise the maintenance, exhibit, and use of the Society's collections, and shall advise the Council with respect to their increase, disposal, or temporary loan. He shall be ex-officio a member of the Committee on the Hall.

ART. 5. The TREASURER may be a person, as defined in Chap. II, Art. 3, or a trust company or other suitable financial corporation of the State of Pennsylvania. He shall collect and receive all moneys due or payable to the Society or entrusted to its care, and all gifts and bequests made to it. He shall pay all bills due by the Society when properly approved, in accordance with appropriations authorized by the Society or the Council, or in accordance with the terms of trust funds established for specific purposes. He shall deposit the funds and securities of the Society in its name with such banks or trust companies in the State of Pennsylvania as may be approved by the Committee on Finance.

ART. 6. The Treasurer shall keep accounts in good and regular order of all receipts and expenditures and of all moneys or other property in his hands, and shall report them, and present them for audit, as may be required by the Committee on Finance.

ART. 7. The Treasurer may, if authorized by vote of the Committee on Finance, employ an assistant treasurer or a trust company or other suitable financial corporation of the State of Pennsylvania, approved by the Committee on Finance, for the performance of such duties as may be delegated to such agent.

ART. 8. The Treasurer shall give bond, at the expense of the Society, for the faithful execution of all his trusts, in such amount as may be required by the Committee on Finance.

ART. 9. The Treasurer shall, upon the expiration of his term of office, deliver over to the Committee on Finance, for transmittal to his successor, the books, papers, moneys, and property remaining in his hands.

ART. 10. No elective office in the Society except that of Treasurer shall carry any salary, but officers may be reimbursed for any necessary expenditures made in the performance of their duties.

Chapter IV

Of the Council and the Annual Budget

Art. 1. The Council shall consist of the Officers, the twelve Councillors, and the Chairmen of the Committees on Finance, Research, Publications, Library and Hall.

Art. 2. The Council shall hold at least two meetings a year, and nine members shall constitute a quorum at any meeting, provided, however, that for the adoption of the budget a vote of a majority of all the members shall be requisite. Minutes of the proceedings and acts of the Council shall be regularly kept.

Art. 3. The Council shall make recommendations for membership in the Society as provided in Chap. I, Art. 9, of the Laws, and elect members of the Committees on Research and Publications as provided in Chap. 5, Arts. 5 and 8.

Art. 4. The Council shall, at such time as they may fix, ask all Committees to submit estimates of their needs for the ensuing fiscal year which, together with the report of receipts and expenditures by the Committee on Finance, shall be made the basis for the annual budget to be submitted by the Council to the Society for its approval at the General Meeting in April or November.

Art. 5. The Council shall have power to take action for the Society in legal matters, to manage its affairs, and to assume its administration, to make contracts or to authorize them to be made in the name of the Society, except as otherwise provided.

Art. 6. The Council shall require reports to be presented to it at least once a year by such officers, committees, and employees of the Society as they may designate, or as may be required by the Laws to present such reports, and shall, through the President, present an annual report to the Society on the state of its affairs.

Art. 7. The Council shall have power to appoint an administrative Executive Officer, and to fix his term of service, duties and compensation.

Chapter V

Of the Committees of the Society

Art. 1. There shall be four Committees on Membership, one in each class, each composed of five members whose appointment and duties are prescribed in Chap. I, Arts. 4-8.

Art. 2. There shall be a Committee on Finance, consisting of the President and Treasurer, ex-officio, and not fewer than five other members who shall be nominated by the President and elected by the Society at the General Meeting in April. A majority of the Committee shall constitute a quorum at any meeting. The Committee shall keep a record of all its acts and proceedings, which shall be communicated to the Council.

Art. 3. The Committee on Finance shall have the general superintendence of the financial concerns of the Society. It shall have the custody and control of all the securities and investments of the Society, both real and personal, with full power and authority to buy and to sell, and to invest and reinvest the same; including the power to purchase and to sell real estate and to make leases thereof, to satisfy mortgages and extinguish ground rents, and to direct the placing of all such insurances as it may deem necessary; as well as to borrow on the credit of the assets of the Society, to create mortgages thereon, and to make such improvements, repairs and alterations to real estate as it may deem necessary. It shall have power to authorize the proper Officers of the Society to execute the necessary papers to effect all purchases, sales and assignments of property, both real and personal; to execute and to satisfy mortgages, to extinguish ground rents and to transfer registered securities; to subscribe to bond-holders' agreements to plans of reorganization involving any securities held by the Society or in which it has an interest, and to do all such acts as are necessary in pursuance of the foregoing powers.

Art. 4. The Committee on Finance shall always have access to the Treasurer's books, accounts, and vouchers,

and shall cause an audit of such accounts to be made at least once a year. It shall require from the Treasurer an annual report of all the operations of the treasury, which it shall present to the Council with an annual statement of estimates of receipts and expenditures. With the approval of the Council it shall determine the fiscal year of the Society and, in case of emergency needs, authorize appropriations over and above the annual budget.

ART. 5. There shall be a COMMITTEE ON RESEARCH, consisting of the President, ex-officio, and of not fewer than six other members, representative of the four classes, who shall serve for three years and who shall be nominated by the President and elected by the Council. A majority of the Committee shall constitute a quorum at any meeting, and shall be requisite for any vote disposing of funds that may be allotted to the Committee. The Chairman, or a member designated by the Chairman, of the Committee on Publications, and of the Committee on Meetings, may sit with the Committee on Research but shall not vote.

ART. 6. The Committee on Research shall, with the approval of the Council, prescribe regulations for receiving and considering proposals for the advancement of knowledge through investigation. It may take such action as it shall see fit with respect to proposals received by it, and may, with the approval of the Council, itself initiate and cause to be executed investigations for the advancement of knowledge. It shall certify to the Treasurer all disbursements to be made from funds appropriated to it by the Council, and may allot therefrom such sums as it may see fit, on such conditions as it may prescribe, for the investigations approved by it. It shall require reports of the expenditures of all sums so allotted, and of the progress of all investigations aided thereby. It may withhold assistance in the event that the said reports are judged unsatisfactory.

ART. 7. The Committee on Research shall report all its acts to the Council, and from time to time submit reports

to the Society on the progress of the investigations aided by it, and on the contributions to the advancement of knowledge made by them.

ART. 8. There shall be a COMMITTEE ON PUBLICATIONS, consisting of the President, ex-officio, and of not fewer than six other members, representative of the four classes, who shall serve for three years, and who shall be nominated by the President and elected by the Council. A majority of the Committee shall constitute a quorum at any meeting, and shall be requisite for any vote disposing of funds that may be allotted to the Committee. The Chairman, or a member designated by the Chairman, of the Committee on Research and of the Committee on Meetings, may sit with the Committee on Publications but shall not vote.

ART. 9. The Committee on Publications shall supervise the contents, editing, printing, publications, distribution, and sale of all publications issued by the Society or in its name. It shall have power to employ necessary editorial assistance, and, with the approval of the Council, to appoint an Editor and to determine his duties and fix his compensation. It shall cause the necessary contracts for the manufacture of the Society's publications to be drawn up and executed. It shall certify to the Treasurer all bills which it shall have examined and approved for expenses attending the publications, as well as all disbursements to be made from funds appropriated to the Committee by the Council.

ART. 10. The Committee on Publications shall, with the approval of the Council, prescribe regulations for receiving and considering proposals for publication, and may take such action as it shall see fit with respect to proposals so received, including the allotment of funds appropriated to the Committee by the Council. The Committee shall have power to appoint referees or special sub-committees to assist it in the examination of material presented to it for publication and, in its discretion, give honoraria for services so rendered. It shall report all its acts to the Council.

ART. 11. There shall be a COMMITTEE ON MEETINGS, consisting of the President, ex-officio, and of not fewer than four other members representative of the four classes. The Committee shall be appointed by the President and shall have power to add to its numbers. A majority of the Committee shall constitute a quorum at any meeting and shall be requisite for any vote disposing of funds that may be allotted to the Committee. The Chairman, or a member designated by the Chairman, of the Committee on Research and of the Committee on Publications, may sit with the Committee on Meetings but shall not vote.

ART. 12. The Committee on Meetings shall be charged with the preparation of the scientific and scholarly programs of all meetings of the Society, and of all meetings held under its auspices, and with the organization of discussions, symposia, and conferences. It shall have power to name special sub-committees to assist it, and to invite suitable persons, whether members of the Society or not, to participate in such programs, discussions, symposia, etc. The Committee shall have power to use such funds as may be appropriated to it by the Council for defraying the expenses of the programs, discussions, etc., organized by it, and shall certify to the Treasurer all disbursements to be made from such funds.

ART. 13. The Committee on Meetings shall transmit to the Committee on Publications all papers, communications, reports, and other materials which it may recommend for publication.

ART. 14. There shall be a COMMITTEE ON LIBRARY, consisting of the President, ex-officio, and of not fewer than six other members, representative of the four classes, who shall serve for three years and who shall be appointed by the President.

ART. 15. The Comittee on Library shall supervise the administration of the Library, and shall, with the approval of the Council, prescribe regulations for its government and use. The Committee shall have power, with the ap-

proval of the Council, to employ a Librarian, determine his duties, and fix his compensation. It shall have charge of the exchange of publications, and shall have power to expend income of trust funds established specifically for purposes of the Library. The Committee shall prepare estimates of expenditures for the maintenance and increase of the Library, and shall certify to the Treasurer all bills properly payable and all disbursements to be made from funds appropriated by the Council for the purposes of the Library.

ART. 16. There shall be a COMMITTEE ON HALL, consisting of the President and Curator, ex-officio, and such other members as may be appointed by the President. They shall serve for three years and shall have charge of the Hall of the Society and of its furniture and fixtures and shall direct all necessary repairs.

ART. 17. There shall be a COMMITTEE ON NOMINATION OF OFFICERS consisting of five members,—a Chairman, appointed by the President, and the four Councillors who are entering the third year of their term of service.

ART. 18. The Committee shall, not later than December first, invite all members of the Society to submit to it informal suggestions for nominations to all offices to be filled by election at the next General Meeting.

ART. 19. The Committee shall then communicate to all members of the Society, not later than March first, a report presenting one nomination to each office to be filled by election at the next General Meeting. Nominations may also be made by petition if signed by twenty or more members and submitted to the Chairman not later than March thirty-first. Notice of such nomination must be sent to all members by April first.

ART. 20. The Committee shall prepare for use in the elections at the General Meeting a ballot in which shall be included, under each position to be filled by election, the name of the Committee's nominee, and the names, in alphabetical order, of any nominees included in petitions duly received in accordance with the Laws.

Chapter VI

On the Meetings of the Society

Art. 1. The Annual General Meeting shall be held in the month of April on days designated by vote of the Council, adopted at least three months before the date fixed therefor, at which it shall be lawful to transact all business not in contravention of the Laws.

Art. 2. The Autumn General Meeting shall be held on days designated by vote of the Council, usually in the month of November, at which it shall be lawful to transact all business not in contravention of the Laws.

Art. 3. Special meetings may be called at any time by order of the President, or, in his absence or disability, by order of a Vice-president, or by vote of the Council, for the consideration of matters of scientific or scholarly interest or for the transaction of such business as shall be specified in the order or vote calling the meeting.

Chapter VII

Of the Publications of the Society

Art. 1. The publications of the Society shall consist of Proceedings, Transactions, Memoirs, Year Book, and of such other serial or separate publications as may be authorized by the Council upon recommendation by the Committee on Publications.

Art. 2. The Proceedings shall contain papers that are read before the Society at its meetings and that have been approved by the Committee on Publications. Other papers from whatever source may also be published in the Proceedings if approved by this Committee. The Proceedings will be distributed without charge, as issued, to the members who request it.

Art. 3. The Transactions shall consist of contributions in the form of monographs, treatises, collections of documents, and other materials, approved by the Committee on Publications. The Transactions shall be issued in complete parts, one or more of which may constitute a volume.

They may be supplied to any member on such conditions or terms as may be prescribed by the Committee on Publications.

ART. 4. The MEMOIRS shall consist of works approved by the Committee on Publications. They shall be issued in such form as shall make possible their assembly in volumes according to subject matter, or to fields of knowledge. They may be supplied to any member on such conditions or terms as may be prescribed by the Committee on Publications.

ART. 5. The YEAR BOOK shall contain, among other items, the Charter and Laws, list of Officers and Committees, the annual report of the President and Officers, important acts of the Society and Council, reports of all standing Committees, a catalogue of prizes, premiums and lectureships, lists of all members together with those elected and those deceased during the year, and obituaries of deceased members. It shall be published as soon as possible after the close of each calendar year and shall be sent gratis to all members of the Society.

CHAPTER VIII

Of the Laws of the Society and their Amendment

ART. 1. No amendment or supplement to these laws, nor any new law shall be made or passed by the Society, unless the same has been duly proposed in writing at a Stated Meeting of the Society and enacted at the subsequent General Meeting; due notice of the proposed law or amendment having been sent by mail at least fourteen days before the said General Meeting to the members qualified to vote thereon.

ART. 2. At the General Meeting no amendment or supplement to these laws shall be made, nor shall any new law be made, unless there be present a quorum of at least twenty members, of whom not fewer than five shall be members of the Council, and the same be voted by two-thirds of the whole body present.

IV

OFFICERS AND COMMITTEES

1946-1947

OFFICERS

PATRON

THE GOVERNOR OF PENNSYLVANIA

PRESIDENT

THOMAS S. GATES

VICE-PRESIDENTS

WILLIAM B. DINSMOOR ALFRED N. RICHARDS HARLOW SHAPLEY

SECRETARIES

W. F. G. SWANN ERNEST M. PATTERSON

CURATOR

FRANCIS R. PACKARD

TREASURER

FIDELITY-PHILADELPHIA TRUST COMPANY

EXECUTIVE OFFICER

LUTHER P. EISENHART

LIBRARIAN

WILLIAM E. LINGELBACH

COUNCILLORS

Elected in 1944	Elected in 1945	Elected in 1946
ARTHUR H. COMPTON	KARL K. DARROW	WENDELL M. STANLEY
ELMER D. MERRILL	EDWIN G. CONKLIN	GEORGE G. SIMPSON
GUY STANTON FORD	NICHOLAS KELLEY	HERBERT F. GOODRICH
C. F. TUCKER BROOKE†	CARL W. BLEGEN	WALDO G. LELAND

†Deceased

STANDING COMMITTEES

The President is *ex-officio* a member of all committees except the Committee on Nomination of Officers. The first member named in each committee is Chairman. The Executive Officer sits with all committees but does not vote unless regularly a member.

FINANCE

(1946–1947)

MARSHALL S. MORGAN
OLIVER E. BUCKLEY
EDWIN G. CONKLIN
MORRIS DUANE
EDWARD HOPKINSON, JR.
NICHOLAS KELLEY
CHARLES J. RHOADS
J. HENRY SCATTERGOOD

RESEARCH

LUTHER P. EISENHART (1945–48)
WILLIAM F. ALBRIGHT (1945–48)
DETLEV W. BRONK (1945–48)
LEONARD CARMICHAEL (1944-47)
†EDWARD P. CHEYNEY (1945-47)
GILBERT CHINARD (1944–47)
EDWIN G. CONKLIN (1945–48)
FRANK A. FETTER (1945–47)
WILLIAM J. ROBBINS (1946–49)
HARLOW SHAPLEY (1945–48)
W. F. G. SWANN (1945–47)
HUGH S. TAYLOR (1945–48)
DONALD R. YOUNG (1946–49)

MEETINGS

(1946–1947)

LUTHER P. EISENHART
EDWIN G. CONKLIN
GEORGE W. CORNER
KARL K. DARROW
HOWARD M. JONES
WALDO G. LELAND
ERNEST M. PATTERSON
WENDELL M. STANLEY
JOSEPH H. WILLITS

†Deceased

HALL

FRANCIS R. PACKARD (1946–49)
EDWIN G. CONKLIN (1946–49)
EDWARD HOPKINSON, JR. (1945–48)
FISKE KIMBALL (1946–49)
EDWIN O. LEWIS (1946–49)
WILLIAM E. LINGELBACH (1945–48)
MARSHALL S. MORGAN (1945–48)
LAWRENCE J. MORRIS (1945–48)
THOMAS J. WERTENBAKER (1945–48)

PUBLICATIONS

JACOB R. SCHRAMM (1944–47)
WILLIAM B. DINSMOOR (1945–47)
LUTHER P. EISENHART (1945–48)
HENRY C. LANCASTER (1946–49)
WILLIAM E. LINGELBACH (1945–48)
ARTHUR D. NOCK (1945–47)
ERNEST M. PATTERSON (1945–48)
ADOLPH H. SCHULTZ (1945–48)
ROBERT L. SCHUYLER (1946–49)
GEORGE G. SIMPSON (1945–47)
HUGH S. TAYLOR (1945–48)

LIBRARY

WILLIAM E. LINGELBACH (1945–48)
JULIAN P. BOYD (1946–49)
GILBERT CHINARD (1946–49)
GEORGE W. CORNER (1946–48)
KARL K. DARROW (1946–48)
WALDO G. LELAND (1946–49)
HARRY M. LYDENBERG (1944–47)
J. PERCY MOORE (1946–49)
A. S. W. ROSENBACH (1944–47)
RICHARD H. SHRYOCK (1945–48)
ST. GEORGE L. SIOUSSAT (1945–48)
CARL VAN DOREN (1946–49)

COMMITTEES ON MEMBERSHIP

(1946–1947)

CLASS I. MATHEMATICAL AND PHYSICAL SCIENCES

LEE A. DUBRIDGE
ROGER ADAMS
OLIVER E. BUCKLEY
ARTHUR B. COBLE
JOEL STEBBINS

CLASS II. GEOLOGICAL AND BIOLOGICAL SCIENCES

WALTER S. HUNTER
ROLLIN T. CHAMBERLIN
L. C. DUNN
ALFRED N. RICHARDS
EDMUND W. SINNOTT

CLASS III. SOCIAL SCIENCES

PHILIP C. JESSUP
HENRY A. MOE
ROBERT L. SCHUYLER
JACOB VINER
EDWIN B. WILSON

CLASS IV. HUMANITIES

WILLIAM F. ALBRIGHT
FRANK AYDELOTTE
WILLIAM S. FERGUSON
HENRY C. LANCASTER
WILLIAM L. WESTERMANN

COMMITTEE ON NOMINATION OF OFFICERS

(1946–1947)

DETLEV W. BRONK,[1] Chairman

ARTHUR H. COMPTON
ELMER D. MERRILL
GUY STANTON FORD
C. F. TUCKER BROOKE† } Retiring Councillors

SPECIAL COMMITTEES

The first named in each committee is Chairman

AMERICAN LINGUISTICS AND ARCHAEOLOGY

HARRY M. LYDENBERG
LEONARD BLOOMFIELD
LUTHER P. EISENHART
ALFRED V. KIDDER
ALFRED L. KROEBER
WALDO G. LELAND
WILLIAM E. LINGELBACH
EDGAR H. STURTEVANT
C. F. VOEGELIN
CHARLES F. VOEGELIN
CLARK WISSLER

AMERICANA

WILLIAM E. LINGELBACH
JULIAN P. BOYD
VAN WYCK BROOKS
GILBERT CHINARD
A. S. W. ROSENBACH
ROBERT L. SCHUYLER
RICHARD HARRISON SHRYOCK
ST. GEORGE L. SIOUSSAT
THOMAS J. WERTENBAKER

[1] Resigned January 1947.
†Deceased

PHILLIPS PRIZE

HERBERT FUNK GOODRICH
JOHN DICKINSON
NICHOLAS KELLEY
QUINCY WRIGHT

MAGELLANIC PRIZE

HERBERT FUNK GOODRICH
LYMAN J. BRIGGS
HARVEY N. DAVIS
HARLOW SHAPLEY

LEWIS PRIZE

LUTHER P. EISENHART
DETLEV W. BRONK
GILBERT CHINARD

EDITORIAL STAFF

LUTHER P. EISENHART, Editor
MARIE A. RICHARDS, Assistant to the Editor

EXECUTIVE OFFICE STAFF

LUTHER P. EISENHART, Executive Officer
JULIA A. NOONAN, Assistant Secretary
FREDA S. LANKFORD, Assistant in the Office

LIBRARY STAFF

WILLIAM E. LINGELBACH, Librarian
GERTRUDE D. HESS, Assistant Librarian
RUTH A. DUNCAN, Assistant in the Library
MARY G. CARY, Cataloguer
FLORENCE M. MOORE, Secretary

LIBRARY RESEARCH ASSOCIATES

LYMAN J. BUTTERFIELD
GILBERT CHINARD
GEORGE W. CORNER
ZELLIG HARRIS
WILLIAM G. ROELKER
CHARLES COLEMAN SELLERS
CARL VAN DOREN
CHARLES F. VOEGELIN

LIST OF FORMER PRESIDENTS

BENJAMIN FRANKLIN, January 2, 1769—d. April 17, 1790.
DAVID RITTENHOUSE, January 7, 1791—d. June 26, 1796.
THOMAS JEFFERSON, January 6, 1797—resigned, November 23, 1814.
CASPAR WISTAR, January 6, 1815—d. January 22, 1818.
ROBERT PATTERSON, January 1, 1819—d. July 22, 1824.
WILLIAM TILGHMAN, January 7, 1825—d. April 29, 1827.
PETER STEPHEN DU PONCEAU, January 4, 1828—d. April 1, 1844.
ROBERT M. PATTERSON, January 3, 1845—declined office.
NATHANIEL CHAPMAN, January 2, 1846—January 5, 1849.
ROBERT M. PATTERSON, January 5, 1849—January 7, 1853.
FRANKLIN BACHE, January 7, 1853—January 5, 1855.
ALEXANDER DALLAS BACHE, January 5, 1855—January 2, 1857.
JOHN K. KANE, January 2, 1857—d. February 21, 1858.
GEORGE B. WOOD, January 7, 1859—d. March 30, 1879.
FREDERICK FRALEY, January 2, 1880—d. September 23, 1901.
ISAAC J. WISTAR, January 3, 1902—January 2, 1903.
EDGAR F. SMITH, January 2, 1903—January 3, 1908.
WILLIAM W. KEEN, January 3, 1908—January 4, 1918.
WILLIAM B. SCOTT, January 4, 1918—April 25, 1925.
CHARLES D. WALCOTT, April 25, 1925—d. February 9, 1927.
FRANCIS X. DERCUM, April 28, 1927—d. April 23, 1931.
HENRY NORRIS RUSSELL, December 4, 1931—April 22, 1932.
ROLAND S. MORRIS, April 22, 1932—April 24, 1942.
EDWIN G. CONKLIN, April 24, 1942—April 19, 1945.

V

MEETINGS OF THE SOCIETY

ANNUAL GENERAL MEETING, APRIL 18, 19, 20, 1946

OPEN SESSIONS

SYMPOSIUM ON PRESENT DAY SOCIAL AND ECONOMIC ASPECTS OF NATIONAL HEALTH

Thursday, April 18, 11 A.M.

THOMAS S. GATES, President, in the Chair

"The Health of the American People: an Historical Survey." Richard Harrison Shryock, Professor of History, University of Pennsylvania.

"Mental Hygiene." Winfred Overholser, M.D., Superintendent, St. Elizabeth's Hospital, Washington, D. C., and Professor of Psychiatry, George Washington University School of Medicine.

"Convalescence and Rehabilitation." Howard A. Rusk, M.D., Associate Editor, *The New York Times;* Former Chief, Convalescent Services Division, Office of The Air Surgeon, Headquarters, Army Air Forces.

Thursday, April 18, 2 P.M.

ALFRED N. RICHARDS, Vice-President, in the Chair

"The Place of the Physician in Modern Society." Henry Ernest Sigerist, Professor and Director, Institute of the History of Medicine, The Johns Hopkins University.

"Role of Governmental Agencies in the National Health Program." I. S. Falk, Director, Bureau of Research and Statistics, Social Security Board.

"The Relationships Between Governmental and Private Responsibilities for National Health." W. A. Milliman, Second Vice President and Associate Actuary, The Equitable Life Assurance Society of the United States.

"Public Health Experiences in the European Theatre of Operations." Major General Warren F. Draper, Deputy Surgeon General, U. S. Public Health Service.

Thursday, April 18, 8.30 P.M.

THOMAS S. GATES, President, in the Chair

THE R. A. F. PENROSE, JR., MEMORIAL LECTURE

"The Gene." George Wells Beadle, Professor of Biology, Stanford University.

The Lecture was followed by an informal reception in the Hall.

Friday, April 19, 2 P.M.

HARLOW SHAPLEY, Vice President, in the Chair

THE UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION, AND AMERICAN PARTICIPATION IN ITS ACTIVITIES

"The Background and Antecedents of UNESCO." Waldo G. Leland, Director, American Council of Learned Societies.

"The Role of Government in UNESCO." Charles A. Thomson, Office of International Information and Cultural Affairs, U. S. Department of State.

"International Relations Among the Scientists." Detlev W. Bronk, Professor of Biophysics, Director, Eldridge Reeves Johnson Foundation for Medical Physics and Institute of Neurology, University of Pennsylvania.

"International Cooperation in the Social Sciences." Robert Morrison MacIver, Lieber Professor of Political Philosophy and Sociology, Columbia University.

"The Humanities and International Understanding." John M. Cooper, Professor of Anthropology, Catholic University of America.

Friday, April 19, 8.30 P.M.

EDWIN G. CONKLIN in the Chair

The members and guests were entertained by four selections of Chamber Music by Dr. W. F. G. Swann and his daughter.

Saturday, April 20, 10 A.M.

WILLIAM BELL DINSMOOR, Vice President, in the Chair

"Astrophysical Results from Ten Total Eclipses." S. A. Mitchell,* Professor Emeritus of Astronomy, Leander McCormick Observatory, and Rupert Wildt.

* Recipient of a grant from the Research Funds.

"The Use of the Extra-Galactic Nebulae in Deriving the Proper Motions of Stars." William Hammond Wright, Director (ret.), Lick Observatory.

"The Light of the Northern Star." Joel Stebbins, Professor of Astronomy and Director, Washburn Observatory, University of Wisconsin.

"International Organization in Science." J. D. Bernal, Professor of Physics, Birkbeck College, London. (Introduced by Dr. Shapley.)

"The Newly Discovered Glacial Lake Leverett." William H. Hobbs,* Professor Emeritus of Geology, University of Michigan.

"Botanical Exploration Along the Alaska Highway." Hugh M. Raup,* Associate Professor of Plant Geography, Harvard University.

"Heroes of Sumer: A New Heroic Age in World History and Literature." Samuel Noah Kramer,* Associate Curator in the Babylonian Section, University Museum, University of Pennsylvania.

"Juvenile Gangs of New York City." Bradford Chambers,* Director, East Harlem Gang Survey.

Saturday, April 20, 4 P.M.

A reception was held at the home of President and Mrs. Gates for members and invited guests.

Saturday, April 20, 7.30 P.M.

The annual dinner was held at the Bellevue-Stratford, President Gates presiding.

The John F. Lewis Prize of $300 and Diploma was awarded *in absentia* to Enrico Fermi, Professor of Physics, University of Chicago, for his part in the development and application of the concept of chain reactions, and in particular, for his paper "The Development of the First Chain Reacting Pile," read before the Society November 17, 1945, and published in January 1946 in the PROCEEDINGS, Volume 90, No. 1.

The following after-dinner addresses were made:

"Benjamin Rush." George W. Corner, Director, Department of Embryology, Carnegie Institution of Washington.

"The American Philosophical Society." Edwin G. Conklin, Past President, The American Philosophical Society.

Friday, April 19, 10 A.M.

EXECUTIVE SESSION

THOMAS S. GATES, President, in the Chair

Secretary Patterson read the names of those members[1] who had died since the last meeting while the members present stood as a mark of respect.

President Gates presented his report and gave an account of the activities of the Society during the year, and stated that a complete report for the year 1945 would be found in the YEAR BOOK which would be brought to date by the Chairmen of the Standing Committees.

The following amendment to Chapter I, Article 2 of the Laws recommended by the Council was approved. It was the sense of the meeting that copies of this proposal be sent to each member of the Society in advance of the Autumn Meeting at which time it will be voted upon:

> Chapter I, Article 2 reads: "The foreign members of the Society are elected from among persons who are neither citizens nor residents of the United States, and who are of the greatest eminence for their attainments in science, letters, or the liberal arts. The number may not exceed sixty, nor may more than eight be elected in any one year."
>
> *Amend as follows:*
>
> Substitute "seventy-five" in place of "sixty" in the last sentence.

Dr. Eisenhart reported that the National Academy of Sciences and the American Philosophical Society would issue jointly to academies throughout the world an invitation to send representatives to a meeting in the autumn. The subject of the meetings in Philadelphia would be past American participation in international science and the meetings in Washington would deal with present day science. There would be meetings in the Hall of the Society on October 17, 18, and 19, and in Washington on October 21, 22, and 23. In addition to these meetings trips to various parts of the country would be arranged for the visitors.

[1] See p. 413.

About forty foreign academies would be invited to send representatives. All of their expenses would be paid from funds underwritten jointly by the Rockefeller Foundation and the Carnegie Corporation.

Dr. Conklin reported that the friends of the late Henry LaBarre Jayne, a member of the Society from 1898 to 1920 and Treasurer from 1903 to 1920, had raised about $5,000 in 1921 for a memorial fund, and that $1,000 had been used for the tablet which hangs in the Hall of the Society, and the remainder had been used for the sponsoring of the Jayne Memorial Lectures which had recently been carried on in conjunction with the activities of the American Society for the Extension of University Teaching in which Mr. Jayne was especially interested. The assets of the University Extension Society amount to about $30,000. The Board of Directors of the Corporation of the American Society for the Extension of University Teaching and the Trustees of the Jayne Memorial Lecture Foundation at a recent meeting, held in the Hall of the Society, voted to dissolve and ask leave of Court to turn over its funds to the American Philosophical Society, or such organization as the Court may direct, with a recommendation that the income therefrom be used by such organization to perpetuate the objectives of the University Extension Society and of the Jayne Memorial Foundation by arranging for lectures, for publications, and for research in the fields of the sciences, literature, and the arts. On motion, the following resolution was adopted:

> WHEREAS, The American Philosophical Society held at Philadelphia for Promoting Useful Knowledge has heretofore had close and friendly relations with the members of the American Society for the Extension of University Teaching, better known as the University Extension Society, most of whose incorporators were members of this Society (hereinafter called the American Philosophical Society), and has also had similar close and friendly relations with the members of the Committee formed to perpetuate the memory of the late Henry LaBarre Jayne, known as the Jayne Memorial Foundation, the work of which Committee some years ago was consolidated with that of the University Extension Society; and
>
> WHEREAS, the University Extension Society and the Jayne Memorial Foundation are about to cease their activities, and both bodies have expressed their desire to transfer their combined assets, now in the hands of the Treasurer of the University Extension Society, to the American Philosophical Society,

to be used for the promotion of the extension of university teaching, as set forth in the Charter of the University Extension Society;

Now, therefore, The American Philosophical Society hereby expresses its willingness to accept such assets of the University Extension Society and hereby agrees to use the same, and the income therefrom, for the promotion of the extension of university teaching, including, *inter alia,* arranging for lectures, publications, and research in the fields of the sciences, literature and the arts, thereby perpetuating the objectives of the University Extension Society as well as the Jayne Foundation.[2]

President Gates stated that the City and State had been planning to go forward with the opening of The Mall on Chestnut Street between Fifth and Sixth Streets north to the Delaware River Bridge until recently when the Governor announced that the work on this project would have to be postponed because of the housing shortage. He reported also that a second open area proposed midway between Walnut and Chestnut Streets to the east from Independence Square to Third Street was under consideration by the Federal Government.

President Gates stated that it had been felt for some time that the Society should restore the exterior of its building to its original form and, in view of the proposed improvements in this area and with the approval of the Committees on Hall and Finance, Mr. Sidney Martin, a highly qualified architect, was engaged for the purpose of making a study of the Society's building and to submit plans. He called attention to the drawings on exhibit showing the proposed Mall and the open area to the east of the Square, and also to the photographs of the Society's building showing the existing condition and how the building will appear when altered.

A tentative estimate was presented for restoring the exterior of the building to its original form including a fireproof roof. President Gates reported that the Council had authorized the Committees on Hall and Finance and certain Officers to go forward whenever possible with the exterior alterations as represented on the drawings. The same group was authorized to proceed with such inside readjustments as may be necessary for the proper utilization of the work of the Society as determined by the Officers of the

[2] Transfer approved by the Court of Common Pleas of Philadelphia, January 1947.

Society without making too many changes in the interior of the building. On motion, duly seconded and carried, the Council's recommendations were approved.

President Gates reported that Judge Goodrich had been appointed Chairman of the Magellanic Fund to succeed the late Roland S. Morris, and that he had accepted this appointment. Because of restrictions contained in the bequest, namely that no discovery, invention, or improvement, already published, shall be entitled to this premium, it is impossible at the present time to make such an award. Thus the Court is to be asked for some relief from this condition and Judge Goodrich has agreed to look into this matter.

Dr. Eisenhart reported that the Council at its meeting on April 17 had adopted by a rising vote the following resolution on the death of the former President, Roland Sletor Morris:

> The Council of the Society at its meeting on April 17, 1946, records with sorrow the passing of Roland Sletor Morris. Under his administration as President for a decade the Society improved its organization and procedure with increased endowment acquired through his efforts, reached the important decision to remain in its historic home on Independence Square, reorganized the whole building for its use, transferred the Library from the third floor to more spacious quarters, and defined the future library policy. Throughout these years and thereafter his wisdom and devotion were constantly available to the Society. A main interest was the use of the funds for research, and investigation leading to useful knowledge, and
>
> *That* the members of the Society will ever appreciate his constant insistence that funds of the Society be used to provide hospitality at the time of the meetings.

President Gates announced the names of the persons elected by the Council or appointed by him to serve on the Standing Committees of the Society for the coming year.

The following Committee on Finance was nominated by the President and elected for the year 1946–1947:

Marshall S. Morgan, *Chairman*	Edward Hopkinson, Jr.
Oliver E. Buckley	Nicholas Kelley
Edwin G. Conklin	Charles J. Rhoads
Morris Duane	J. Henry Scattergood

The John F. Lewis Prize

President Gates stated that the Council had approved the award of the John F. Lewis Prize to Enrico Fermi, Professor of Physics, University of Chicago, for his part in the development and application of the concept of chain reactions, and in particular for the following paper:

"The Development of the First Chain Reacting Pile." (Read November 17, 1945. PROC. AMER. PHILOS. SOC. **90**: 1-79, 1946.)

Mr. Morgan, Chairman of the Committee on Finance, presented his report and gave a brief account of the activities of the Committee. Copies of the report reprinted from the YEAR BOOK were available. On motion, the report of the Treasurer and the Auditor was accepted as presented.

Dr. Eisenhart, Chairman of the Committee on Research, presented a summary of the work of the Committee and stated that a complete report would be found in the YEAR BOOK. He stated that at the last three meetings of the Committee forty-eight grants had been awarded from the Penrose Fund totalling $30,873. He further stated that at the close of the year the unexpended balances in the research funds had been transferred to the "Reserve Fund for Post-War Expenditures" which was established in 1943. There is now over $177,400 in this Reserve Fund. Various suggestions were made as to how this money might be expended and Dr. Eisenhart stated that the Council and the Committee on Research had discussed the ultimate use of this Fund and that the matter is now under consideration by the Committee. On motion the report was approved as presented.

Dr. Schramm, Chairman of the Committee on Publications, presented his report and called attention to the policy on distribution which is now in effect for both the domestic and foreign exchanges. He also called attention to the three-year policy which had been adopted by the Committee relative to foreign distribution.[8]

Dr. Eisenhart stated that the Committee is primarily interested in having the Society's publications placed in the libraries abroad.

[8] See p. 78.

The State Department is establishing library centers in connection with the American embassies and Richard H. Heindel, Acting Chief, Division of Libraries and Institutes, Office of International and Cultural Affairs, is in charge of this project. He stated further that he had written Mr. Heindel that the Society would supply copies of some of its publications for distribution to these library centers.

Dr. Eisenhart gave a complete report on the distribution of publications by exchange and subscription, and called attention to the individual sales of recent symposia published in the PROCEEDINGS and to two MEMOIRS, namely, the "Thomas Jefferson Garden Book" edited by Edwin M. Betts (volume 22) and "Sumerian Mythology" by Samuel N. Kramer (volume 21).

Dr. Eisenhart called attention to the various issues of the Society's publications which had been issued recently and stated that a complete report on the Committee's activity during the year would be found in the YEAR BOOK. He stated that the Committee had accepted for publication in the MEMOIRS, probably Volume 23, Charles Coleman Sellers' biography of Charles Willson Peale in two volumes. He also reported that Edwin M. Betts is now working on Thomas Jefferson's Farm Book which will appear in the MEMOIRS.

Dr. Lingelbach, Chairman of the Committee on Library, presented a report on the activities of the Library. He called attention to the many new acquisitions and stated that a complete report would be found in the YEAR BOOK. The Society was informed that an article on the Library by Dr. Lingelbach appeared in the *William and Mary Quarterly,* ser. 3, **3** (1), 1946.

Annual Election

The Society proceeded to the election of officers and members. Walter Richard Miles and Robert R. McMath acted as Judges and Morris Duane as Clerk of Election.

The Tellers subsequently reported that the following officers and members had been duly elected:

OFFICERS

President

Thomas S. Gates

Vice-Presidents

William B. Dinsmoor
Alfred N. Richards
Harlow Shapley

Secretaries

W. F. G. Swann
Ernest M. Patterson

Curator

Francis R. Packard

Treasurer

Fidelity-Philadelphia Trust Company

Councillors

(To serve for three years)

Wendell M. Stanley, *Class I*
George G. Simpson, *Class II*
Herbert F. Goodrich, *Class III*
Waldo G. Leland, *Class IV*

MEMBERS

CLASS I—MATHEMATICAL AND PHYSICAL SCIENCES

Resident

John Johnston, Kearny, N. J.
Carl Gustav Arvid Rossby, Chicago, Ill.
Frederick Seitz, Jr., Pittsburgh, Pa.
Otto Stern, Pittsburgh, Pa.
Edgar Bright Wilson, Jr., Cambridge, Mass.

Foreign

Paul Alexandroff, Moscow, U.S.S.R.

CLASS II—GEOLOGICAL AND BIOLOGICAL SCIENCES

Resident

Wallace Osgood Fenn, Rochester, N. Y.
Barbara McClintock, Cold Spring Harbor, L.I., N. Y.
Robert Cushman Murphy, New York, N. Y.
John Spangler Nicholas, New Haven, Conn.
Leslie Spier, Albuquerque, N. M.
Chester Stock, Pasadena, Calif.

CLASS III—SOCIAL SCIENCES

Resident

James Cummings Bonbright, New York, N. Y.
Zechariah Chafee, Jr., Cambridge, Mass.
Carter Goodrich, New York, N. Y.
Wallace Notestein, New Haven, Conn.
Sumner Huber Slichter, Cambridge, Mass.

CLASS IV—HUMANITIES

Resident

Albert Croll Baugh, Philadelphia, Pa.
W. Norman Brown, Philadelphia, Pa.
John Nash Douglas Bush, Cambridge, Mass.
Chandler Rathfon Post, Cambridge, Mass.
Francis Henry Taylor, New York, N. Y.

Foreign

Gaetano De Sanctis, Rome, Italy

COUNCIL NOMINEES

Edwin O. Lewis, Philadelphia, Pa.
George Catlett Marshall, Washington, D. C.

One hundred and forty-five members and approximately one hundred guests attended the meeting.

The following previously elected members subscribed the Laws and were admitted into the Society during the course of the meeting: George Wells Beadle, Edwin Garrigues Boring, Harvey Nathaniel Davis, Edward Adelbert Doisy, Edwin Broun Fred, Paul Willard Merrill, Carl O. Sauer, and Richard Edwin Shope.

MEETINGS OF THE SOCIETY AND THE NATIONAL ACADEMY OF SCIENCES

OCTOBER 18–23, 1946

These meetings were organized in connection with the visit of delegates from foreign academies brought to the United States by the Society and the National Academy of Sciences on funds provided by the Rockefeller Foundation and the Carnegie Corporation, as announced at the Annual General Meeting. The two societies had arranged a program, the first part to be held in Philadelphia and the second part in Washington. Because of the hotel strike in Washington the program as originally planned by the Academy was modified and the meetings held in the Hall of the Society.

Invited Academies and their Delegates

R. Accademia Nazionale dei Lincei, Rome—1603
Guido de Ruggiero

The Royal Society, London—1662
Sir Henry Hallett Dale, Sir Alfred Egerton, Sir Edward Salisbury

Académie des Sciences, Institut de France, Paris—1666
Emile Borel, Maurice Caullery, Gaston Julia

Akademija Nauk S.S.S.R., Moscow—1725

Kungl. Svenska Vetenskapsakademien, Stockholm—1739
Per Geijer, Vertil Lindblad, Manne Siegbahn

Det Kongelige Danske Videnskabernes Selskab, Copenhagen—1742
Niels H. D. Bohr, Niels Erik Nørlund

Académie Royale de Belgique, Brussels—1772
Paul Brien, Lucien Godeaux

The Royal Society of Edinburgh—1783

Akademie Věd a Umění, Prague—1784
Václav Hlavatý

The Royal Irish Academy, Dublin—1785

Académie Suisse des Sciences, Geneva—1815
Jean Weigle

The Royal Society of New South Wales, Sydney—1821
Francis Lions

Magyar Tudományos Akadémia, Budapest—1825
Zoltan Kodaly

Det Koninklijke Nederlandsche Akademie van Wetenschappen, Amsterdam—1851
F. A. Vening Meinesz, M. G. J. Minnaert

Det Norske Videnskapsakademie i Oslo, Oslo—1857
Olaf Holtedahl, H. Solberg

Academia Română, Bucharest—1866
Dimitrie Gusti

The Royal Society of New Zealand, Wellington—1867
Robin Sutcliffe Allan

Polska Akademja Umiejetności, Cracow—1873
Michal Korczewski

The Royal Society of South Africa, Cape Town—1877
Harper Kelley

The Royal Society of Canada, Ottawa—1882
F. J. Alcock, Jacques Rousseau

Academia Nacional de Ciencias "Antonio Alzate," Mexico City—1884
Manuel Vallarta

Academia Peruana, Lima—1887
Carlos Monge

Suomalainen Tiedeakatemia, Helsinki—1908
Pentti Eskola

Academia Brasileira de Sciencias, Rio de Janeiro—1916
Mario P. de Brito

Academia Chilena de Ciencias Naturales, Santiago—1926
Gualterio Looser

Akademia Athenon, Athens—1926
Spiridon Dontas

Academia Sinica, Chungking—1928
Y. R. Chao

National Institute of Sciences of India, Calcutta—1935
H. J. Bhabha, Sir K. S. Krishnan

Academia Nacional de Ciencias Exactas, Buenos Aires—1937
Bernardo Alberto Houssay

AMERICAN PHILOSOPHICAL SOCIETY

AUTUMN GENERAL MEETING, OCTOBER 17, 18, 19, 1946

Thursday, October 17, 4 P.M.

The delegates assembled in the Hall of the Society, and were introduced by the Secretary, Dr. Swann, to the President and members in the order of the seniority of the Institutions they represented. Immediately after the introduction a reception was held.

Thursday, October 17, 6.30 P.M.

An informal dinner for out-of-town members and delegates was held at the Benjamin Franklin Hotel after which the group left for visits to the Academy of Natural Sciences of Philadelphia, the Franklin Institute, and the Philadelphia Museum of Art.

OPEN SESSIONS

SYMPOSIUM ON AMERICA'S ROLE IN THE GROWTH OF SCIENCE

Friday, October 18, 10 A.M.

THOMAS S. GATES, President, in the Chair

"The American Philosophical Society and International Relations." Edwin G. Conklin, Past President of the American Philosophical Society.

"The Development of Astronomy in America." Henry Norris Russell, Professor of Astronomy, Princeton University.

"Physical Sciences and their Applications." Karl K. Darrow, Research Physicist, Bell Telephone Laboratories.

Friday, October 18, 1.30 P.M.

ALFRED N. RICHARDS, Vice-President, in the Chair

"Botanical Sciences and their Applications, including Agriculture." Liberty Hyde Bailey, Director, Bailey Hortorium, Cornell University.

"Eighteenth Century Theories on America as a Human Habitat." Gilbert Chinard, Professor of French Literature, Princeton University.

"Trends in American Medical Research During the Nineteenth Century." Richard Harrison Shryock, Professor of History, University of Pennsylvania.

Friday, October 18, 4 P.M.

Visit to the University of Pennsylvania and Reception for Foreign Delegates, Members, and Invited Guests, University Museum.

Friday, October 18, 7.30 P.M.

The dinner was held at the Benjamin Franklin Hotel, Thomas S. Gates, President, presiding.

Following the dinner, informal addresses were made by four of the visiting delegates, namely:

Bernardo Alberto Houssay, Academia Nacional de Ciencias Exactas, Buenos Aires

Dimitrie Gusti, Academia Românâ, Bucharest

Maurice Caullery, Académie des Sciences, Institut de France, Paris

Sir Alfred Egerton, The Royal Society, London

Saturday, October 19, 10.30 P.M.

WILLIAM BELL DINSMOOR, Vice-President, in the Chair

"An Electronic Reading Aid for the Blind." V. K. Zworykin, Director of Electronics Research, Radio Corporation of America, Princeton, and L. E. Flory.

"Some Basic Problems Concerning the General Circulation of the Atmosphere." Carl G. A. Rossby, Professor of Meteorology, University of Chicago.

"Recent Observations on Programs for Medicine and National Health in Russia." Stuart Mudd, Professor of Bacteriology, University of Pennsylvania.

"The Techniques of Race Relations." Donald Ramsey Young, Executive Director, Social Science Research Council.

"The Pakistan Issue in India." W. Norman Brown, Professor of Sanskrit, University of Pennsylvania.

"American Democracy and the Civil War." Roy Franklin Nichols, Professor of History, University of Pennsylvania.

The foreign delegates had left at 9 A.M. on Saturday to attend the Bicentennial Convocation of Princeton University, and to visit other scientific centers in Princeton, and returned to Philadelphia that evening.

Saturday, October 19, 9 A.M.

EXECUTIVE SESSION

THOMAS S. GATES, President, in the Chair

Secretary Swann read the names of those members[4] who had died since the last meeting while the members present stood as a mark of respect.

The amendment to the Laws proposed at the General Meeting in April with respect to the number of foreign members to be elected in any one year was on motion, duly seconded, approved as follows:

> Chapter I, Article 2 reads: "The foreign members of the Society are elected from among persons who are neither citizens nor residents of the United States, and who are of the greatest eminence for their attainments in science, letters, or the liberal arts. The number may not exceed sixty, nor may more than eight be elected in any one year."
>
> *Amended as follows:*
>
> Substitute "seventy-five" in place of "sixty" in the last sentence.

Copies of the report of the Committee on Finance were distributed and Mr. Morgan gave an account of the work of the Committee and of the Treasurer. The report of the Committee and the budget for 1947, as recommended by the Council were on motion, duly seconded, approved.

Mr. Charles F. Jenkins called attention to the Michaux Fund and offered various suggestions as to how the income of this Fund should be used. Dr. Eisenhart stated that this matter was now under consideration and that Dr. Schramm was working on a project which he would submit to the Society for consideration, and that a special committee would be appointed to make recommendations to the Committee on Research which since 1941 has been in control of the Fund.

President Gates reported that he had appointed a Committee on the Magellanic Premium to advise the Society on whether something could be done to change the requirements in order that use could be made of the Fund. He further reported that the Council had approved the Committee's recommendation that application

[4] See p. 413.

be made to the Orphans' Court of Philadelphia County, Pennsylvania, so that the suggested changes be allowed in order to carry out the obvious intention of the donor of the Fund.

Dr. Eisenhart, Chairman of the Committee on Research, presented a summary of the work of the Committee, and stated that at the June meeting of the Committee twenty-five grants had been awarded from the Penrose Fund totalling $20,940, and three grants from the Johnson Fund totalling $8,150. He stated that a special meeting of the Committee had been held on October 4 to consider the future policy of the Society relative to its "Reserve Fund for Post-War Expenditures" which amounted to $177,446, and also projects submitted by Dr. Shapley upon request of the Committee which might be supported from funds from the Reserve Fund. In considering one of these projects, namely, a request for a substantial contribution toward the publication of monographs and monographic studies in any field of scholarship, even though publication is outside the Society, Dr. Eisenhart stated that the Committee on Research had presented a recommendation to the Council which was not approved in the form presented, but the Council had made the following recommendation:

> The Council recommends the appointment by the President of a special committee to consider the possibility of encouraging scholarship through publication, and report back to the Council.

On motion, the report was approved as presented.[5]

In the absence of Dr. Schramm, Chairman of the Committee on Publications, Dr. Eisenhart, the Editor, reported on the activities of the Committee and presented a list of the publications issued during the year and of those now in press. He called attention to the increase in the number of subscriptions since 1944 for the Society's publications. A survey of the distribution of publication funds among the four classes from 1941 to 1945 inclusive showed that nearly twice as much had been spent for publications in Classes III and IV as had been spent for publications in Classes I and II[6]. On motion, the report was approved as presented.

Dr. Lingelbach, Chairman of the Committee on Library, presented his report, and called attention to the significant acquisitions which had been acquired during the year. He also reported on the

[5] See p. 82.
[6] See p. 81.

present state of the Boas Collection and the steps that have been taken to make this material available to scholars. On motion the report was approved and ordered to be filed.

One hundred and twenty-five members, twenty-nine delegates, and one hundred guests attended the Meeting.

The following previously and newly elected members subscribed the Laws and were admitted into the Society during the course of the Meeting: Albert Croll Baugh, Niels Hendrik David Bohr, W. Norman Brown, Hans T. Clarke, Sir Henry Hallett Dale, Wallace Osgood Fenn, Carter Goodrich, Bernardo Alberto Houssay, John Johnston, Robert Cushman Murphy, John Spangler Nicholas, Wallace Notestein, Isidor Isaac Rabi, Carl Gustaf Arvid Rossby, Harald U. Sverdrup, and Francis Henry Taylor.

THE NATIONAL ACADEMY OF SCIENCES, OCTOBER 20, 21, 22, 23, 1946

Sunday, October 20, 4 P.M.

A Reception was held in the Hall of the American Philosophical Society for the foreign delegates.

OPEN SESSIONS

SYMPOSIUM ON PRESENT TRENDS AND INTERNATIONAL IMPLICATIONS OF SCIENCE

Monday, October 21, 10 A.M.

FRANK B. JEWETT, President, in the Chair

"Astronomy." Harlow Shapley, Director, Harvard College Observatory.

"Meteorology." Carl G. A. Rossby, Professor of Meteorology, University of Chicago.

"Oceanography." Harald Ulrik Sverdrup, Professor of Oceanography, Director, Scripps Institution of Oceanography, University of California.

Monday, October 21, 2.30 P.M.

LUTHER P. EISENHART, Vice-President, in the Chair

"Atomic Physics." Niels H. D. Bohr, Professor of Theoretical Physics, University of Copenhagen, Denmark.

"Geophysics." James B. Macelwane, S. J., Professor of Geophysics and Director, Department of Geophysics, St. Louis University.

"High-speed Computing Machines." John von Neumann, Professor of Mathematics, Institute for Advanced Study.

"Mineral Resources." Charles Kenneth Leith, Professor of Geology, University of Wisconsin.

Tuesday, October 22, 10 A.M.

ROSS G. HARRISON, in the Chair

"Epidemic Diseases." Thomas Milton Rivers, Director, Hospital of the Rockefeller Institute for Medical Research.

"Combating Plant Diseases." Elvin Charles Stakman, Professor and Chief, Division of Plant Pathology and Botany, University of Minnesota Experiment Station.

"Nutrition." William Cumming Rose, Professor of Biochemistry, University of Illinois.

Tuesday, October 22, 2 P.M.

PROBLEMS OF INTERNATIONAL COOPERATION IN SCIENCE

DETLEV W. BRONK, Foreign Secretary, in the Chair

"Publications and Exchange of Publications." Alexander Wetmore, Secretary, Smithsonian Institution.

"International Scientific Unions." John A. Fleming, Director (ret.), Department of Terrestrial Magnetism, Carnegie Institution of Washington.

"International Congresses of Science." Jerome C. Hunsaker, Head, Department of Mechanical Engineering, Massachusetts Institute of Technology.

Tuesday, October 22, 8.15 P.M.

UNIVERSITY MUSEUM, UNIVERSITY OF PENNSYLVANIA

FRANK B. JEWETT, President, in the Chair

PILGRIM TRUST LECTURE

"The Freedom of Science." Sir Henry Hallett Dale, Past President, Royal Society of London.

The delegates and members of the Academy left Philadelphia on Wednesday morning for Washington. They attended the meeting of the Academy on Wednesday afternoon, as originally sched-

uled, and in the evening the Centenary Celebration of the Smithsonian Institution. The next day they visited various institutions in Washington and left that night on a tour of the country to take them as far as the Pacific coast.

MEETINGS OF OTHER ORGANIZATIONS

HELD IN THE HALL OF THE SOCIETY

THE ARCHAEOLOGICAL INSTITUTE OF AMERICA, PHILADELPHIA SOCIETY

January 24, 8.15 P.M. Professor Emerson H. Swift, Columbia University. "Hagia Sophia at Constantinople."

March 14, 8.15 P.M. Hugh O'Neill Hencken, Director of the American School of Prehistoric Research, and Curator of the Peabody Museum of Harvard University. "Prehistoric Europe."

November 14, 8.15 P.M. William Bell Dinsmoor, Professor of Archæology, Columbia University. "Athens from Democracy to Empire."

AWARDS OF THE JOHN SCOTT MEDAL AND PREMIUM

Presented by the Board of Directors of City Trusts of Philadelphia.

January 17, 8.30 P.M. Dr. Edwin J. Cohn, Department of Chemistry, Harvard Medical School, for the development of methods yielding separated blood proteins of therapeutic value.

Dr. Ernest W. Goodpasture, Professor of Pathology, Vanderbilt University, for the discovery of a method of cultivating viruses in the living chick embryos.

February 15, 8.30 P.M. Dr. William E. Doering and Dr. Robert B. Woodward, Research Laboratory, Polaroid Corporation, for the total synthesis of quinine.

Dr. George H. Shull, Professor Emeritus of Botany and Genetics, Princeton University, for the development of a practical method of greatly improving the quality and yield of corn by selective hybridization.

December 19, 8.30 P.M. Dr. Donald W. Kerst, University of Illinois, for the discovery of the betatron for acceleration of electrons by magnetic induction.

The Corporation and Board of Directors of the Union Library Catalogue of the Philadelphia Metropolitan Area—January 10, April 10, December 23.

Committee on Predoctoral Fellowships of the National Research Council—February 2, March 2, July 11.

Joint Meeting of the Special Libraries Council of Philadelphia and Vicinity and Philadelphia Metropolitan Library Council—February 7.

Council on Foreign Relations, Inc.—April 26 and 27.

First National Conference on Citizenship—May 17 and 18.

American Council of Learned Societies, Executive Committee—October 12, December 7; Special Committee—November 9.

Wistar Association, November 14.

Regional Committee on the Rhodes Scholarships—December 14.

VI

REPORTS OF STANDING COMMITTEES

1. REPORT OF THE COMMITTEE ON MEETINGS

The Committee on Meetings for the year 1946-1947 consists of Thomas S. Gates, *President,* Luther P. Eisenhart, *Chairman,* Edwin G. Conklin, George W. Corner, Karl K. Darrow, Howard M. Jones, Waldo G. Leland, Ernest M. Patterson, Wendell M. Stanley, and Joseph H. Willits. During the year 1946 the Committee held four meetings, namely, on February 6, May 16, October 3, and December 19.

At the February meeting Dr. Eisenhart reported that Dr. Frank B. Jewett, President of the National Academy of Sciences, had secured the assurances from the Rockefeller Foundation and the Carnegie Corporation that they would underwrite jointly to the extent of $100,000 a plan to arrange for a meeting of foreign scientists as guest of the Academy and the Society. At first it was suggested that this meeting be held in April, but it was finally decided that it should be held the latter part of October so that proper arrangements could be made meanwhile, and that a report concerning the proposal would be made to the Committee at its May meeting.

At the May meeting further consideration was given to the meetings of the Society and the National Academy of Sciences to be held in October in connection with the visitation of the foreign representatives in accordance with the plan previously suggested. It was decided that there be meetings in the Hall of the Society on October 17, 18, and 19, and the Academy hold its meetings in Washington on October 21, 22, and 23. It was agreed that the papers at the meeting in Philadelphia should deal primarily with the historical aspects of international science and in Washington with present day and future science. It was approved that forty academies be invited jointly by the two societies to send representatives to the meetings. A tentative program for the entertainment of the delegates while in Philadelphia was presented

and Drs. Eisenhart and Bronk were authorized to proceed with the arrangements.

At this meeting also there was a discussion of the program for the Annual General Meeting to be held on April 24, 25, and 26, 1947. It was agreed to change the former order of the meetings as follows:

(1) That the first two days of the meeting be devoted to papers and if a symposium is arranged that it be placed preferably on Friday,

(2) That the Executive Session be held on Saturday morning instead of on Friday morning as heretofore,

(3) That the Council meet on Wednesday as formerly,

(4) That the R. A. F. Penrose, Jr., Memorial Lecture be held on Thursday evening, preceded by an informal dinner at the Benjamin Franklin Hotel, and

(5) That the annual dinner be held on Friday evening, preferably at the Benjamin Franklin Hotel.

At the October meeting plans for the coming April meeting were considered. In addition to tentative proposals it was suggested that the Chairman invite recently elected members to present papers at this and subsequent meetings.

At the December meeting the program for the 1947 Annual General Meeting was tentatively arranged and the Chairman was authorized to invite the appropriate persons to read papers.

The programs of the 1946 Annual and Autumn General Meetings appear in the report on Meetings of the Society.[1]

[1] See p. 55.

2. REPORT OF THE COMMITTEE ON PUBLICATIONS

The Committee on Publications for the year 1946-1947 consists of the following members: Jacob R. Schramm, *Chairman,* Luther P. Eisenhart, *Editor,* William B. Dinsmoor, Henry C. Lancaster, William E. Lingelbach, Arthur D. Nock, Ernest M. Patterson, Adolph H. Schultz, Robert L. Schuyler, George G. Simpson, Hugh S. Taylor, and Thomas S. Gates, *President.*

During the year 1946 three meetings of the Committee were held, namely on March 9, October 5, and December 14.

The Committee expresses its appreciation of the cooperation of members who have so generously returned upon request certain back issues of the PROCEEDINGS which were needed in order to complete certain volumes that are in demand. The Society is still in need of the following:

Volume	51 (1912)	No. 206
	52 (1913)	No. 210
	57 (1918)	No. 7
	66 (1927)	Bicentenary Volume and Minutes
	78 (1937)	Nos. 1, 2, 3, 4
	79 (1938)	Nos. 2, 3, 4
	80 (1939)	Nos. 1, 2, 4
	81 (1939)	Nos. 1, 3, 4, 5
	83 (1940)	No. 4
	86 (1943)	Nos. 2, 3

In accordance with the recommendation of the sub-committee the previous year, which was approved by the Council and the Society in Executive Session, a revision of the foreign exchange list has been started and considerable progress made. At the end of 1946 the revised foreign exchange list was as follows: 132 libraries to receive PROCEEDINGS, 37 TRANSACTIONS, 3 MEMOIRS, and 132 YEAR BOOK. Of these, 17 were informed that this arrangement was for a three-year period only and that after that time they should consider obtaining the Society's publications on a subscription basis. During the war many copies of the Society's publications intended for foreign libraries were stored, as issued, at the Lancaster Press. These are now being sorted and copies have been sent to libraries in all countries for which the Smithsonian International Exchange Service is handling shipment. A number of

new subscriptions have been received during the year and letters soliciting subscriptions have been written to all libraries which have ordered individual copies of the Society's publications as well as to many other libraries. The following table gives a comparison in the mailing list before March 1, 1944, at which time the new policy was instituted of reducing exchanges and obtaining subscriptions, and the end of 1946:

	Before March 1, 1944		December 31, 1946		
	Active	Inactive	Domestic	Foreign	Total
PROCEEDINGS:					
Subscriptions	60		205	40	245
Exchanges	176	368	49	132	181
TRANSACTIONS:					
Subscriptions	26		120	49	169
Exchanges	70	95	17	37	54
MEMOIRS:					
Subscriptions	10		61	4	65
Exchanges	71	95	1	3	4
YEAR BOOK:					
Subscriptions	1		36	7	43
Exchanges	176	368	56	132	188

The number of subscriptions and exchanges for the MEMOIRS is not indicative of the circulation; for example the number of individual copies of Volume 22, "Thomas Jefferson's Garden Book," sold by December 31, 1946, was 850 while that of Volume 21, "Sumerian Mythology," was 600.

Sales of publications are continuing and a number of back sets have been supplied to institutions to complete their files. The demand for the recent publications of the Society is increasing. The receipts from the sale of publications during 1946 amounted to $8,596.70 to be credited to the Publication Reserve Fund which now amounts to $25,430.90. A comparison of the receipts of 1946 with those of the previous four years is given below:

Year	Receipts	Year	Receipts
1942.....	$1,390.44	1945.....	$9,722.88
1943.....	5,533.35	1946.....	8,596.70
1944.....	10,111.32		

In 1906 in connection with the Franklin Bicentenary Celebration a set of six volumes was published, the first a record of the Celebration and the other five containing a calendar of the Franklin papers. These were published with funds provided by the State of Pennsylvania and copies were given to the American Philosophical Society for distribution. At the beginning of 1946 there were about one hundred and fifty sets remaining in the possession of the Society. It was decided to offer to a college or university library which was a subscriber to the Society's publications a set provided it did not already have one. Thus far forty copies have been distributed this year.

At the beginning of the year an appropriation of $20,000 was made for publication purposes to which was added $15,458 carried over from the previous year. During 1946 publication expenses amounted to $11,529 leaving a balance of $23,929. Instead of being carried over to 1947 this balance will be reverted to principal with the exception of $18,000 to cover work now in process on which commitments have been made. This is in accordance with the new policy which provides on the budget accordingly an increased appropriation. In the fall the Society was notified by the Lancaster Press that it was necessary for them to increase their prices by 16 per cent, to take effect beginning with PROCEEDINGS, Volume 90, Number 5, and TRANSACTIONS, Volume 37, Part 1, and the Committee accepted the proposal.

The cost of direct advertising was about $322 for an advertisement in the *Trade List Annual,* two in *Science,* the printing of circulars, and the addressing of envelopes outside the office. Announcements of recent publications were sent to libraries, institutions, and individuals, and copies of every publication issued by the Society during the year were sent to appropriate journals for review. The above expenses, together with postage and office expenses were charged to the Executive Office Expense Account.

From time to time the question has been raised by members as to the funds being expended for publication of material in the various Classes of membership. Accordingly the following statement covering the years 1941-1945 has been prepared; since there is overlapping in certain publications, the statement is only approximately correct.

	1941	1942	1943	1944	1945	Total
Class I. Mathematical and Physical Sciences	$1,476	$455	$400	$3,130	$607	$6,168
Class II. Geological and Biological Sciences	5,467	386	4,122	4,780	2,957	17,712
Class III. Social Sciences	823	4,711	4,527	8,644	434	19,139
Class IV. Humanities	3,915	2,042	8,654	4,335	2,004	20,950

During the year the Committee considered and accepted for publication fifty manuscripts as follows:

In the PROCEEDINGS ..... 45 papers
TRANSACTIONS ..... 2 monographs
MEMOIRS ..... 3 books

Seventeen manuscripts were declined.

According to the policy recently adopted, one volume of the TRANSACTIONS is to be issued each year. Wartime restrictions and manpower shortage delayed the issuance of the complete Volume 35 in 1945, although it has since been issued, and the length and complicated character of the one monograph consisting of about 800 pages on the "History of Chinese Society—Liao," which is being published as Volume 36 of the TRANSACTIONS, made it impossible to issue it during 1946. However, this volume will appear in 1947 and, in the meantime, Volume 37 will be issued, in several parts, as the volume for 1947.

A complete volume of the PROCEEDINGS, consisting of five numbers, was issued during the year. While no MEMOIRS appeared during the year, two are in press and will be issued early in 1947. Volume 23 is to be a biography of Charles Willson Peale in two parts, by Charles Coleman Sellers. Mr. Sellers had in 1939 published privately a volume on the early life of Peale, entitled *The Artist of the Revolution*. His bound edition of five hundred copies has been exhausted but he still had five hundred copies in flat sheets. These he made available to the Society for publication as Part 1 of Volume 23 of the MEMOIRS, "Charles Willson Peale,

Volume I, Early Life (1741-1790)." At the same time his manuscript on "Charles Willson Peale, Volume II, Later Life (1790-1827)" is being published as Volume 23, Part 2.

Carl Van Doren graciously consented to edit and annotate the Benjamin Franklin—Richard Jackson correspondence acquired recently by the Library, and this is being issued as Volume 24 of the MEMOIRS under the title "Letters and Papers of Benjamin Franklin and Richard Jackson, 1753-1785." This volume is being printed by the George H. Buchanan Company which has also been employed to print the YEAR BOOK for 1946.

The supply of the one thousand-copy edition of "Thomas Jefferson's Garden Book" was completely exhausted at the end of 1946 and it was decided to reproduce this volume by offset. An additional thousand sets of illustrations had been printed at the time of the first edition and these are being used in the offset edition.

At a meeting of the Council on October 17, at the suggestion of the Committee on Research, the President appointed a special committee to consider the possibility of encouraging scholarship through publication. This special committee, consisting of Luther P. Eisenhart, Chairman, William F. Albright, Gilbert Chinard, Waldo G. Leland, and Jacob R. Schramm, met on November 22 and voted that the following recommendation be submitted back to the Council:

> *Resolved,* That the Committee recommend to the Council that the Committee on Publications of the Society may draw from the "Reserve Fund for Post-War Expenditures" for publication by the Society of scholarly monographs, and that for the year 1947 the sum shall not exceed $10,000.

In the discussion preceding the adoption of this resolution it was pointed out that heretofore the Committee on Research had been expected not to make contributions for publication of a manuscript resulting from a grant; there might be presented a manuscript based upon the research of a grant which is worthy of publication; and the funds provided by the above resolution might meanwhile have been committed. Accordingly it was further

> *Resolved* That in any such case the Committee on Research may make from the "Reserve Fund for Post-War Expenditures" a further grant to the Committee on Publications for the publication of the manuscript.

Publications of the American Philosophical Society During the Year 1946

Transactions:

Vol. 35, Pt. 2. January.

Conway Zirkle. The Early History of the Idea of the Inheritance of Acquired Characters and of Pangenesis. 61 pp.

Vol. 35, pt. 3. March.

Margaret Lantis. The Social Culture of the Nunivak Eskimo. 171 pp., 2 maps, 84 figs.

Vol. 35, pt. 4. September.

E. C. Case. A Census of the Determinable Genera of the Stegocephalia. 96 pp., 186 figs.

Proceedings:

Vol. 90, No. 1. January.

Symposium on Atomic Energy and its Implications.

H. D. Smyth. Fifty Years of Atomic Physics. pp. 1-6.

J. R. Oppenheimer. Atomic Weapons. pp. 7-10.

Robert S. Stone. Health Protection Activities of the Plutonium Project. pp. 11-19.

Enrico Fermi. The Development of the First Chain Reacting Pile. pp. 20-24.

Eugene P. Wigner. Resonance Reactions. pp. 25-29, 3 figs.

Harold C. Urey. Methods and Objectives in the Separation of Isotopes. pp. 30-35, 1 fig.

John Archibald Wheeler. Problems and Prospects in Elementary Particle Research. pp. 36-47.

Joseph H. Willits. Social Adjustments to Atomic Energy. pp. 48-52.

Jacob Viner. The Implications of the Atomic Bomb for International Relations. pp. 53-58.

James T. Shotwell. The Control of Atomic Energy under the Charter. pp. 59-64.

Irving Langmuir. World Control of Atomic Energy. pp. 65-69.

Arthur H. Compton. Atomic Energy as a Human Asset. pp. 70-79.

Vol. 90, No. 2. May.

Edwin M. Betts. Groundplans and Prints of the University of Virginia, 1822-1826. pp. 81-90, 6 figs.

Robert Livingston Schuyler. The Antiquaries and Sir Henry Spelman. An Essay in Historiography. pp. 91-103.

Reginald A. Daly. Origin of the Moon and its Topography. pp. 104-119.

Samuel N. Kramer. Heroes of Sumer. A New Heroic Age in World History and Literature. pp. 120-130.

Howard Mumford Jones. The Colonial Impulse. An Analysis of the "Promotion" Literature of Colonization. pp. 131-161.

Vol. 90, No. 3. July.

Sigmund Skard. The Use of Color in Literature. A Survey of Research. pp. 163-249.

Vol. 90, No. 4. September.

Symposium on Present Day Social and Economic Aspects of National Health.

Richard Harrison Shryock. The Health of the American People. An Historical Survey. pp. 251-258.

Winfred Overholser. Mental Hygiene. pp. 259-264.

I. S. Falk. Role of Governmental Agencies in a National Health Program. pp. 265-270.

Howard A. Rusk. Convalescence and Rehabilitation. pp. 271-274.

Henry E. Sigerist. The Place of the Physician in Modern Society. pp. 275-279.

W. A. Milliman. The Relationships between Governmental and Private Responsibilities for National Health. pp. 280-288.

Warren F. Draper. Public Health Experiences in the European Theatre of Operations. pp. 289-294.

Symposium on the United Nations Educational, Scientific and Cultural Organization, and American Participation in its Activities.

Waldo G. Leland. The Background and Antecedents of UNESCO. pp. 295-299.

Charles A. Thomson. The Role of Government in UNESCO. pp. 300-303.

Detlev W. Bronk. International Relations among Scientists. pp. 304-308.

Robert Morrison MacIver. Intellectual Cooperation in the Social Sciences. pp. 309-314.

John M. Cooper. Problems of International Understanding. pp. 314-317.

Vol. 90, No. 5. December.

Otto Haas and George Gaylord Simpson. Analysis of some Phylogenetic Terms, with Attempts at Redefinition. pp. 319-349.

Tage Skogsberg and Austin Phelps. Hydrography of Monterey Bay, California. Thermal Conditions, Part II (1934-1937). pp. 350-386.

Antonio Pace. The American Philosophical Society and Italy. pp. 387-421.

George Wells Beadle. The Gene (R. A. F. Penrose, Jr., Memorial Lecture). pp. 422-431.

YEAR BOOK for 1945. 440 pp., 16 figs.

COST[1] OF PUBLICATIONS ISSUED DURING 1946

TRANSACTIONS	
Vol. 35, Part 2. 61 pp. 530 copies	$ 539.85
Vol. 35, Part 3. 171 pp., 2 maps, 84 figs. 622 copies	1,711.27
Vol. 35, Part 4. 96 pp., 186 figs. 472 copies	1,449.78
PROCEEDINGS	
Vol. 90, No. 1. 79 pp., 4 figs. 2,032 copies	748.44
Second printing from standing type 1,239 copies.	277.69
Vol. 90, No. 2. 81 pp., 6 figs. 1,142 copies	783.11
Vol. 90, No. 3. 87 pp. 1,430 copies: 1,230 paper-bound, 200 flat sheets	929.25
103 copies bound in cloth	93.71
Vol. 90, No. 4. 67 pp. 1,540 copies	543.35
Vol. 90, No. 5. 115 pp., 20 figs., 1,112 copies	1,187.44
MEMOIRS	
Vol. 12. Binding in cloth 213 copies held in flat sheets	340.69

[1] Includes all expenses connected with publications, viz. printing, engraving, wrapping, addressing, mailing, postage, etc., except authors' reprints.

YEAR BOOK for 1945. 440 pp., 16 figs. 815 copies: 740 paper-bound, 75 cloth-bound	$1,973.36
Reports reprinted from YEAR BOOK: 25 Committee on Research, 50 Committee on Finance, 200 Committee on Library, 50 Membership Lists, 300 Library Bulletins	400.65
Authors' reprints	235.54

3. REPORT OF THE COMMITTEE ON RESEARCH

The Laws (Chap. V, Art. 4) specify that the Committee on Research shall consist of the President, *ex officio,* and not fewer than six other members, representative of the four Classes, who shall be nominated by the President and elected by the Council. In practice it has been found desirable to have more than six elected members in order to obtain wider representation of subjects. While regular election to the Committee is for a term of three years, several persons so elected have found it necessary to resign and others have been appointed to fill out their terms. There is no provision in the Laws against the reelection of a person to serve on this Committee. Several members of the Committee have served for two or more terms and their experience has been of great and increasing value. All serve without compensation; actual expenses incurred in attending meetings are paid, as in the case of all other committees.

The members of the Committee for 1946–1947, the subjects they represent, and the dates of their last election are listed herewith:

Eisenhart, Luther P., *Chairman* (Mathematics), 1945
Albright, William F. (Archæology), 1945
Bronk, Detlev W. (Biophysics and Physiology), 1945
Carmichael, Leonard (Psychology), 1944
†Cheyney, Edward P. (History), 1945
Chinard, Gilbert (Languages and History), 1944
Conklin, Edwin G. (Biology), 1945
Fetter, Frank A. (Political Economy), 1945
Robbins, William J. (Botany), 1946
Shapley, Harlow (Astronomy), 1945
Swann, W. F. G. (Physics), 1945
Taylor, Hugh S. (Chemistry), 1945
Young, Donald R. (Sociology), 1946
Gates, Thomas S., *ex officio* (Education), 1945

There are three research funds in the keeping of the Society, the Penrose Fund which is unrestricted, the Johnson Fund which is partially restricted in that it has been agreed that persons working in certain institutions may be regarded as occupying a pre-

† Deceased.

ferred position, and the Daland Fund which is restricted to research in clinical medicine.

The Committee has been charged with the distribution of research grants from all three of these funds and the same forms of application and methods of procedure are used in all cases.

The Committee held five meetings during the year 1946, namely on March 1, April 12, June 6, October 4, and November 1. Applications and supporting letters are manifolded and sent to the members of the Committee about ten days in advance of the meeting; in many cases members consult by correspondence or in person with applicants, or with persons conversant with the applicants or their projects.

The Committee decided several years ago that apparatus and materials of lasting value that have been purchased from the research funds should be marked with metal tags reading: "Property of the American Philosophical Society, Philadelphia," and should be subject to recall when the project for which they were purchased had been fulfilled. The Committee has been receiving applications for apparatus and materials similar to that already on loan. In order to meet such applications, the Committee recently voted to request the return of such items after the expiration of the period named in the application as the probable duration of the research, unless granted an extension. A list of items follows:

Apparatus on loan

Equipment for aluminizing mirrors in optical train.
Regional spectrophometer, direct vision hand spectroscope, thermostat for rapid reaction device.
High precision graduated circle with accompanying microscopes.
Geiger-Müller counter, electrometer, ionization chamber.
2 thermionic DC amplifiers, galvanometer.
Permanent magnet for construction of beta-ray spectrograph.
10 milligrams radium-beryllium neutron source.
Warburg respirometer.
2 densitometers.
Dionic water tester.
Libby photronreflectometer.
Colorimeter.
High angle centrifuge.
Zeiss research microscope.
Spencer research microscope.
Photoelectric colorimeter.
Victoreen condenser-type r-meter with a 25-r chamber, 100-r chamber tube and chamber.

Amplifiers and recording system for encephalography.
2 oscillographs.
Equipment for measuring alpha particles, and photografluc alpha particle recorder.
Radio test-meter.
Constant temperature incubator, research microscope.
4 Beckman spectrophotometers.
Barcroft-Warburg bath and six Summerson manometers and respirometer vessels.
Refrigerated high speed centrifuge.
Converter to operate recorder off car generator.
Flame photometer and accessories.
Ultra violet spectrophotometer, torsion balance.
3-channel brain wave amplifiers.
Leeds and Northrup potentiometer, galvanometer, Lane-Nims microvoltmeter.
Photoelectric colorimeter.
Precision potentiometer unit.
Vacuum line cathetometer and special dissociation equipment.

Apparatus returned—in possession of the Society.

Thermograph, hygrograph.
Taylor Instrument Company dermatherm.
Micro-manipulator.

In the past grants have been made from the Penrose Fund in aid of publications, but now it has been decided that applications for such grants shall be referred to the Committee on Publications, but only in cases when the application is in keeping with the policy of this Committee. The Committee does not make grants from the Penrose Fund in aid of books not published by the Society. In 1946 it appropriated a grant to the Committee on Publications from the Reserve Fund for Post War Expenditures to increase its funds for the publication of scholarly manuscripts. However, the Committee makes grants in aid of publication from the Johnson Fund when the project is in line with the policy of the Committee with reference to this Fund.

The following general principles have been adopted by the Committee:

1. Grants are made only for the promotion of research and chiefly in the fields represented by the membership of the Society.

2. Grants are not made to pay salaries in whole or in part of members of the staff of an educational or scientific institution. It is expected that an institution will cooperate by furnishing at least general laboratory, library, and office facilities for those engaged in the investigation.

3. Grants are not given for fellowships, or scholarships, nor for work on doctoral theses. They are not given for usual or permanent equipment of the institution involved. Apparatus of permanent value purchased by means of a grant shall become the property of the Society, for such disposition as the Society may determine when the purpose for which it was purchased has been fulfilled.

4. Projects, methods of procedure, places where the work is to be done, and any cooperation of the institution where the research is to be conducted and of other institutions or agencies should be clearly stated.

5. Preference will be given to the support of investigations which are already well begun and in which definite results can be expected with the aid of the grant. Projects requiring long continued support cannot in general be assisted.

6. Any publication of work supported in whole or in part by a grant from this fund shall state in connection with the title that the work was supported by a grant from the particular fund of the American Philosophical Society from which the grant was made, and a copy of such publication shall be sent to the Society.

7. As a general policy the funds allocated to each project will be disbursed quarterly by the Society to those in charge, unless the nature of the work requires a different arrangement.

8. Reports of expenditures from grants are expected semi-annually, and a report of progress shall be made by the grantee to the Committee on Research annually. A summary of the work shall be presented to the Society for publication in its YEAR BOOK when that part of the work for which the grant was made is completed.

9. No recipient of a grant thereby becomes an employee of the Society.

The Committee recommended to the Committee on Finance when preparing the Budget for 1947 that balances at the close of 1946 in the Penrose, Johnson, and Daland Funds be no longer added to the Reserve Fund for Post War Expenditures established in 1943, but that such balances be added to Principal, and reported the same to the Council. The Council, however, at its meeting on October 17 voted that all balances in excess of commitments at the end of the year be added to Principal of the funds with the understanding that funds so added to Principal shall be subject to withdrawal by action of the Council.

THE PENROSE FUND

The budget for 1946 assigned $70,000 from the income of the Penrose Fund for the support of research. To the sum of $70,000 were added refunds and cancellations amounting to $2,604.91, so that a total of $72,604.91 was available for grants. The following 74 grants were awarded totalling $65,475, leaving a balance of $7,129.91 which has been carried over to 1947.

Grant No. 809*b*. Victor Zuckerkandl, Princeton, N. J. Extension of Grant No. 809 for another three months in connection with the preparation of a book on the function of music in liberal arts education. (Third grant.) $300

Grant No. 844. Reed C. Rollins, Stanford University. Assistance in connection with the investigation of (*a*) determination of the effects of the introduction of various chromosome compliments from other species of *Parthenium* upon certain characteristics of interspecific hybrids involving *Parthenium argentatum;* (*b*) studies to determine the nature of the inheritance of apomixis in the guayule rubber plant and the relationship of this process to similar methods of reproduction in other plants 700

Grant No. 845. Bradford Chambers, New York, N. Y. Maintenance and part-time secretarial assistance for a study of the juvenile gang as a social phenomenon in New York City..... 700

Grant No. 846. Wallace Craig, Cambridge, Mass. Maintenance for the completion of a paper entitled "The space system of the perceiving self." (Third and final grant)..... 1,500

Grant No. 847. William W. Dowdy, Lincoln University. Maintenance for a study of stratification of the Arthropoda in the oak hickory forest of Missouri 500

Grant No. 848. Reginald R. Gates, Marine Biological Laboratory. Field work, and travel, secretarial work, etc., in connection with the preparation of a paper on race ancestry and race crossing in man. (Fourth and final grant.)..... 600

Grant No. 849. William H. Hobbs, University of Michigan. Travel and living expenses for a restudy of the glacial history of Iowa. (Third grant.) 400

Grant No. 850. J. F. K. Holtfreter, McGill University. Assistance in connection with the investigation of the physicochemical properties of cell inclusion (yolk and lipo-protein bodies) in amphibian development. (Second grant.) 200

Grant No. 851. Thomas D. Cope, University of Pennsylvania. To secure copies of manuscripts and pay for searches in connection with the preparation for publication of the scientific background of the Mason and Dixon tradition 500

Grant No. 852. Conyers Read, Villa Nova, Pa. Assistance to supervise the completion of a book by the late Howard L. Gray on a study of British government finance during the middle decade of the fifteenth century ..... $750[1]

Grant No. 853. Ralph L. Rusk, New York. Secretarial assistance in connection with the preparation and completion of the life of Ralph Waldo Emerson. (Second grant.) 400

Grant No. 854. David B. Stout, Washington, D. C. Living and travel expenses in connection with the study of Cuna Indian Culture in Panama 700

Grant No. 855. Henry K. Townes, Jr., Takoma Park, Md. Field work in connection with the study of the taxonomy of the Ichneumonidae (Humenoptera) 300

Grant No. 856. J. Mason Brewer, Samuel Huston College. Scoring of 20 songs and typing 200 pages in connection with the completion of a guide book of American Negro folklore. (Second and final grant.) 125

Grant No. 857. William D. McElroy, Johns Hopkins University. Purchase of equipment in connection with the biosynthesis of biologically important purine compounds 1,200

Grant No. 858. Antonio Pace, Syracuse University. Maintenance, photostats, etc. in connection with the study of the relationships between the American Philosophical Society and Italo-American Cultural relations. (Second grant.) 300

Grant No. 859. Abraham M. Shanes, New York University, College of Dentistry. Apparatus in connection with the study of the correlation of physical, chemical, and metabolic factors in the production of electrical potentials by invertebrate nerve 450

Grant No. 860. Lorenzo Dow Turner, Nashville, Tenn. Travel, informant's fees, assistance to further the completion of a three volume work of Afro-Brazilian folklore 750

Grant No. 861. Lloyd R. Watson, Alfred University. Assistant, travel, apparatus, etc., to improve the technique of the instrumental insemination of queen bees. (Third grant.) 300

Grant No. 862. Clara M. Szego and Sidney Roberts, Worcester Foundation. Equipment, etc. for the investigation of the chemical nature of circulating estrogen and the possible role of the liver in its formation. 400

Grant No. 863. Henry N. Andrews, Missouri Botanical Garden. Preparation of microscopic thin-sections of plant specimens in connection with a study of the petrified Cretaceous ferns belonging to the genus *Tempskya*, from southeastern Idaho 250

Grant No. 864 Adolph Berger, New School for Social Research. Maintenance in connection with the preparation of a vocabulary of Roman Law 1,000

[1] Balance of $480.13 credited to Penrose Fund.

Grant No. 865. Ernest Berliner, Bryn Mawr College. Assistant in connection with the investigation of a competitive bromination of alkyl-benzenes for the purpose of ascertaining a possible conjugation of alkyl groups with the benzene rings $500

Grant No. 866. W. Eugene Hollon, University of Oklahoma. Travel, maintenance for a biographical study of Zebulon Montgomery Pike 500

Grant No. 867. R. Florence Brinkley, Goucher College. Travel and equipment for a study of Coleridge on the seventeenth century.... 1,200

Grant No. 868. L. S. Cressman, University of Oregon. Field work and assistants for an investigation to determine if the early cultures of the Northern Great Basin of South Central Oregon were diffused to the Great Basin through the John Day River area from the North 500

Grant No. 869. Harold Kirby, University of California. Assistance in preparation of illustrations, etc. in connection with the studies of comparative morphology, morphogenesis, and taxonomy of flagellate protozoa symbiotic in termites 800

Grant No. 870. Charles Coleman Sellers, Hebron, Conn. Maintenance for the preparation of a volume on Charles Willson Peale's portraits and paintings. (Library Research Associate. Third grant.).. 1,800

Grant No. 871. Otto Springer, University of Pennsylvania. Assistants and supplies in connection with the preparation of a variorum edition of the Elder Edda 1,200

Grant No. 872. Charles Calvert Bayley, McGill University. Assistant, travel, stenographic assistance for the evolution of the college of prince-electors in Germany, 1198-1356 300

Grant No. 873. Alfred Frederick Bliss, Albany Medical College. Laboratory room and services in connection with the identification of intermediate steps in the visual cycle, with special reference to marine invertebrates, e.g. the squid. (Second grant.)..... 220

Grant No. 874. Frederick H. Cramer, Mt. Holyoke College. Travel, and maintenance to complete the volume on "the natural science in Roman life and law." 1,000

Grant No. 875. Hilda Geiringer, Wheaton College. Books, travel, etc. in connection with the investigation of mathematics of heredity. (Second grant.) 600

Grant No. 876. Margaret Fulford, University of Cincinnati. Assistant to investigate the possible relationship between the fungus, a species of *Cephalosporium*, and regeneration in leafy liverworts through the growing of uncontaminated cultures of liverworts from spores, etc. (Second grant.) 500

Grant No. 877. Isabelle W. Pfeiffer, Yale University. Technical assistance in connection with the investigation of the endocrine system of the grasshopper *Melanoplus differentialis* 1,800

Grant No. 878. W. Sherman Savage, Lincoln University. Travel, assistants, field work, equipment for the completion of work on the Negro in the history of the West, 1830-1890 ..... $500

Grant No. 879. Rushton Coulborn, Atlanta, Ga. Research-secretarial assistance for an elucidation by historical procedure of the distinction between civilized and primitive societies: the emergence of the former by conglomeration of the latter is shown, and then, in the five cases (Egypt, Mesopotamia, N.W. India, N. China, and Crete) the first rise and fall of the civilized society 500

Grant No. 880. Rutherford E. Delmage, St. Lawrence University, Canton, N. Y. Living and travel expenses, equipment in connection with a study of the idea of progress in America from 1750 to 1800 400

Grant No. 881. William J. Roach, University of Pennsylvania. Assistant in connection with an edition and critical study of the First Continuation of the Old French Perceval by Chrétien de Troyes. (Second and final grant.) 1,500

Grant No. 882. John D. Kern, Temple University. Travel, etc. in connection with the identification of the authors of anonymous articles in the *Quarterly* and *Edinburgh Reviews* during the first half of the nineteenth century ..... 1,000[2]

Grant No. 883. Bureau of Municipal Research, Philadelphia. (1) To determine whether or to what degree recreational opportunities are freely available to Negroes in quantity and quality comparable to those available to Whites. (2) For such inequalities as are found to exist, to make recommendations for their correction.... 1,125

Grant No. 884. Herman A. Witkin, Brooklyn College. Assistant and equipment to investigate the problem of geographic orientation, i.e., the manner in which the individual determines his bearing toward the north, south, east, west axes of space... 525

Grant No. 885. Samuel P. Bayard, State College, Pa. Maintenance during the summer while collecting traditional song and music (including instrumental music) in Pennsylvania. (Second grant.) 300

Grant No. 886. Gairdner B. Moment, Goucher College. Equipment for the measurement of the electrical potentials produced by growing and regenerating animals and their parts in connection with a new theory of growth limitation..... 850

Grant No. 887. Aron Gurwitsch, Cambridge, Mass. Maintenance. Continuation and completion of the study of William James' theory of the "transitive parts" of the stream of thought. (Second grant.) 600

Grant No. 888. Albert C. Smith, Arnold Arboretum. Wages and subsistence for native assistants in connection with the botanical exploration of the Fiji Islands 1,000

[2] Grant relinquished.

Grant No. 889. Paul Lucian Garvin, Indiana University. Equipment, field work, travel, maintenance in connection with the summarizing in brief structural statement the numerous manuscripts on the Kutenai language in the Society's collection $700

Grant No. 890. Zellig S. Harris, Philadelphia. Field trips, travel, assistance, etc. for carrying out research, etc. designed to develop the Boas Collection of manuscripts in American Indian Linguistics in the Society's Library. (Library Research Associate. Second grant.) 1,200

Grant No. 891. Eufrosina Dvoichenko-Markoff, New York. Maintenance for the continuation of work pertaining to relations between the American Philosophical Society and Russia in the eighteenth and nineteenth centuries. (Second grant.) 400

Grant No. 892. Charles A. Berger, Fordham University. Assistance for the investigation of the role of polyploidy in the normal development of diploid plants. (Third grant.) 600

Grant No. 893. T. T. Chen, University of California. Assistance in connection with the investigation of (*a*) sex types, sex reaction, and conjugation in Paramecium; (*b*) problem of aging in Paramecium. (Fourth grant.) 300

Grant No. 894. Edward Girden, Brooklyn College. Construction of amplifiers to permit (1) the completion of a phylogenetic comparison of the experimental drug dissociations in animals and (2) the investigation of some of the phenomena of dissociation in human subjects. (Fourth grant.) 1,500

Grant No. 895. William Greene Roelker, East Greenwich, R. I. Secretarial assistance and travel to edit the Franklin-Greene Correspondence in the Library of the Society. (Library Research Associate) 1,500

Grant No. 896. Helen M. Johnson, Chicago, Ill. Travel expenses to complete the press copy of additional volumes of the annotated translation of the Triṣaṣṭiśalākāpurusacaritra, Lives of the Sixty-three illustrious persons 2,000

Grant No. 897. Leyden Observatory, Dr. J. H. Oort, Director. To determine the fundamental declinations from azimuth-measures from a station on the equator (Kinya) 240

Grant No. 898. Jean L. A. Brachet, University of Pennsylvania. Assistant to work on nuclei acid metabolism in normal and hybrid embryos 1,500

Grant No. 899. Robert D. Meade, Randolph-Macon Woman's College. Field work, assistance, travel, etc. for the completion of a definitive life of Patrick Henry. (Second grant.) 1,000

Grant No. 900. Richard B. Morris, College of the City of New York. Assistance, equipment for a study of the convergence of freedom and bondage in the ante bellum period of American history. (Second grant.) 2,000

Grant No. 901. Lorrin A. Riggs, Brown University. Equipment for (*a*) study of electrical potentials in the human eye and (*b*) a comparison between the above electrical method and the traditional psychophysical methods of obtaining data on the process of dark adaptation and color vision of the human eye $600

Grant No. 902. Charles S. Singleton, Johns Hopkins University. Assistance for the preparation of a critical edition of Giovanni Boccaccio's *Decameron* 450

Grant No. 903. Charles F. Voegelin, Indiana University. Travel for an investigation of the structure of American Indian Language. (Library Research Associate) 750

Grant No. 904. Harold Courlander, New York. Assistants, equipment to reproduce the texts of folksongs and folk music as they appear in Creole, with adequate explanations of elusive references, and translate them into English 500

Grant No. 905. W. A. Hiltner, Yerkes Observatory. Equipment for a photometric investigation of the polarization of the continuous radiation from early type stars 750

Grant No. 906. Jane M. Oppenheimer, Bryn Mawr College. Assistant for an experimental analysis of the development of structure and function in the central nervous system of fish embryos..... 3,000

Grant No. 907. Moddie E. Taylor, Lincoln University. Equipment, assistants, etc. for a study of the factor involved in the strain of the hydrogen bond to a new order of precision..... 1,500

Grant No. 908. Frank Bradshaw Wood, Jacksonville, Florida. Assistants for a precise photoelectric observation of selected eclipsing variables 250

Grant No. 909. E. D. Bueker and Morris Belkin, Medical College of the State of South Carolina. Supplies for a study of the differentiation of motor and sensory neurons after the substitution of growing tumor masses for the limb periphery 300

Grant No. 910. Henry Norris Russell on behalf of Panel on Orbits of Eclipsing Variables. Assistance, equipment for a systematic eclipsing variables, preparatory for the construction of a critical First Catalogue of Orbits of Eclipsing Binary Systems..... 2,500

Grant No. 911. Bradford Allen Booth, University of California. Travel in connection with the preparation of an edition of the letters and private papers of Anthony Trollope 750

Grant No. 912. Philip P. Wiener, New York. Living expenses, travel, etc. for the preparation of his work on "Evolutionism and Pragmatism in American Philosophy." (Second grant.) 500

Grant No. 913. James F. Crow, Dartmouth College. Assistance, recording observations for a study of the different susceptibility to drugs of several closely related Drosophila species 300

Grant No. 914. Arthur Loveridge, Museum of Comparative Zoology, Harvard University. Travel, etc. in connection with the ecologic studies on the vanishing vertebrate fauna of rain forest remnants in tropical East Africa $2,000

Grant No. 915. Bermuda Biological Station for Research, Inc. Stipends for Fellows to be chosen by the Executive Committee of the Station to continue their research..... 6,000

Grant No. 916. Denis L. Fox, Scripps Institution of Oceanography. Research assistance and special reagents for the investigation of comparative animal metabolism of carotenoids 840

The distribution of these grants to various subjects is shown in the following table:

		Grants	Amount
Class I.	Astronomy	4	$ 3,740
	Mathematics	1	600
	Chemistry	2	2,000
Class II.	Geology	1	400
	Zoology	12	13,250
	Embryology	1	3,000
	Ecology	2	2,500
	Botany	4	2,450
	Anthropolgy	3	1,800
	Psychology	4	4,125
	Physiology	4	2,270
	Biochemistry	1	840
Class III.	History	6	6,200
	Sociology	2	1,825
	Jurisprudence	1	1,000
Class IV.	Philosophy	2	1,100
	History, Ancient and Cultural	14	8,425
	History of Science	1	500
	Philology and Linguistics	7	8,850
	Music	2	600
Total		74	$65,475

A summary of the research grants from the Penrose Fund made since the beginning of the Society's research program in midsummer of 1933 is shown in the following table:

SUMMARY OF GRANTS AWARDED FROM THE PENROSE FUND
From July 31, 1933 to December 31, 1946

		Grants	Amount	Refunds	Total
Class I.	Mathematics	10	$ 6,436.00		$ 6,436 00
	Astronomy and Astrophysics	39	39,190.00	$ 542.06	38,647.94
	Meteorology	4	2,232.00	21.75	2,210 25
	Physics	77	78,232.53	3,563.95	74,668.58
	Geophysics	3	4,200.00		4,200.00
	Chemistry and Geochemistry	55	47,700.00	2,514.77	45,185.23
	Engineering	1	75.00		75 00
	Total	189	178,065.53	6,642.53	171,423.00
Class II.	Geology	11	5,305 00	4,000.00	1,305 00
	Paleontology	18	10,575.00		10,575.00
	Geography and Physiography	3	1,200.00		1,200.00
	Zoology	102	68,382 73	324.53	68,058 20
	Genetics and Cytology	59	51,439.00	1,035.36	50,403 64
	Ecology, Limnology, and Oceanography	19	11,762.50	230.75	11,531.75
	Botany	69	50,101.71	1,352.00	48,749.71
	Dendrochronology	1	500.00		500.00
	Bacteriology	7	3,450 00		3,450.00
	Anthropology	21	25,885.00	2,146.14	23,738 86
	Psychology	28	16,940.00	1,591.75	15,348 25
	Anatomy	19	10,475.00	474.19	10,000.81
	Physiology	72	59,402.00	617.54	58,784.46
	Biochemistry	5	3,140.00		3,140.00
	Pathology, Medicine, and Immunology	14	10,400.00	249.06	10,150.94
	Total	448	328,957.94	12,021.32	316,936.62
Class III.	History, American and Modern	54	48,162.00	2,051.92	46,110.08
	Political Science and Government	8	15,360.00	249.31	15,110.69
	Economics	2	600.00		600.00
	Sociology	5	3,825.00		3,825.00
	Jurisprudence	3	3,800.00		3,800.00
	Total	72	71,747.00	2,301.23	69,445.77

SUMMARY OF GRANTS AWARDED FROM THE PENROSE FUND—*Continued*

		Grants	Amount	Refunds	Total
Class IV.	Philosophy and Education	10	8,500.00	1,100.00	7,400.00
	History, Ancient, Medieval and Cultural	48	31,313 00	2,330.13	28,982 87
	History of Science	4	2,160 00		2,160 00
	Archaeology	40	45,575.00	7,144.53	38,430.47
	Ethnology	16	14,350.00	500.00	13,850.00
	Philology and Languages	38	37,175.00	42.27	37,132.73
	Literature	17	24,150.00	750.00	23,400 00
	Drama	2	1,000.00		1,000.00
	Music	13	8,770 00	283.95	8,486 05
	Art	9	7,150.00		7,150 00
	Architecture	4	3,580.00		3,580 00
	Total	201	183,723.00	12,150.88	171,572 12
MISCELLANEOUS		20	41,750 00	9 45	41,740 55
TOTAL		930	$804,243.47	$ 33,125.41	$771,118 06

Total appropriations July 1933 to December 31, 1946	$910,000.00	
Refunds and canceled grants	33,125.41	$943,125 41
Total grants July 1933 to December 31, 1946.	804,243.47	
Expenses 1933–1936*	247.96	
Transferred to the Committee on Library 1943	20,000.00	
Transferred to "Reserve Fund for Post-War Expenditures" to December 31, 1946	111,504 07	935,995 50
Balance on hand December 31, 1946		$ 7,129 91

* After this date a separate fund was established for research expenses.

THE JOHNSON FUND

The budget for the year 1946 assigned the sum of $19,000 for research from the income of the Eldridge Reeves Johnson Fund. From this sum the following five grants amounting to $10,150 were approved during the year and $1,000 was tentatively committed leaving a balance of $7,850 which has been transferred to Principal.

Grant No. 67. University Museum, Philadelphia. Publication of the second and concluding volume of *The Excavations at Tepe Gawra* by Arthur J. Topler **$6,500**

Grant No. 68. Samuel Noah Kramer, University Museum. Assistant to catalogue the tablet collection of the University Museum of approximately twenty thousand tablets and fragments $1,000

Grant No. 69. James A. G. Rehn, Academy of Natural Sciences of Philadelphia. Maintenance, motor fuel, etc. for investigating the insects of the order Orthoptera in certain areas of Colorado, Utah, Arizona, New Mexico, and western Texas. (Fourth grant.)..... 650

Grant No. 70. Ruth Patrick, Academy of Natural Sciences of Philadelphia. Travel, equipment, to collect for taxonomic and ecological study the diatoms of southern Mexico. (Second grant.) 1,000

Grant No. 70. H. Radclyffe Roberts, Academy of Natural Sciences of Philadelphia. Assistance, equipment to investigate the genetic nature of specific and subspecific characters ordinarily used in the taxonomy of grasshoppers. (Third grant.) 1,000

THE DALAND FUND

The appropriation from the income of the Judson Daland Fund for Research in Clinical Medicine at the beginning of the year 1946 was $8,000. No grants from this Fund have been made during the year and the $8,000 has been transferred to Principal.

RESERVE FUND FOR POST-WAR EXPENDITURES

This Fund was established in 1943 from unexpended balances in the allotments from the Penrose, Johnson, and Daland Funds. It was added to in the same manner with the balances in 1944 and 1945 at which time the Fund amounted to $177,446.92. From this sum the following three grants amounting to $11,000 were approved during the year:

Grant No. 1. American Association for State and Local History. Expansion program of the Association $4,000

Grant No. 2. Society for the Study of Evolution. To underwrite to the extent of $5,000, the proposed international quarterly journal of evolution to be established by the Society for the Study of Evolution 5,000

Grant No. 3. Science Service. Assistance in financing the development of Science Fairs in the South..... 2,000

REPORTS FROM RECIPIENTS OF GRANTS[1]

(ARRANGED ALPHABETICALLY UNDER THE CLASSIFICATIONS OF SUBJECTS REPRESENTED IN THE MEMBERSHIP OF THE SOCIETY)

CLASS I. MATHEMATICAL AND PHYSICAL SCIENCES

MATHEMATICS

HARRY S. VANDIVER, University of Texas

Grant No. 405 (1940), $1,500. Fermat's last theorem and related topics in the theory of numbers.

About three fourths of the work done so far on the manuscript "Fermat's Last Theorem and related Topics in Number Theory" was done prior to September 1941. From that time until May 1945, nothing was done along this line because of a heavy teaching load at the University of Texas, where I was employed, the great difficulty of getting any assistance while war conditions prevailed, and the impossibility of obtaining any leave with or without pay from the University. Since May 1945, however, I have been able to do some work on the manuscript and have obtained the assistance of Dr. J. L. Dorroh of the Illinois Institute of Technology in the project. Of some thirty-five chapters planned for the work, eight are practically complete, and the whole book should be finished in several years.

In thinking over the material for the book many new ideas have been obtained by the writer and papers resulting from them have been published within the last year.

ASTRONOMY

E. A. FATH, Carleton College

Grant No. 448 (1940), $150. A photometric study of the variable star 12 Lacertae wth a photo-electric photometer.

The short-period variability of 12 Lacertae was discovered independently by Stebbins in 1917 and by Guthnick in 1918. Because of the varying amplitude of the radial velocity curve reported by Young and others this star was placed on our observing list to see if it should prove to have several periods such as we found for δ Scuti.

[1] All grants from the Penrose Fund unless otherwise specified.

The observations were all made by means of a photo-electric photometer attached to the 16-inch Goodsell refractor for the season of 1937 and to the 12-inch Lick refractor for the seasons of 1939 and 1940.

In the hope that observations at other longitudes would help greatly in settling the beat period and therefore the value of the secondary variation period requests for observations were made early in 1940 to the observatories at Cambridge, England, Neubabelsberg, Berlin, and Abastumani, in the U.S.S.R. The first two responded with observations by H. E. Green and by Guthnick. Unfortunately, on only one night were observations made in Europe on the same night as at Mt. Hamilton and these failed to settle the question of the period of the varying amplitude. Green's observations have been published in *Monthly Notices of the Royal Astronomical Society* **101**: 42, 1941.

The Fundamental Period

For the determination of the fundamental period of variation there were used only well-defined maxima, one by Stebbins in 1917, two by Guthnick in 1919 and 1920, 51 by the author in 1937, 1939 and 1940, 3 by Guthnick and 6 by Green in 1940, a total of 63.

A least-squares solution of the observation equations gave

$$\text{Max.} = \text{J. D. } 2421439.776 + 0.19308902\ E.$$

The total number of periods between Stebbins' first maximum in 1917 and my last in 1940 is 43990. The deviations of the observed maximum from the computed ranged from $-0^d.040$ to $+ 0^d.036$. The average deviation was $\pm 0^d.014$.

The Second Period

Since the amplitude of the light curves varied from $0^m.035$ to $0^m.189$ it seemed necessary to assume that there were other periods besides the fundamental one and that the observed light curves were the results of interference between various periods and amplitudes. Assuming that the mean light curve could be considered the fundamental variation in amplitude and period, the difference between each observation and the mean curve would give a series of residuals free from the fundamental period. These "first" residuals were then tested by means of a periodogram for other periods. Two values near $0^d.16+$ and $0^d.13+$ were found to indicate possible additional periods. The one near $0^d.16+$ was first investigated.

Many trial periods were tested. The value $0^d.164850$ gave the best results. Using the formula

$$\text{Min.} = \text{J.D. } 2428750.600 + 0.164850\ \text{E}$$

resulted in somewhat different curves for the three years. It seemed impossible to get the three maxima into exact phase. A change of 1 either way in the value of the sixth decimal of the period threw them farther out of phase. There appeared no other choice than to accept the above value of the second period with different curves for the three seasons' observations.

Since the periodogram had also indicated a period near $0^d\,13$ a hunt for the third period was in order.

The Third Period

The second period curves were substracted from the first residuals for the corresponding years and new series of values, second residuals, were obtained. These had been freed from the fundamental and second periods. Trials for a third period near $0^d\,13$ were made. On the basis of the value of the correlation ratios and smoothness of curve it soon became evident that there was not only no chance of forcing the third curves of the three years into phase but also that the periods for the three years differed, beginning with the fourth decimal place.

The best curves for the three years resulted in the following three phase equations

$$\begin{aligned}\text{Min.} &= \text{J.D. } 2428750.600 + 0.131627\ \text{E}\\ &= \text{J.D. } 2428750.600 + 0.131850\ \text{E}\\ &= \text{J.D. } 2428750.600 + 0.131875\ \text{E}\end{aligned}$$

In each of these three cases the residuals for one year gave nearly flat or very irregular curves when plotted on the period of either of the other two years. The difference therefore seems real.

There were still available many residuals which might have been analysed for a fourth period but the small amplitude of third period curves made it seem improbable that results of real value could be obtained. It was therefore decided to stop at this point.

Tests

It proved impossible by the use of the three curves of different period and amplitude to reproduce quantitatively the actual light curves. Three qualitative checks, however, were made.

1. Eight of the light curves are almost flat with a range of $0^{m}.05$ or less. These were interpreted as a combination of a maximum of the fundamental variation with the minima of both the second and third periods. As a check the times of maximum of the first period and the minima of the other two were computed for the low amplitude curves. The greatest time difference between the computed maximum of the primary and either of the other minima was $0^{d}.068$ and the least was $0^{d}.005$. The mean of the 16 deviations is $0^{d}.026$.

2. Three of the curves show definite humps on an otherwise smooth curve. In each case one or both of the second and third periods gave a maximum at these humps.

3. There are 4 curves for which a displacement of the observed maximum from the computed time of primary maximum amounted to $0^{d}.03$ or more. In 2 cases the observed maximum preceded the computed and in 2 cases it followed. In each case the computed maxima for the second and third periods occurred on the proper side to displace the observed maximum in that direction.

Summary

We may conclude, therefore, on the basis of 63 maxima, one each in 1917, 1919, and 1920, and 60 in 1937–1940 that the mean period of the fundamental variation is 0^{d} 19308902 with an amplitude of 0.082 magnitude. Besides the fundamental period there is a second period of $0^{d}.164850$ with an amplitude of about 0.031 magnitude, and a third period of $0^{d}.1316+$ with an amplitude of about 0.017 magnitude.

My sincere thanks are due to the American Philosophical Society for aid to cover expenses in connection with the observations of the 1940 season, to the Sigma Xi Research Fund for aid for the 1939 season, to Dr. J. H. Moore, director of the Lick Observatory, for placing the 12-inch refractor of that observatory at my disposal and to various students who acted as recorders or computers.

WILLEM J. LUYTEN, University of Minnesota

Grants No. 432 (1940), $500, No. 579 (1941), $250, and No. 831 (1945), $1,000. Measurement and preparation for publication of the motions of stars in the zone between declinations -40 and -50 and north of declination -40.

The first two grants were made to aid in the measurement and preparation for publication of the motions of stars in the zone between declinations —40 and —50. Owing to the war, work on this research was interrupted for several years, and it was not until the present calendar year that the funds granted were used up, and the work completed.

Measures and reductions of the motions of more than 15,000 stars within the limits of declination mentioned, with photographic magnitudes brighter than 17, and with motions exceedings 0.030 annually have now been completed. The information thus obtained has been incorporated into a card catalogue as well as into a manuscript catalogue in which the stars are arranged in order of Right Ascension, and which is now ready for publication. Statistical analysis and discussion of the data thus obtained is now in progress.

Grant No. 831 was for the purpose of aiding with the measurement of the motions of stars north of declination —40. A grant of like amount toward the same research was made by the Graduate School of the University of Minnesota. The actual measurements were to be made by student assistants but during the first few months of the year severe difficulties were encountered in finding students suitable for this work—both in the matter of being capable, and, that of being willing to do it. However, during the summer conditions improved considerably, and a large amount of work has been accomplished since that time.

To date the motions of 2,800 stars occurring on 35 pairs of plates with centers at declination —37½ have been measured and reduced. Positions and photographic magnitudes have been determined for these same stars and a beginning has been made with the recording of these data on filing cards to be incorporated into the general catalogue of proper motions in the southern hemisphere.

If the work can be continued on the same scale there is every reason to hope that the —37½ zone may be completed in 1947 and all motions south of —30 may be completely measured by the end of 1948.

Since one of the ultimate aims of the proper motion survey has been the making of a broad and homogeneous search for White Dwarfs in the sky, and since such a search cannot be undertaken unless the first phase of the work, viz., the measurement of the motions and the determination of the positions and magnitudes

of the stars has been completed, the results attained in this White Dwarf Survey may properly be reported here also.

With the collaboration of the Steward Observatory of the University of Arizona and of the Cordoba Observatory in Argentina color observations of several thousand proper motion stars have now been obtained. From these observations a total number of 50 new white dwarfs has been found, considerably more than have been found by all other investigators in this field combined. Among these 50 there are 15 which are components of binaries and which will thus afford the only direct means of determining the masses of white dwarfs by the study of their orbital motions.

LUYTEN, WILLEM J. 1941-1943. Reports of progress, *Yr. Bk. Amer. Philos. Soc.* for 1940: 213; for 1942: 101-102.

————————1945. Radial velocities and spectral classes for some starts of larger proper motion. *Astrophys. Jour.* 102: 382-386.

————————1946. White dwarfs among components of binaries. *Astron. Jour.* 52: 35-37.

LUYTEN, WILLEM J., and MARTIN DARTAYET, 1945. Preliminary color indices for starts of large proper motion, II. *Astrophys. Jour.* 102: 196-202.

S. A. MITCHELL, Leander McCormick Observatory, University of Virginia

Grant No. 655 (1942), $1,500 and No. 733 (1944), $1,500. Study of the spectrum of the chromosphere from photographs obtained at eclipses of the sun.

The work of a life-time spent in observing total eclipses of the sun is now completed. The details of the observations and their interpretations will appear in January 1947, in three separate publications, the first two by S. A. Mitchell, the third by Rupert Wildt. In *Popular Astronomy* will be described the high lights of 100,000 miles of travel in order to secure observations concentrated in a possible 26 minutes of time.

At a total eclipse, the moon progressively covers and uncovers the sun's atmosphere called the chromosphere. At the instant of the beginning and again at the end of totality the spectrum of the chromosphere may be photographed, but for a very few seconds only. The spectrographs always used have been very simple, namely, each consisting of a concave grating and used without slit. The photographs were made on fixed celluloid films.

The second and third articles, referred to above, will appear in the *Astrophysical Journal.* In the second publication, the results were combined from four separate eclipses, observed in

Spain (1905), Connecticut (1925), Niuafoou Island (1930), and Canton Island (1937). The tabular material comprises a total of 3,500 lines in the chromosphere between wavelength 3066 A in the ultra violet and 8863 in the infrared. In addition to the wavelength of each line, the element in the sun is given, together with the intensities in the chromosphere approximately on the Rowland scale, the heights in kilometers above the photosphere and the excitation potentials.

The measurements of the lengths of the arcs of the flash spectrum furnish accurate information about the heights in kilometers that the vapors forming the chromosphere extend above the surface of the sun. A quarter century ago, Saha utilized Mitchell's heights to confirm his theory of ionization, by means of which our knowledge of the spectrum of the sun and the stars has been completely revolutionized. The brilliant work of Henry Norris Russell and Charlotte E. Moore in disentangling the intricacies of laboratory spectra and arranging them in multiplet series, together with information giving the energies required for the transitions and measured in electron volts, has further revolutionized our knowledge of the sun.

In the third of the three publications, Dr. Wildt discusses the astrophysical consequences and gives the new information regarding the sun and its atmosphere that has been obtained from the observations recorded in the second publication.

The heights in the chromosphere depend on the total number of emitting atoms contained in a column along the line of sight, on the threshold sensitivity of the photographic emulsion, and on the transparency of the earth's atmosphere and of the optical system. Theoretical intensities of a group of related lines from multiplets originating from the same element are plotted against the heights, H, and this plot can be represented by a continuous function represented by $E(H)$. By the application of certain small corrections, there is then derived the function $f(H)$ which represents conditions in the chromosphere, and especially the number of atoms involved at different heights above the sun's surface.

As is well known, the sun consists of all the elements known on earth, the most abundant element being hydrogen. There are great differences in intensities between the lines in the ordinary Fraunhofer spectrum of the sun and in the flash spectrum. No helium lines ordinarily appear in the solar spectrum but lines of

both He I and He II appear in the flash spectrum. For hydrogen, there are only four strong lines in the Fraunhofer spectrum, though other lines may be traced faintly, while in the flash spectrum Mitchell has photographed 35 lines of the Balmer series. At the 1937 eclipse, he was successful in photographing, and for the first time, up to H 40 in the Paschen series in the infrared.

The radial decay of the density of hydrogen in the chromosphere is strictly exponential to heights of the order of 15,000 km and may be represented numerically as proportional to one exponential. The density gradients derived from the Balmer and the Paschen series are in good agreement. The same density gradient of hydrogen has been derived from a comparison of the electron density at the base of the chromosphere with that at the elevation of 15,000 km, and was deduced by Baumbach from the absolute intensity of the continuous spectrum of the solar corona, the reasoning being that the free electrons are nearly all produced by the ionization of hydrogen, by far the most abundant element in the solar atmosphere.

For the metals in the sun, the density laws can be represented as the sum of two or three exponentials. At heights in the chromosphere less than 2,000 km, their gradients are much steeper than that of hydrogen, but between 3,000 km and 6,000 km they seem to approach the hydrogen gradient. The sun is comparatively rich in iron and the density gradients of both neutral and ionized iron are compatible with the existence of ionization equilibrium with constant temperature throughout the chromosphere.

Relative abundances of many elements in the chromosphere are derived from the estimated heights and from absolute transition probabilities; these ratios agree well with those found by Russell from the Fraunhofer spectrum. While the chromosphere appears to be well mixed as regards the metals, the abundance ratio A of hydrogen to the sum of the metals increases greatly with height above the surface of the sun. This variation of A is evaluated by a comparison of lines of Fe I and the Balmer series, and the extrapolated value of A at the base of the chromosphere agrees as to order of magnitude with that resulting from the model of the solar photosphere formulated by B. Stromgren. The number of atoms per cc at the level of 500 km is a million times greater for neutral hydrogen than for neutral iron. The absolute densities of hydrogen and the metals thus determined lead to the conclusion that self-

absorption in the tips of the chromospheric crescents is negligibly small.

Since the opacity of the solar atmosphere originates from the ionization continuum of the negative hydrogen ion, the radial distribution of continuous radiation at the extreme solar limb is determined by the density gradient of hydrogen. The predicted sharpness of the solar limb is seven times greater on the assumption of hydrostatic equilibrium than in the hypothetical case that the chromospheric gradient of hydrogen would continue downward unchanged for 500 km below the range covered by observations. Photometric observations of the sharpness of the solar limb, made by Lindblad at the 1945 eclipse, are in excellent agreement with the predicted hydrostatic gradient. Hence the chromosphere appears to have a rather well defined lower boundary.

PHYSICS

F. A. BENEDETTO, S.J., Fordham University

Grant No. 839 (1945), $520. Simultaneous mesotron observations atop the Empire State Building and at sea level.

In June 1945 work was started at Fordham University, New York City, on the overhauling and redesigning of the dual cosmic-ray telescope that had been used for several previous investigations of the atmospheric temperature effect on the intensity of mesotron variations.[1, 2, 3] It was suggested by Professor W. F. G. Swann, of the Bartol Research Foundation, Swarthmore, Pa., that the tower structure of the Empire State Building in New York City might afford sufficient altitude to justify a repetition of the height differential constant-mass-absorber type of experiment that had been done some years previously by observers who utilized the greater heights afforded by mountain ranges in Colorado and in North Carolina.[4, 5, 6]

[1] Hess, V. F., and F. A. Benedetto. Mesotron variation with upper air temperatures. Phys. Rev., vol. 60, pp. 610-611 (1941).

[2] Benedetto, F. A., G. O. Altmann, and V. F. Hess. Mesotron studies with dual telescope. Phys. Rev., vol. 61, pp. 266-269 (1942).

[3] Benedetto, F. A. Note on mesotron temperature coefficient. Phys. Rev., vol. 64, pp. 317-318 (1943).

[4] Rossi, B., N. Hilbury, and J. B. Hoag. The variation of the hard component of cosmic rays with height and the disintegration of mesotron. Phys. Rev., vol. 57 pp. 461-469 (1940).

[5] Rossi, B. and D. B. Hall. Variation of the rate of decay of mesotrons with momentum. Phys. Rev., vol. 59, pp. 223-228 (1941).

[6] Nielsen, W. M., C. M. Ryerson, L. W. Nordheim, and K. Z. Morgan. Differential measurements of the meson lifetime. Phys. Rev., vol. 59, pp. 547-553 (1941).

In this type of experiment mesotron intensities are recorded at different elevations; at the higher elevation a compensating layer of some solid such as lead, iron, or graphite, equal in mass to the difference in pressure between stations, is placed above the recording apparatus. Since under these circumstances there is the same total mass above each station, differences in mesotron intensities are interpreted as due to the decay of the short lived mesotron during the time interval required to traverse the difference in elevations of the two stations.

The two stations chosen for this experiment were the 87th floor level of the Empire State Building, 1,125 feet above sea level, and the roof of the physics building at Fordham University, 142 feet above sea level. The difference in altitude between these two stations, 983 feet, indicated that a difference in intensity of approximately 2 per cent could be expected due to the decay effect. Such a small variation could easily be masked by other disturbances such as atmospheric temperature, barometric, and magnetic variations; consequently in this experiment it was necessary to operate both stations simultaneously. As the two stations were close enough to be influenced equally by these extraneous variations, the ratio of the rates observed simultaneously at the two stations gave the variation due solely to mesotron decay over the path difference between the two elevations. Results of this experiment gave the mean life range of the mesotron equal to 9.7 ± 3km, showing that the decay phenomenon is appreciable even near sea level. Accuracy of the determination of the mean life range was limited chiefly by the comparatively small difference in height between stations. Preliminary results of this experiment were described by the author at the May 1946 meeting of the American Geophysical Union in Washington, D. C., and have been published in the October issue of the *Transactions* of the American Geophysical Union.

Besides serving as a control for the experiment above, the Fordham telescope was used for a series of correlation studies in which daily variations of mesotron intensities were correlated with the daily values of the height variations of seven different pressure levels of the atmosphere from 1,000 millibars to 100 millibars inclusive. Since Blackett's original paper on the temperature effect[7] it has been customary to assume a unique mesotron production level

[7] Blackett, P. M. S. Penetrating component of cosmic rays. Nature, vol. 142, pp. 692-693 (1938).

at approximately 16 km; the present series of correlation studies was undertaken in the attempt to verify this asumption and/or to ascertain if other levels of production might also exist. In these studies a maximum value of -0.62 ± 0.06 was found for the correlation coefficient and occurred at the 500 mb level, approximately 5.6 km. Beyond this level there is a sharp decrease in the value of the correlation coefficient followed by a slow increase which indicates a second maximum around the 100 mb level, approximately 16.3 km, at which level a correlation coefficient of -0.47 ± 0.09 was found.

From a composite study of several authors' investigations Rathgeber[8] concluded that two production levels for mesotrons exist at approximately 6 km and 17 km respectively; it is believed that the correlation studies reported here offer the most direct evidence to date of the existence of these two production levels. The final results of the two investigations outlined in this paper have been submitted for publication in the *Physical Review* and are expected to appear in the December 1946 issue.

The author wishes to express his appreciation to Professor V. F. Hess of Fordham University for his encouragement and valuable suggestions, and to Professor W. F. G. Swann of the Bartol Research Foundation who kindly furnished facilities for the repair of counters used in these investigations. Space for the upper station was gratuitously furnished by the Empire State, Inc. New York City.

BENEDETTO, F. A. 1946. Simultaneous cosmic ray measurements at the Empire State Building and at Fordham University. *Trans. Amer. Geophys. Union* 27:665-669.

———— ——1946. Some mesotron observations by simultaneous registration at two stations. *Phys. Rev.* 70:817-820.

WILLIAM W. COBLENTZ, National Bureau of Standards

Grant 591 (1941), $500. Improvement in a photoelectric cell for measuring ultraviolet solar and sky radiation on a horizontal plane.

The development and investigation of a standard photoelectric dosage intensity meter, and methods of measurement of the biologically effective component of ultraviolet solar and sky radiation, for use in heliotherapy, have been in progress since February 1, 1941. In the meantime about two dozen ultraviolet intensity meters

[8] Rathgeber, H. D. The mesotron component of cosmic rays. Phys. Rev., vol. 61, pp. 207-211 (1942).

have been studied. Progress was impeded by the war, and since then by strikes, which prevented delivery of new types of photoelectric cells now on order.

A by-product of this investigation is the procurement of a continuous record of data on the total daily amount of ultraviolet solar and sky radiation incident on a horizontal plane, which information is useful in ultraviolet bioclimatology. Progress reports are given in the following papers.

COBLENTZ, W. W. 1945. Biolclimatic measurements of u.v.-solar and sky radiation in Washington, D. C., 1941-1944. *Bull. Amer. Meteorol. Soc.* **26**: 113-117.

————————1946. Measurement of ultraviolet radiation useful in heliotherapy. *Jour. Opt. Soc. Amer.* **36**: 72-76.

COBLENTZ, W. W., and R. STAIR. 1944. A daily record of ultraviolet solar and sky radiation in Washington, 1941 to 1943. *Jour. Res. Nat. Bur. Standards* **33**: 21-44.

DAVID C. GRAHAME, Amherst College

Grant No. 782 (1945), $1,400. Measurements of the electrical and thermodynamic properties of mercury-solution interfaces.

Measurements have been made of the capacity of the electrical double layer at 25°C. between mercury and aqueous solutions of sodium chloride in concentrations between one-hundredth and one mole per liter. The accuracy of the results is great enough to permit the separate evaluation of Γ_+ and Γ_-, the superficial densities of cations and anions defined in the manner of Gibbs. Utilization of the same data in conjunction with results of Gouy permits an independent evaluation of the same quantities. The results are independent in spite of the fact that some of the same data are used, because the least certain quantity is not the same in the two methods of evaluation.

It is found that in moderately concentrated solutions Γ_+ is positive at all potentials, indicating that cations accumulate at the interface whether the mercury is positively or negatively charged. The value of Γ_+ *increases* as the mercury becomes more strongly charged, whether positively or negatively. In the latter case the attraction is manifestly coulombic, but in the former case the attraction is a secondary result of the chemisorption of anions on the mercury. The chemisorbed anions exceed in charge the positive charge on the mercury, leaving a net negative charge which attracts cations.

A specific adsorption potential has been calculated for anions on mercury showing that the force of attraction varies with the charge in a manner which is not coulombic. It is concluded, therefore, that the covalent bond between mercury and chloride ion increases in strength as the mercury is charged positively.

Present evidence indicates that hydrated cations do not, in general, lose their solvent sheath on approaching a metallic surface whereas most anions do. The Gouy theory of the diffuse double layer is therefore applicable only up to a plane defined by the electrical centers of solvated cations at their distance of closest approach to the surface. Calculations of the properties of the electrical double layer based upon this assumption are in much better agreement with experimental data than previous calculations.

GRAHAME, DAVID C. 1947. The electrical double layer and the theory of electrocapillarity. *Chem. Rev.* 39. In press.

CHEMISTRY

HERBERT C. BROWN, Wayne University

Grants No. 710 (1943), $1,000, No. 776 (1944), $500. Studies on steric strains.

Study of the qualitative and the quantitative aspects of steric strains in chemistry has been continued. In part the studies have been based upon observations of the relative stability of addition compounds of amines and phosphines, and in part upon the rates of selected chemical reactions. These investigations have led to new concepts of the nature and importance of steric effects in chemistry and they promise to clarify many of the hitherto unexplained peculiarities of the highly branched carbon compounds.

In the previous progress report it was pointed out that considerations based upon the known polar effect (+I) of alkyl substituents lead to the prediction that the base strength of amines should increase with increasing number of alkyl groups. That is, the order shown by a given series of amines would be that of sequence A (table 1). However, the order actually observed in aqueous solution, i.e., with the proton as the reference acid, is sequence B. This peculiar behavior is attributed to a new steric effect, termed "B-strain," which is discussed later in the report.

Many workers in the field of theoretical organic chemistry have in recent years expressed doubt as to the importance or even the

very existence of steric effects. For that reason it was deemed desirable to direct the first investigations toward obtaining conclusive evidence to answer this question. This has been accomplished by determining the relative stability of addition compounds of trimethylboron and tri-*t*-butylboron with the methyl-, ethyl-, isopropyl- and *t*-butylamines.

If steric effects were negligible, the relative stability of a given series of addition compounds should be predictable from the relative strengths of the bases involved in their formation. This is true because the tendency of the base to add a proton and its tendency to add a molecule of trialkylboron should be directly related to the ability of the base to donate its electron pair.

$$(1)\ R_3N{:}H^+ = R_3N{:} + H^+$$
$$(2)\ R_3N{:}BR'_3 = R_3N{:} + BR'_3$$

In the absence of important steric effects, it would therefore be predicted that the order of stability of a given series of bases, NH_3, RNH_2, R_2NH, R_3N, should be independent of the trialkylboron with which they are combined.

If steric effects were important, the stability of the addition compound should decrease greatly as the bulk of the alkyl groups, either on the amine or on the trialkylboron, is increased. Indeed, it may be predicted that with increasing steric effects, the sequences shown by any given series of amines should change from B to C, to D, to E, and finally to F.

TABLE 1

POSSIBLE SEQUENCES SHOWN BY ALKYLAMINES

A	NH_3	<	RNH_2	<	R_2NH	< R_3N
B	NH_3	<	R_3N	<	RNH_2	< R_2NH
C	R_3N	<	NH_3	<	RNH_2	< R_2NH
D	R_3N	<	NH_3	<	R_2NH	< RNH_2
E	R_3N	<	R_2NH	<	NH_3	< RNH_2
F	R_3N	<	R_2NH	<	RNH_2	< NH_3

The experimental results, summarized in table 2, clearly demonstrate that the observed sequence changes in a regular and predictable manner from B to F as the size and bulk of the alkyl groups attached to nitrogen or boron are increased. In view of this evidence there can be little reason to question either the existence or the importance of steric effects in the dissociation of these addition

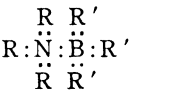
compounds. If it is accepted that steric effects are important in these compounds, there is no reason to doubt that they must be generally important since there is nothing unique about the dimensions or the configurations of these molecules.

TABLE 2

SEQUENCES SHOWN BY AMINE SERIES WITH VARIOUS REFERENCE ACIDS

Amine Series	*Reference Acid*		
	H^+	$(CH_3)_3B$	$(t\text{-}C_4H_9)_3B$
Methyl	B	B	F
Ethyl	B	D	F
Isopropyl	B	E	
t-Butyl		F	

It is considered that the increased dissociation of the addition compounds,



as the bulk of the groups R and R′ is increased, is to be attributed to a strain set up at the interface between the two components as a result of conflicting steric requirements. For convenience it has been named "F-Strain" and in nature is related to the steric effect which has been loosely termed steric hindrance in classical organic theory.

B-strain, which has no counterpart in classical theory, was introduced to explain the weakness of tertiary amines (compare the observed sequence B with the predicted sequence A, table 1). It was postulated that the three alkyl groups attached to the nitrogen atom in tertiary amines were badly crowded. This condition can be relieved somewhat in the free amine by a spreading of the carbon-nitrogen-carbon bond angle to a value somewhat greater than that of the tetrahedral angle. Addition of a proton or other group to the free electron pair tends to close these bond angles. A strain is thereby set up in the resulting quaternary derivative which leads to increased dissociation into the components and to an apparent weakening of the strength of the base.

The greatly increased size of the phosphorus atom in the phosphines should result in the absence of B-strain (unless the alkyl groups are of enormous size.) Experiment has revealed that in

these compounds, the base strength increases regularly with the number of alkyl groups, $PH_3 < CH_3PH_2 < (CH_3)_2PH < (CH_3)_3P$. This marked difference in the behavior of the nitrogen and phosphorus bases offers strong support for the B-strain hypothesis.

The dimensions of nitrogen atoms and carbon atoms are quite similar. It follows that three alkyl groups attached to carbon should also be crowded and bring about a condition of strain. Once this postulate is accepted, a simple and reasonable explanation is available for many of the peculiar properties of highly branched carbon compounds. Preliminary investigations of some of the consequences of the new concept have already yielded results which are highly favorable to the hypothesis.

BROWN, HERBERT C. 1945. Report of Progress, *Yr. Bk. Amer. Philos. Soc.* for 1944: 146-148.

————————1945. The effect of F-strain on the relative strengths of ammonia and the ethylamines. (Paper VII: Studies on Stereochemistry.) *Jour. Amer. Chem. Soc.* 67:1452-1455.

————————1945. B-strain and base strength. *Jour. Amer. Chem. Soc.* 67: 503.

————————1946. A new steric effect in organic chemistry. *Science* 103: 385-387.

BROWN, HERBERT C., and HOWARD PEARSALL. 1945. The effect of F-strain on the relative base strengths of the isopropyl- and *t*-butylamines. (Paper VIII: Studies in Sterochemistry.) *Jour. Amer. Chem. Soc.* 67: 1765-1767.

BROWN, HERBERT C., and GERALDINE K. BARBARAS. 1946. Steric strain in compounds with tertiary butyl groups; steric strain in polyisobutylene. *Jour. Chem. Physics* 14: 114.

BIOCHEMISTRY

ALBERT P. KLINE, Washington College (Now at Kirksville College of Osteopathic Medicine)

Grant No. 626 (1942), $200. Studies on the specificity and sensitivity of certain colorimetric reactions of the amino acids.

An attempt has been made to assemble an exhaustive collection of references concerning the colorimetric reactions of the more common amino acids. The number of reactions that have been found so far are as follows: 9 for alanine, 14 for arginine, 3 for aspartic acid, 14 for cysteine, 13 for cystine, 3 for glutamic acid, 14 for glycine, 22 for histidine, 6 for hydroxyproline, 1 for isoleucine, 10 for leucine, 3 for lysine, 3 for methionine, 15 for phenylalanine, 5 for proline, 1 for serine, 1 for threonine, 17 for tryptophane, 20 for tyrosine, and 1 for valine. These total 175.

Thirty of these reactions have been applied to 18 amino acids.

These 30 were distributed as follows: 4 for alanine, 4 for glycine, 4 for cystine, 2 for histidine, 1 for isoleucine, 1 for lysine, 5 for phenylalanine, 2 for leucine, 2 for methionine, 2 for hydroxyproline, 1 for threonine, and 2 for valine.

Two solutions of each acid were prepared. Their concentrations were, respectively, .1 per cent and .5 per cent, except those of cystine and tyrosine which, because of their low solubilities, were .1 per cent and saturated solutions. Each test was made on both solutions of each of the eighteen amino acids used. The quality of color developed was ascertained by comparing a standard thickness of solution with the standard colors on a Bradley Color Chart, under a standard daylight light. Because this work was of a preliminary nature, such a chart was thought to afford sufficient accuracy, especially since each color was compared by three different observers having tested normal color vision. The whole procedure was performed three times.

The amino acids used were obtained from Merck and Co. The other chemicals were of the purest commercially obtainable.

In the first fifteen tests various modifications were made in the procedure with a view to obtaining more specific reactions. However, these attempts were abandoned in favor of completing the work on all the tests before modifications of any were attempted.

In order to give an illustration of the results obtained, table 1 is included. This table presents the data so far obtained with respect to alanine. Since many of the other reactions so far investigated yield rather similar data it can be tentatively concluded that not many of them seem sufficiently specific or sensitive to prove of analytical value. However, modification of these tests may lead to an increase of both their specificity and their sensitivity.

TABLE 1

Reactions Involving Alanine

The colors to be expected for alanine with each of the reactions are for Part A, deep red; Part B, orange; Part C, bluish violet; and Part D, orange. The per cents refer to concentrations.

The explanation of the symbols are as follows:

R—red or reddish	B—blue or bluish	S—*shade*
O—orange	V—violet	NC—no color
Y—yellow or yellowish	T—tint	SS—saturated solution

The final numbers refer to intensity of either shade or tint.

Part A

Colorimetric Results Obtained by Subjecting 18 Amino Acids to Arreguine's Reaction for Alanine, Leucine, & Glutamic Acid

ALANINE	ARGININE	ASPARTIC ACID	CYSTINE	GLUTAMIC ACID	GLYCINE
.1% .5%	.1% .5%	.1% .5%	.1% SS	.1% .5%	.1% .5%
VRT^3 VRT^3	VRT^3 VRT^3	ORT^2 VRT^2	VRT^2 VRT^2	VRT^2 VRT^2	RT^1 RT^1

HISTIDINE	HYDROXYPROLINE	ISOLEUCINE	LEUCINE	LYSINE	METHIONINE
.1% .5%	.1% .5%	.1% .5%	.1% .5%	.1% .5%	.1% .5%
RT^1 RT^1	OR^2 VRT^2	VRT^2 VRT^2	VRT^2 VRT^2	RT^1 VRT^2	VRT^2 VRT^2

PHENYLALANINE	PROLINE	SERINE	THREONINE	TYROSINE	VALINE
.1% .5%	.1% .5%	.1% .5%	.1% .5%	.1% .5%	.1% .5%
VRT^2 VRT^2	ORT^2 VRT^2	RT^2 VRT^2	VRT^2 VRT^2	VRT^2 VRT^2	VRT^2 VRT^2

Cf. Arreguine, V. A new reaction of glycine and some other acylic amino acids, *Semana Med.* 37: 1074-1076, 1930.

Part B

Colorimetric Results Obtained by Subjecting 18 Amino Acids to Dubsky & Langer's Reaction for Alanine

ALANINE	ARGININE	ASPARTIC ACID	CYSTINE	GLUTAMIC ACID	GLYCINE
.1% .5%	.1% .5%	.1% .5%	.1% SS	.1% .5%	.1% .5%
YOT^1 ROS	YOT^1 ROS	OYS^1 ROS	YOT^1 ROS	OYS ROS	OYT^1 ROS

HISTIDINE	HYDROXYPROLINE	ISOLEUCINE	LEUCINE	LYSINE	METHIONINE
.1% .5%	.1% .5%	.1% .5%	.1% .5%	.1% .5%	.1% .5%
YOT^1 ROS	YOT^1 ROS	YOT^1 ROS	YOT^1 ROS	YOT^1 ROS	YOT^1 ROS

PHENYLALANINE	PROLINE	SERINE	THREONINE	TYROSINE	VALINE
.1% .5%	.1% .5%	.1% .5%	.1% .5%	.1% SS	.1% .5%
YOT^1 ROS	YOT^1 ROS	YOT^1 ROS	YOT^1 ROS	YOT^1 ROS	YOT^1 ROS

Cf. Dubsky, J. and A. Langer. Color reactions of asrcosine and alanine w. ferric salts, III, *Collec. Czechslov. Chem.*

PART C

Colorimetric Results Obtained by Subjecting 18 Amino Acids to Sanchez's Reaction for Alanine

ALANINE	ARGININE	ASPARTIC ACID	CYSTINE	GLUTAMIC ACID	GLYCINE
.1% .5%	.1% .5%	.1% .5%	.1% SS	.1% .5%	.1% .5%
NC VSI	NC VSI	NC VSI	NC VSI	NC VSI	NC VSI

HISTIDINE	HYDROXYPROLINE	ISOLEUCINE	LEUCINE	LYSINE	METHIONINE
.1% .5%	.1% .5%	.1% .5%	.1% .5%	.1% .5%	.1% .5%
NC VSI	NC VSI	NC VSI	NC VSI	NC VSI	NC VSI

PHENYLALANINE	PROLINE	SERINE	THREONINE	TYROSINE	VALINE
.1% .5%	.1% .5%	.1% .5%	.1% .5%	.1% SS	.1% .5%
NC VSI	NC VSI	NC VSI	NC VSI	NC VSI	NC VSI

Cf. Sanchex, J. A., Three new reactions of alanine, *Semana Med.* **1**: 651-653, 1931.

PART D

Colorimetric Results Obtained by Subjecting 18 Amino Acids to Woker & Anteonr's Reaction for Histidine, Arginine, Lysine, & Proline

ALANINE	ARGININE	ASPARTIC ACID	CYSTINE	GLUTAMIC ACID	GLYCINE
.1% .5%	.1% .5%	.1% .5%	.1% SS	.1% .5%	.1% .5%
NC OTI	NC OT[2]	NC NC	NC NC	NC NC	NC OTI

HISTIDINE	HYDROXYPROLINE	ISOLEUCINE	LEUCINE	LYSINE	METHIONINE
.1% .5%	.1% .5%	.1% .5%	.1% .5%	.1% .5%	.1% .5%
NC NC	NC RTI	NC OT[2]	NC NC	NC OTI	NC NC

PHENYLALANINE	PROLINE	SERINE	THREONINE	TYROSINE	VALINE
.1% .5%	.1% .5%	.1% .5%	.1% .5%	.1% SS	.1% .5%
NC OT[2]	NC RTI	NC OTI	NC OT[2]	NC NC	NC OT[2]

Cf. Woker, O. and I. Antenor. Quinone reactions, *Helv. Chim. Acta.* **20**: 1260-1270, 1938.

CLASS II. GEOLOGICAL AND BIOLOGICAL SCIENCES

GEOLOGY

WILLIAM H. HOBBS, University of Michigan

Grant No. 849 (1946), $400. The glacial history of Iowa and parts of Minnesota and Missouri.

All earlier studies of the Pleistocene ("Ice Age") deposits have been made on the assumption that the glaciers which invaded Iowa were in all respects save larger size like the small glaciers of the Swiss Alps; and Alpine glaciers were the models for all interpretations thus far made.

The Greenland Expeditions of the University of Michigan (1926–1929) for the first time supplied a picture of the earlier Pleistocene glaciers. It was there found that in addition to the deposits made by the glaciers themselves, others fully as important and quite as extensive were laid down by the meltwater off their fronts (glacio-fluvial deposits); and still others were wind-deposited ones (glacio-eolian deposits). Neither of these types of deposit had been taken into account by the Iowan geologists, and a restudy therefore became imperative. The Greenland studies had moreover supplied marks by which each of the three deposit types could be identified.

My study of the Iowan area began with six months of intensive indoor review and digest of the 38 volumes of the state reports, and this was followed in August and September by several weeks of field work in Iowa and Missouri. A quite new study was also made of the thousands of drilled well logs which are on file in the several states.

As a consequence, it has now been found that one of the glaciations described ("Iowan") did not occur, but was the outwash from a much later glacier. A new glacier was found to have invaded the state from Minnesota, and three others came into Iowa from across the Mississippi in Illinois. Each of the three compelled the Mississippi of its time, then greatly swollen by meltwater, to make a long detour through Iowa and Missouri before returning to the present channel. The "father of waters" thus had ancestors—a "grandfather," a "great grandfather," and a "great-great grandfather of waters."

Except for final retyping the report, accompanied by many maps and figures, is now ready for publication, and will shortly be submitted.

ZOOLOGY

ELMER D. BUEKER and MORRIS BELKIN, Medical College of the State of South Carolina

Grant No. 909 (1946), $300. Differentiation of motor and sensory neurons in chick embryos after the substitution of growing tumor masses for the hind limb periphery.

The enumeration of mitotic figures in the ependymal layer and cells in the ventral half of the brachial and lumbosacral spinal cord in limb amputation experiments on chick embryos give evidence that proliferative processes are not influenced by the limb periphery.[1] These basic proliferative processes fill the central nervous system with indifferent neuroblasts. Certain of these cells which are to form the sensory and motor centers of the spinal cord and sensory cells in the spinal ganglia are unable to differentiate when isolated from the non-neural periphery.[2]

Radical hind limb extirpation experiments on chick embryos cause a hypoplasia as high as 90 per cent of the lateral motor column in lumbosacral segments; a hypoplasia of spinal ganglion cells of 50 per cent in corresponding levels.[3] Isolation of brachial segments of the spinal cord from possible influences of ascending and descending tracts by using tantalum foil indicates that the differentiation of motor cells in these segments is not influenced by long fiber tracts.[4] Brachial and lumbosacral spinal cord grafts with and without the influence of limb primordia give added evidence that long fiber tracts play no significant role in the differentiation of motor cells.[3, 5] All experimental data emphasize the importance of the limb periphery as the single factor which is essential for the differentiation of the lateral motor column in limb segments of the spinal cord.

[1] Hamburger, Viktor and Eugene L. Keefe, The effects of peripheral factors on proliferation and differentiation in the spinal cord of chick embryos, *Jour. Exp. Zool.* **96**: 223-242, 1944.

[2] Hamburger, Viktor, The effects of wing bud extirpation on the development of the central nervous system of chick embryos, *Jour. Exp. Zool.* 68:449-494, 1934.

[3] Bueker, Elmer D., Intracentral and peripheral factors in the differentiation of motor neurons in transplanted lumbosacral spinal cords of chick embryos, *Jour. Exp. Zool.* **93**: 99-129, 1943.

[4] Hamburger, Viktor, Isolation of brachial segments of the spinal cord of chick embryos by means tantalum foil blocks. *Jour. Exp. Zool.* 103: 113-142, 1946.

[5] Bueker, Elmer D., The influence of a growing limb on the differentiation of somatic motor neurons in transplanted avian spinal cord segments, *Jour. Comp. Neur.* **82**: 335-361, 1945.

As has been pointed out a stimulus resides in the limb periphery which is essential for the differentiation of these cells.[1] Little is known about the nature of this stimulus. However, we do know that the stimulus from the limb periphery is not species specific.[5] The lumbosacral spinal cord of the guinea hen will differentiate an excellent lateral motor column in the presence of the chick hind limb. Neither is there a definite point for point organ specificity inasmuch as the brachial spinal cord segments will differentiate motor columns when grafted so as to grow in proximity to the hind limb.[6] Furthermore, the mesial motor column of non-limb segments of the cord will undergo a hypoplasia or develop approximately a normal number of cells when isolated as grafts and grown so that the hind limb is available for innervation.[5] The non-specific nature of the required periphery, and the fact that the peripheral stimulus exerts its influence before motor end plates and sensory nerve endings are formed indicate that stimuli from the periphery may be of a general nature and reside in cells with certain histogenetic properties.

It was thought possible that tumor cells, because of their autonomy, their rapid proliferative growth, and their histogenetic properties, might be an apt place to look for intrinsic stimulating properties which would meet the peripheral requirements for the differentiation of sensory or motor centers of the nervous system. The object of this investigation is therefore to substitute growing tumors arising from muscle (rhabdomyomas, myomas), connective tissue (sarcomas), and epithelial cells (mammary adenocarcinomas) for the hind limb periphery, and subsequently after allowing sufficient time for their growth and innervation evaluate the response of sensory and motor centers of the lumbosacral nervous system.

The general method used in these experiments was to remove the hind limb primordium from the right side of the 48–60 hour chick embryo and substitute pieces of tumor of adequate size to fit into the somatopleure where the limb primordium had been present. After 4 to 6 days incubation (postoperatively) the embryos were removed and fixed in Bouin's fluid. The lower half of the embryo was serially sectioned at 10μ and stained with hematoxylin. Graphic reconstructions of peripheral nerves and cell counts of the spinal ganglia and lateral motor column were made of the right and left sides of the lumbosacral nervous system using always the limb side as a control.

Forty-eight experiments were performed, 12 of each of the fol-

lowing: (1) mouse sarcoma 180, (2) mouse sarcoma 37, (3) spontaneous mouse mammary adenocarcinoma, (4) Rous fowl sarcoma. The mortality during the first three days postoperatively was 37 per cent. It was found that mouse sarcoma grows very well in chick embryos. Embryos with Rous fowl sarcoma transplants generally die of extensive hemorrhage during the ninth day of total incubation, which is apparently due to the growth and dissemination of the Rous sarcoma virus and its destructive effect on embryonic blood vessels.[6] The Rous tumor cells grow rapidly and are invasive, being found in regions beyond the original site of implantation. Spontaneous mouse adenocarcinoma transplants grow poorly and only few scattered cells are found at 8 days total incubation.

A general survey of five of our best cases (two Rous sarcoma, three mouse sarcoma 180) where the tumor masses had grown to sufficient size so as to approach the volume of the limb on the opposite side gave the following results: (1) the peripheral nerves, which normally form the lumbosacral plexus, were well developed but were spread out as numerous irregular branches through the tumor, (2) enumeration of spinal ganglion cells on the experimental side as compared with those contralaterally indicates that in the most favorable material they are hyperplastic or approximate those on the normal side, (3) the lateral motor column undergoes a hypoplasia in all cases. General results indicate that a sarcoma, when ideally located (in the limb position) and of sufficient size so as to compare favorably with the limb in bulk, may serve as an adequate periphery for the differentiation of spinal ganglia. It is not an adequate periphery for the complete differentiation of the lateral motor column.

TZE-TUAN CHEN, University of California, Los Angeles

Grant No. 763 (1944), $150. Chromosome studies in opalinid ciliate infusorians.

Chromosome studies in Protozoa are valuable in the following ways. First of all such studies are important for the understanding of the life-history of these animals. Secondly it is interesting to compare the chromosome behavior in these unicellular organisms with that in multicellular organisms to determine whether or not

[6] Milford, John J. and F. Duran-Reynals, Growth of a chicken sarcoma virus in the chick embryo in absence of neoplasia, *Cancer Research* 3: 578-584, 1943.

there is any fundamental difference in the physical basis of heredity between these two groups.

For some years the writer has been interested in the chromosomes of opalinids, a group of astomatous ciliates, most species of which live in the rectum of anurans. Few Protozoa, if any, are more favorable for cytological studies than certain opalinids; their chromosomes are relatively large and differ in shape and size. Furthermore some of these chromosomes show remarkable relationships with nucleoli.

In spite of these interesting and favorable features, much misinterpretation and confusion existed with regard to the chromosomes of the opalinids, and indeed the very existence of chromosomes in these animals had been denied. The results of the present investigation, which differ radically from those of most previous investigators, are summarized in the following paragraphs.

(1) This investigation deals chiefly with the chromosomes in five species of the genus *Zelleriella* with special reference to their behavior, morphology, individuality, diploidy, haploidy, and association with nucleoli.

(2) Resting Stage.—In the resting stage the two nuclei in each animal are spherical or ovoid and lie some distance apart. The resting nucleus, as seen in the fixed and stained preparations, consists of three principal structures: (*a*) the nuclear membrane which is persistent throughout mitosis as in the majority of Protozoa, (*b*) the chromatin reticulum which gives rise to chromosomes during mitosis, (*c*) the several deeply staining structures which are the nucleoli. The nucleoli are constantly associated with definite portions of particular chromosomes.

(3) Behavior of Chromosomes.—The behavior of chromosomes during mitosis in these opalinids is essentially the same as in the Metazoa and Metaphyta, including: (*a*) during the prophase, a transformation of the chromatin reticulum into slender chromosomes which later condense and shorten; (*b*) arrangement of the chromosomes in the equatorial region of the nucleus and longitudinal splitting during the metaphase; (*c*) movement of daughter chromosomes toward opposite poles during the anaphase; and (*d*) gradual transformation of daughter chromosomes into the chromatin reticulum of the daughter nuclei during the telophase.

(4) Morphology of the Chromosomes.—Chromosomes in these opalinids are elongated bodies, graded in size and different in the

location of fiber attachment. All are atelomitic, having median, submedian or subterminal fiber attachment; most have a submedian fiber attachment. They show definite structural differentiation, in some cases unusual and remarkable differentiation.

(5) Individuality of Chromosomes.—Chromosomes in these opalinids can be recognized individually because of their constant differences in size and in location of fiber attachment and because of certain structural peculiarities of some of them.

(6) Diploidy.—The twenty-four chromosomes found in each of the several species of *Zelleriella* studied constitute a diploid group. This view is supported not only by the fact that these chromosomes can be grouped into duplicate series on the basis of size, shape, and structure, but also by the finding of some exceptional haploid nuclei. Based on the evidences presented above, it is concluded that the opalinids, like other ciliates, are diploid organisms, in contrast with some sporozoons (such as *Aggregata*) and some flagellates (such as *Chlamydomonas* and *Protosiphon*) which are haploid organisms.

(7) Haploidy.—A small number of haploid animals were found in one species of *Zelleriella*. These haploid animals are of approximately the same size as the diploid animals. But each haploid animal has four nuclei whereas each diploid animal has but two nuclei. The haploid nuclei are much smaller than the diploid nuclei. In the haploid nucleus there are only twelve chromosomes differing in size and location of fiber attachment, there being only one chromosome of each size and shape. Each haploid nucleus contains three nucleolus-chromosomes. Six is the characteristic number of nucleolus-chromosomes in the diploid nuclei of the same species.

(8) Relation between Chromosomes and Nucleoli.—(*a*) The nucleoli in these animals stain intensely with hematoxylin in all stages of mitosis and also in the resting stage, but show negative reaction with Feulgen technique. (*b*) The nucleoli are located at definite portions of specific chromosomes. Depending on the species, there are four or six nucleoli found respectively on four or six (two or three pairs) of the twenty-four chromosomes. Only one nucleolus is found on each of the several chromosomes and it always occupies a non-terminal position. The location of nucleoli is identical on homologous chromosomes. (It is concluded that the constant location of nucleoli at definite portions of particular chromosomes is an expression of the constancy in the internal organization of the chromosomes in these protozoons.) (*c*) There are three types

of association between chromosomes and nucleoli. In the first type the nucleolar material is located outside the chromosome, forming extra-chromosomal structures. In the second type the nucleolar material is located both inside and outside the chromosome. In the third type the nucleolar material is located inside the chromosome. In the last two types the chromosome segment becomes greatly enlarged and shows conspicuous structural modifications. (*d*) Within each species the chromosomes associated with nucleoli are specific. For example, in *Zelleriella elliptica* the nucleoli are located on pairs 1 and 4; in *Z. intermedia* the nucleoli are located on pairs 4, 6, and 8; in *Z. louisianensis* the nucleoli are located on pairs 1, 4, and 5. (Association between chromosomes and nucleoli has also been found in the genus *Protoopalina.*) (*e*) Compared with that of other chromosomes, the behavior of nucleolus-bearing chromosomes is normal. Condensation and shortening in the prophase, arrangement at the equatorial region of the nucleus and appearance of longitudinal splitting during the metaphase, separation and movement of daughter chromosomes toward opposite poles in the anaphase take place regularly as in other chromosomes and at the same rate. When the daughter chromosomes move toward opposite poles, each carries half of the nucleolus. (*f*) During mitosis the nucleoli, probably because of their intimate relation to the chromosomes, show a behavior similar to that of the chromosomes. (*g*) The nucleoli associated with different chromosome pairs are of different sizes, and such differences may be conspicuous. These relative sizes are retained during the resting stage. It is, therefore, possible to recognize the individual nucleoli in the resting stage, and the positions of the nucleoli mark the location of the corresponding chromosomes in the resting nucleus. (*h*) The real number of nucleoli associated with the chromosomes in the several species of *Zelleriella* carefully studied, being four or six, often does not correspond with the apparent number commonly found in the nucleus. Accidental fusion of two or more nucleoli gives rise to variations in the apparent number of nucleoli within the species.

(9) Chromosome Differences between Different Species of *Zelleriella.*—Different species of *Zelleriella* may differ in the following ways: (*a*) difference in chromosome number, (*b*) difference in the number of chromosomes associated with nucleoli, (*c*) difference in the specific chromosomes associated with nucleoli, and (*d*) difference in the type of association between chromosomes and nucleoli.

(10) No intra- or extra-nuclear kinetic centers were observed.

(11) Cytokinesis.—Division of the body, which is longitudinal, is initiated by the formation of a groove at the surface of the body between the two nuclei. This groove deepens until it cuts through the entire cytosome. Nuclear division is usually, but not always, accompanied by the division of the body. Delay in the body division gives rise to animals with four or eight nuclei. Animals with three, five, six, seven, or nine nuclei have also been observed.

(12) Four new species of *Zelleriella* are described: *Z. elliptica, Z. louisianensis, Z. pfitzneri,* and *Z. valliceps.*

CHEN, T. T. Chromosomes in Opalinidae (Protozoa, Ciliata) with special reference to their behavior, morphology, individuality, diploidy, haploidy, and association with nucleoli. *Jour. Morph.* In press.

WILBURN J. EVERSOLE, The Rice Institute
(now at Syracuse University)

Grant No. 829 (1946), $500. Metabolic studies in treated adrenalectomized rats fed a purified diet deficient in carbohydrate.

It was previously reported that the effectiveness of hormones of the adrenal cortex on growth and survival was reduced when a purified diet was used lacking carbohydrate. The investigations reported here are supplementary to those studies and concern the comparative effectiveness of cortical extract and desoxycorticosterone acetate on more detailed metabolic phenomena.

The rats used in these experiments weighed approximately 200 gm. Results are shown in the following table:

AVERAGE FIGURES SHOWING RESPONSE OF RATS TO DCA AND CORTICAL EXTRACT WHEN FED A CHO-FREE DIET FOR 5-6 DAYS.

No. rats	*Diet*	*Treat.*	*Wgt. change gm./day*	*Food cons. gm./day*	*Water cons. ml./day*	*Urine ml./day*	*Terminal Liver glycogen mg.%*	*Terminal Blood Urea N. mg.%*
6	Stock	None	+3.6	18.5	29.3	9.5	1059	21.0
6	CHO—free	None	—0.7	8.2	34.2	22.5	1299	42.1
5	CHO—free	Adrex. 1mg. DCA daily	—3.0	3.8	13.6	9.7	749	36.7
5	CHO—free	Adrex. Approx. 0.7 ml. cortical extract per day	—7.0	5.3	26.2	25.5	927	43.1

No definite conclusions can be made concerning these results until more animals have been studied. However, the data indicate that adrenalectomized animals on a carbohydrate-free diet respond differently to desoxycorticosterone acetate and adrenal cortex extract.

With the strict dietary regime used here, where the animals ate and drank *ad libitum*, both intact and treated adrenalectomized rats consumed relatively small quantities of food and lost weight. However, adrenalectomized animals treated with cortical extract ate more food and lost more weight than adrenalectomized animals treated with desoxycorticosterone acetate. The greater weight loss of the extract treated animals may be partially accounted for by their augmented urine output. Apparently the diet used had a diuretic effect, because all animals given the purified diet excreted in the urine over 65 per cent of the water consumed. The animals given cortical extract were in negative water balance since they excreted 97 per cent of the water consumed and insensible water loss could account for considerable more. Under the conditions of these experiments it would seem that cortical extract more effectively stimulates food consumption, water consumption, and urine output in the adrenalectomized rat than does desoxycorticosterone acetate.

The liver glycogen and blood urea values were higher in the adrenalectomized animals treated with cortical extract than in animals treated with desoxycorticosterone acetate. There is some question as to whether or not the figures are statistically significant, and the differences could probably be explained on the basis of higher food consumption in the rats treated with cortical extract. However, more studies along these lines with forced-feeding techniques must be completed before any conclusions can be made.

EVERSOLE, WILBURN J. 1945. Relation of carbohydrate-deficient diets to the effectiveness of the hormones of the adrenal cortex. *Endocrinology* 37: 450-455.

———————1946. Relation of dietary factors to the effectiveness of hormones of the adrenal cortex. I. Carbohydrate-deficient diets. *Yr. Bk. Amer. Philos. Soc.* for 1945: 148-149.

———————1946. Relation of protein-deficient diets to the effectiveness of hormones of the adrenal cortex. *Anat. Rec.* 94: 22-22 (Suppl.).

HAROLD KIRBY, University of California

Grant No. 869 (1946), $800. Studies on the comparative morphology and evolution of flagellate protozoa of the trichomonad group, and related forms in termites.

The phase of the subject that is now being studied is the origin and development of the polymonad group of trichomonad flagellates that constitute the family Calonymphidae. These protozoa occur in termites of the family Kalotermitidae, of which I have preparations from more than 120 species, of which about half contain calonymphids. Professor Alfred Emerson has kindly agreed to allow me to make preparations from alcoholic specimens in his large collection of termites at the University of Chicago. This will make it possible to record the occurrence in calonymphid genera, known in detail from the fixed and stained preparations, throughout a large group of termites representative of the existing world fauna.

The grant has been used in part in preparation of illustrations for the final number of a monograph on the devescovinid flagellates[1] which are the stem forms of Calonympidae, and in illustration of the monograph on calonymphids that is in preparation. The studies in the latter group made recently have been mainly on the genera *Coronympha* and *Metacoronympha.* These are present, in all my material, only in twelve species of *Kalotermes* in North and Central America and nearby Pacific islands; except that one species of the latter genus, somewhat different from the rest, occurs in a *Kalotermes* of Madagascar. Thus there is in this group of flagellates a significant restriction to interrelated hosts, and furthermore a geographical limitation as regards certain types. By way of *Coronympha,* the calonymphids have a close relationship to the monomonad devescovinids. *Coronympha* and *Metacoronympha* show features of much interest in the development of a fibrillar system by which the mastigonts are interrelated, in the type of arrangement of the mastigonts, in the tendency to loss of nuclei from these unit structures which has become a permanent feature of organization in more advanced calonymphids, and in arrested division or fusion giving multiple organization.

[1] Kirby, H., Devescovinid flagellates of termites., *Univ. Calif. Publ. Zool.* 45: 1-318, 1941-1945.

S. MERYL ROSE, Smith College

Grants No. 757 (1944), $300 and No. 841 (1945), $300. Study of causes of failure in regeneration by the method of exchange transplantation between tails and limbs of lizards.

We are continuing to try to determine what tissues or combinations of tissues from the tail of a lizard will stimulate regeneration when transplanted to a limb, and conversely, what limb tissues will inhibit tail regeneration.

In a first set of experiments skin was exchanged between limbs and tails of the American chameleon, *Anolis carolinensis*. No appreciable effect was exerted by the foreign skin in its new site even though it remained alive and contributed the wound epithelium. Tails regenerated normally with an epidermal wound covering which had migrated from a ring of limb skin at the periphery of the wound. Regeneration was not stimulated in limbs when the wound epithelium was derived from tail epidermis. In *Anolis* it seems clear that the wound epithelium is not a critical tissue in determining whether regeneration shall occur.

Next an attempt was made to exchange internal tissues between tails and limbs of *Anolis*. Sixty-one autoplastic transplantations were made and the results studied histologically. In all cases most, if not all, of the transplant was destroyed. The only effect was to delay what would happen naturally, viz. regeneration in the tail and scar formation in the limb.

In order to continue the analysis it seemed necessary to develop a method by which the transplanted internal tissues could be kept alive until circulation was reestablished. Since the tissues were probably dying from failure to receive enough raw products for metabolism or because waste products were accumulating in toxic quantities, the animals were kept cold in a refrigerator most of the time. In order to further the growth of blood vessels into the transplants the animals were removed from the refrigerator for twenty-minute periods every hour during the day for two weeks. It was hoped that any debt of raw materials or excess of waste products incurred during the periods of warmth might be compensated for by diffusion during the next period in the refrigerator. After the two weeks of alternating warmth and cold the animals were maintained between 20° and 32° C. *Anolis carolinensis* proved unable to tolerate such treatment. Now *Scleropus undu-*

latus, a more hardy lizard, is used in the studies, and it can tolerate the experimental conditions. Exchanges of skin between tail and limb were repeated for *Scleropus* with a different result. A wound epithelium from limb epidermis completely inhibits tail regeneration. The only inhibited tail studied histologically so far had the appearance of a non-regenerating limb stump with the typical cartilaginous callus surrounded by fibrous tissue. The reciprocal operation in which a limb stump is given a tail wound epithelium does not cause regeneration of a limb. In *Scleropus* limb skin does not furnish a wound epithelium suitable for regeneration, but this is not the only tissue in a limb which prevents regeneration. This is known from the fact that when the limb epithelium is replaced by tail epithelium regeneration still does not occur.

Work is continuing with the transplantation of other tissues alone and in combination with skin.

ROSE, S. MERYL. 1945. Report of Progress. *Yr. Bk. Amer. Philos. Soc.* for 1944: 161-162.

FERDINAND SICHEL, University of Vermont College of Medicine

Grant No. 834 (1945), $500. The role of potassium in conduction of the impulse in striated muscle.

It has been previously shown[1, 2] that non-conducted, graded contractile responses can be obtained from isolated skeletal muscle fibres of the frog. It has also been shown that similar responses are obtained reversibly from intact entire muscles if they are bathed in a medium containing three to four times the usual concentration of potassium ion.[3] In these circumstances the conducting mechanism is not functioning while the contracting mechanism is essentially normal. As a working hypothesis it has been assumed that the failure to conduct while retaining the ability to contract is due to a decrease in the concentration gradient of potassium ions from within the fibres to the extracellular space. In the case of the isolated fibres, the ends are cut and the potassium ions presumably diffuse out, thus tending to equalize the concentration inside and outside the cell. In the case of the intact muscle the gradient is decreased by increasing the concentration on the outside. The present series of experiments is an attempt to measure the rate of dif-

[1] Brown, D. E. S., and Sichel, F. J. M., *Jour. Cell. Comp. Physiol.* 8:315, 1936.
[2] Sichel, F. J. M. and Prosser, C. L., *Amer. Jour. Physiol.* 128:203, 1940.
[3] Sichel, F. J. M., *Amer. Jour. Physiol.* 129: 464, 1940.

fusion of potassium ions from injured cells to determine whether the above hypothesis is quantitatively tenable, or whether there are other important factors to be considered.

The sartorius muscles of frogs were carefully dissected out, rinsed quickly in Ringer's solution, lightly blotted on filter paper, and weighed. They were then placed in 31 millilitres of Ringer's solution per gram of muscle. Some of these preparations were kept as controls. In others the muscles were traumatized by cutting each transversely in three more or less equal parts. In all cases they were then shaken for periods varying from one minute to twenty-four hours, and the potassium ion concentration of the medium was subsequently determined at various times with the flame photometer.

It was found that the rate at which potassium left the cells and accumulated in the medium was of the order of magnitude which could explain the failure to conduct in a time of the order of minutes. Further experiments are being carried out to determine this rate with different volumes of the medium, and also, if possible, to determine whether in the injured cell the outward diffusion is solely through the cut ends, or whether the entire surface of the fibres has been made more permeable to the potassium ion.

CONCHOLOGY

KATHERINE VAN WINKLE PALMER, Paleontological Research Institution

Grant No. 788 (1945), $500. Illustration of Carpenter West Coast molluscan types.

The preliminary names of the inventory of the species described by Philip P. Carpenter of the west American Mollusca with data on the same have been compiled. Approximately 250 species and more names were involved in the study.

Search in the Academy of Natural Sciences, McGill University, the American Museum of Natural History, the New York State Museum, the Museum of Comparative Zoölogy at Harvard University, Cornell University, and the Division of Mollusca, United States National Museum has been made.

The greater number of the types are at the United States National Museum. Those at McGill University have been photographed. A few types are in the State Museum at Albany, New

York. Several Carpenter types, extraneous to this problem, are in the American Museum of Natural History and have been photographed. A completion of the work is waiting the convenience of the staff at the U. S. National Museum in photographing the types which are there. The final analysis of the work cannot be made until these photographs are obtained. So far about two thirds of the bivalve and univalve types have been found. The illustration of even that portion of the total number of types will establish unquestionably the identity of far more specimens than the conchologists have believed were represented by authentic material in present day collections.

The search for the types of the molluscan species of Carpenter has brought to light about 140 Carpenter letters hitherto unknown. These represent communications between leading conchologists in America and abroad during the period of 1859 to 1877. They contain facts concerning scientists, collections, institutions, and natural history not compiled in published accounts. It is to be expected that many more letters will be found in pertinent sources not yet reached. The material significant in that phase has therefore made its study outgrow in importance the original intention to publish merely a limited and general résumé of Philip Carpenter's life as an introduction to the main paper. There are ample important data on this aspect of the study to warrant through their elaboration and interpretation a separate work on this important historical stage in American conchology.

A paper entitled "Illustrations of Carpenter West Coast Molluscan Types" was read before the American Malacological Union on August 15, 1946.

GENETICS AND CYTOLOGY

ALBERT FRANCIS BLAKESLEE, Smith College

Grants No. 621 (1942), $700, No. 628 (1942), $1,800, No. 751 (1944), $1,500, and No. 816 (1945), $1,500. Embryology in plants, especially in the genus Datura.

There are 10 species of the genus Datura which have been subjected to intensive study in respect to their capacity to hybridize *inter se*. There are 90 theoretically possible hybrids between these 10 species if each species is used as both a male and a female parent but viable seed have been secured in only 19 hybrid com-

binations. As reported in *Proceedings* of American Philosophical Society, December 1945, it has been possible in some cases to dissect out from the ovaries the arrested hybrid embryos and to grow them in artificial media. At that date we had succeeded in dissecting out embryos from 18 hybrid combinations and growing 7 of them to maturity. We now can report having dissected embryos from 41 combinations and grown mature hybrids from them in 26. Furthermore, by making a minimum of 50 separate pollinations for each combination, we have been able to list certain combinations as apparently incapable of yielding even arrested embryos. Of the 30 such combinations which yield no embryos it is of interest that 23 are combinations in which pollen from a species with a short flower was used on a species with a long flower. It would appear that pollen tubes from a short flower have not developed the capacity of growing the distance through long styles necessary to reach the ovaries of long flowered species. A further study is being made of the various barriers to crossability between species which have been developed during their evolutionary separation with the expectation that with the control of some of their life processes those barriers may be overcome. The cultivation of excised embryos has thus yielded numerous new hybrids which were not possible heretofore. Such hybrids are making possible the analysis of differences between species of Datura in respect to their chromosomal structure. They offer a new method which bids fair to be of considerable practical as well as theoretical importance.

BLAKESLEE, ALBERT F. 1945. Removing some of the barriers to crossability in plants. *Proc. Amer. Philos. Soc.* 89: 561-574.

CHARLES W. METZ, University of Pennsylvania

Grant No. 810 (1946), $1,200. The relation of chromosome changes to problems of evolution.

1. *Evolutionary chromosome changes.* We are working on the widely accepted hypothesis that a primary factor in evolution is the origin of new genic materials by means of, (*a*) duplication of parts of individual chromosomes, followed by, (*b*) qualitative alteration of some of the duplicated components. This process would add the required new genic constituents without eliminating pre-existing ones. Our studies in this field have been continued

during the year, using the giant salivary gland chromosomes of Sciara, and concentrating on the remarkable "triple repeat" condition found in two closely related species of this genus.[1] On account of technical difficulties some details have not yet been cleared up, hence the following statement is subject to later correction, but it seems to be strongly supported by present evidence.

In the X chromosome of *Sciara ocellaris* Comstock, a short region or segment is present in triplicate—i.e., the segment is represented three times in different parts of the chromosome. The repeated segment includes four different cross-hands or disks as seen in the salivary gland chromosomes. Homology of the segments is indicated not only by similarity in pattern but by synapsis between homologous bands, leaving no doubt that the condition arose through duplication. If the three repeat regions have remained unaltered, synapsis should occur uniformly between them. But this is not the case. The three segments are designated 1, 2, and 3 respectively. Numbers 2 and 3 do not unite in synapsis with one another, but do unite with number 1. From this we infer that there are different degrees of homology between the segments in spite of what appear to be morphologically similar patterns, and consequently that qualitative evolutionary changes have occurred in at least two of the segments subsequent to the time of duplication. Qualitatively, segments 1 and 2 have something in common which results in synapsis; similarly segments 1 and 3 have something in common, but a different something from the other; while segments 2 and 3 do not have either quality in common.

A similar and apparently identical condition is found in *Sciara reynoldsi* Metz, a closely related species which will hybridize with ocellaris.

This case seems to provide evidence of the evolutionary origin in nature of new genic conditions in the manner just indicated. Since the synaptic relations of the three regions appear to be just the same in the two species, the main evolutionary change, at least, presumably occurred before the two species became differentiated —which gives a rough measure of the time factor.

The main uncertainty at present is whether the delicate structural details (band pattern) are as just represented. Technical

[1] Metz, Charles W., Observations on evolutionary changes in the chromosomes of Sciara (Diptera), *Carnegie Inst. Washington, Publ. No.* 501: 275-294, 1938.

difficulties, due to the synaptic attachments, make this a very difficult point to establish. If our observations are correct, however, an additional point of special interest is revealed—namely, the apparent unit action of the repeat regions. Apparently each entire repeat segment functions as a unit and must remain intact in order to function. Space will not permit elaboration of this point here.

2. *Other studies.* (1) Preparation of the manuscript (long delayed by the war) covering our earlier studies on irradiation-induced chromosome changes has been practically completed. This work was aided by an earlier grant (No. 661, 1943, see YEAR BOOK for 1943: 161-162). (2) Dr. Helen V. Crouse, in collaboration with Dr. Hans Ris, carried out experimental studies on the internal organization of the giant salivary gland chromosomes of Sciara, leading to a new hypothesis concerning the nature of the chromatic bands or disks in these chromosomes. (3) With Dr. Dietrich Bodenstein she has likewise carried out transplantation studies designed to determine whether germ line differentiation in Sciara is controlled by the soma or by the constitution of the germ cells themselves. The results, although as yet inconclusive, do not reveal any influence of the soma. (4) Continuing studies on the influence of chromosome aberrations on reproduction and development in Sciara, Dr. Crouse has secured further evidence that X chromosome translocations in heterozygous condition upset the mechanism for the production of unisexual families ordinarily characteristic of *Sciara coprophila.* New light is thrown on this mechanism in several respects (details to be published elsewhere).

RIS, HANS, and HELEN V. CROUSE. 1946. Structure of the salivary gland chromosomes of Diptera. *Proc. Nat. Acad. Sci.* 31: 321-327.

ECOLOGY

WILLIAM W. DOWDY, Lincoln University

Grant No. 847 (1946), $500. Study of Arthropoda in an oak-hickory forest with reference to stratification.

The field work in this study covered a period of twelve months, April, 1944, to April, 1945. Collections and physical factors were taken weekly. The main emphasis was placed on stratal or layer societies, 5 strata being studied as follows: Soil, 0.1 of a meter to the depth of about 8 centimeters was taken and the leaf sample comprised the dead leaves which covered this area. The arthro-

pods in the soil and leaf samples were multiplied by 10 for comparison with sweeps. From the 3 vegetation strata, herbs, shrubs, and trees, 50 sweeps in each were made with the insect net. The habitat was an oak-hickory forest located in Central Missouri. The forest had been disturbed in numerous ways and hence a secondary area. The pH of the soil was about 6. The soil was low in fertility; it was the union silt loam.

The evidence from the temperature data indicates that when the temperature in the vegetation strata reaches 35°F. this is a sufficient reduction in temperature to cause practically all the arthropod fauna to disappear from those strata. After the week of December 9 no arthropods were taken from the vegetation until April 7. Low temperatures, during the winter, practically reduce the arthropod population to two strata, soil and leaf. Temperature extremes and fluctuations are not as great in the soil as in the leaf stratum and not as great in the leaf stratum as in the air above. The soil and leaf strata are not easily influenced by temperature changes. Animals which inhabit the soil are probably better protected from temperature extremes than those in the leaf stratum and those in the leaf stratum are better protected than those living on the vegetation some distance above the ground.

The data will show that the number of species collected in or limited to *only one* stratum was 177; in *only two* strata 29; in *only three* strata 21; distributed in *four* strata 2; in *five* strata 5.

On the basis of the foregoing facts the following conclusions may be drawn:

1. In an oak-hickory association which has been disturbed by man the following stratal societies of arthropod fauna has been described: soil, leaf, herb, shrub, and tree.

2. Temperature is a very important physical factor; during fall and early winter it practically reduces the arthropod fauna to two strata, soil and leaf. A temperature of about 35° F. brings a marked reduction in the number of arthropods on the vegetation.

3. Rainfall, during the warm months, increases the arthropod fauna.

4. In general, the arthropod fauna decreases with an increase of the evaporation stress of the air and increases with a decrease of the evaporation stress.

5. In the order of abundance of specimens the strata stood as follows: leaf, soil, herb, shrub, and tree. In the order of abundance of species: herb, shrub, tree, soil, and leaf.

6. The greatest number of specimens and species were taken during the warm season.

7. Stratal preference is clearly shown by many species, genera, and order of Arthropoda.

8. Four species and one genus of ants did not show very much stratal preference but had a rather wide distribution through all five strata studied.

9. A net total of 233 species was taken.

10. The most abundant species were *Reticulitermes virginicus, Phlegyas abbreviatus, Lygus oblineatus, Crematogaster linealata, Prenolepsis imparis* and the genera *Paratrechina* and *Melanoplus;* some of the latter were identified as *M. femur-rubrum.*

11. The orders having the largest number of species, in order of abundance are: Coleoptera, Hemiptera, Homoptera, Diptera, Hymenoptera, and Orthoptera.

12. The various physical factors are stratified and probably together with certain biological factors have resulted in the stratification of the arthropod biota.

WILLIS A. EGGLER, Alma College
(Now at Central Michigan College)

Grant No. 787 (1945), $1,000. Study in the Parícutín volcanic area of the effect of volcanism on plants and animals.

Studies were made of the effects of the volcano Parícutín, state of Michoacán, Mexico, upon vegetation. General observations throughout the region and statistical studies of small plots just outside the radius of influence of the volcano indicate that the forests are predominately pine, three species being present. This is a subclimax which is maintained because of disturbance. On steep slopes not easily accessible to woodcutters and cattle is a climax forest in which oaks are dominant. Other hardwoods and the pines make up a minor part of it.

Over a hundred measurements, made in various directions from the volcano, showed that volcanic ash extends farthest and has accumulated deepest west of the volcano. At a half mile it was

nineteen feet deep and at seven miles twenty inches. Northwestward it was about ten feet deep at a half mile and four inches at seven miles. While the ash blanket may have been rather uniform in thickness as it fell several measurements taken in a small area showed a lack of uniformity. This indicated that there had been transportation from high places to low. Rivers flowing from the area during the wet summer season are loaded with ash and a considerable quantity has been carried away by this means.

It was found that there has been rather complete destruction of vegetation over an area of about twelve square miles. Of this area about five square miles have been covered with lava flows and everything is effectively buried. The rest is under a blanket of ash five feet or more in thickness and only a few trees have survived.

Where the ash is less than five feet deep there has been a selective elimination of plants. Herbs and tree seedlings were first removed, followed by small trees only a few inches in diameter, and then by large trees over a foot in diameter and shrubs. Last to succumb and sometimes growing in five feet of ash are trees five to twelve inches in diameter. Hardwoods generally survived better than pines but there were few of them near the volcano. Factors contributing to the killing of plants in this outer area were breakage under the weight of the ash, and starvation and suffocation because of the coating of ash over the entire plant and the prolonged absence of leaves.

Several herbaceous perennials have resumed growth from buried roots after lying dormant for two years under as much as three feet of ash. A poppy and a four o'clock are most successful in this.

It was found that the volcanic activity has caused little change in the rate of growth of trees. Examination of increment cores from seventy trees widely scattered over the area, a few not over a mile from the volcano, show that annual rings laid down during the three years from 1943, when the volcano started, to 1945 are about equal in thickness to the average for the ten years prior.

Crab grass and Bermuda grass have maintained growth all during the period of eruption in fields where the ash is not over a foot deep and in woods where it is not over two feet. In fields which were fallow the grasses may cover half of the surface area, but in woods they are confined to areas around stumps and under trees. On eroded hillsides they are becoming established in shallow gullies and are helping to control erosion.

Revegetation of totally bare areas has not yet begun and no seedlings were found in pure ash. The ash seems to contain all nutrients necessary for plant growth and barley grains planted in pots of ash in the laboratory grew to maturity with only the addition of distilled water.

EGGLER, WILLIS A. 1945. Parícutín, 1945. *Masama* 27: 80-84.

BOTANY

HENRY N. ANDREWS, JR., Missouri Botanical Garden, St. Louis

Grant No. 863 (1946), $250. A Study of the Cretaceous petrified tree ferns belonging to the genus *Tempskya* from Idaho.

During the summer of 1942, and again in 1945 and 1946 collecting trips were made in the southeastern portion of Idaho to obtain specimens of the Cretaceous tree ferns referred to the genus *Tempskya*. Although previously reported in very limited numbers from certain of the northwestern states and a few European localities these fossils have turned up in abundance in certain parts of eastern and southeastern Idaho. A large portion of the material on which this study is based was collected by Mr. Henry Thomas in the immediate vicinity of Wayan, Idaho. During the '45 and '46 trips the writer was able to study this private collection consisting of hundreds of specimens and to gather personally a large number for detailed study.

The genus *Tempskya* includes a group of apparently closely related species characterized by trunks that are composed of numerous siphonostelic stems held together by a dense and compact mass of small diarch roots. Many of the specimens that have been collected are very well preserved. Because the specimens are silicified, the preparation of thin sections has involved considerable labor. The peel method has been used to advantage with the better preserved material and for preliminary study of the poorer ones. This method has been supplemented with ground thin section some of which have been prepared in our laboratory at Washington University and others by a professional petrographic laboratory. Recourse has also been made to a local stone-cutting firm to section the larger trunks on machines designed to handle large specimens of stone.

Two primary objectives in the investigation have been first, a consideration of the wide range of size and form of the trunks and second, a study of the ontogenetic development of the stem anatomy.

If the cross sectional form of the *Tempskyas* could be depended upon as a specific taxonomic character the number of species represented would be very nearly endless. Many of the specimens are circular in cross section while others vary from broadly elliptical to strongly flattened forms. Considerable controversy has existed in previous accounts as to whether these shapes are natural or caused by the weight of overlying sediments prior to petrifaction. A final statement is not yet intended although the study to date indicates that the latter explanation is primarily responsible. This is suggested first by the close gradation in the various forms, and lack of correlation with any observed anatomical character. Furthermore it has been noted that in most of the roots the middle parenchymatous cortex is decayed, resulting in the collapse of the outermost cortex and epidermis. Since, then, the trunk in most specimens is composed largely of roots it seems apparent that relatively slight pressures might have caused the stems and roots to be re-arranged into a flattened form.

A second controversy that has centered about these unique plants concerns the general habit of the trunk; that is, whether they were creeping, ascending, or upright. A special effort was made to locate basal portions which might be expected to clarify this problem. Considerable satisfaction has been realized in this respect. The Thomas collection was found to contain a number of basal specimens and others were collected in the field by the author. These are recognized as such by their slightly flaring basal extremity, a characteristic knobby surface on the underside, and a lack of stems, the trunk in this region being composed exclusively of roots. None of these stump specimens display any longitudinal curvature and of the hundreds of other specimens in the Thomas collection only two appreciably curved ones were found. There is, therefore, no evidence from this large collection—which may confidently be said to contain far more than all previously reported collections combined—to indicate that the plants were other than stout-trunked, erect tree ferns.

The maximum size that they attained has proven to be considerably greater than was formerly supposed, the largest in the Thomas collection measuring 16 inches in diameter. The exact height attained is not as easily ascertained, however, since complete trunks have not been found. Judging from measurements of many specimens including tips, basal portions, and intermediate

trunk sections it is clear that the plants reached a height of 10 to 15 feet and judging from the few very large specimens, ranging from 12 to 16 inches in diameter, a height of perhaps 20 to 30 feet or higher does not appear improbable.

A few other points may be mentioned briefly in the nature of a progress report. Considerable variation has been noted in stem size within an individual trunk indicating that the divisions of the stems, which are frequent, are by no means always equal dichotomies. Perhaps the most variable character in the trunk lies in the number of stems observed in a single cross section. In specimens no more than 4.5 inches in diameter as many as 190 stems have been observed while others of equal size may display only a dozen or two. It is clear that in the older parts of the trunk (toward the base) the stems are digested by their own roots or those of associated stems so that in general one may expect to find progressively more stems toward the tip. There seems to be, nevertheless, much variation in stem number aside from this. In one specimen a considerable number of spores and sporangial fragments were found down among the stems, leaf bases, and roots. The spores, with their characteristic tri-radiate marking, present an unsculptured exine offering no clearly defined clue to their family identity. All than can be said of the sporangial fragments is that the annuli are not clearly comparable to those of the Schizaeaceae to which family it has been thought the *Tempskyas* might belong.

Previous authors have reported no other plant remains associated with these petrified ferns. It is, therefore, of interest to note that we have found immediately associated with the *Tempskyas* in the Wayan hills rather abundant speciments of dicotyledonous and coniferous wood as well as one cycadeoid trunk. Some clue is thus offered as to the plants that were associated with the *Tempskyas* in life.

T. H. GOODSPEED, University of California

Grant No. 843 (1945), $525. Studies of meiotic prophase phenomena in species and F_1 interspecific hybrids of *Nicotiana*.

Comparative studies of meiotic prophases in pollen mother cells (PMC) of species and F_1 interspecific hybrids of *Nicotiana* were undertaken to determine the significance of meiotic (MI) pairing in the latter for interpretation of species origins and relationships.

The results of these studies support the validity of employing extent and quality of MI pairing in F_1 interspecific hybrids as contributing basic evidence to a new taxonomic organization of the genus.[1]

In addition, this investigation has provided evidence for interpretation of the factors involved in meiotic prophase progressions. It appears that, in *Nicotiana* at least, the spiralization cycle is initiated at leptotene with distinctions in size and linear sequence of "chromomeres" providing evidence of "spiralization patterns." Despiralization, beginning during pachytene, may contribute to the breaks conditioning crossing-over at that stage, and to decrease in chiasma frequency and increase in terminalization coefficient from diplotene to diakinesis.

The occurrence in pachytene of alternating thick and thin areas of varying length in the unpaired chromonemata (whole chromosomes or segments) in F_1 interspecific hybrids of *Nicotiana,* particularly striking in those of the lowest pairing category, and in an asynaptic, is apparently due, in large part, to lack of uniform timing of despiralization in such unpaired chromonemata. The probability that timing of the spiralization-despiralization cycle is correlated with progression of nucleic acid condensation during prophase and thus is affected by the entire physiological condition of the hybrid protoplast, itself a product of interaction of what may be great distinctions in the genic constitution of the parental genoms, introduces a series of problems the solution of which must rest upon further evidence.

The most significant result of these investigations is the establishment of correspondence between prophase and MI chromosome behavior. Thus, in a hybrid showing approximately as complete pairing at MI as occurs in the parental species, zygopachytene conjugation is also complete; in a hybrid exhibiting a variable amount of pairing from one PMC to another at MI a similar range in ratio of paired to unpaired chromosomes appears in the zygotene-diakinesis sequence; and in a hybrid characterized by almost complete lack of pairing at MI, prophase association is also almost entirely absent, or at most is confined to short segments. In other words, the extent of MI pairing in F_1 interspecific hybrids of *Nicotiana* is a reflection of amount of preceding prophase associa-

[1] Goodspeed, T. H. 1945. Studies in *Nicotiana* III. A taxonomic organization of the genus. *Univ. Calif. Publ. Bot.* 18: 335-344.

tion. Therefore, since synapsis is the accepted measure of extent of genic similarity in character and arrangement, amount and quality of MI pairing in F_1 interspecific hybrids, in this genus at least, is a reliable criterion suggestive of phylogenetic relationships.

GOODSPEED, T. H. 1945. Meiotic prophase phenomena in species and interspecific hybrids of *Nicotiana*. *Jour. Arnold Arb.* 27:453-469.

HUI-LIN LI, Academy of Natural Sciences of Philadelphia

Grant No. 800 (1946), $850. Floristic relationships between eastern Asia and eastern North America.

During the spring and summer of 1946, visits to various herbaria in different parts of the country were made for the purpose of examining specimens of plants belonging to those genera that are common to eastern Asia and eastern North America. Field trips were also made to parts of the southeastern states to study the natural vegetation. The main part of the study was conducted at the Academy of Natural Sciences of Philadelphia.

Close floristic relationships exist between eastern Asia and North America; in the latter, this relationship is particularly marked in the east, though affinities with Asia are also evident in the southern as well as western floras. Aside from the many genera that are common to the two areas but are of wide distribution throughout the northern hemisphere, like *Salix, Populus, Quercus, Acer,* and other genera of more limited ranges like *Gleditsia, Sophora, Aralia, Cornus, Vaccinium, Styrax,* there are many genera that are found only in North America and eastern Asia. Some, like *Trautvetteria, Tiarella, Boykinia, Physocarpus, Amsonia,* are more developed in the western than the eastern part of North America. But a larger number of genera have discontinuous distribution in eastern Asia and eastern North America.

No less than 56 genera or pairs of genera are found to be specially confined to these two regions. Some of the genera are distributed in temperate regions in both areas. They are: *Carya, Buckleya, Hydrastis* (America) and *Glaucidium* (Asia), *Podophyllum, Jeffersonia, Diphylleia, Caulophyllum, Menispermum, Liriodendron, Sassafras, Stylophorum, Penthorum, Decumeria, Hamamelis, Neviusia* (America) and *Rhodotypus* and *Kerria* (Asia), *Gymnocladus, Cladrastis, Wistaria, Apios, Pachysandra, Stewartia, Panax, Elliotia* (America) and *Tripetaleia* (Asia), *Epigea, Chio-*

genes, Shortia, Helasia, Chionanthus, Veronicastrum, Phryma, Mitchella, Triosteum, Diervilla (America) and *Weigela* (Asia), *Zizania, Diarhhena, Symplocarpus, Helonias* (America) and *Heloniopsis* (Asia). Other genera are distributed in temperate and also in tropical regions in one or both areas: *Saururus, Pyrularia, Magnolia, Schizandra, Illicium, Lindera, Astilbe, Itea, Parthenocissus, Gordonia, Acyrum, Nyssa, Pieris, Lyonia, Osmanthus, Gelsemium, Campsis, Catalpa, Croomia.*

Among the families that have most genera represented are the Magnoliaceae and related families, the Berberidaceae, and the Saxifragaceae. Other important families are Hamamelidaceae, Lauraceae, Santalaceae, Juglandaceae, Theaceae, Leguminosae, and Ericaceae. The genera are mostly with but a few species and, in practically all cases, the species of the Old World are distinct from those of the same genera in the New World. Apparently, the long isolation of the floras of these two areas has brought such clear differentiation. Many of the species considered to be identical in the two regions in the early times by Gray, Miquel, and others, have been proved by later authors to be distinct. Many other species that are identical in North America and eastern Asia are found only in the northern colder regions of both continents and are actually more or less continuous in their range and do not belong to this disjunctive category. These elements, although often referred to as Asiatic and American, are not to be mixed up with the temperate disjunctive elements which are generic.

A study of the habit and habitat of these temperate disjunctive genera will also reveal the nature of the vegetation when these genera and their relatives and associates, both extinct and extant, were once the dominant elements of the floras in the geological past. Some points can be especially noted. The large number of the genera are woody plants, only a few being herbaceous. These woody plants are nearly all deciduous; the few evergreen species are of more southerly distribution. Most of the woody plants have simple leaves. It is apparent that if these woody plants were once the dominant elements of the flora, the forests would be mesophytic and deciduous, adapted to situations like some parts of the present temperate regions of the world. The herbaceous species are nearly all perennials with heavy rootstocks and a few large leaves. They are naturally adapted to form the undergrowth of deciduous forests.

The majority of the species are without any special adaptive means for seed or fruit dispersion. The natural habitat of these plants is on hillsides and mountain sides in dense, more or less moist forests, usually with rich humid soil.

The present isolated and disjunct floras of eastern Asia and eastern North America appear to be the remnants of a great mesophytic forest that extended over all the northern hemisphere and even reached the arctic regions in the Tertiary. Geological changes including mountain elevation, submergence, climatic variations, glaciations, etc. have destroyed and changed the floras of many lands so that this mesophytic forest of the Tertiary in the northern hemisphere survives mainly in eastern Asia and eastern North America, with only scattered relics in southeastern Europe, western Asia, and western North America.

C. C. LINDEGREN and S. SPIEGELMAN, Washington University

Grants No. 722 (1943), $600, and 775 (1946), $900. The relation of sporulation and the range of variation of the haplophase to populational adaptation.

Various yeasts have previously been reported as being unable to ferment galactose and this character has been used as a basis of identification within several genera of yeasts.

An attempt was made to select galactose fermenters from three known nonfermenters of galactose, *Schizosaccharomyces pombe*, *Schizosaccharmoyces octosporus*, and *Saccharomycodes ludwigii*. *S. pombe* was brought to sporulation in an 8 per cent galactose, 2 per cent glucose medium and from this medium haploid cultures were selected which could ferment galactose. The 2 per cent glucose maintained growth of the culture through sporulation but was rapidly exhausted, leaving only galactose, so that cells not able to grow on galactose were unable to continue growth. Clones from individual spores which grew were tested further for ability to ferment galactose on the Warburg apparatus.

It was not found possible to obtain galactose fermenters from *S. octosporus* and *S. ludwigii*, because they exist in the haploid phase for only very short periods of time. *S. octosporus* haploid spores conjugate to form diploids immediately upon their release from the ascus and *S. ludwigii* spores, for the most part, conjugate within the ascus.

S. cerevisiae and *S. carlsbergensis* ordinarily adapt and are able to ferment galactose within 80 and 90 minutes respectively. Haploid clones were isolated from these two species which were able to grow on galactose but were not able to ferment galactose although transferred every other day for four months in a galactose medium. During this time, which amounted to over 1,200 generations, involving billions of individuals in each generation, the clones mutated to form a variety of morphological mutants, but were unable to mutate back to galactose fermenters.

In view of the morphological heterogeneity which developed in the non-galactose fermenting strain the use of fermenting characters in classification may be expected to involve some difficulties.

LINDEGREN, C. C., and SPIEGELMAN, S. 1944. The relation of sporulation and the range of variation of the haplophase to populational adaptation. *Jour. Bact.* 49: 257-269.

ELMER DREW MERRILL, Arnold Aboretum of Harvard University

Grant No. 832 (1945), $600. An index to the overlooked and as yet unlisted binomials published in eight editions of Eaton's *Manual of Botany* and those published by Muhlenberg in various papers of the Society.

This grant was used to finance an intensive bibliographic study of all eight editions of Amos Eaton's *Manual of Botany* (1817–1840) as it had been noted that in all editions of this pioneer American descriptive manual a large number of new binomials appeared. Most of these had been ignored by Eaton's successors, chiefly because they had been overlooked by the compilers of standard indices. The completed manuscript, in excess of 100 pages of typescript, entitled "New Plant Names Published by Amos Eaton Between the Years 1817 and 1840," is actually in press, forming the major part of No. 24 of *Bartonia* (Proceedings of the Philadelphia Botanical Club). Each edition of Eaton's work is considered in detail, and following the historical part, each new name that Eaton published is considered in relation to the name or names for the same species proposed by other authors. In the Eaton volumes, supplemented by unlisted names that were detected in the works of other botanists which were consulted in relation to Eaton problems, the surprising total of about 250 validly published but unlisted binomials were detected, and about 60 corrections made to previously listed names where earlier places of publication were located. Fol-

lowing the completion of the Eaton study it became possible to initiate a similar consideration of the new names in the published works of H. L. Muhlenberg that appeared between 1793 and 1818, in Philadelphia. Muhlenberg (1756–1817) was a member of this Society. It is anticipated that the study will be completed within a year.

ANTHROPOLOGY

R. Ruggles Gates, Marine Biological Laboratory
(now at Harvard University)

Grants No. 662 (1942), $390, No. 714 (1943), $500, No. 765 (1944), $200, No. 790 (1945), $585, and No. 848 (1946), $600. Race ancestry and race crossing in man.

During the present year I have completed the reading of the proofs of my *Human Genetics,* which was published by the Macmillan Company in September. The two volumes number 1,518 pages with 326 figures. These two volumes deal with the principles of human heredity in a comprehensive way, with many references to related work in animal genetics and with special chapters on such topics as twins, cancer, and constitution, written from a biological point of view. The innumerable characters the inheritance of which is considered fall into two main categories: (1) medical or pathological abnormalities generally inherited as simple unit differences, (2) anthropological or racial differences, whose inheritance is generally more complex. The work should thus be of prime use to medical men and anthropologists as well as to geneticists and all those interested in any aspect of eugenics.

I have also just completed the writing of a book on *Human Ancestry.* The earlier chapters are concerned with general principles of evolution, especially in the mammals and primates, with emphasis on the principle of parallel evolution in paleontology and in human phylogeny. The bulk of the book is devoted to fossil records of the Hominidae and related primates. The story is brought down to the modern races and illustrated by photographs of fossil skulls, and also photos of modern races taken by myself in various expeditions.

The last two chapters are devoted to the subject of species and genera of man, involving a discussion of the experimental work with animal hybridization as it bears on the question of sterility and species. The whole constitutes a study of human evolution from a paleontological and genetical point of view.

This book was begun as an introduction to a study of Racial Crossing, but it was found necessary to make a separate work of it. The book on Race Crossing has yet to be written.

ROBERT FLEMING HEIZER, University of California, Berkeley

Grant No. 538 (1941), $750. Analysis of archaeological collection from Uyak Bay, Kodiak Island, Alaska.

In the summer of 1946 a survey was made at the U. S. National Museum of the large archæological collection made during the seasons of 1931–1936 by Dr. A. Hrdlička from an extensive village site on the north shore of Kodiak Island. A preliminary study of types (the collection contains over 3,000 items) shows that since the earliest period of occupation considerable cultural change and development have occurred. Bag handles, ovoid stone lamp with flat border and wick channel, large splitting adzes, single-piece curved bone fishhook, bundle reburial, and steam sweatbath are restricted to the uppermost occupation level, while long heavy bone lance points, net spacers, and heavy bone socketpieces are more abundant in the upper levels than in deeper strata. Peculiar to the lower (i.e., earlier) levels are wide flat barbed projectile points, composite harpoons, spinning-top discs, slate mirror, and elaborately decorated stone lamps. Numerous other types (partial list includes single-pointed birdbone awls, bone pins with decorated end, drilled ivory pendants, heavy whalebone dishes, bone arrow and dart heads, bone foreshafts, grooved stone sinkers, chipped stone blades, grooved stone mauls, toggle harpoon points, chipped or drilled slate ulos, and composite bone fishhooks) are relatively more abundant in the lower than upper levels. The following types (list not complete) are found in both upper and lower levels: single-pointed mammal bone awls, shovel blades of bear or whale scapula, paired fishspear points, bone combs, tubular bone beads, whalebone wedges, and small adze blades and bone adze-shafts. Iron-tipped engraving tools and the mechanically drawn dot-and-circle design are old in the site. Two small flat slate plates with detailed engravings and a red-painted pebble were found—both types are hitherto unreported from the Alaskan area. From earliest times a physically distinctive people with a basically Eskimo culture lived on the Uyak site, as shown by the harpoon, semilunar slate knife, oil lamp, and other distinctive items. This early population ultimately gave way

to a different people who either were rather similar culturally, or became dominant gradually while taking over the culture forms of the older group. The origin and fate of the earliest inhabitants are among the central problems of this study.

A collection of potsherds from near-surface levels of sites at Alitak Bay on the southwest coast of the island is being studied and a special report on these is in preparation. The vessels were apparently pressed or molded (with a paddle?) and tempered either with coarse pebbles or crushed granite. The only decoration consists of grooved flat rims and concave grooves on the exterior just below the rim. No complete vessels are in this lot, but shape, size, and thickness correspond to the complete specimen described by de Laguna.[1] The pottery is not like that described by George Quimby from the Aleutian Islands.[2]

From the Alitak Bay locality a full record of some unusual petroglyphs, briefly reported on in Volume 19 of the *American Anthropologist* (1917), has been prepared for publication.[3] Since petroglyphs are a non-Eskimo trait, their origin is to be looked for to the east or south, and it is along the Northwest Coast, from Yakutat Bay south to Columbia River that rock engravings are of common occurrence, and many of the Kodiak Island designs (e.g., spiral, hollow-center "star," faces without outline) also occur here. Kodiak Island Eskimo petroglyphy therefore seems to represent the northernmost extension of an art of the North Pacific Coast Indians.

D. B. STOUT, Syracuse University

Grant No. 854 (1946), $700. Studies of certain aspects of San Blas Cuna culture and acculturation.

Ethnological field data were collected from the San Blas Cuna Indian tribe of eastern Panama in 1940 and 1941, and brief descriptions of the culture and general analyses of San Blas Cuna acculturation have been previously written.[1] Present study of these data has been concerned with:

[1] A pottery vessel from Kodiak Island, *Amer. Antiquity* 4: 334-343, 1939.
[2] Pottery from the Aleutian Islands, *Fieldiana* 36 (1), Sept. 19, 1945, Chicago Natural History Museum.
[3] Petroglyphs from southwestern Kodiak Island, MS.

[1] D. B. Stout, San Blas Cuna acculturation, *Social Forces*, 21: 87-90,1942; "The Cuna" chapter in *Handbook of South American Indians* IV, Smithsonian Institution, Bureau of American Ethnology, Bulletin 143, 1946 and 1947 (in press); San Blas Cuna acculturation: an introduction, MS, 1941, to be published in *Viking Fund Anthrop. Ser.*, 1947.

1. The incidence, propagation and social position of albinos in this tribe. Harris[2] had previously described the Cuna albinos and estimated an incidence of .69 ± per cent, and, on the basis of genealogic and anthropometric study concluded that they were genetically homozygous recessives resulting from a mutation in one or more genes rather than the result of miscegenation with Caucasoids. On the basis of more accurate tribal census data the incidence has been lowered to .47 ± per cent, which is to be regarded as less of a refinement than as a confirmation of a remarkable phenomenon far exceeding the usual expectation of albinos among human societies in general. Explicit reference to the Cuna beliefs about, and attitudes toward, albinos and brief description of the structure of Cuna society demonstrate how the in-breeding necessary for the continuation of this genetic phenomenon, once arisen through mutation, has occurred wherein albinos are produced by the mating of phenotypically normal individuals.

2. An analysis of present-day San Blas Cuna property concepts with reference to their aboriginal background and the influences consequent to contact with Euro-American cultures. The functional relationships between property and other aspects of the cultures are indicated and the conclusion reached, in common with Cooper,[3] that the dominant factors determining (*a*) whether land tenure is communal or in severality and (*b*) property rights in other immovables are the relative abundance or scarcity of the various products of the land or water itself and the fixity or motility of the species inhabiting the environment being exploited. This is in contrast to concepts of property in movables or of incorporeal property, wherein the governing factors are concluded to be the interests and emphases of the culture itself, as expressed by the attitudes and values of the individuals participating in the culture.

3. A description of special features of the San Blas Cuna language with particular reference to the relationships between it and other aspects of the culture. Among the topics described and illustrated are: the specialized vocabularies and stylistics employed by the chiefs, medicine men, and ceremonial chanters; tabooed and other strongly affective words; cultural interests and orientations

[2] Reginald G. Harris, The San Blas Indians, *Amer. Jour. Phys. Anthrop.* **9**: 17-63, 1926.

[3] John M. Cooper, Temporal sequence and the marginal cultures, *Catholic Univ. of Amer., Anthrop. Ser.* **10**: 57-61, 1941.

reflected in the vocabulary; Cuna linguistic theory and evaluation of other languages with which the tribe has been in contact; and the mnemonic drawings (so-called picture-writings) made and used by the medicine men.

4. An application of Barnett's hypothesis "that the disgruntled, the maladjusted, the frustrated, and the incompetent are preeminently the accepters of cultural innovations and change"[4] and of his conceptual scheme of form, meaning, function, and principle as attributes or aspects of culture traits and complexes and their importance in the analysis of the processes of invention and culture change[5] to the study of the acculturation of the San Blas Cuna. The above, developed by Barnett in conjunction with his study of invention in present-day American culture and of the acculturation of the Yurok, Hupa, and Karok tribes of California and the Tsimpshian tribe of British Columbia, were found to be fully applicable in the analysis of the acculturation of the Cuna whose culture and contacts have been and remain totally different, and to be the only satisfactory explanation of certain phenomena of culture change in this tribe. The concepts of form, meaning, function, and principle as developed by Barnett are a refinement of formulations first made by Linton.[6] To them, and on the basis of their application to ethnological data from the Cuna, there has been added a discussion and appreciation of the inherent demonstrability of a principle as an important factor in the study of culture dynamics.

STOUT, D. B. 1946. Further notes on albinism among the San Blas Cuna, Panama. *Amer. Jour. Phys. Anthrop.*, n.s. 4 (4):483-490.
———————1946. Land tenure and other property concepts among the San Blas Cuna. *Primitive Man*, 19 (3 and 4). In press.
———————1947. Ethno-linguistic observations on San Blas Cuna. *Internatl. Jour. Amer. Linguistics* 13 (1):9-12.

PSYCHOLOGY

H. A. WITKIN, Brooklyn College

Grant No. 884 (1946), $525. Studies in geographic orientation.

These experiments investigated the way in which orientation toward the NS-EW axes of space is normally maintained.

[4] H. G. Barnett, Personal conflicts and cultural change, *Social Forces* 20: 171, 1941; also *Yr. Bk. Amer. Philos. Soc. for 1941*, 214, 1942.
[5] H. G. Barnett, Culture processes, *Amer. Anthrop.* 42: 21-48, 1940; Invention and cultural change, *Amer. Anthrop.* 44: 14-30, 1942.
[6] Ralph Linton, *The study of man*, 402-411, N. Y., Appleton-Century, 1936.

In a first experiment the ability to remain oriented through a series of bodily movements, without the aid of vision, was determined. Sitting in the dark, the subject was submitted to one or more turns in a rotating chair, and required at the end of the movement to indicate which way he was facing in the unseen but familiar room. Using standard patterns of movement of varying complexity, it was found in a group of 30 subjects that judgments made under such conditions are quite poor. 47 per cent of all judgments were off by 90° or more. Though most subjects did poorly, there were important individual differences. The extreme scores ranged from 2 correct judgments out of 24 in one case to 19 out of 24 in another. It is most significant that almost invariably, though very much in error, subjects had a conception of where the room was after movement. In other words, the unseen surroundings were quickly structured in terms of the main axes of space.

This experiment indicated that bodily experiences occurring during movement do not in themselves provide a very adequate basis for maintaining orientation. In another series of experiments the effect of providing a visual frame of reference, to supplement the bodily experiences, was investigated. The visual field employed was a simple one, consisting of a large square luminous frame. This frame was parallel to the floor, about two feet below the subject's seat, and it was pivoted on the axis of the chair so that it could be rotated about the chair. In one test the subject was submitted to movement with eyes closed, and then on opening his eyes, saw the frame, the position of which was varied from trial to trial. He was then required to indicate the axes of the room by adjusting an overhead luminous pointer to its front wall. In a control experiment, the subject was given the very same series of trials, but with the luminous frame omitted. The results indicate that when the luminous frame was present, it considerably influenced the subject's judgment, in that it was frequently adopted as a basis for determining the axes of the unseen room. Accordingly, when the rod was adjusted, it was most frequently brought into alignment with the frame, whatever the objective position of the frame.

In another experiment it was found that subjects even tended to change their judgments when confronted with the frame in a position which "contradicted" their original judgment. Thus, if after "locating" the unseen room, the frame was introduced, the subject was more apt to align the rod with the frame than to ad-

just it in accordance with his original conception of the position of the room. Thus, in one experiment where the frame was placed at a 45° angle to the subject's original conception of the axes of the room, the rod was brought into approximate alignment with the frame in 44 per cent of all judgments. There were again important individual differences, with some subjects sticking to their original judgments, formed on the basis of bodily experiences, and others consistently abandoning them in favor of the frame.

In a control experiment, where the frame was introduced in a position which "confirmed" the subject's original judgment, the rod adjustment was almost invariably made in accordance with that judgment.

In the course of these experiments in the dark room, some subjects reported self movement while seated in a stationary position. This movement included rotation, involving as many as five or six turns, ascent and descent, tilting from side to side, and forward-backward and right-left progression. Since this illusory bodily movement depends upon removal of an anchoring visual field, it is related to the autokinetic effect, and will therefore be called the "postural autokinetic effect." Several experiments were done to investigate this effect further. In one experiment it was suggested to each of 30 subjects that bodily movement would take place. Reports of self movement occurred in 22 cases. In a control experiment, where no suggestion was given, only 11 of 30 subjects reported self movement. In an effort to stop this effect, each of these groups was retested with the luminous frame present. This "weak" visual field did not reduce the incidence of self movement, but did seem to reduce its magnitude. One of the most striking findings was that some subjects were made ill by the illusory movement, and asked that the "movement" be discontinued. In one extreme case the nausea and headache which occurred persisted for three hours after the experimental session.

In order to investigate further the nature of individual differences in orientation toward the NS-EW axes of space, a paper-and-pencil test was devised. This test includes two kinds of compass problems, and problems involving the determination of one's position following a series of movements. The range of scores obtained on this test is extremely wide, indicating large individual differences. Also, the intercorrelations among the three parts of the test

are fairly high, indicating that a common ability is involved. Further work is required in standardizing this test, and in determining the basis of the extreme differences in performance.

The major part of this investigation was done by assistant Mrs. Z. H. Luria.

PHYSIOLOGY

WILLIAM R. AMBERSON, University of Maryland Medical School

Grant No. 9—Daland Fund (1943), $1,500. Clinical experience with hemoglobin-saline solutions.

In collaboration with Dr. C. Martin Rhode and Mrs. Joye J. Jennings, a method has been devised for the preparation of hemoglobin-saline solutions suitable for intravenous injections in clinical cases. Injections have been made into 14 patients, 7 of whom have received more than one injection.

In the multiply injected group there were 5 cases of secondary anemia due to hemorrhage or infection. Of these, 3 patients showed definite improvement after treatment, exhibiting reticulocytosis, and an increase in blood hemoglobin and hematocrit values. In a fourth patient the effect of the injections could not be evaluted, since hemorrhage continued. In none of these 4 cases did oliguria develop. In a fifth patient the secondary anemia developed from a severe hemorrhage post partum, which led to a state of shock. Administration of hemoglobin-saline (2,300 cc. in 5 injections) restored blood pressure to normal. The patient appeared to be recovering, but developed oliguria and died on the ninth day.

In one case of lymphatic leukemia and one of agnogenic myeloid metaplasia no improvement was observed after repeated injections. Urine flow remained normal.

In the singly injected group no beneficial effects were observed. One patient showed oliguria, with recovery. Another patient died 2 hours after injection, without pyrogenic reaction or other clinical signs.

Although definite oliguria was observed in only 2 cases in the series, indications of renal impairment (by NPN or clearance values) were observed in 3 other cases, 2 of the multiply injected group and one of the singly injected group. In the last mentioned patient after injection of 200 cc. of hemoglobin-saline, both glomerular filtration rate, as measured by mannitol clearance, and renal plasma flow and Tm, as measured by PAH clearance, were reduced

to about one-third of the original values, with later recovery to normal.

Liver function tests remained normal in the 3 cases tested.

In most cases the solutions exert a pressor effect which endures for several hours. The rise in blood pressure is accompanied by bradycardia.

In some cases injections up to a valume of 500 cc. (= 50 to 60 grams hemoglobin) have given no rise in temperature, or other reactions. In other cases pyrogenic reactions have been observed, usually mild, but occasionally severe, complicated by other reactions.

No evidence of anaphylactic reactions caused by hemoglobin was observed in any case.

The solutions do not agglutinate cells of the four main blood groups.

Methemoglobin does not accumulate in the plasma, even after large injections of these solutions.

In 6 patients the average amount of hemoglobin which appeared in the urine was 18 per cent of that injected.

ALFRED F. BLISS, Tufts College Medical School

Grants No. 817 (1945), $500 and No. 873 (1946), $220. Studies on visual pigments.

Rhodopsin and iodopsin, the photosensitive pigments of vertebrate night and day vision, bleach in the light with the release of colored lipides which undergo obscure dark reactions. The primary photoproduct is probably a complex consisting of protein and the acid tautomer of indicator yellow, a lipide which acts as a sluggish pH indicator at temperatures a few degrees above 0°C. In fresh solutions of *Rana pipiens* rhodopsin below pH 8 acid indicator yellow is in reversible equilibrium with basic indicator yellow, and is irreversibly converted to vitamin A by a labile enzyme. When formation of vitamin A is inhibited, by aging the solution for three hours at 25° or by pretreatment of the retinas with potassium aluminum sulfate, acid indicator yellow is slowly converted to the carotenoid, retinene. The conversion apparently does not affect the formation of vitamin A by addition of fresh enzyme.

The retina of the squid and certain other marine invertebrates contains a red pigment which becomes photosensitive in the presence

of formalin, and bleaches with the release of retinene. The presence of a derived rhodopsin-like pigment and its associated carotenoids in the squid is of importance in establishing a more general concept of visual mechanisms. An investigation was therefore undertaken into the extent to which the invertebrate visual system parallels that of the vertebrates. The visual pigment of the squid has been purified by preliminary washing of retinal homogenates with disodium phosphate and pH 4.6 buffer. The absorption spectrum of purified squid visual purple in digitonin solution is identical with that of rhodopsin. The squid visual pigment is not appreciably affected by light, but is much less stable chemically than rhodopsin. These distinctive properties suggest the desirability of a specific name, cephalopsin, for the squid visual purple. Cephalopsin, like rhodopsin, releases acid indicator yellow when extracted with cold acetone. This lipide then is rapidly converted to retinene. The question of whether the squid retina contains a vitamin A-forming factor similar to that of the frog remains to be answered.

BLISS, ALFRED F. 1946. Photolytic lipides from visual pigments. (Abstract) *Fed. Proc.* 5: 9; *Jour. Gen. Physiol.* 29: 299-304.
———————1946. Intermediate steps in the visual cycle. *Biol. Bull.* 91:210; *Collecting Net* 19:45.
———————1946. Properties of purified squid visual pigment. (Abstract) *Biol. Bull.* 91:220.

KENNETH C. FISHER, University of Toronto

Grant No. 651 (1942), $425. The quantitative effects of narcotics and allied inhibitors on isolated enzyme systems.

There are recorded in the literature several tests of the possibility of describing the concentration-effect relation of indifferent inhibitors upon the activities of cells by simple expressions based on the law of mass action. In setting up the appropriate formulae it has usually been assumed, tacitly or otherwise, that the inhibitor has only one mode of action, and this upon only one enzyme in the cell. The results of such investigations show usually that a curve results where the description of the relation given by the mass law would require a straight line. In most instances, therefore, the simple expression of the mass law is not an adequate description.

Recently[1] attention has been drawn to the fact that the curves relating the effects of narcotics on the oxygen consumption of in-

[1] Armstrong, F. H., and Kenneth C. Fisher, The oxygen consumption associated with growth in *Escherichia coli* and the effect of sulfathiazole and of n-propyl carbamate on it, *Jour. Gen. Physiol.* 30: 279-289, 1947.

tact cells with the concentrations of these inhibitors can be quite accurately predicted if it be presumed that the inhibitor acts at two sites in the cell instead of at only one.

This is true whether each of the two sites is in one of two parallel chains of oxygen consuming reactions or whether the two sites are in series, i.e., stand in such a relation to one another that the respiratory activity after reduction by one action of the inhibitor is still further reduced by the second action. From the shape of the curve relating the concentration of the inhibitor with its effect then, as Fisher and Stern indicate, one cannot decide which of the two possible arrangements of the sites actually exists. At the moment it seems that the existence of two parallel respiratory systems at the level attacked by narcotics would provide a reasonable interpretation of more data than would the series arrangement. [1, 2] This, therefore, is the view which is at present favored in the investigations of this laboratory.

In their quantitative treatment Fisher and Stern[3] accepted the common presumption that the effect of the inhibitor on a single isolated enzyme would be capable of description by a simple expression derived from the mass law and involving only one mode of action of the inhibitor. It now appears quite definite that in the case of luciferase there may be two actions of the inhibitor on a single enzyme.[4] The situation here is then that there are two "sites" of action, the sites being in series.

A complete understanding of the effects of inhibitors on intact cells obviously involves a knowledge of the effect of the inhibitors on the many separate enzymes contained in them. It seemed important, therefore, to determine to what degree the existence of two modes of action for the inhibitor is peculiar to luciferase.

We have, therefore, compared the effects of salicylate, lauryl sulfonate and urethane on the rate of oxygen consumption by yeast, on the stability of haemoglobin, and on the activity of car-

[2] Fisher, K. C., R. J. Henry, and E. Low, The effects of sulfanilamide and azide on oxygen consumption and cell division in the egg of the sea urchin, *Arbacia punctulata, Jour. Pharm. and Exper. Therap.* **81**: 58-66, 1944.

[3] Fisher, K. C., and J. R. Stern, The separation of an "activity" metabolism from the total respiration of yeast by the effects of ethyl carbamate, *Jour. Cell. and Comp. Physiol.* **19**: 109-122, 1942.

[4] Johnson, F. H., H. Eyring, R. Steblay, H. Chaplin, C. Huber, and G. Gherardi, The nature and control of reactions in bioluminescence. With special reference to the mechanism of reversible and irreversible inhibitions by hydrogen and hydroxyl ions, temperature, pressure, alcohol, urethane and sulfanilamide in bacteria, *Jour. Gen. Physiol.* **28**: 463-537, 1945.

bonic anhydrase, zanthine oxidase, lactic dehydrogenase, succinic dehydrogenase and decarboxylase.

In approximately one half of the instances the data, when plotted to test the applicability of the mass law, conform to a straight line as required. In the remainder, distinct curves result. The straight lines do not appear to be associated with any particular one of the three inhibitors nor with any one of the various systems investigated. This finding is in accord with the general prediction made by Johnson, Eyring et al.

It seems very likely, therefore, that inhibitors may act generally on enzymes by either one or both of two different mechanisms. It follows that it is unsafe if not actually incorrect to assume that the inhibition of any given enzyme will be capable of description by a simple expression of the mass law involving a single mode of action. It follows also as Johnson, Eyring et al note that the curves referred to above, which are typically found when the effects of inhibitors on intact cells are examined, could result from the inhibition of a single enzyme. These findings do not, of course, remove the possibility that the curves noted for intact cells result from the inhibition of two enzymes in separate parallel respiratory systems. Final decisions in this connection must be based upon considerations in addition to the shape of the relation between curve and effect.

It is a pleasure to acknowledge the collaboration of Mr. D. B. Waddell in this research.

OTTO MEYERHOF, University of Pennsylvania School of Medicine

Grant No. 819 (1946), $2,422. Studies on carbohydrate metabolism.

1. The oxidation of d-glyceraldehydephosphate by cozymase in the presence of inorganic phosphate and the oxidizing enzyme from yeast was further investigated in collaboration with Dr. Peter Oesper. The progress of the reaction was followed by measuring the absorption of light by dihydrocozymase at 340 mμ. The oxidation obeys the law of mass action for every component of the system. Moreover, it is strongly dependent on the pH. For constant concentrations of phosphate and glyceraldehydephosphate the formula applies:

$$\frac{[\text{dihydrocozymase}]^2}{[\text{cozymase}] \times [H^+]} = K$$

An unstable addition product forms between inorganic phosphate and glyceraldehydephosphate, but its amount is very small even with high concentrations of phosphate. It may attain a third of the total glyceraldehydephosphate under the most favorable conditions (in press).

2. With Dr. Wayne Kielley, a water soluble adenosinetriphosphatase was isolated from muscle. In contrast to the myosin-bound enzyme which is activated by Ca and inhibited by Mg, the new enzyme is activated by Mg and inhibited by Ca. Work is in progress to decide what connection exists between the two enzymes. Neither of them is activated by creatine, in opposition to the findings of Engelhardt and Cori.

DONALD M. PACE, University of Nebraska

Grant No. 801 (1945), $600. Investigation on respiration in the colorless flagellate, *Chilomonas paramecium*, with special emphasis on the vitamins involved in the respiratory mechanism.

I. Oxygen consumption and carbon dioxide elimination in *Tetrahymena geleii* Furgason.

These investigations were made in collaboration with Dr. E. D. Lyman.

With the aid of a Barcroft-Warburg respirometer, oxygen consumption and carbon dioxide elimination have been ascertained in *Tetrahymena geleii* for different population densities, for different temperatures, and for both young and old organisms. *Tetrahymena* was grown in 2 per cent proteose-peptone (Difco) solution but the tests were run for most of the experiments with the organisms in inorganic buffer solution. This solution consisted of $K_2HPO_4.3H_2O$, 65.5mg; NaH_2PO_4, 40 mg.; $CaCl_2$, 100 mg.; $MgCl_2$, 2 mg.; H_2O (redistilled), 1000 ml.

When young organisms are used, the O_2 consumption per unit volume of cell substance is inversely proportional to the population density. The respiratory quotients for all tests were practically all above 1.0; the highest R.Q. value was 1.41.

When old organisms are used there is an increase in O_2 consumption per unit volume of cell substance with an increase in

population density up to 69,000-72,600 organisms per ml. Densities above this result in lower consumptions. Respiratory quotients vary from an average of 1.11 in low population densities to 1.28 at optimum densities.

Oxygen consumption increases with increase in temperature up to 25°C. in both young and old cultures. Above this temperature the consumption decreases. R.Q. values were above 1.0 in all the tests made at different temperatures, 10° to 35° C. (5° increments).

Tests were also run in proteose-peptone solution, the solution in which the organisms were cultured. Some were tested in fresh 2 per cent proteose-peptone solution, others in the old solution in which they had been growing. Those tested in fresh solution show a much greater oxygen consumption than those tested in inorganic buffer solution (666 $mm.^3$ oxygen per hour per million organisms as compared to 325 $mm.^3$ oxygen in inorganic solution). Old organisms, however, tested in the same solution in which they had been growing have a lower oxygen consumption than old organisms tested in buffer solution.

Very high R.Q. values were obtained for all organisms tested in proteose-peptone solution, especially in the old solution where the average was found to be 2.81.

In nitrogen gas with but minute traces of oxygen, *Tetrahymena* utilizes the oxygen and gives off comparatively large quantities of CO_2. The R.Q. values are extremely high, from 1.49 to 2.87. It is, therefore, anaerobic to a limited extent. Its metabolism has been compared to that of vertebrate striated muscle. Oxygen is essential for continued function and life itself.

II. The necessity of vitamins and their effects on growth in *Chilomonas paramecium* and *Tetrahymena geleii.*

The flagellate, *Chilomonas paramecium,* and the ciliate, *Tetrahymena geleii,* may be grown in pure sterile culture. They are for this reason highly desirable for work of this type, which has to do with investigations of cellular functions and needs.

Tetrahymena was grown in a 2 per cent proteose-peptone (Difco) solution; *Chilomonas,* in a sodium acetate-ammonium chloride solution along with other essential inorganic compounds. Several of the B-vitamins—(nicotinic acid, thiamine, calcium pantothenate, pyridoxine)—and ascorbic acid were investigated.

There is at least a slight increase in growth whenever any of

these vitamins are added to the culture solutions of either organism. A very great increase in growth is obtained whenever thiamin is added to the solution containing *Chilomonas.*

Iron, as $FeCl_3$, has a decided effect on growth in both organisms and adds to the effect of each vitamin. Manganese also has a beneficial effect on growth in *Chilomonas.* An example of the great effect that iron has on growth is shown by results on the effect of riboflavin on *Tetrahymena.* It has little effect on growth unless $FeCl_3$ is also added. In 4-day cultures in proteose-peptone (which had been treated so as to destroy most, if not all, riboflavin present in it) an average of 27,900 organisms per cc. were found; in the same culture solution plus riboflavin (0.01 mg/L), 37,400; in the same culture solution plus $FeCl_3$ (0.1 mg./L), 54,820; and in the same culture solution plus riboflavin (0.01 mg./L), and $FeCl_3$ (0.1 mg./L), 67,800 organisms. Thus, although riboflavin has a beneficial effect on growth, by far the greatest effect is found when iron is added. There is over an 80 per cent increase in number produced when iron is added to the solution already containing riboflavin. These investigations are being continued.

ABRAHAM M. SHANES, New York University College of Dentistry and Marine Biological Laboratory

Grant No. 859 (1946), $450. Physical and metabolic factors governing the production of the resting potential in nerve.

An experimental approach to the relation of metabolism to the resting potential has been developed further and applied to the sciatic nerve of *Rana pipiens* and to the leg nerves of *Libinia emarginata.* The results with frog nerve delimit a specific mechanism necessary and sufficient to account for relationships known in this tissue: Hydrogen ions produced metabolically exchange for extracellular potassium and thereby maintain the high potassium gradient which is the immediate source of potential. This mechanism is consistent with membrane characteristics, viz., low permeability to sodium and anions and high permeability to hydrogen and potassium ions, indicated by potential measurements[1] and by the equivalence of NaCl and KCl as osmotic agents. Crab nerve, however, is permeable to anions[2] and to some extent to

[1] Netter, H., *Pfl. Arch. f. ges. Physiol.* 218: 310-330, 1928.
[2] Shanes, A. M., *Jour. Cell. Comp. Physiol.* 27: 115-118, 1946.

sodium as well, as shown by its limited osmotic response to NaCl and KCl. This fundamental difference in the membrane properties of the vertebrate and invertebrate nerves precludes the same relationship between metabolism and the potential in both systems, as actually observed. The available evidence is consistent with the possibility that the potassium gradient in crab nerve is also directly concerned with the potential, but that the high carbohydrate reserve in these nerves,[3] as already demonstrated in yeast,[4] functions to maintain this gradient.

Potassium. In addition to the high intracellular potassium concentrations in frog and crab nerve,[5] evidence for the importance of the potassium gradient in the two systems is as follows: (*a*) Except at the very lowest potassium levels, where potassium leakage from the fibers would interfere with the results, the potential declines in proportion to the logarithm of the extracellular potassium concentration (up to 0.11 molar for frog nerve,[6] 1.0 molar for crab nerve); (*b*) the extent of the decline and recovery of potential during and following anoxia decreases with increasing potassium concentration as expected from the liberation and reabsorption of potassium by the fibers; (*c*) the decline and recovery of potential upon application and removal of high potassium concentrations follow different time courses as predicted on the basis of a concentration gradient. The uptake of potassium during the post-anoxic recovery of frog nerve is indicated further by the considerably weakened response of the potential to CO_2 during this period; the recovery of potential is 2 to 3 times greater than the decline during anoxia and therefore depletes the extracellular potassium as shown by the ineffectiveness of CO_2 (see below).

Metabolic relationships. In frog nerve lactic acid production during anoxia provides hydrogen ions which serve to retain potassium. This is indicated by (*a*) the faster anoxic decline of potential during iodoacetate poisoning,[7] (*b*) the slower fall in the presence of a good source of lactic acid such as glucose and (*c*) the slower fall in sulfanilamide and thiophene-2-sulfonamide which, as

[3] Kleinholz, L., Personal communication; Holmes, E. G., *Biochem. Jour.* 23: 1182-1186, 1929.

[4] Rothstein, A., Thesis, Univ. Rochester, 1943.

[5] Fenn, W. O., D. M. Cobb, A. H. Hegnauer, and B. S. Marsh, *Amer. Jour. Physiol.* 110: 74-96, 1934.

[6] Shanes, A. M., *Jour. Cell. Comp. Physiol.* 23: 193-196, 1944.

[7] Shanes, A. M., and D. E. S. Brown, *Jour. Cell. Comp. Physiol.* 19: 1-13, 1942.

inhibitors of carbonic anhydrase, would delay the loss of hydrogen ions tending to combine with cellular bicarbonate to form CO_2.

The rate of acid production in crab nerve during anoxia is many times greater than in frog nerve.[8] Nevertheless it does not contribute to the potential as shown by (*a*) the relatively rapid anoxic decline of potential, a decline comparable to that of iodoacetate poisoned frog nerve, (*b*) the failure of iodoacetate to accelerate this decline and (*c*) the failure of glucose to retard the decline. Iodoacetate and sulfanilamide reduce the anoxic fall of potential; both apparently do so by lowering the general level of metabolism for the resting potential is lowered prior to anoxia.

During post-anoxic recovery of frog nerve increased CO_2 production supplies hydrogen ions for the reabsorption of potassium. In agreement with this (*a*) iodoacetate retards recovery by having prevented lactate formation during the anoxic period, for (*b*) lactate (and pyruvate) counteract this inhibition;[7] also (*c*) sulfanilamide and thiophene-2-sulfonamide depress recovery as expected from the depression of carbonic acid formation from CO_2. Lactate and pyruvate can also prevent the slow fall of potential in oxygen induced by iodoacetate poisoning of frog nerve.[7]

In crab nerve, however, pyruvate cannot retard the steady decline of potential in iodoacetate. Furthermore, although iodoacetate retards post-anoxic recovery, pyruvate only enhances this inhibition. Pyruvate by itself, as in frog nerve, increases the degree of recovery; this effect is due to enhanced metabolism for the level of potential is increased 20 per cent and the anoxic decline is proportionately greater. The action of this substrate therefore may be at different loci in the two systems, that in crab nerve being above (glycogen formation?) rather than below (carbonic acid formation) the level of iodoacetate poisoning. Glucose and sulfanilamide also inhibit post-anoxic recovery of crab nerve potentials.

Carbon dioxide. The same principles are applicable in interpreting the action of 5 per cent CO_2 in oxygen. Thus, in frog nerve carbonic anhydrase should speed the rise of the hydrogen ion concentration within the fibers and result in an initial uptake of

[8] Meyerhof, O., and W. Schulz, *Biochem. Ztschr.* 206: 158-170, 1929.

potassium; as the extracellular pH declines a secondary slower loss of potassium to the medium will occur. In keeping with this an initial rapid rise and a secondary slower fall in potential are induced by CO_2. Furthermore, sulfanilamide and thiophene-2-sulfonamide reduce the rise and increased buffering of the medium reduces the secondary fall in potential.

The importance of potassium in these phenomena is shown by the ineffectiveness of CO_2 when potassium is absent from the medium. The involvement of ionic transfer is also suggested by the ability of calcium to slow the rise of potential in CO_2, an effect consistent with the ability of this ion to retard potassium movement in frog nerve.[9]

In crab nerve 5 per cent CO_2 lowers the potential, the response being reduced by increased buffering and by a lowered calcium concentration of the medium. This effect of acidification provides a possible explanation of the inhibition of post-anoxic recovery by pyruvate in the presence of iodoacetate, by glucose, and by sulfanilamide.

It may be pointed out that these results provide a basis for understanding the lower efficiency of crab nerve functioning as compared with that of frog nerve.

SHANES, A. M. 1946. The dependence of the resting potential of nerve on potassium, calcium, and hydrogen ions. *Biol. Bull.* 19:211.

————————1946. Possible metabolic and physical chemical factors in the production of the injury potential in spider crab nerve. *Biol. Bull.* 19: 228-229.

CLARA M. SZEGO and SIDNEY ROBERTS, Worcester Foundation for Experimental Biology, Shrewsbury, Mass.

Grant No. 862 (1946), $400. Studies on the transport and activity of estrogen *in vivo*: the physico-chemical nature of circulating estrogen and the possible role of the liver in its formation.

Previous work[1] has implicated the viscera as essential for the activity of exogenous estrogen in the rat. Thus, the well-known effect of uterine water deposition could not be elicited in the eviscerated rat with very large doses of estrone and alpha-estradiol administered by combined routes and in divided doses.

In related studies, it was found that natural circulating estro-

[9] Fenn, W. O., *Science Suppl.* 79: 16-20, 1934.

[1] Szego, C. M., and S. Roberts, Estrogen activity in the eviscerated rat, *Endocrinology* 36: 104-109, 1945.

gen in several species investigated[2] differed from the free steroid in that approximately two-thirds of the estrogen in blood was closely bound to protein. This estrogen, as well as the one-third not bound to protein, was shown to dialyze quantitatively past a collodion membrane, suggesting that an equilibrium exists in blood between protein and estrogen, and that estrogen bound to protein is potentially available for physiological action by dissociation at the cell membrane.

Further progress has been made in the elucidation of the chemical constitution and formation of the natural estrogen acting on the end-organ. An investigation was undertaken of the estrogenic activity of purified protein fractions prepared from human blood. These were obtained through the generous cooperation of Professors Edwin J. Cohn, L. E. Strong, and associates at the Harvard Medical School. These studies revealed that practically all of the estrogen present in pooled human plasma occurred in the beta-lipoprotein fraction III-O (Roberts and Szego, 1946). The estrogen was found to dialyze readily out of this fraction under simulated physiological conditions. The specificity of the protein fraction involved strongly indicated that the protein component of the "estroprotein" was of the beta-globulin type. Evidence also indicated that a specific estrogen was present, namely, estriol, which appeared to be bound to the protein in an hydrophilic, esterified form, possibly as the glucuronide. The estrogenic activity was not removed from fraction III-O by the usual procedures of fat solvent extraction which nevertheless removed 95 per cent of the other lipids associated with this fraction.

The significance of "estroprotein" and compounds similar to it in steroid transport and activity *in vivo* can not be discussed at any length in this report. These results, however, may be pertinent to the observed failure of estrogen activity in the absence of the viscera.[1] The role of the liver in the elaboration of some of the plasma proteins suggested that this organ may be the site of conjugation of the estroprotein complex.

Accordingly, studies of estrogen activity in the partially hepatectomized, ovariectomized rat were undertaken (Roberts and Szego, in press.). It was found that partial hepatectomy greatly reduced the effectiveness of doses of alpha-estradiol which were

[2] Szego, C. M., and S. Roberts, The nature of circulating estrogen. *Proc. Soc. Exper. Biol. & Med.* 61 161-164, 1946.

highly active in stimulating the uterus of control animals, when such doses were administered intravenously up to 12 hours after operation. In the absence of approximately 65 per cent of the liver, therefore, injected estrogen was greatly reduced in effectiveness. During the period of active liver regeneration, however, 24 to 72 hours after partial hepatectomy, the effectiveness of injected estrogen was significantly enhanced over that observed in the controls. The temporal increase in uterine response exhibited a striking parallelism with the degree of liver regeneration.

Other workers[3, 4, 5] who had found enhancement of estrogen activity under similar circumstances, had not made their observations earlier than 24 hours after toxic damage to the liver or partial hepatectomy. Consequently, not only was the early reduction of estrogenic activity overlooked, but the enhancement observed was interpreted as due to failure of the remaining liver to detoxify injected estrogen.

In the light of the studies herein reported, however, a dual role of the liver in estrogen metabolism is indicated: the depression of estrogenic activity early after hepatectomy, followed by later enhancement, suggests that the liver functions in both the "activation" and inactivation of the estrogens, and that the "activation" function may return sooner than the inactivation process during liver regeneration. Whether these results are due to true activation of estrogen, e.g., through the formation of the estroprotein complex, or to the intervention of a metabolite normally supplied by the liver and necessary for the response of the estrogen-stimulated uterus, remains to be elucidated. These studies are still in progress.

Development along other lines has included a study of the estrogen content of human blood at various stages of gestation, using, in the main, the method of dialysis[2] for the isolation of the estrogen. This study has indicated that the grossly elevated urinary estrogen levels reported in the literature are not a reflection of greatly increased blood titres. This may imply the existence of a kidney threshold which may depend upon the dissociation

[3] Talbot, N. B., The inactivation of endogenous estrogen by the liver, *Endocrinology* 25: 601, 1939.

[4] Pincus, G., and D. W. Martin, Liver damage and estrogen inactivation, *Endocrinology* 27: 838, 1940.

[5] Segaloff, A., The effect of hepatectomy on the inactivation of alpha-estradiol, *Endocrinology* 38: 212, 1946.

constant of the estroprotein complex. Evidence for such a threshold has been lacking heretofore. This work is nearly concluded and will be reported shortly.

Still another line of investigation has involved studies of uterine metabolism *in vitro* as influenced by various estrogenic compounds. The failure of pure estrogens *in vitro* to exert their effects on increasing the Q_{O_2} of surviving uterine tissue[6] has been confirmed in our studies. This has seemed to be further evidence that the natural estrogen *in vivo* is not the free steroid. Moreover, previous incubation of uterine slices in serum in the presence of the sodium salt of estradiol, sodium estrone sulfate, or calcium estriol glucuronide, all water-soluble forms, failed to alter the subsequent aerobic respiration of the tissue in Krebs-Ringer-phosphate solutions. There is the possibility that forms of estrogen such as have been suggested from our work on estroprotein may be active in the preparation. These may have to be isolated from the blood of the species involved, or prepared by synthetic means in order to be applied in these studies. The *in vitro* investigations are still in progress.

ROBERTS, S., and C. M. SZEGO. 1946. The nature of circulating estrogen: lipoprotein-bound estrogen in human plasma. *Endocrinology* 39: 183-187.

ROBERTS, S., and C. M. SZEGO. 1947. The early reduction in uterine response to alpha-estradiol in the partially hepatectomized rat, and the subsequent enhancement during active liver regeneration. *Endocrinology*. In press.

CLASS III. SOCIAL SCIENCES

AMERICAN AND MODERN HISTORY

LYMAN HENRY BUTTERFIELD, Princeton University

Grants No. 803 (1945), $200, and No. 818 (1945), $4,000. Preparation of an edition of the letters of Dr. Benjamin Rush, and organization of a union catalogue of manuscripts, publications, and other materials relating to Rush.

The year 1946, the two-hundredth anniversary of Benjamin Rush's birth, has been marked by numerous tributes to his suddenly reviving fame. Rush symposia and exhibitions have been held in Baltimore, in Atlantic City, and more than once in Philadelphia. A collection of Rush's writings has been announced for

[6] Kerly, M., The effect of estrone on the metabolism of rat uterus, *Biochem. Jour.* 34: 814, 1940.

publication by the Philosophical Library, New York; and I have undertaken to prepare a biography to be published by the firm of Schuman in the "Life of Science" series. The recognition which Rush felt was denied him in his lifetime, and which the nineteenth and early twentieth centuries were almost aggressively unwilling to accord, has at length come to him in full measure.

My own work under the Society's grants has been retarded by my acceptance, halfway through the year I expected to devote exclusively to Rush, of a full-time post under Julian P. Boyd, editor of the Papers of Thomas Jefferson at Princeton. But the generous terms of the grant and the encouragement of Mr. Boyd have made steady, if not rapid, progress possible.

Toward the edition of Rush's letters the main accomplishment has been the transcription of about 600 letters from manuscript and printed sources, the ratio between the two types of sources being about four to one. A final selection of, probably, 400 letters for publication remains to be made. Partly because of the bulk of material and partly because in only a few cases have both sides of a correspondence with a particular person survived at all fully, I have decided to exclude letters written to Rush. Progress of the search for letters still outstanding is described below. Annotation of the letters chosen for publication is well under way.

Work toward establishing the Rush union catalogue in the Library of the Society, suspended between March and December because I could not be in Philadelphia, is once again proceeding. An assistant is engaged in calendaring the mass of in-letters and miscellaneous papers in the Rush MSS. at the Ridgway Branch of the Library Company of Philadelphia—the only collection, but by far the largest, not yet calendared. Rush's notebooks at the Ridgway are being microfilmed for calendaring at Princeton. I have also made substantial progress toward a bibliography of Rush's published writings, based on the original issues, published guides and lists, catalogue cards of the major libraries, systematic search of serials and newspapers, and certain special aids like the Index to Early American Periodical Literature at New York University. That Rush was a prolific author is notorious: how prolific will appear only when all his uncollected pamphlets, essays, and contributions to newspapers, many of them anonymous and pseudonymous, are ferreted out and enumerated. At present

little more is being attempted than alphabetical and chronological checklists. An exhaustive descriptive bibliography of Rush would be a tremendous task.

The greater part of the new materials for the edition of the letters found during the year is in private hands. Dr. Josiah C. Trent, of Durham, North Carolina, has generously made available to me his entire splendid run of Rush's letters to Mrs. Rush written daily during the months that the yellow fever raged in Philadelphia in 1793, together with numerous other letters of the highest interest covering the greater part of Rush's career. Mr. Lloyd W. Smith, of Madison, New Jersey, has kindly allowed me to film the Rush letters in his collection; they represent a variety of Rush's activities—medical, religious, and humanitarian. Single letters have come from other collectors, an outstanding example being a letter (owned by Mr. George A. Ball of Muncie, Indiana) from Rush to Elias Boudinot, dated 18 April 1790, relating to the death of Benjamin Franklin and proposing a public tribute to Franklin by Congress. Letters owned by institutions but not hitherto located include an early group written by Rush while a student at Edinburgh to persuade John Witherspoon to accept the presidency of the college at Princeton (in the New Jersey Historical Society); several excellent letters to Noah Webster, 1788-1799 (in the New York Public Library); and letters to William Roscoe and William Cullen (in the Liverpool Public Libraries and Glasgow University Library, respectively). It is disappointing to report that Rush's side of notable correspondences with certain friends and members of his family has not come to light. Largely or entirely missing are his early letters to the Rev. Thomas Coombe and the Dilly brothers, booksellers, in London, and to Dr. Dubourg in Paris; to Senator Maclay and Congressmen Fitzsimons and Muhlenberg in New York during the first session of the First Congress; to Dr. Priestley in Northumberland, Pennsylvania, Dr. Percival in Manchester, Dr. Ramsay in Charleston, Dr. Hosack in New York, and Dr. Waterhouse in Boston; to his brother, Judge Jacob Rush, and to his son Richard, the statesman and diplomat. The papers of some of these men are no doubt extant; information regarding them would be warmly welcomed.

Search of printed sources has yielded a good many stray letters, the most noteworthy find being a brilliant but forgotten letter describing in Boswellian detail a dinner with Dr. Johnson, Gold-

smith, and others at Sir Joshua Reynolds' in 1769. This letter, printed in *The Port Folio* in 1804, provides the substance of the little book called Rush's *Reminiscences* in the bibliography below.

Some important Rush manuscripts other than letters have been located and calendared during the year. One of the most valuable is Rush's journal of his voyage to Liverpool and his life in Edinburgh, 1766-1768, recently acquired by the University of Indiana Libraries. A shorter but exceedingly characteristic diary kept by Rush on a trip to Carlisle for a meeting of the Dickinson College trustees in 1784 is owned by Dr. Trent. Several uncatalogued Rush notebooks of greater or less importance have recently been found among the uncatalogued holdings of the Ridgway Branch of the Library Company of Philadelphia, together with a continuous series, covering many years, of the daybooks and account books of his medical practice. These are manifestly of the highest value as sources for the medical historian and deserve much more intensive study than I shall be able to give them. In a search (for another purpose) of the Continental Congress Papers in the Library of Congress, I found a number of reports by Rush and other papers relating to his service in Congress and in the hospital department of the Continental Army. Finally, in both institutional and private collections, I have examined a good many sets of students' notes on Rush's lectures at the University of Pennsylvania. These are quite commonly encountered, and from the fact that the writers' names do not always appear are sometimes mistaken for Rush holographs. Careful study of a sequence of them distributed over several decades would help explain Rush's pedagogical methods and success.

BUTTERFIELD, L. H. 1946. Report of progress. *Yr. Bk. Amer. Philos. Soc.* for 1945: 186-193.

————————1946. Benjamin Rush: A physician as seen in his letters. *Bull. Hist. of Med.* 20: 138-156.

————————1946. Benjamin Rush's Reminiscences of Boswell & Johnson. Privately printed, Somerville, N. J.

CHESTER MCARTHUR DESTLER, Elmira College
(now at Connecticut College)

Grant No. 617 (1942), $450. Preparation of a biography of Henry Demarest Lloyd.

Further progress was made on the biography during the past year, nine months of which were spent wholly on the project on

a Library of Congress Fellowship. At the present writing the biography is approximately two thirds finished, some of it in fourth draft, with the research for the remainder completed.

During 1946 three studies, collateral to the Lloyd biography, were published. *American Radicalism,* 1865-1901: *Essays and Documents* contains two new essays and a document of this character, together with a number of essays that had already appeared in print. The document in question is a campaign speech delivered by Henry Lloyd in 1894. Its importance derives from Lloyd's attempt to fuse the indigenous radical tradition with the plan for a collectivist economy that the Labor-Populists of Illinois were advocating. The two essays indicated, "The Labor-Populists Alliance of Illinois in the Campaign of 1894," and "The Disintegration of the Labor-Populist Alliance in Illinois" develop at length the organizational and ideological problems that arose from the attempt to merge Populists, silverites, trades unionists, Single Taxers, Nationalists, Coxeyites, and Socialists in a common front under the Populist banner. This was accomplished by means of a Springfield platform, supplemental to the Omaha platform, through adapting to Labor-Populist purposes the political program then being considered by the constituent unions of the American Federation of Labor. Data introduced from other states suggest that the Illinois experiment had regional if not national significance. The opposition of Populist national headquarters to party affiliation with the Socialists was a prime factor in disrupting the Illinois "popular front." Of almost equal importance as contributors to this end was factional conflict within it between Single Taxers and Socialists, and the final rejection of the political program of the American Federation of Labor at its Denver Convention.

The second study, "A 'Plebian' at Columbia 1863–1869" was adapted from two early chapters of the manuscript of the Lloyd biography. The article describes Lloyd's student years at Columbia as an undergraduate and then in the Law School. The classroom influence of Francis Lieber, with whom Loyd formed a fast friendship, confirmed a youthful bent toward liberalism and serious study. Equally important in moulding his character were Henry Lloyd's campus literary ambitions and particularly his exclusion from the fraternity circle. He emerged, perforce, as an outstanding leader of the less cohesive "plebs." In this capacity he won

a notable victory over both Nicholas Fish's fraternity faction and President F. A. P. Barnard in his junior year during a bitter conflict growing out of a question of discipline. Lloyd's reward came in his senior year when he was elevated to the post of class secretary and named "Class Poet" as well. Meanwhile, his fight against the fraternity men had confirmed a youthful if not hereditary antagonism to special privilege and social snobbery to which he adhered for the remainder of his life.

The third study, "The Standard Oil, Child of the Erie Ring, 1868–1872, Six Contracts and a Letter," dealt with documents which were byproduct of a search for Lloyd letters in the papers of Roger Sherman of Titusville, and which establish, incidentally, the accuracy of an unpublished deduction of Henry Lloyd. During research in preparation for the writing of *Wealth against Commonwealth,* Lloyd concluded on the basis of partial evidence that the Standard Oil monopoly had originated in freight rate favors secured from Jay Gould and James Fisk, Jr. Vigorous efforts to run down further evidence were of no avail, and he did not publish his tentative hypothesis. Accidental discovery of the documents in question would seem to establish the validity of this contention and at the same time raise still higher Lloyd's rating as an investigator. The documents and accompanying editorial comment reveal that a community of interest had been established between the supposedly independent Erie Railway and the Atlantic and Great Western Railroad by means of stock ownership in the Allegheny Transportation Company by Jay Gould and Robert B. Potter, Receiver of the AGW. Both railroads paid drawbacks on oil to the Allegheny, the first pipeline combination of the Oil Region, whose President, Henry Harley, was oil rate agent on the Erie and a noted manipulator of the price of crude oil on the exchanges. The combination was extended to include three favored petroleum refining firms in Cleveland in 1868, who were assigned together a quarter interest in the Allegheny and three-quarters of the drawbacks paid it by the AGW on Cleveland bound oil freights. From this combination dates the swift rise of Cleveland to primacy in refining, and the even more phenomenal success of Rockefeller, Andrews, and Flagler which was soon transformed into the Standard Oil. Merged with Clark, Payne and Company on the eve of the South Improvement Company coup, which must be reinter-

preted in the light of the Rockefeller-Gould alliance, this firm and its leaders went on to achieve a monopoly of petroleum refining by methods learned while associates of the Erie "oil ring."

DESTLER, CHESTER MCARTHUR. 1946. American radicalism, 1865-1901; essays and documents. *Conn. College Mon.* 3: 162-254.
———1946. A "plebian" at Columbia 1863-1869. *N. Y. History* 27: 306-323.
———1946. The Standard Oil, child of the Erie Ring, 1868-1872, six contracts and a letter. *Miss. Valley Hist. Rev.* 33: 89-114.

CARL COKE RISTER, University of Oklahoma

Grant No. 797 (1945), $720. A study of "No Man's Land, Heart of the Dust Bowl."[1]

Abundant manuscript records, as well as printed documents, now on file in our National Archives, Washington, D. C., refer to Oklahoma's Panhandle, during the period of the 1870's and 1880's, as "No Man's Land." This region was a part of the Southern Plains country acquired by the United States from Texas in 1850. It was a high prairie tableland of approximately 3,000 feet elevation, semi-arid, wind-blown and uninviting to early home seekers. Indeed, as late as 1880 the federal census described the general area of which it was a part as "not more than 7,000,000 acres of arid and barren land, destitute of forage." This description suggests that pioneer western people had truly catalogued it as a "No Man's Land" to coincide with the name given it by the federal government.

But the region was a "No Man's Land" in other ways. In carving out the boundaries of Kansas, Colorado, and New Mexico, and in re-shaping the Texas Panhandle, Congress neglected to attach it to any state or territory, thus leaving a strip of land 34½ miles wide and 166 miles long (more than 5,500 square miles) without governmental control or any kind of law. Yet it embraced an area larger than two of the smallest American states. It was watered by clear running Beaver and Cimarron rivers and their numerous tributaries and its valleys and uplands were carpeted by nutritious grasses, conditions ideal for Indian tenure as well for a range for buffalo, elk, deer, and pronghorns.

For forty years (1850 to 1890) this "No Man's Land" was a land orphan and until well past the Civil War it was occupied only

[1] Tentative title of book now in preparation for release during the spring of 1948.

by the nomadic Comanche and Kiowa Indians, who adapted their way of life to the region's varying climatic moods. But by 1867 New Mexican shepherds had driven their flocks to the Black Mesa country, and an outlaw, named Coe, had built "Robber's Roost" in the same vicinity and had brought there a large following of thieves to rob the caravans passing over the Santa Fe Trail. The tenure of both classes was short, however, for presently the thieves were driven out by Colorado troops and the sheepmen had withdrawn in favor of cattle ranchers. By 1885 upward of 100,000 cattle grazed the grassy plains of "No Man's Land."

The cowmen's occupation of "No Man's Land" attracted the attention of "grangers" or farmers, who began to appear during the middle 1880's, crossing the Cimarron River into eastern "No Man's Land." And by 1887 homesteaders had pretty well occupied the region's eastern half. When these settlers found that they were beyond the bounds of federal or state control, they established their own rules and law, and, indeed, their own territorial government.

They were equally resourceful in adapting themselves to a rigorous climate and a poverty-stricken country. They built their homes of sod; they brought in drought-resisting crops; and they employed adaptation and innovation to meet the demands of a region afflicted by blizzards, droughts, hot winds, and dust storms.

Few American settlers have experienced a more rigorous discipline. Peculiar hardships, near-starvation, and terrific handicaps were their common lot. Consequently these factors finally shaped a plains culture and people. Many new settlers would not submit to these trials and left the country, but others remained to work out their common problems. The blizzard of 1883 drove out many ranchers; the drought and hot winds of 1888, and the "Old Oklahoma" settlement of the next year, caused a second exodus, this time of farmers; a second drought of 1893 and the opening of the Cherokee Outlet to settlement brought a third migration; and at least two other settler flights after 1900, the last during the period of the prolonged drought and dust storms of the 1930's, occurred. But the population of "No Man's Land" slowly increased, for during these decades of trial more people came in and adapted themselves to the country than left.

In 1890 "No Man's Land" was attached to the newly created Territory of Oklahoma as Beaver County; and seventeen years

later, when Oklahoma became a state of the American Union, it was divided into three counties—Beaver, Texas and Cimarron. For a time it seemed that the people of these counties would be rewarded for their long years of wishful waiting. The federal government gave them their homesteads and nature added bountiful crops. Then came the "Dirty Thirties" (1933–1939)—the period of drought and dust storm. This region was the very heart of the dust bowl and its people suffered the most from these bitter trials. At last thousands of them, broken in health, in spirit and penniless fled from the "black blizzards" as though from a plague. But as in other severe tests, many others remained to bring in a new economy, a dust bowl economy, characterized by soil-rebuilding, by mechanized wheat farming on a bonanza scale, and by improved stock-ranching.

Today on these wind-swept, drought-frequented plains dwell a most remarkable people, seasoned by adversity and trial, but conditioned into a resourceful, adaptable way of life.

W. SHERMAN SAVAGE, Lincoln University

Grant No. 878 (1946), $500. A study on the Negro in the history of the West, 1830-1890.

The various libraries where the original researches had been made were visited so as to make sure the references and the bibliographies were correct as nearly as that was possible. The subject, *The Negro in the History of the West,* was one that required study in many centers and thus in checking the work, it was necessary to go back to these areas again.

Some of these libraries were state, city, and national depositories. The State Historical Society Library at Topeka was most important, as were also the State Historical Society Libraries of Colorado in Denver, the State Historical Society Library of Utah in Salt Lake City, and the State Historical Society Library of California in San Francisco. The city libraries were those of Denver and San Francisco, where some material on the Negro had been secured. The National Depositories were those of the Library of Congress and the National Archives which had been of much help in the original research.

The private and special depositories were the Western Historical Library housed in the Denver Public Library, the Henry Hunt-

ington Library housed at Huntington Library and Art Museum Building at San Marino, California. The Bancroft Library housed in the University of California Library, and the Library of the Church of Latter Day Saints in Salt Lake City were some of the places visited in carrying out this project.

The work on the manuscript is still going on. Thus far, nothing has been published.

SOCIOLOGY

BRADFORD CHAMBERS, New York, N. Y.

Grant No. 845 (1945), $700. A study of the juvenile gang as a social phenomenon in New York City.

Investigations have been made of juvenile conflict gangs in New York City. This research has been carried on intermittently during the past four years, and was continued in 1946-1947 with the aid of a grant from the Society. The studies were concentrated in Upper Manhattan, especially in Harlem, East Harlem, and a racial borderline area in Manhattanville, called "Mousetown." The location and distribution of the gangs were surveyed, their national, racial, and religious composition, their organization and general activities. Parental, environmental, and psychological factors were studied. Various techniques were tested and developed to perform the research. The investigator approached the gangs in their own haunts and was gradually able to gain their confidence. The main part of the project has been field work investigations. Information was accumulated and observations noted. Throughout the research, the active cooperation of the following individuals and organizations was secured: Mr. G. Howland Shaw, President, The Welfare Council of New York; Mr. Phillip Heimlich, Director, the Youth Counsel Bureau, District Attorney's Office, New York City; Professor Frederic M. Thrasher, New York University; the Osborne Association; the Society for the Prevention of Crime; and the East Harlem Council for Community Planning. Students from Antioch College, New York University, Columbia University, and the Social Research Laboratory of the City College of New York participated in certain field work investigations.

Emphasis has been placed on the conflict gangs, a phase of juvenile delinquency which hitherto has received only scant treat-

ment. The problem, however, is one of wide magnitude. In terms of actual deaths, during 1945–1946, twelve boys were killed in New York City directly or indirectly from juvenile gang conflicts. There is also the equally important yet less apparent problem of the destructive, predatory patterns of attitude and behavior which these gangs tend to set for their satellites, the younger boys and girls in the gangland communities. Then, too, we have found that these gangs are the product primarily of racial frustrations and tensions. The potential fodder they present to native American fascists who, as Hitler did, might utilize them for their own nefarious purposes, is also tremendously serious.

Most of the conflict gangs studied possess from twenty to thirty members.[1] However, some of them number as high as two hundred to five hundred boys and girls. Members range in age from twelve to seventeen years. There are various leaders, including special "guerilla captains" and "war counselors" who take charge in gang fights. Many of the gangs are divided into divisions: "tiny tims," "tots" or "babes," midgets, cubs, juniors, and seniors. Actual gang conflict is largely premeditated. Gang fights, called "rumbles," are often planned well in advance. The gangs send out spies, lay elaborate traps, and decoy their rivals into battle. Weapons used in gang conflicts are varied. The most frequent observed are clubs, switch-blade knives, brass knuckles, black jacks, (often made in school workshops), dagger rings, ice picks, and home-made .22 calibre revolvers. The manner in which the boys fashion together these "saddy" guns is but one of many examples of misdirected ingenuity and energy. Outside of fighting and occasional stealing, the most common activities of the gangs are stick-ball and other unsupervised street sports, pool, crap and card games, "mooching"—sneaking into movie theaters, and loafing. Although the gangs have strong sentiments and codes, they do not tend to set up artificial standards or laws. Primary group controls in the conflict gangs are strong.

With all their predatory outlets, it has been found that these gangs possess certain assets of unity, leadership, initiative, and

[1] More detailed accounts of the findings of these studies are published in the following articles, by the investigator: The Gangs of New York, *New York Times*, Magazine Section, December, 1944; Race Wars In the Streets, *Common Sense*, June, 1944; Gangland in Embryo, *Negro Digest*, July 1944; Juvenile Gangs of New York, *The American Mercury*, April 1946.

loyalty. And some of the gangs' democratic features, as when they elect leaders and decide upon activities, are striking. The gangs also have their colorful aspects. Girl auxiliaries, for instance, are called "debutante" or "sub-deb" divisions.

Considerable attention in the research has been given to the problem of gang treatment and to the existing treatment methods employed by social agencies. The conflict gangs in East Harlem were observed for the specific purpose of studying social agency-gang relationships. This phase of the research revealed much of interest.[2] But, in East Harlem, as in other sections studied, the glaring fact stands out that these more aggressive gangs, those in need of particular attention, are the very groups that do not tend to come under the constructive influence of the social agencies. The explanation of this lies not in any lack of interest on the part of the agencies to deal with them. Juvenile conflict gangs are nonconformist groups. They shy away from supervision. They shun organized agency programs. In fact, they thrive on independence from all outside discipline and authority. Settlement houses, big boys' clubs, and other youth-serving agencies naturally find it difficult to compete with the wild, carefree life of the gangs. In the case of those gangs that are enticed into agency buildings, the agencies complain that they disrupt programs and that they have a destructive influence on the more conformist members already within the agencies' fold. Moreover, a significant finding of the research is that case work techniques, probation and reform school treatment are unable to get far with the gangs, mainly because they cannot effectively deal with the gang member without first controlling his gang and without at the same time working to change the destructive influences and conditions within the gang boys' environment. Gang controls and attractions are strong, and one fundamental conclusion of this study is that the only way to deal with the individual gang boy is first to reach the whole gang.

What can be done to deal with the gangs, how they can be reached, has been a primary object of this research. A constructive project with two gangs in a racial borderline area in Upper Manhattan was developed to test the thesis that it is possible to redirect the outlets of such gangs by accepting their identities, respecting them as groups, and by constructively channeling their qualities

[2] The East Harlem Gang Survey. An 80 page report, confidential, unpublished.

of unity, leadership, initiative, and loyalty.[8] The investigator approached the gangs in their own haunts and slowly established rapport with them. The confidence and loyalty of the gangs were gradually obtained, then a process of "stand-on-the-sideline" democratic and indirective leadership and manipulation was applied. Once the gangs had taken on certain constructive interests and activities, then where individual treatment was needed, psychiatric and medical care, vocational guidance and other case-work techniques were introduced. Several failures were met with the first gang, and later, a project with more encouraging results, was initiated with a similar group. Mr. Ernst Beier, a graduate student in psychology at Columbia University, assisted our attempts to redirect the outlets of this group. The project, on the whole, was experimental. Although most of the work was carried on from the summer of 1945 through the spring of 1946, our relations with the group continue. Certain techniques for dealing with such a group of non-conformist boys were developed. These, the problems encountered, and progress were recorded in detail. A report on the project has been prepared entitled, "The Saxons—An Experiment in Channeled Energies," which is to be published.

In this constructive phase of the research project, the investigator has also had the active cooperation of Mr. Alfonso Rivero of Lima, Peru, who was in this country under the sponsorship of the Institute of International Education. Mr. Rivero was interested in the organization of such a group which would give him a model to encourage similar work in Peru, one which would help promote democracy in his country, and at the same time foster North and South American relations. We worked together with the gang, and he introduced the appealing South American interest. Mr. Rivero has sinced returned to South America where he has initiated a similar program. We have stimulated the group in such activities as corresponding and exchanging pictures with a club of boys he has organized in Peru.

[8] This concept has been presented together with discussions of social agency-gang relationships in the following articles by the investigator: Gangs Present a Different Problem, *The Proceedings*, National Conference of Juvenile Agencies, February 1944; An Approach to the Gang, *Survey Midmonthly*, September 1944; The Dukes, *The Proceedings*, National Conference of Juvenile Agencies, April 1945. For an excellent discussion of a constructive gang project in Washington, D. C., see an article in the same issue of *The Proceedings*, titled, The Junior Citizens Police Corps, by Oliver Cowin; see also the report of the Committee On Street Clubs, Welfare Council of New York, published in the Spring of 1946.

The group we are working with in New York has shown keen interest in their "brother club" in Peru. We are hoping to find the means to take at least eight members of the club on a two to three-month trip to South America, and study their reactions to such a new environment.

CLASS IV. HUMANITIES

PHILOSOPHY

PHILIP P. WIENER, Managing Editor, *Journal of the History of Ideas*

Grant No. 808 (1945), $1,000. Studies on the influence of evolutionism on the genesis and diverse forms of pragmatism in American philosophy (Chauncey Wright, Charles S. Peirce).

After careful search of the unpublished papers and correspondence of Chauncey Wright at Northampton, Mass., and of Charles S. Peirce at Cambridge, Mass., it was discovered that Wright's correspondence with Charles Darwin was a turning point in the history of American philosophy and psychology, and that Peirce made a mathematical generalization of Darwinian evolution as "a theorem in probabilities." The latter was made the basis of a metaphysical interpretation of an evolutionary logic and cosmology intended to reveal a scientific theism that would rectify the "Ockhamist nominalism" behind British empiricism and agnosticism. A hitherto unknown and unpublished paper in three versions by C. S. Peirce and important correspondence (1901) between Peirce and S. P. Langley, Secretary of the Smithsonian Institution, dealing with the modern evolutionary conception of a Law of Nature and with the subjective theory of probability used by Hume in his Essay on Miracles, was discovered in the files of the Smithsonian Institution, and will be published with an introduction and notes in the PROCEEDINGS of the American Philosophical Society, vol. 91, no. 2.

Progress was made in the investigation of the influence of evolution in Darwin's sense on the psychology of William James, who was the only one of the Cambridge philosophers to reject Lamarckianism.

Not a single reference to Peirce's "Metaphysical Club" supposed to consist of Wright, James, O. W. Holmes, Jr., John Fiske,

Nicholas St. John Green, Joseph B. Warner—the latter four trained in law—F. E. Abbot, and Peirce has been found outside of Peirce's inconsistent accounts in any of their writings or accounts of their lives by their friends, so that Peirce's claim that he first formulated the principle of pragmatism in that group is doubtful. But the group did symbolize the great effect of Darwin's work on American thought in the diverse forms of pragmatism that appear in the works of these men in methodology of science, law, history, and theology.

WIENER, PHILIP P. 1946. Peirce's Metaphysical Club and the genesis of Pragmatism. *Jour. Hist. Ideas.* 7: 218-233.
———The evolutionism and Pragmaticism of Peirce. *Ibid.* 7: 321-350.

ANCIENT, CULTURAL, AND LITERARY HISTORY

ALFRED OWEN ALDRIDGE, The University of Buffalo

Grants No. 786 (1945), $400; and No. 835 (1946), $400. A study of the critics of Lord Shaftesbury's *Characteristics* in the eighteenth century.

During the summer months research was continued in the Yale University library on the background and influence of Lord Shaftesbury's *Characteristics.*

It was discovered that Shaftesbury's position on ecclesiastical matters was directly influenced by Matthew Tindal's *The Rights of the Christian Church Asserted,* that Shaftesbury's opinions on the subject of apostolic succession were sympathetic to those of Bishop Hoadly and the Latitudinarians, and that the important issues of the Bangorian Controversy (1717–1720) were foreshadowed or anticipated in Shaftesbury's *Characteristics.*

It was discovered also that passages from Shaftesbury's *A Letter concerning Enthusiasm* were read aloud and condemned in the House of Lords as part of the proceedings in the famous Sacheverell trial.

A book based on this research is now being prepared.

ALDRIDGE, ALFRED OWEN. 1946. Report of Progress. *Yr. Bk. Amer. Philos. Soc.* for 1945: 208-209.
———1946. A preview of Hutcheson's ethics. *Modern Lang. Notes.* 61: 153-161.
———1946. Shaftesbury's earliest critic. *Modern Philol.* 44: 10-22.

HANS BARON, Institute for Advanced Study

Grants No. 697 (1943), $2,000 and No. 764 (1944), $500. Studies on Humanism and the Florentine Commonwealth in the Renaissance.

This project is composed of a group of interrelated studies on both the cultural and political (including constitutional and economic) history of Florence from about 1300 to 1530. The purpose is to attain two associated objectives simultaneously: to establish for the history of humanistic ideas an understanding of the role played by the influence of civic life in the Florentine Commonwealth; and to procure from the study of Florentine ideas and the experiences reflected in them a lead for the correction of some of the accepted views of the political and economic pattern of Renaissance Florence.

1. The present range of the project has developed gradually. The study started with an analysis of the ideas of Florentine Humanism, with the following program of work. While from the perspective of general history we are accustomed to conclude that the Italian Renaissance was distinguished from the feudal Middle Ages by the emergence of a civic-urban society in the Italian city-states, we are prone to think, when turning to Renaissance culture, preponderantly not of the effects of the City-Republic with its civic elements but of the courtly sphere of the Tyrant-Court. Even though the part of the latter was great, the most creative ideas of early Humanism refuse, however, to be traced to the milieu of courtly society or the Tyranny. From Petrarch to the time of Machiavelli, humanistic interest in Florence was focussed upon the citizen of ancient Athens and Rome in the days of civic liberty. His civic virtue was rediscovered as underlying the moral precepts of Aristotle and Cicero, and served as a touchstone for the historical critique of the medieval idea of a God-willed ever-lasting Universal Monarchy of the Roman Emperors. The culture of the ancient citizen was made the foundation of an education which was to be "human" and without consideration for the special needs of chivalrous or courtly classes. All these tendencies have clearly the flavor of the life of that civic-urban society which had set the Italian development apart from the feudal Middle Ages. They are so far from the courtly hue of the Tyrant-Courts that it should appear to be vital for any successful approach to the world of early Humanism to lay open, first of all, the relationship of Humanism to the urban-civic spirit.

As early as about twenty years ago, the present writer started with a series of brief publications to bring out most of these traits of Florentine fifteenth century Humanism.[1] Petrarch, in part the fourteenth century pioneer, and in part the antagonist from whom civic Humanism had to diverge, was included in those investigations. Though only fragments of the Petrarch-studies then made found a place in the published papers, a monograph tracing the growth of Petrarch's ideas of history and human nature was worked out, to serve as an introduction to the analysis of fifteenth century civic Humanism. In 1942–1943 a Guggenheim Fellowship provided a chance to merge the varied studies in an integrated book which, when eventually published, under the title of "Humanism and the City-State" will describe the pregnant conflict of the Old and the New in Petrarch, and the final flowering of the new seeds under the impulse of civic life in fifteenth century Florence.

2. The studies encouraged by the grant of the Guggenheim Foundation proved at the same time that there were fundamental aspects of the project which, though not suitable for examination within the range of a study of Humanism, had to be cleared up as a prerequisite for understanding the forces which were to mould Humanism in the Florentine atmosphere.

In the first place, some key ideas in the historical outlook of Florentine humanists were found to have emerged from the world of the Tuscan city-states in the thirteenth and fourteenth centuries, rather than from Humanism itself. In preparing this project, therefore, the rise of the new historical outlook had partly to be traced from the portions of Aquinas' *De Regimine Principum* added by his Tuscan disciple Ptolemy of Lucca, and through the

[1] In the introduction to an edition of the humanistic works of Leonardo Bruni (Leonardo Bruni Aretino, *Humanistisch-philosophische Schriften*, Leipzig, 1928) the nature of "Florentine civic Humanism" ("florentiner Buergerhumanismus") was first delineated. The growth of a new historical outlook in the surroundings of the Florentine Commonwealth was described in "Das Erwachen des historischen Denkens im Humanismus des Quattrocento" (*Historische Ztschr.* 147: 5-20, 1932); the reappraisal of Cicero and Aristotle as teachers of a moral philosophy congenial to men leading an active and political life, in "Cicero and the Roman Civic Spirit in the Middle Ages and the Early Renaissance" (*Bull. John Rylands Library Manchester* 22: 72-97, 1938), and in "Franciscan Poverty and Civic Wealth as Factors in the Rise of Humanistic Thought" (*Speculum* 13: 1-37, 1938); the part played by the civic element in the rise of a new idea and theory of human nature, in "Das Erwachen des historischen Denkens . . . " (*loc. cit. passim*), and in "La Rinascita dell'Etica Statale Romana nell'Umanesimo Fiorentino" (*Civiltà Moderna*, Florence, 7: 1-31, 1935).

works of the Florentine chroniclers of the fourteenth century. Since, on the other hand, most of the historical ideas set forth by Florentine humanists reached their mature phase with Machiavelli, Guicciardini, and Giannotti after 1500, there emerged a history of political and historical thought in the Florentine Commonwealth from about 1300 to about 1530, with Humanism only one element in a blend which partly was of earlier origin and partly lasted longer than civic Humanism itself.

Secondly, among the factors moulding Florentine thought, contemporary politics and economics were often found to be in need of independent reexamination. For instance, when the significance of Florence's resistance to the expansion of the Visconti-Tyranny of Milan had been established for Florentine thought, including the rise of the idea of a states-system, the stimulating power of these events could be fully appraised only when the picture of interstate relations in the early Renaissance was redrawn in the field of political history. When Florentine laws and writings were discovered to reveal a specifically Florentine positive attitude toward industry and manual work, in contrast to Venetian opinions, this result appeared in its full light only when in the picture of Florence's economic structure the traits of industrialism and mercantilism, too little emphasized in the accepted view, had received due emphasis. And when the faith in the necessity of active political rights for every citizen was found to show an unexpected vigor in many writings of Machiavelli, Guicciardini, and Giannotti, this trait was not minimized, as has too often been done, as being in conflict with the reality of contemporary constitutional conditions, but accepted as a lead, with the result that the traditional notion of an outright imitation of aristocratic Venetian precedents by the Florentine constitution around 1500 could be refuted at essential points.

Thirdly, as in many historical studies of a similar scope, a reexamination of certain vital source-materials became indispensable. In several places, prevailing opinions on the nature and chronology of essential sources proved to be false after a review in the light of the present study. Especially in the field of humanistic literature in the early Renaissance a considerable number of writings, drawn upon as sources in this project, had to be restudied, foremost among them the various works of Leonardo Bruni, Florentine Chancellor from 1427 to 1444.

3. With the aid of the Penrose grants no. 697 (1943) and 764 (1944), and two research grants from the Rockefeller Foundation in the years 1944–1946, an adequate study of all these problems became possible. Within the term afforded by these grants the material was collected for the following two additional sections of the project, and to a large extent prepared in typewritten manuscripts:

(*a*) A study best characterized by the tentative title of "Renaissance Liberty: Politics, Economics, Citizenship, and the Growth of Political Thought in the Florentine Commonwealth." It is composed of the following parts: The dawn of the Florentine tradition in foreign policy, constitutional life, and historiographical thought in the fourteenth century; the rise of a states-system, from the anti-Viscontean wars about 1400 to the theories of a balance-of-power about 1500; industrial society, mercantilism, and a new ethos of work; the constitutional texture and the ideas of citizenship and mixed government (the theory of checks and balances of power), in the early Florentine Renaissance, in the Savonarolian Republic, and in the period of Machiavelli, Guicciardini, and Giannotti; Florentine nationality and the meaning of "national" Italian sentiment in the Florentine Renaissance.

(*b*) A study composed of literary and chronological investigations into works of Florentine publicists and humanists in the early Renaissance, with special emphasis on Leonardo Bruni; including a survey of Bruni's development as a citizen-humanist and historian, a reconstruction of the chronology of the literary production of Florence during the war against the Visconti about 1400, a chronological catalogue of Bruni's works, and an edition of five works of Bruni illustrating his views as a citizen-humanist and not yet included in the edition of Bruni's humanistic and philosophical writings published in 1928.

4. Contrary to the sequence of studies followed in the preparation of the project (namely extension of the research from an analysis of the ideas of the period to a reexamination of the political and economic conditions, and ultimately to a study of the lacunae discovered in the source-material), publication of the results will logically have to employ the inverse order. The section presenting the literary and historical criticism of the sources has been mostly completed with the aid of a grant (for 1946–1947) from the Institute of Advanced Study, of which the writer has been a member

since 1944. A volume with the literary production of Bruni in the center will be ready for print in 1947. After this study has gone to press, work will be continued on "Politics, Economics, Citizenship, and the Growth of Political Thought," and ultimately on "Humanism and the City-State." Some of the finished portions of the latter two sections are ear-marked for temporary publication in smaller monographs, in advance of the final volumes.[2]

BARON, HANS. 1944. Articulation and unity in the Italian Renaissance and in the Modern West. *Annual Report Amer. Hist. Assn. for 1942* 3: 123-138.
————————1947. New light on political writers of the Florentine Renaissance. *Jour. Hist. of Ideas* 8. Accepted.

J. MASON BREWER, Samuel Huston College

Grants No. 798 (1945), $1,063, No. 856 (1946), $125. Examination and recording of the Negro folk material in the Library of Congress, and a survey of Negro folklore in the Cleveland Public Library.

Investigations in the area of Negro folklore have been continued at the University of Texas Library, at Indiana University, and on the field. I also attended the Folklore Institute of America, at Indiana University, for eight weeks during the summer of 1946, where I supplemented the research previously done in American Negro oral tradition: three courses were taken at the Institute, which opened up new vistas to me.

Six hundred and twenty-two pages of the proposed "Guide Book of American Negro Folklore" have been typed and a pictorial map of traditional negro Folk types in various localities has been completed. An article entitled "Negro Folklore in North America —A Field of Research" was published in 1946. This article was prepared from materials examined during the duration of the grant-in-aid given me by the American Philosophical Society. A paper entitled "American Negro Folklore—A Lore of Loyalty" was also based upon the information obtained from the examination of Negro folklore material made possible by the two grants from the American Philosophical Society. This paper was read at the

[2] Summaries of some of the key ideas and results of the project may be found in the following successive sketches: "The Historical Background of the Florentine Renaissance," *History* n.s. 22: 315-327, 1938. "Lo Stondo Storico del Rinascimento Fiorentino," *La Rinascita*, Florence, 1: 50-72, 1938 (enlarged Italian version of the preceding article); "A Sociological Interpretation of the Early Renaissance in Florence", *South Atlantic Quar.* 38: 427-448, 1939; "Towards a More Positive Evaluation of the Fifteenth Century Renaissance", *Jour. Hist. of Ideas* 4: 21-49, 1943; "Articulation and Unity in the Italian Renaissance . . . ", *cf.* the quotation above on this page.

fifty-eighth annual meeting of the American Folklore Society, which convened at the Palmer House, Chicago, on December 27, 1946.

The study has revealed the fact that Negro oral literature may be divided into three classes, rather than the generally accepted belief that the whole mass of oral tradition in the American Negro area is of one genre only. Further investigation into the field of Negro Folklore, especially as it pertains to theses and dissertations housed in American university archives would provide valuable supplementary material to the proposed "Guide Book of American Negro Folklore" the manuscript of which is now complete, with the exception of an appendix giving excerpts, examples, and titles of theses and dissertations in various university libraries, on the subject of American Negro folklore. The inclusion of this type of information in the guide book would bring it up to date in every respect and enhance its value.

BREWER, J. MASON. 1946. Report of Progress. *Yr. Bk. Amer. Philos. Soc.* for 1945: 212.

———. 1946. North American Negro folklore—A field of research. *New Mexico Quart. Rev.* 16: 51-58.

R. FLORENCE BRINKLEY, Goucher College

Grant No. 867 (1946), $1,200. The seventeenth century as interpreted by Coleridge.

The purpose of this first six months of research has been to locate materials extant in England. To this end a survey has been made of Coleridge manuscripts, manuscript marginal notes in printed books (including Coleridge's own works), and printed materials in old or obscure newspapers, magazines, and books. To this end fruitful investigation has been carried on at the following places: in London at the British Museum, the Victoria and Albert Museum, Dr. Williams's Library, the Swedenborg Society, and several book dealers'; outside of London at Cambridge and Oxford Universities, the John Rylands Library (Manchester), Bristol Central Library, and Rugby School Library. In addition, manuscripts and books from the library of the late Reverend G. H. B. Coleridge have been made available and photostats of a large collection of notebooks in the library of Lord Coleridge at Ottery St. Mary.

A considerable body of new material has been located from lectures, notebooks, marginal notes, and letters. The original manu-

script notes for the works, or in some instances part of the works, of thirty seventeenth-century authors have been found, and also pertinent comments in many other annotated volumes. In many cases it is possible to re-edit published comments from original sources and so to establish an accurate and unexpurgated text.

Evidence has been found that Coleridge often intended his marginal notes as a portion of some projected work, and therefore the notes take on an even greater significance. A number of letters were written also with the intention of publication and furnish a connected and planned treatment of the subject considered. Especially pertinent to this study is a series of unpublished letters concerning John Locke which have been located.

In the course of this investigation it has been discovered that occasionally there are volumes by the same author with different sets of notes in Coleridge's hand; in other cases the marginalia have been duplicated in other volumes in a different hand, some of the copies having been made in Coleridge's lifetime and some shortly after his death. When Henry Nelson Coleridge was preparing to edit the *Literary Remains*, many marginal notes were transcribed on loose sheets or in notebooks—the evidence for this exists in letters. Sometimes books with transcribed annotations have been sold as Coleridge autographs. An article on this subject will appear later.

New Coleridge material not directly concerning the seventeenth century will be published eventually as by-products of this study.

The investigation of manuscripts in the British Museum is still in progress, and an effort is being made to find certain additional seventeenth-century books known to contain Coleridge annotations.

RUSHTON COULBORN, Atlanta University

Grant No. 879 (1946), $500. Studies on the origin of civilized societies, etc.

Before the currency of this grant it had already been determined that a definite change took place in the status of human societies and their cultures commencing during the sixth and the fifth millennia B.C. To this end had been used almost all relevant published work of historians, most such work of archæologists, and, for the special purposes of discovering the succession of climatic changes and the "geochronological" evidence for dates, much work

by geologists, paleontologists, and climatologists. In addition, paleobotanical works had been studied for data bearing upon the origins of cultivation of edible plants.

Some additional material of these kinds was read during the currency of the grant, and alterations accordingly made to a draft of all the material. Although a little further material still remains to be read, there seems no doubt of the general conclusions to be reached, and these may therefore be stated very briefly as follows:

In the early sixth millennium B.C. primitive agricultural peoples were living in the sub-mountainous parts of Palestine-Syria, Transcaucasia, Iran, and probably other such regions located here and there in the central Asiatic mountain massif. These peoples had been expelled by desiccation consequent upon decline of the last (Würm III) glaciation from the lands which had become desert in north Africa, inland Syria, Iran, northwest India, Turkestan, and the Gobi. Desiccation, however, was reaching a climax from about 9000 B.C., was affecting seriously the sub-mountainous refuges themselves, so that desperate emigration of peoples began to take place from them. Groups of these peoples eventually concentrated in the valleys of the Nile, the Tigris and Euphrates, the Indus and Great Mihrân, and the Yellow River, the only remaining regions adjacent to the general desert belt of the northern hemisphere of the Old World in which they could survive. Before, during, and after the concentration of these peoples in the valleys, they developed, as a result of their harrowing experiences, a somewhat new kind of religion. It was under the inspiration of these religions, and in order to solve the special climatic-physiographic problems of survival in the valleys (problems far from easy of solution) that these peoples, at first mere primitive tribes, gradually coalesced, partly by internecine warfare and conquest, into the large scale valley societies known to ancient history. The case of the society of Crete and nearby islands is similar but not an original case, for the movement toward a large scale society there was begun by immigrants from Egypt who had already participated in the main part of the movement toward a large scale society in the Nile valley; Crete offered a survival problem similar in principle, but different in particulars, from those encountered in the valleys.

Logically, it is best to say that a "civilized society" was not fully achieved until a single political state had been set up in each of the five cases—a process which lasted not more than 2,500 years.

A further change to be noted besides establishment of political unity in that period is the accumulation of a body of empirical knowledge of the physical world far surpassing that of any primitive society, and the process of critical philosophical and scientific thought resulting from comparison of this new fund of knowledge with the doctrines of the religions which had been new at the commencement of the process. Outwardly, therefore, the novelty of civilized societies is their great size by comparison with primitive societies. It is not believed that their modes of thought differ from those of primitive societies, or even that their religions differ fundamentally but only in scope of imaginative speculation; hence the doctrine of Lévy-Brühl *et al* is absolutely rejected. It is thought that the change should be expressed causally: the primary cause is environmental, the climatic revolution; the secondary cause specific, the new directions of thought, belief, knowledge. Hence the change is to be understood ultimately as analogous to biological change, but upon a socio-cultural, and not upon a physiological, plane of existence. The order of time involved, perhaps 3,000 years including wanderings from the sub-mountainous habitats to the river valleys, is notably short by comparison with the time lapse required for earlier social changes—a phenomenon also known in relation to biological change.

It was realized that the actual change to civilized status was but the culmination of a series of earlier changes, just as the primary cause of the culmination, climatic change, was known to be but the climax of a desiccation which had been proceeding cyclically during several tens of thousands of years. It was desired to understand these earlier changes as fully as present knowledge permits, more particularly because great dissatisfaction was felt with statements of that knowledge by archæologists. Accordingly, during the whole currency of the grant as well as for some months before it, a very full enquiry into the existing data on the subject was undertaken, together with consultation in person and by letter and manuscript drafts with a number of other scholars. (The money of the grant has been expended on secretarial and technical aid to this end.) This is still in progress and results must be held as tentative:

(1) During the decline of the Würm I glaciation, the *homo sapiens* (neanthropic) stock was dislodged from foothill regions of the western part of the central Asiatic massif, and the "late paleo-

lithic," "blade-tool" peoples spread over the Old World, *neanderthalensis* and other paleanthropic stocks being largely exterminated by the climatic revolution.

(2) During the decline of the Würm II glaciation, actually in areas becoming desert (and certainly not elsewhere), new cultures were evolved. Some of these have been distinguished by archæologists and called "mesolithic," but several (e.g., the Magdalenians of Europe) have not been so understood. Nor has it been realized that their origin was in this period.

(3) During the decline of the Würm III glaciation, the areas becoming desert were finally evacuated (or their populations killed out), flight to the sub-mountainous areas took place (these included Ethiopia-Kenya and the mountains of northwest Africa as well as the Asiatic regions enumerated above), and early cultivation was evolved slowly, in Asiatic sub-mountainous regions only (*ca.* 15000—8000 B.C.), out of some of the mesolithic food-gathering practices.

Much of this general synthesis is new.

Unfortunately no publication has yet been possible. A book on "The Origins of Civilized Societies," which may be published by the Princeton University Press, has been held up for completion of the investigations last above described. It is proposed to complete first a more technical book on the latter investigations, and then to abstract from that for completion of the original study. It is not possible at present to forecast when either book will be finished.

RUTHERFORD E. DELMAGE, Saint Lawrence University

Grant No. 880 (1946), $400. A study of the idea of progress in America 1750-1800.

The purpose of the study has been to gather evidence on the prevalence of the idea of progress in North America before, during, and after the American Revolution, and to determine: (1) from what sources the idea of progress sprang; (2) to what extent it motivated the founders of the republic; and (3) how widespread was this faith among the colonies and the thirteen original States.

The writer spent two months (July 15–September 15, 1946), examining pertinent printed matter, chiefly in the American Philosophical Society Library, Philadelphia, in the Ford Collection of the New York Public Library, New York City, and in the Yale University Library, New Haven. Because of limited time, it was

necessary to exclude from consideration manuscripts and American newspapers and periodicals, and to concentrate on eighteenth-century American pamphlets and books, especially those printed in Philadelphia, in New York, and in New England. For the same reason, the summer's research was limited for the most part to the idea of political progress. Because of my earlier investigation of the chief thinkers of the revolutionary period, I also confined myself during the summer to the writings of minor figures.

Three most important sources of the idea of progress in America emerge: (1) the scientific spirit typified in England by The Royal Society for the Improvement of Knowledge, and in the United States by the American Philosophical Society; (2) the age-old millennial dream of Christianity, particularly as developed by English and American protestants; (3) the growth of popular government and democratic thought in England, America, and France in the seventeenth and eighteenth centuries. Considering this threefold aspect, the student of American political progress cannot neglect the interrelationship between science, politics, and religion in the crucial years 1750–1800. Into the frame of the general meliorism of the American enlightenment as part of the total picture, fit what William Barton wrote concerning the growth of population in North America, what Amasa Dingley wrote concerning the improvement of medicine, what David Rittenhouse wrote concerning the progress of astronomy, and what Nathaniel Emmons wrote concerning the intellectual, moral, and religious progress of the individual and race.

A re-reading of selected writings of Benjamin Franklin has led me to consider him the earliest distinguished exponent of the theory of progress in eighteenth-century America. A re-reading of selected writings of Thomas Jefferson has convinced me that he was in his time the chief and most persuasive American believer in progress. Franklin and Jefferson therefore serve as the best available *points de repère* for the study of this idea in America during this period: they form the center of reference for this investigation.

Numerous other Americans, representing practically all thirteen original States, clearly and unmistakably enunciated their faith in the political progress of America, from Dr. David Ramsay of South Carolina to James Wilson of Pennsylvania, from Elihu Palmer of New York to John Lathrop of Massachusetts.

Nevertheless, several American thinkers of this period did not share Jefferson's philosophy of history, which in substance agreed with Condorcet's theory that human progress and perfectibility are illimitable. Franklin himself occasionally expressed his doubts about the moral progress of mankind, and the reservations of Alexander Hamilton and John Adams were even more serious and frequent. The theory of the degeneration of the human race in the new world (Corneille de Pauw), and the cyclical theory of history (Montesquieu, James Bowdoin, William L. Smith) also found expression in eighteenth-century America. The conservative Federalists, reacting against Priestley and other sympathizers with the French Revolution, tended to say with William Cobbett: "We want no improvement."[1]

The dominant mood of the American Revolution and early republic, however, favored optimism. The vastness of the continent, its wealth of natural resources, the steady increase in population resulting from European emigration and a rising birth rate, were observable and practical potentialities. Paine, Freneau, and Joel Barlow were unrestrainedly eloquent and enthusiastic in the sureness of their faith. The patriotism of Alexander Hamilton and John Adams at least partially overcame their doubts of progress where the future of the new nation was concerned; the same sentiment likewise mollified John Witherspoon's acceptance of the Calvinist doctrine of total human depravity since he hoped for a special dispensation of divine grace to his beloved adopted country. As fully as the Universalist John Murray, Witherspoon believed that America was moving forward toward greater political and religious liberty. Numerous others—Francis Blake, Hugh Henry Brackenridge, Ezra Stiles, Nicholas Collin, Dr. Benjamin Rush—shared these high hopes.

The most popular leader of the Revolution and early republic, George Washington himself, agreed with Franklin and Jefferson concerning America's future growth and betterment. By 1800, the idea of progress had become so frequently expressed, so persistent, and so widespread in the United States that most Americans, at least in respect to their own country's development, would probably have assented to Tom Paine's thesis: "Improvement and the world will expire together."

[1] *Observations on the Emigration of Dr. Joseph Priestley*, 42-43, 3d ed., Philadelphia, 1795.

The author is indebted to Professor Frederick C. Prescott of Cornell University and Professor Gilbert Chinard of Princeton University for their advice and encouragement. The generalizations in this report will be documented in an essay now being prepared for publication.

EUFROSINA DVOICHENKO-MARKOFF, New York

Grants No. 821 (1945), $400, and No. 891 (1946), $400. A study of the relations of Franklin, Jefferson, and the American Philosophical Society with Russia.

All of the year 1946 was devoted to studies of Franklin's manuscripts and of the correspondence of the American Philosophical Society with Russia, in the Library of the American Philosophical Society in Philadelphia. Abundant printed material concerning Russian scholars and statesmen who were in contact with Franklin, Jefferson, and the American Philosophical Society was examined in the New York Public Library, where portraits of the most noted Russian members of the American Philosophical Society were found and photostated. Among these personalities we may note: Princess Dashkaw, President of the Russian Academy; Count de Romanzoff, the Chancellor; Krusenstern, the explorer and Count Cancrine, the founder of the Russian monetary system.

The fact, as yet unknown by both the Russian and the American specialized literature, that Franklin exchanged letters with Russian scholars was discovered. In 1937 a book appeared in the U.S.S.R. under the title: "Scholarly Correspondence of the Academy of Science in the XVIIIth Century (1766–1782)," out of which I quote the following: "Our academicians exchanged letters neither with Franklin nor with Lavoisier" (p. 23).

I discovered that Franklin was in contact with Lomonosow through President Ezra Stiles of Yale and the fact of Franklin's correspondence with the Russian academicians Epinus and Braun. I also found unpublished letters to Franklin, written by: the Russian scholar and diplomat, Prince Gallitzin and by Princess Dashkaw, President of the Russian Academy. The latter was elected member of the American Philosophical Society in 1789, on Franklin's recommendation; the same year, Franklin was elected a member of the Russian Academy, on Princess Dashkaw's recommendation.

In the establishment of cultural relations between America and Russia, and especially between the American Philosophical Society and the Russian Academy, Franklin's role was decisive. Since his death these relations have been continued to our own days. I found that there have been 33 Russian members of the American Philosophical Society and have located their unpublished letters to this body. Photostats of this correspondence were made. Each of these Russian members of the American Philosophical Society will be mentioned in my work, which, because of the abundance of material is divided into 4 papers:

1. Franklin and the Russian Scientists in the XVIIIth Century.
2. American Philosophical Society and Russia.
3. Jefferson and Russia.
4. Catherine II and the Study of native Indian Dialects in America.

The last subject listed originates in the unpublished exchange of letters between the Russian scholar Adelung and Du Ponceau, then the Secretary of the American Philosophical Society, which correspondence I found in the archives of the latter. A study of this correspondence and of other material helped me to clear up the question of the influence of Catherine's "Comparative Dictionary" (called also after P. S. Pallas) upon the studies of Indian dialects in America and on the role of the persons who helped in spreading this influence, such as Lafayette, George Washington, Franklin, and Jefferson.

A lecture on the main subjects of my research was delivered August 13, 1946, during the meeting of the Russian Circle of Columbia University, under the title: "Cultural Ties between Russia and the United States in the XVIIIth and XIXth Centuries from still unpublished Sources."

A short popularization, "Franklin and the Russian Scientists in the XVIIIth Century" was published in the New York Russian language monthly *Novosselye* (No. 29-30, 1946, p. 79-88).

SAMUEL NOAH KRAMER, University Museum
University of Pennsylvania

Grant No. 68—Johnson Fund (1946), $1,000. Catalogue the tablet collection of the University Museum of approximately twenty thousand tablets and fragments.

The first part of the year was devoted primarily to a preliminary survey of some eight thousand uncatalogued tablets and frag-

ments in the Nippur collection of the University Museum which I had not seen before. Among these there proved to be several hundred Sumerian literary pieces. Most of them are small fragments, but will nevertheless prove of considerable importance for the reconstruction of the Sumerian literary compositions.

As a result of the examination of the University Museum tablet collection, it became ever more clear that one of its most important scientific needs was that of cataloguing. Altogether the museum has about twenty thousand tablets and fragments of which only approximately half are catalogued. With the aid of a grant of the American Philosophical Society, an assistant has undertaken to begin this tedious, difficult, but highly useful work. A full report of the results achieved in this direction will be forwarded to the Society in the spring of 1947.

The latter part of this year was devoted to a research project for which, it may well be said, it was the American Philosophical Society which paved the way; it was the support given by the Society in recent years to the work on the restoration of the ancient Sumerian literature which made this new project possible and meaningful. It was undertaken by me as the annual professor of the American Schools of Oriental Research and as representative of the University Museum, and was planned to consist of two phases. The first was to involve a stay of from four to five months in Istanbul for the purpose of copying in its Museum of the Ancient Orient as many as possible of the Nippur tablets and fragments inscribed with the Sumerian myths and epic tales. The second phase of the project involves a journey from Istanbul to Baghdad. Here in the course of a six week stay, I plan to study the tablet collection of the Iraq Museum in general and the recently unearthed Sumerian tablets from Harmal in particular. The first phase of the undertaking, that is the work in Istanbul is now complete, and the following is a report of the results achieved.

Between August 7, the day of my arrival in Istanbul, and December 21, the day of my departure for Baghdad, and the day on which this report was prepared, I copied one hundred and twenty Nippur tablets and fragments inscribed with the Sumerian epics and myths; they range in size from a twelve-column "Enmerkar" tablet inscribed with more than six hundred lines of text, to a tiny Gilgamesh fragment containing no more than a few broken lines. The contents of these one hundred and twenty pieces run the entire

gamut of the Sumerian myths and epic tales. Some will help in piecing together such heroic poems as "Enmerkar and the Lord of Aratta," "Lugalbanda and Enmerkar," "Gilgamesh and the Land of the Living," "Gilgamesh and the Nether World," "Gilgamesh and Agga of Kish." Others will help to restore some of the more important myths of Sumer, such as "Enlil and Ninlil: the Begetting of the Moon-god," "Enki and Sumer: the Organization of the Earth and its Cultural Processes," "Cattle and Grain," "Inanna's Descent to the Nether World," "Inanna and Enki: the Transfer of the Arts of Civilization from Eridu to Erech," "Emesh and Enten: Enlil Chooses the Farmer-god," "The Journey of the Moon-god to Nippur," "The Feats and Exploits of Ninurta." Finally there is one large tablet inscribed with an hitherto unknown myth in which the goddess Inanna and one Shukallituda play the leading roles, and two new "Tammuz" myths.

The great majority of the pieces copied by me in Istanbul consist of small and middle-sized fragments. But there are also a number of large tablets, such as the twelve-column Enmerkar tablet described in considerable detail in the *Bulletin of the American Schools of Oriental Research* (December, 1946); a six-column tablet with the new Inanna-Shukallituda myth (it will be described in detail in the spring number of the *Bulletin of the American Schools of Oriental Research;* an eight-column tablet more than half preserved whose text will furnish the basic framework for the reconstruction of the myth "Emesh and Enten: Enlil Chooses the Farmer-god;" two large four-column tablets with new "Tammuz" myths.

KRAMER, SAMUEL NOAH. 1946. Report of Progress. *Yr. Bk. Amer. Philos. Soc.* for 1945: 213-217.
———————1946. Immortal clay. *American Scholar* 15:314-326.
———————1946. Accadian Literature. *Encyclopedia of Literature* 1:1-3.
———————1946. Sumerian literature. *Encyclopedia of Literature* 2: 914-917.

RAFAEL TAUBENSCHLAG, Columbia University

Grant No. 823 (1945), $2,000. Toward the completion of the second volume of his *Law of Greco-Roman Egypt.*

I have just finished the second volume of my *Law of Greco-Roman Egypt.* (The first was published 1944, Herald Square Press, New York.)

The second volume consists of two parts, devoted to constitutional and administrative law.

The first part: *the constitutional* law consists of four chapters: I. The Ptolemaic monarchy and the Roman empire; II. The autonomous cities and the χώρα; III. Citizens and non-citizens; IV. The fundamental rights and duties of citizens and non-citizens.

The second part: *Administrative law* consists also of four chapters: I. Control of individuals and their material and intellectual interests (regulations concerning birth notifications, names, buildings, alimentation, sanitation, education, passports, death notifications); II. Control of corporate bodies (regulations concerning temples and priests, and associations); III. Control of economics (*A.* Primary production: agriculture, trees, and bushes, hunting, fishing, salt; *B.* Industry and trade: oil industry, beer industry, ointments, textiles, papyrus-production; *C.* Currency and banking; *D.* Shipping and postal-service.); IV. Administrative proceedings and execution.

I may mention that constitutional law chapter III (Citizens and non-citizens) is now in printing as my contribution to "Studi in onore Ferrini" in Milano.

HISTORY OF EDUCATION

LAMBERTO BORGHI, New York, N. Y.

Grant No. 827 (1946), $1,000. Education in modern Italy. Part II. Italian education before Fascism (1900-1922).

This part of the study consists of the analysis of the movement for the democratic reorganization of the educational system in Italy from 1900 to 1922. It is based on an evaluation of the political and educational trends that prevailed in the Italian Socialist Party, which was the chief instrument for a democratic transformation of Italian society.

The reformist program of social democracy amounted to a demand by the Socialist Party for legislation enabling the working class to participate in the creation of a modern capitalist system in Italy, regarded as a prerequisite for furthering a socialist order. Parallel to their demand for social legislation, the Socialists asked for a reform of the educational system by creating new schools in which the workers would receive technical preparation in agriculture and industry. This program, sponsored by

socialist and democratic educators, widened the gulf between liberal and vocational education. At this time the Technical Schools provided a general and vocational education simultaneously for the lower income groups and represented the nucleus for a realization of genuine democratic education. The Italian government was ready to carry out a reform which reserved general education for the middle and upper classes, and limited the education of the workers to narrowly vocational fields. This program, approved by socialists, democrats and conservatives alike in 1909, was presented to Parliament after the First World War, and was sponsored by the Liberal Party and by the newly created Catholic Party ("Popular Party"). However, it was strongly opposed by democratic groups and especially by the Socialists who, after 1913, had disavowed their former reformist trend and had adopted a revolutionary platform.

Separate chapters are devoted to the chief exponents of the various schools of thought on educational reform: G. Salvemini for the reformist-socialists; B. Croce and G. Gentile for the liberal-conservatives, and G. Prezzolini for the nationalists.

ARCHÆOLOGY

CLARENCE T. HURST, Western State College of Colorado

Grant No. 836 (1945), $300. Excavation of an early cave site in the canyon of the Dolores River, Colorado.

The operations were carried out from August 3 to 17, 1946, in a cave site located in the NE¼, NE¼, Sec. 14, T48N, R18W, in the canyon of the Dolores River in Montrose County, Colorado.

The personnel of the party last August included twelve people. This was four more than the usual size of our parties. The excavation work was carried to completion because of this larger group, and it will not be necessary to return to the site. The enlarged personnel was made possible by this grant. This help enabled us to have certain paid personnel, as well as additional incidental labor and other services that were necessary. It also made possible much scouting of the surrounding country for surface artifacts and for additional sites for future reference.

The cave had been badly vandalized prior to the work, but about two-thirds of it had not been touched, so it was possible to get sufficient material from it to reveal the story in good shape.

The whereabouts of the vandalized material is known, and it will be possible to study it and add what it may tell to the general story.

The 1946 expedition from the museum of Western State College was the tenth such expedition, and the eighth one to the Tabeguache and Dolores country of western Montrose County. The first two expeditions were to a Ute and a Folsom site in the San Luis Valley; the third to fifth were to Tabeguache Cave; the sixth to eighth were to Tabeguache Cave II; the ninth to Tabeguache Pueblo; the tenth to Dolores Cave I—the site herein reported on.

The excavation of the two caves and the one pueblo, during the seven previous seasons, in the Tabeguache country, has revealed a cultural continuity from pre-Basket Maker times to modern Ute times. Tabeguache Cave II yielded a pre-Basket Maker culture that we have named the Tabeguache Culture and have tentatively dated to 1000 years or more B.C.

The excavation of Dolores Cave I did not yield any new extension of the time involved. It did, however, give evidences of new patterns of known cultures.

Dolores Cave I is on the west side of the Dolores River, opposite the so-called Lone Dome, and just under the rimrock of the deep canyon. It is a large overhanging cave of the type so prevalent in the sandstone canyons of the Southwest. Deposits on the floor of this cave reached a maximum depth of about four feet.

A plane-table map was made of the cave, and it was surveyed into uniform squares for the purpose of plotting all excavations. A cross trench was run, and the entire deposit was worked by frontal approach with the excavated wall being kept as near vertical as possible all the time, so that at no time was the stratification lost to view.

Preliminary study of the artifacts recovered shows occupancy of the cave from early Basket Maker times to the time of the modern Ute, but apparently the latest Utes themselves did not occupy the cave. The latter interpretation rests upon the fact that none of the pottery fragments and arrowpoints characteristic of the late Utes were found. The amount of Basket Maker material found would indicate that the true Basket Maker culture was not involved.

Two interpretations are possible with regard to the Basket

Maker material found. (1) It may be trade or conquest material, or, (2) It may indicate a nomadic culture with Basket Maker affinities.

The material must be studied at leisure before final conclusions can be made. At present, we should be inclined to believe that the cave was used continuously by a people that was undergoing a gradual cultural evolution, and that its early period was contemporaneous with and partook of the characteristics of the Basket Maker culture. If this is the case, it is a link in the chain of evidence for the possible fact that a pre-Basket Maker culture may have been widespread and in the nature, more or less, of a foundation culture widely underlying a variety of both sedentary and nomadic cultures.

Among other items, the artifacts found included: metates; manos; dart foreshafts; arrow foreshafts; projectile points; scrapers; beads; awls; cordage; matting and other woven work; a ceremonial bundle containing feathers, a wooden knife, a deer skin object, cordage and rope; food refuse bone; large charcoal fragments; wooden objects.

Much further study is necessary before more can be said. This present report is scarcely more than the indication that the work of excavation has been completed.

The ultimate aim is to reveal, site by site through the years, the entire story of man in western Colorado and eastern Utah from beginning to end. Former work has shown, in addition to the Tabeguache culture, that artifacts form a series back to Folsom times in our area. Prior to Tabeguache artifacts, the rest are known only from the surface. They must be found in stratified sites in order to be properly tied up with each other. It is possible that these sites exist, and they may eventually be found. We are on the lookout for them.

The final detailed report on the work accomplished will be published in the June 1947 issue of *Southwestern Lore,* the official publication of the Colorado Archæological Society.

ETHNOGRAPHY

Sister M. Inez Hilger, St. Cloud, Minn.

Grant No. 805 (1945), $1,500. Ethnological field study of the beliefs, customs, and traditions in the development, rearing, and training of the Araucanian Indian child of Chile.

My assistant, Miss Margaret Mondloch, and I arrived in Santiago on October 7. We studied the Araucanian exhibits in the Museo

Nacional de Historia Natural and the Museo Histórico Nacional de Chile and did some work in the Biblioteca Nacional. The collection of Araucanian silver exhibits in Museo de Arte Popular was in storage. We may be able to study it on our way home. Dr. Huberto Fuenzalida, Director of the Museo Nacional de Historia Natural will send us a complete bibliography of all sources dealing with the Araucanians that he has collected with permission to publish any sources not found in Cooper's recent article on the Araucanians in the *Handbook of South American Indians*. Dr. Recardo Donoso, Director of the Biblioteca Nacional will give assistance to Miss Maria Quiroga Infante (former student of the College of St. Catherine, St. Paul, Minnesota, and now instructor of Spanish in Santiago) in making a bibliographical list of all sources found in the Biblioteca Nacional. Miss Quiroga will also collect any sources found in the Museo Histórico Nacional de Chile.

In Concepción we interviewed Dr. Carlos O. Henkel, Instituto de Histologia of the University of Concepción, who has made some physical anthropological studies of the Araucanians, and also Dr. Carlos Oliver Schneider, Director of the Museo de Concepción. Both men are sending us reprints of their publications and have offered to send us the items listed in their private collections of secondary sources. These various bibliographies along with Cooper's should make nearly a complete bibliography of the Araucanians.

While in Santiago we also studied the details of our plan of work among the Araucanians with Bishop Guido Beck de Ramberga who has lived among the Mapuche for nearly thirty years and has been the Catholic Bishop of Araucanía for eighteen years. He was in the city for two of the weeks that we were there, and we therefore had the opportunity to make complete plans regarding our accommodations and interpreters. The Bishop also arranged for transportation among the Indians. One can reach the more primitive ones only by ox cart, horseback, or canoe or boat. He notified the Indians of our arrival in Chile and they have sent word that they will give us a "formal" reception in each locality upon our arrival there. We were given such a reception here in the Alepúe area.

We arrived in San José de Mariquina, a town in the Araucanian country, on November 7 and set out on horseback for Alepúe on November 11. The Indians here are agricultural, cattle and sheep-raising people. Single families live on tracts of burnt-over lands

scattered over areas not unlike our counties, called Queule, Mehuin, Maiquillahui, Alepúe, Chan Chan, Pelluco, and Pichicuillin, on the Coastal Range. They do not have a single village in the area. They are an exceedingly proud, most courteous people. All speak the native language, Mapuche, and all but the small children and some of the older women speak Spanish. They walk barefoot except at fiestas when most of the men and some of the women wear shoes. Occasionally a child does. Many of the women and some of the men still wear the native dress. They live in rukas (framework of sapling covered with layers of grass), cook on fireplaces on the ground, sleep on sheep pelts on the ground. None has a stove, sewing machine, nor lamp. Most children attend school, either State or Mission schools, from one to four years. A few go to Valdivia for another year or two of schooling. Children are loved by their parents and are well cared for. An occasional child lives with a grandparent, both to be of help to the grandparent and to be a companion. Unless the parents are very poor—there are a few parents who possess no land—the child has property from the day of its birth, a gift from a parent. Women own land and cattle and give of them to their children in the same manner as the father. Summary statements which are true in general for the Araucanian child in the area from Queule to Pichicuillin are: the child is considered human from the day of its birth; it is born with the assistance of a man as "midwife"; the entire family is present at its birth; it is carried in a cradleboard and rests in it many hours of the day; it is nursed until two years old, is not liked if it is a twin, receives no Mapuche name (all are baptized); is instructed by both parents, is punished and rewarded; has few, if any, toys; plays at mimicking elders; has no puberty rite; attends either Catholic or Protestant services and the yearly celebration of the native religion; may be treated by a sorcerer if ill or given decoctions by an herbalist; will probably be married after an elopement, unless the groom is willing and able to pay the bride price. If it dies, it will be buried by the male relatives with only one person of its family present. Law and order fall under the Chilean system of national policemen.

We shall leave the Alepúe area for Lake Panguipulli on December 30 to work among the Araucanians in Trafún and Calafquen in the Andes. At the end of January we shall shift to the Toltén area (to Licán) and shall be there through February. We shall spend March in the Boroa area (Quilimanzano, Puculón, and Almagro).

The most primitive Indians live in the above-named areas. By the end of March our funds shall have been exhausted and we shall close the study. I am confident, however, that we shall have made a very good study by then. We have accomplished far more in this area than I had ever anticipated.

ETHNOLOGY

LUTHER S. CRESSMAN, University of Oregon

Grant No. 868 (1946), $500. Archæological field work to attempt to determine if the carriers of the Early Cultures of the Northern Great Basin of South Central Oregon entered from the north by way of the John Day River area.

A problem of primary importance in North American Archæology is how did the occupation of the Great Basin take place. Archæological research has shown the early cultures of the Great Basin to be distinct from those of the High Plains but roughly contemporaneous on the basis of geological and paleontological evidence.[1] One of the possible lines of movement of people into the Great Basin was from the Columbia Plateau by way of the John Day River and up its tributaries to the Great Basin, an aboriginal route of historic times. A reconnaissance party from the University of Oregon in June, 1938 located a cave on Butte Creek, a tributary of the John Day River, about ten miles west of Fossil from which basketry was taken similar to that from the South Central Oregon caves. Our project in 1946 was to excavate this cave, examine Pleistocene terraces along the John Day River and Bridge Creek and carry out further reconnaissance in an attempt to answer the question: Whether southward movement into the Great Basin had taken place through the John Day region.

Butte Creek cave had been badly looted and the usual systematic excavation was useless. Careful excavation of one undisturbed area, tests in the others, and in the looted areas were carried out. Materials taken from the cave by the person who had done the digging were studied and photographed. His insistence that they came from the cave was probably to be relied on in view of the

[1] Cressman, L. S., Arch. researches in the Northern Great Basin, *Carnegie Inst. Washington, Publ.* 538, 1942; Results of recent arch. research in the Northern Great Basin of South Central Oregon, *Proc. Amer. Philos. Soc.* 86 (2): 236-246, 1943; Early man in Oregon, *Scientific Monthly* 42 (1): 43-51, Jan. 1946.

similarity of the textiles in his possession to those recovered by us from the undisturbed site. The undisturbed area which we excavated contained a burial of an adult male, fragments of basketry and rope, seven triangular scrapers, and a part of a garment, probably a cape, made from twined rabbit skin strips, felted (?) hair of mink (?) or marten (?) and tip of a coyote tail. A dog had been buried with the man. A tip of a stone projectile point had pierced the left acromion process and the wound had not healed as shown by the splintered bone.

A cave about three miles south of Clarno Post Office on the John Day River about fifteen miles north of the confluence of Butte Creek with the John Day River and twenty-five miles southwest of Fossil was excavated but was found to be practically sterile.

The Pleistocene terraces along the John Day River between Kimberly and Picture Gorge, a distance of about twenty miles, were examined with negative results. Other terraces between Picture Gorge and Dayville and up the South Fork of the John Day River were checked as were terraces west of Mitchell on Bridge Creek, a tributary of the John Day River, some thirty miles west of Picture Gorge. All results were negative. One mano was found west of Mitchell but could not be assigned to the period of terrace building. Two pit houses were excavated west of Spray but the results contributed no information toward answering our basic problem.

North of Fossil a talus slope cremation pit was excavated with results that indicate the desirability of further work on the problem it raised. The few specimens recovered suggest a relationship to the cremation pit materials of the Dalleas-Deschutes region.[2] A point of particular interest in this pit is the great heat of the fire which melted the basaltic talus fragments. Informants have reported similar cremation pits near Heppner about sixty miles northeast of Fossil and just west of Antelope approximately fifty miles west of Fossil. A study of these sites which are apparently later than the Butte Creek cave occupation would help define the southerly limits of the Columbia River influences and perhaps answer the puzzling problem of how such great heat was generated to fuse basalt.

[2] Strong, W. Duncan, W. Egbert Schenck, and Julian H. Steward, Archæology of the Dalleas-Deschutes region, *Univ. of Calif. Publ. in Amer. Arch. and Ethnol.* 29 (1), 1930.

The artifacts from Butte Creek cave show definite similarities to those from the south central Oregon caves but the cave lacks any chronological reference material. It is impossible to relate this cave occupation to that of the Basin caves because of lack of geological and paleontological material and any comparable dating must therefore be done by cross dating of artifacts. The results of this method will not establish antecedence of either area to the other in the absence of comparable geological or paleontological evidence.

The original problem, however, needs to be pursued further by reconnaissance and excavation along the canyons of the lower John Day River and Deschutes River to the west.

A detailed report is in preparation to be submitted to a professional journal for publication.

PHILOLOGY

HENRY DEXTER LEARNED, Temple University

Grant No. 339 (1939), $200. A dictionary of the French usage in England, 1066-1400.

Work has been resumed after five years' interruption.

The project developed from an attempt to assemble a list of Old French loanwords in English, using chiefly materials in Murray's *New English Dictionary* (NED).[1] It became apparent that NED would not alone suffice because of the advances in scholarship since the earlier parts of NED appeared, the availability of recently published Anglo-French texts, and the inclination of some of NED's editors to prefer French to Latin as the source of many loanwords that could be from either language.

For my purposes, few, if any, editions of the texts could be used with ease, because modern editions are usually "critical," altering the text for various reasons, and relegating rejected readings of the manuscript to footnotes. Hence a time-consuming process becomes necessary: the manuscript variants must be restored to their places in the text so that their evidence may be fairly considered, since the chief, if not the sole, interest attaching to the French of Stratford-atte-Bowe and the other schools is precisely its varieties and vagaries.

[1] Purchased for me by the Smith Fund at the University of North Carolina, with which I was then connected.

Dating the forms has presented a further problem. For instance, Bozon's works come down in approximately contemporary manuscripts, while those of Simund de Freine's works were copied a century after the author's death, and the unique manuscript (end of thirteenth century) of Marie de France's *Espurgatoire Saint Patrice* is a Central French copy of an Anglo-French original. In these last two cases, it is misleading to cite the forms under the author's date, and equally misleading to cite them under the date of the scribe. The practise is therefore adopted of giving both the date of the manuscript cited and the date of the original composition. Thus:

CUE, tail, Ms ca 1300 (orig. end XII)

followed by one or more citations including sufficient context to define the entry word.

Such details of organization and procedure having been settled, the work is going on smoothly and as rapidly as local conditions permit.

Examples from approximately 6,000 items so far filed[2] may serve to illustrate the principles which have guided the work, and indicate its potential value.

ESTOUNDRE, Ms XIV (orig. *ca.* 1200) *Boeve de Haumtone,* ed. A. Stimming, Bibl. Normannica VII, Halle 1899, l.148: Le emperur prent vers lui ad estoundre Mult est fort son escu si ne le face fendre. The editor corrects to "a destendre," plausibly enough; but the motive which led the fourteenth-century scribe to write *estoundre* (an easy shift of conjugation from *estoner,* making sense in the passage and rhyming well enough), and the difficulty of deriving English *astound* from extant forms, justify at least provisional retention of the manuscript reading.

IUS, Jews, Ms *ca.* 1275, Grosseteste, ed. Dean, *PMLA* LI (1936) p. 611,11, is to be added to the etymology of *Jew* as the source of Middle English *Iu,* NED, *s.v.*

LATIMER: three citations to corroborate its currency in the late thirteenth century (manuscript of *Esp.S.Pat.*) would have been

[2] Filing equipment purchased by a Temple University research fund.

deleted by the editor's emendation "latinier" (ll. 231, 1957, 1980).[3]

PLEASE, 3 sing. subjunctive, beside *plese,* older *plaise, pleise,* is an Anglo-French form common by 1400 (*Anglo-Norman Letters and Petitions,* ed. Legge for ANTS, No. 3, Oxford 1941). The -ea- spelling is apparently due to English influence, though NED has no English spelling of the word with -ea- before the fifteenth century.

SAMPLE, Ms 2d half XIII (orig. late XII) *Vie de S. George,* by S. de Freine, ed. Matzke for Satf, Paris 1909, enables us to revise the etymology of English *sample* (NED, Webster) to: "Anglo-F. *sample,* aphetic form of OF ensample, essample."

It seems necessary to retain in the vocabulary all forms, even apparent mistakes, in the manuscripts, for the sake of any evidence they may offer. Thus the use of non-etymological final -e in Anglo-French may not be capricious, and so *mere* for *mer, ilueke* for *iluec, hume* for *hom, ayle* for *ail, avoutoure, prisone,* and the reverse: *bargayn* vs. *bargayne,* etc., are not discarded or normalized. Forms, typically past participles, with double e, though masculine, like *assigneez, attourneez,* are retained.

Contraction of vowels in hiatus appears earlier in England than on the continent, so that *age* (not "eage" or "aage"), *mesaise* (not "mesaaise"), *runde* (not "roünde"), *cheigne* (OF *chaeine*) must take their proper places among the entries. Lines of verse thus shortened by a syllable can be read without difficulty, since Anglo-French versifiers allow themselves some latitude in counting syllables.

Shortenings of the type *sacramentum* > *serment* are normal, and require forms like *guerdon* (not "gueredun" or "guerredun") to be retained unemended. As above, strict rules of continental French metrics do not apply here.

Dialect criteria would be obliterated if manuscript forms like *evesked* and *reparnable* were emended ("eveschié" and "reprenable"); hence the originals, not the editor's emendations, are entered. The form *chin* (F. *chien*) may belong to the same category.

Nasalization and its effect on the nasalized vowels in *an, en, on* wants such evidence as may be supplied by the contemporary

[3] K. Warnke, ed. *Das Buch von Espwigatoire S. Patrice* (etc.), Bibl. Normannica IX, Halle 1938.

spellings *carponter, chalengier, chalanger;* these forms are retained.

The use of the letter *w* between vowels in Anglo-French manuscripts is not quite clear. Examples like *reuwe* (F. *rue*), *veuwe, vewe* (F. *vue, n.*), in the same manuscript with *pouer* (Eng. *power,* OF. *poeir, povoir,* etc.), *oueskes* (F. *avec*), *allower* (inf.), are retained.

This collecting of actual forms and citations inevitably leads one to reaffirm the principle stated by Wackernagel[4] far back in the last century, restated a generation ago by Bédier, and since widely discussed, to the effect that a medieval manuscript is a historical fact, that what the scribe set down is primary linguistic source material, and to emend it is to destroy its realism.

We must not treat medieval texts as if they were manuscripts of Cicero and Xenophon, for which rigid standards exist. In the centuries between Charlemagne and Elizabeth experiment, uncertainty, even error, are proofs of life.

The ideal edition of a medieval manuscript would be a photographic reproduction, transcribed on opposite pages, with the editor's suggested emendations in the margin, or in footnotes, while glossaries must enable the student to find the forms actually used by the scribe.

LINGUISTICS

ZELLIG S. HARRIS, University of Pennsylvania

Grant No. 890 (1946), $1,200. Library Research Associateship in American Indian linguistics.

Part of the work of this Library Research Associateship was the administration, for research purposes, of the Boas Collection of materials in American Indian linguistics which is now an integral part of the Library of the American Philosophical Society. As a first step, attempts were made to bring additional important manuscripts to the Collection. The following groups of manuscripts have been acquired by gift: Kwakiutl and Chehalis by Boas; Dakota by Miss Deloria; Athapascan by Goddard; material on various languages by Sapir; and the large professional and personal correspondence of Boas, stretching over seventy-two years, which was deposited in the Library by the Boas family. New manuscripts are also being added as a result of the research projects mentioned below.

[4] In *Altfranzösiche Lieder und Leiche,* Basel, 1846.

A number of associated research projects have been undertaken, most of them on special grants of the Society. Professor C. F. Voegelin of Indiana University is preparing structural summaries of representative American Indian languages. Mr. Paul Garvin is writing a Kutenai grammar on the basis of all the Kutenai manuscripts in the collection, and gathered new material of his own on a field trip in the summer of 1946. Mr. Leigh Lisker, who did the preliminary classification of the Boas correspondence, is preparing a morphological analysis of the Thompson language; and Mr. Joseph Rumberger is doing the same to the manuscripts of Chindau, one of the few African languages in the collection.

A particular concern of the expansion of the Boas Collection is the development of new material in the languages of the Eastern woodlands. Work in the Iroquois family has already begun. Mr. Floyd Lounsbury is writing a dictionary of Oneida, based on 90,000 word slips. In association with Mr. Ernest Bender, new texts and word lists have been collected in Cherokee, a continuation of work done by the present Research Associate in 1941. The Iroquois languages in general, and Cherokee in particular, have been subjected to very little analysis. The morphology is the more difficult to describe because it has little in the way of intersecting paradigms. The problem is rather one of relatively ordered morpheme classes, with particular complexity in what amounts to the personal pronouns. In the phonology, it was found that great simplification could be obtained by extracting from all the allophones in any word a contour of rhythm, tone, and stress (the zero grade of stress resulting in the whispering or omission of vowels).

In addition to the intensive work in Iroquois, morphological analyses are being prepared for several of the languages represented in the collection. The structural restatement for Eskimo has been completed; others are under way.

Publications from the collection: B. L. Whorf, Grammatical Categories, *Lang.* 21: 1-11, 1945; C. F. Hockett, Sapir on Arapaho, *Int. Jour. Amer. Ling.* 12:243-245, 1946.

HARRIS, ZELLIG S. 1946. American Indian liguistic work and the Boas Collection. *Yr. Bk. Amer. Philos. Soc.* for 1945: 96-100; *Lib. Bull.*, 57-61.

———1947. Structural restatements I. *Int. Jour. Amer. Ling.* **13**: 47-58.

HARRIS, ZELLIG S., and ERNEST BENDER. 1946. The phonemes of North Carolina Cherokee. *Int. Jour. Amer. Ling.* **12**: 14-21.

MUSIC

VICTOR ZUCKERKANDL, Princeton, N. J.

Grants No. 809 (1945), $600, No. 809a (1945), $600, and No. 809b (1946), $300. Writing of a book on problems of musical theory, particularly as a topic of liberal arts education.

The main purpose of the work was (1) to develop basic concepts which would make accessible to reasonable description and knowledge certain elements of a musical composition in which its artistic quality becomes manifest and which hitherto have been held to be accessible to feeling only; and (2) to show how these concepts are applied in actual descriptions of compositions.

Analysis of elementary musical experiences shows that the materials of music are not tones as acoustical phenomena, but tones as dynamic events. Apart from the musical context, a single tone is fully characterized by its acoustical qualities (pitch, intensity, color, duration, volume). When the tone figures as an element in a musical context, a new quality is added, a *tendencial* quality. The tone is now part of a system, or order, and demonstrates this fact dynamically through that quality.

The dynamic quality of a tone is, strictly speaking, its musical quality. It is directly perceived in hearing. When we hear music we do not hear the pitch, etc., of a tone; we actually hear, through the pitch, etc., its tendencial quality. This quality is not a subjective addition of the listener to the objective acoustical facts; it is not the result of some "Einfühlung" or of an association established by previous experiences. It is an objective characteristic of the tone as part of a musical context.

The idea of a dynamic field is suggested where every tone has its specific tendencial quality according to the place it occupies. The ear distinguishes the various tendencial qualities as clearly as it distinguishes pitches. It knows from the tendencial quality of a tone at what place in the field it occurs. It hears the succession of tones in music—otherwise a mere change of sensory quality—as a movement in a dynamic field.

The action pattern of the tonal forces, the structure of the field, the way it is established and changed, the freedom of the tonal movement to yield or run counter to the pull of the forces, are shown as they are observed in melody, counterpoint, harmony. Dynamic action of a pattern similar to that of the tonal forces is also found in the phenomena of meter and rhythm.

The action of the tonal forces as such has no artistic significance; the forces are active in all music, the master's as well as the pupil's. It is when we recognize what is *achieved* through these forces, what the actual tonal movement does with them in the concrete situations of a piece, and how a tonal whole of the type of a living organism grows out of their action, that the artistic rank of a composition and the genius of its composer become almost tangibly manifest.

The complete description of a composition (Beethoven's Sonata Appassionata) is given as an example how these things are shown.

While traditional theory is primarily concerned with the writing of music and is useful mainly to professional students, the theory outlined here is primarily concerned with the understanding of music and should be useful to professional and non-professional students alike. Its proper place is in liberal arts education where it might fill an actually existing need.

4. REPORT OF THE COMMITTEE ON FINANCE

According to the Laws of the Society, the Committee on Finance consists of the President and the Treasurer, *ex-officio,* and not fewer than five other members who shall be nominated by the President and elected by the Society at the General Meeting in April.

Chapter V, Articles 3 and 4 of the Laws read:

"The Committee on Finance shall have the general superintendence of the financial concerns of the Society. It shall have the custody and control of all the securities and investments of the Society, both real and personal, with full power and authority to buy and to sell, and to invest and reinvest the same; including the power to purchase and to sell real estate and to make leases thereof, to satisfy mortgages and extinguish ground rents, and to direct the placing of all such insurances as it may deem necessary; as well as to borrow on the credit of the assets of the Society, to create mortgages thereon, and to make such improvements, repairs and alterations to real estate as it may deem necessary. It shall have power to authorize the proper Officers of the Society to execute the necessary papers to effect all purchases, sales and assignments of property, both real and personal; to execute and to satisfy mortgages, to extinguish ground rents and to transfer registered securities; to subscribe to bond-holders' agreements to plans of reorganization involving any securities held by the Society or in which it has an interest, and to do all such acts as are necessary in pursuance of the foregoing powers.

"The Committee on Finance shall always have access to the Treasurer's books, accounts, and vouchers, and shall cause an audit of such accounts to be made at least once a year. It shall require from the Treasurer an annual report of all the operations of the treasury, which it shall present to the Council with an annual statement of estimates of receipts and expenditures. With the approval of the Council it shall determine the fiscal year of the Society and, in case of emergency needs, authorize appropriations over and above the annual budget."

During the year 1946–1947, the Committee on Finance consisted of Marshall S. Morgan, *Chairman,* Oliver E. Buckley, Morris Duane, *Secretary,* Edwin G. Conklin, Edward Hopkinson, Jr., John Story

Jenks†, Nicholas Kelley, Charles J. Rhoads, J. Henry Scattergood, and Thomas S. Gates, *President.* Luther P. Eisenhart, *Executive Officer,* sat with the Committee.

The members of the Committee meet regularly once a month from January to June and from October to December with occasional special meetings.

General and Special Funds

There are twenty-three funds in the keeping of the Society. Only five of these are unrestricted in the uses to which their income may be applied "for promoting useful knowledge"; three specify a primary purpose, after which any balance may be used for general purposes; fifteen are restricted to specific uses, eleven of these being for the purchase of books for the Library. These funds and the manner and purpose of their establishment are listed alphabetically below.

Associated Fund

Created as of December 31, 1939, in accordance with a resolution adopted by the Committee on Finance, December 5, 1939, with the approval of Legal Counsel. All assets held in the Balch International Law Library, Boyé Library, Brush Endowment, Carlier Library, Franklin Library, Jefferson Library, Lewis, Magellanic, Michaux, Norris Library, Phillips Library, Proud Library, Seybert Library, Tilghman Library, and Whitfield Funds, have been transferred to the Associated Fund at their market value, and each contributing fund has been assigned a proportionate interest in the Associated Fund based on the value of assets contributed.

Balch International Law Library Fund

Founded by Thomas Willing Balch, Esq., of Philadelphia, October 13, 1911, with an initial gift of securities valued at about $700, increased by later gifts to about $1,600, as a memorial to his father for his part in bringing about the submission of the Alabama Claims to the Geneva Tribunal. A part of the income to be used for the purchase of books relating to the law of nations and such other uses, when thought advisable, as may promote the study of that science; a part, not less than one-half, to be added annually to the principal.

†Deceased.

BOYÉ LIBRARY FUND

Bequest of $1,879.21 by Professor Martin Boyé, of Coopersburg, Pa., who died March 5, 1909. By resolution of the Society, December, 1910, the income to be expended in the purchase of books, preferably on chemistry and geology.

BRUSH ENDOWMENT FUND

Gift of $10,000 by Charles Francis Brush, LL.D., of Cleveland, Ohio, November 24, 1914. Income to be used for the general purposes of the Society.

BUILDING FUND

Created by deed of trust dated June 4, 1900, Girard Trust Company, depositary and trustee. All money or property which shall be designated or devoted by any donor, testator or other person, for the acquisition of land or buildings for the Society's use, shall be forthwith paid over, conveyed, or delivered by the Society to the said depositary, for the acquisition of land and the construction and furnishing of buildings for the use and occupation of the Society. The present value is $662,173.51.

CARLIER LIBRARY FUND

Bequest of $5,000 by Auguste Carlier, of Paris, who died March 16, 1890. The income, less 10 per cent which is to be added to the principal, is to be expended for the purchase of books for the Library.

CARNEGIE LIBRARY FUND

Gift of $100,000 by the Carnegie Corporation in 1931. The income to be used for the maintenance of the Library.

DALAND FUND

Bequest of the residuary estate of Dr. Judson Daland, of Philadelphia, who died August 14, 1937, approximately $220,000. The income, less 10 per cent which is to be added annually to the principal, to be used by the Society for research in clinical medicine.

FRANKLIN LIBRARY FUND

Established by the Library Committee in May, 1911, from funds derived from the proceeds of the sale in that year of duplicates, formerly the property of Benjamin Franklin, approximately $3,400. The income to be used for the purchase of books.

GENERAL FUND

This fund has been accumulated from various sources through many years; its income is available for the general purposes of the Society.

JEFFERSON LIBRARY FUND

Established by the Library Committee on January 20, 1905, from the proceeds of royalties from the publication of manuscripts acquired by the Society through President Thomas Jefferson, approximately $1,700. Income to be used for the purchase of books.

JOHNSON FUND

Established in 1937 when Mr. Eldridge Reeves Johnson removed the restriction on his gift of $500,000 and changed it to General Endowment until 1957, unless prior thereto Mr. Johnson directs that it be used for some other purpose of the Society. After 1957 it is to become an unrestricted gift. All income to be used for the general purposes of the Society.

LEWIS FUND

Gift of $10,000 made by Mrs. John F. Lewis in 1935 in memory of her husband; the income to be used each year as an award to the American citizen who shall announce at any general or special meeting of the Society, and publish among its papers, some truth which the Council of the Society shall deem worthy of the award. In any year income not so awarded to be added to principal.

MAGELLANIC FUND

Gift of 200 guineas by John Hyacinth de Magellan, of London, in 1786, for a gold medal to be annually awarded under prescribed terms, to the author of the best discovery or most useful invention relating to navigation, astronomy, or natural philosophy (mere natural history only excepted). Any surplus of interest remaining to be used for such purposes as may be authorized under the Society's Charter and Laws. By resolution of the Society, December, 1899, the unexpended annual income, less 10 per cent which is to be added to the principal, may be used for the purchase of books relating to those departments of science in which the premium is annually offered.

MANUSCRIPTS AND IMPRINTS FUND

Established by the Society, November 20, 1943, from unappropriated allotments made to the Committee on Library, to be held subject to the Committee on Library; income to be turned over to the General Fund.

MICHAUX FUND

Bequest of 92,600 francs by François André Michaux, who died at Vaureal, France, October 23, 1855; for the extension and progress of agriculture, and more especially of sylviculture, in the United States. By resolution of the Society, March, 1899, the income, less 10 per cent reserved for investment, to be used for the purchase of books on forestry, etc.; since 1940 the Committee on Research has been charged with the disposition of the income.

NORRIS LIBRARY FUND

Established by the Library Committee in May, 1911, from the proceeds of the sale in that year of duplicate pamphlets, presented to the Society in 1815 by Joseph Parker Norris, Esq., of Philadelphia, approximately $2,100. Income to be used for the purchase of books.

PENROSE FUND

Bequest of one-half of the residuary estate of Dr. Richard A. F. Penrose, Jr., of Philadelphia, who died July 31, 1931, approximately $3,900,000; by the terms of the bequest this gift to be considered an endowment fund, the income of which only is to be used and the capital to be properly invested.

PHILLIPS LIBRARY FUND

Bequest of his residuary estate, approximately $3,410 (December, 1895), by Henry Phillips, Jr., Esq., of Philadelphia, who died June 6, 1895, to which were later added two bequests to him, confirmed and audited October 5, 1903, of $7,547.54 from the estate of his aunt, Emily Phillips, and of $42,315.80, being an interest in the residuary estate of his uncle, Henry M. Phillips. Income to be used for the purchase of books on archæology and philology in accordance with the terms of the bequest.

PHILLIPS PRIZE ESSAY FUND

The gift on October 5, 1888, of $5,000 by Miss Emily Phillips, of Philadelphia, in memory of her brother Henry M. Phillips. Income to be used in the awarding of a prize for the best essay of real merit on the science and philosophy of jurisprudence.

PROUD LIBRARY FUND

Established by the Library Committee in May, 1911, from the proceeds of the sale in that year of duplicate pamphlets presented in 1812 by Robert Proud, Esq., of Philadelphia, $2,500. Income to be used for the purchase of books.

RESERVE FUND FOR POST-WAR EXPENDITURES

Established by the Society, November 20, 1943, from unappropriated allotments made to specific committees; available to the committees when needed unless the Council takes other action; income to be turned over to the General Fund.

SEYBERT LIBRARY FUND

Bequest of $2,000 by Henry Seybert, Esq., of Philadelphia, who died March 3, 1883. By resolution of the Society, November, 1909, the income to be expended for the purchase of books.

TILGHMAN LIBRARY FUND

Bequest of $200 by Chief Justice William Tilghman, of Philadelphia, who died April 30, 1827. Income to be expended for the purchase of books.

WHITFIELD FUND

Bequest of the residuary estate of James Edward Whitfield of Philadelphia, who died November 4, 1930; approximately $42,000. This fund was left "absolutely and in fee." Ten per cent of the income will be added to principal annually and the balance applied to general purposes of the Society.

WOOD MEMORIAL FUND

Bequest of the residuary estate of Walter Wood, of Philadelphia, who died April 20, 1934, approximately $150,000, in memory of his uncle, George B. Wood, his cousin, Horatio G. Wood, and his two brothers, Richard and Stuart Wood, all of whom were members of the American Philosophical Society; to be used by the Society first for the construction of a building that shall be adequate for the needs of the Society and if there be any surplus, then the same to be applied to such useful purpose or purposes as the Counsel (*sic*) and Officers of said Society may determine.

Endowment Funds of the Society in Order of Establishment

	Date	Name and Purpose	Book Value Original	Book Value Dec. 31, 1946
1.	1786	Magellanic Medal and Premium Discovery or most useful invention relating to navigation, astronomy, or natural philosophy	200 guineas	$5,748.86*
2.	1827	Tilghman Fund for books for the Library	$200.00	2,080.77
3.	1855	Michaux Fund for promotion of agriculture and sylviculture	92,600 francs	54,713.03*
4.	1883	Seybert Fund, assigned to Library, 1909	$2,000.00	3,910.59
5.	1888	Phillips Fund for Prize Essay on jurisprudence	5,000.00	14,179.35
6.	1890	Carlier Fund for books for the Library	5,000.00	14,442.29*
7.	1895-1903	Phillips Fund for books on archæology and philology for the Library	53,273.00	94,682.19
8.	1900	Building Fund for Land and Buildings	Gradual accumulations	662,173.51
9.	1900	General Fund	Gradual accumulations	1,244,578.64
10.	1905	Jefferson Fund for books for the Library	1,700.00	3,826.32
11.	1909	Boyé Fund, assigned to Library, 1910	1,880.00	3,445.69
12.	1911	Proud Fund for books for the Library	2,500.00	5,834.12
13.	1911	Norris Fund for books for the Library	2,100.00	4,762.44
14.	1911	Franklin Fund for books for the Library	3,400.00	10,160.58
15.	1911	Balch International Library Law Fund	1,600.00	5,080.33†
		Amount forwarded	$78,653.00	$2,129,618.71

* 10% of income is added to Principal annually.
† 50% of income is added to Principal annually.

	Date	Name and Purpose	Original	Book Value Dec. 31, 1946
		Brought forward	$78,653.00	$2,129,618.71
16.	1914	Brush Endowment Fund, for general purposes	10,000.00	11,465.75
17.	1931	Carnegie Library Fund for maintenance of Library	100,000.00	87,192.81
18.	1931	Penrose Fund, unrestricted	3,900,000.00	4,442,141.21
19.	1934	Wood Fund primarily for a building	ca. 150,000.00	769,684.38
20.	1935	Lewis Prize Fund	10,000.00	11,300.36
21.	1937	Johnson Fund for general purposes	500,000.00	556,349.37
22.	1937	Daland Fund for research in clinical medicine	220,000.00	223,522.98*
23.	1942	Whitfield Fund for general purposes	42,000.00	46,592.50*
		Totals	$5,010,653.00 200 guineas 92,600 francs	$8,277,868.07

The Auditor's Report made by our certified public accountants, Linvill & Parry, included at the end of this report, contains schedules setting forth the receipts and disbursements of income and principal in the foregoing funds. It also includes a statement setting forth the book value of these funds as of December 31, 1946.

In accordance with action taken by the Society in prior years, balances of unexpended funds allotted to specific committees at the end of each year were set aside in the Reserve Fund for Post War Expenditures, Publication Reserve, and Manuscripts and Imprints Fund. This money is available to the specific committees when needed unless the Council takes other action. By action of the Society in October 1946, this practice was discontinued and the budget for 1947 provides accordingly for each committee without adding thereto the unexpended balance in its budget for 1946.

At the end of the year, in accordance with the foregoing, balances from the Wood Fund Personalty and the Wood Fund Real Estate, as shown in Schedules IV and V, were added to the principal of the Wood Fund Personalty, with the understanding that they might subsequently be withdrawn.

Income from the Building Fund, of which the Girard Trust Company is Trustee, as set forth in Schedules VIII and IX, was applied to maintain the Hall, and the balance was added to principal of this Fund in accordance with the trust agreement establishing the Fund.

Balances of income in the Brush Endowment, Carnegie Library, Penrose Endowment, and Whitfield Funds (the latter after transferring 10 per cent to Principal) were transferred to the principal of the General Fund where the money is available for disposition by the Society. In the case of the other funds, transfers to principal were made in accordance with the agreements establishing the funds, and the balances in income were held for future disposition. Unexpended budget appropriations, less actual commitments, have been transferred to the principal of the Johnson and Daland Funds. The unexpended budget balance in the Research Fund (Penrose) was small and has been carried forward for use by the Committee next year.

All other income and all other expenses are consolidated in the General Fund (see Schedule I) so that that fund sets forth the operating income and disbursements of the Society. During the past year receipts from the General Fund were:

Over-expended for temporary investment 1/1/46	*$ 3,912.50*	
Income (Consolidated)	255,148.61	$251,236.11
Disbursements (Consolidated)		185,117.53
Balance 12/31/46		$ 66,118.58

In considering the General Fund, the principal of which now has a book value of $1,244,578.64, it is to be noted that this includes the Reserve Fund for Post-War Expenditures of $177,446.62, and certain similar sums as set forth in Schedule VII. When these are expended, the General Fund will be reduced accordingly.

In December 1946 we transferred to the Academy of Natural Sciences of Philadelphia the unexpended balance of $6,434.07 in the grant made by the Carnegie Corporation of New York to the Committee on Education and Participation in Science. This transfer was made after consultation with the Carnegie Corporation of New York.

At the close of the year we were awarded by the Court of Common Pleas the funds of the American Society for the Extension of University Teaching, which we have not as yet received, but which will amount to approximately $30,000. This fund will be known as the Jayne Memorial Fund and will be used for the promotion and the extension of university teaching including, *inter alia,* arranging for lectures, publications and research in the fields of the sciences, literature, and the arts.

The total book value of all the funds of the Society, as of December 31, 1946, amounted to $8,277,868.07 as compared with $8,135,995.22 on December 31, 1945. The market value and the distribution of investments as of February 3, 1947, together with the current yield, are all set forth on page 226. The budget for the ensuing year follows.

Respectfully submitted

M. S. Morgan
Chairman, Committee on Finance

Budget for 1947

Estimated Expenses

Salaries	$ 30,000.00	
Executive Office Expenses	6,000.00	
Telephone	800.00	
Insurance	2,000.00	
Committee on Publications:		
Publication Expenses	30,000.00	
Committee on Library:		
Books and Manuscripts	25,000.00	
Library Administration	3,000.00	
Rental for Housing of Library	8,700.00	
Treasurer's Expenses	12,500.00	
Hall Fund	5,000.00	
Committee on Research:		
Penrose Fund	71,500.00	
Johnson Fund	22,000.00	
Daland Fund	8,500.00	
Meetings	12,000.00	
Pensions	1,800.00	
Miscellaneous	10,000.00	
		$248,800.00
Balances carried forward from 1946:		
Commitments		
Publication Expenses	$ 18,000.00	
Research Fund (Penrose)	38,472.33	
Research Fund (Johnson)	3,297.25	
Reserve Fund for Post War Expenditures	11,000.00	$ 70,769.58
Uncommitted		
Publication Reserve	$ 25,430.90	
Reserve Fund for Post War Expenditures	166,446.62	$191,877.52

Estimated Income

Funds

General	$ 45,740.25	
Charles Francis Brush Endowment	437.27	
Carnegie Library	2,000.00	
Judson Daland	8,656.00	
Johnson Endowment	22,197.00	
Richard A. F. Penrose, Jr. Endowment	168,401.50	
Whitfield	1,769.25	
Income Applicable to Budget		$249,201.27

Funds for Special Purposes[1]

Thomas Balch International Law	$ 189.65	
Martin Boyé	131.40	
Auguste Carlier	548.42	
Benjamin Franklin	387.49	
Thomas Jefferson	145.93	
John F. Lewis Prize	426.11	
Magellanic	218.30	
François André Michaux	2,077.61	
Joseph Parker Norris	181.63	
Henry Phillips, Jr.	3,604.95	
Henry M. Phillips Prize Essay	304.50	
Robert Proud	222.50	
Henry Seybert	149.14	
William Tilghman	79.35	
Wood Memorial	8,411.50	
Funds for Special Purposes		$ 17,078.48
Total Estimated Annual Income		$266,279.75

[1] See Schedule VIII for Building Fund.

DISTRIBUTION OF INVESTMENTS AND MARKET VALUES AS OF FEBRUARY 3, 1947

	Bonds		Guaranteed and Preferred Stocks		Common Stocks		Total	
	Cash Value	%	Cash Value	%	Cash Value	%	Cash Value	%
Uninvested Cash	$ —	—%	$ —	—%	$ —	—%	$ 100,245.02	1.1%
U. S. Government	2,757,240.00	31.4	—	—	—	—	2,757,240.00	31.4
Railroad	778,041.25	8.9	86,462.50	1.0	95,650.00	1.1	960,153.75	11.0
Public Utility	219,375.00	2.5	407,675.00	4.7	784,823.75	8.9	1,411,873,75	16.1
Industrial and Miscellaneous	205,592.50	2.4	345,081.00	3.9	2,549,649.25	29.1	3,100,322.75	35.4
Bank and Insurance Company	—	—	—	—	439,797.00	5.0	439,797.00	5.0
	$3,960,248.75	45.2%	$839,218.50	9.6%	$3,869,920.00	44.1%	$8,769,632.27	100.0%
Annual Cash Income	$106,489.50		$36,807.00		$159,991.00		$303,287.50	
Current Yield	2.69%		4.39%		4.13%		3.50%	

REPORT OF THE CERTIFIED PUBLIC ACCOUNTANTS

LINVILL & PARRY
Certified Public Accountants
Twelve South Twelfth Street, Philadelphia

February 14, 1947

DR. THOMAS S. GATES, *President*
The American Philosophical Society
Philadelphia, Pennsylvania

Dear Sir:

GENERAL AND TRUST FUNDS

We have examined the accounts of the American Philosophical Society for the year ended December 31, 1946, as contained in the records of the Treasurer, the Fidelity-Philadelphia Trust Company. The appended statements, Schedules I to VII inclusive, are in accordance with these records.

We have examined paid cancelled checks and vouchers in connection with disbursements in the various funds except the Wood Fund Real Estate Income Account, as to which we have accepted the cash records of the Fidelity-Philadelphia Trust Co. as agent, without any further examination. The cash in bank at December 31, 1946, as summarized in Schedule VI, has been verified.

We have examined into the changes during the year in the investments in all of the funds. We examined the perpetual and other fire insurance policies carried as an investment in the General Fund, and obtained detailed statements from the Fidelity-Philadelphia Trust Company, the Girard Trust Company, and The Pennsylvania Company etc., showing at December 31, 1946 the bonds, stocks, real estate and other investments held by them as agents or trustees for the Society, thus satisfactorily accounting for all of the investments of the Society as called for by the records at December 31, 1946.

The investments composing the various funds at December 31, 1946, as summarized in the appended statement (Schedule VII) are at book value, which, in all funds except the Associated Fund, is as follows: Bonds and Mortgages at par or face value to January 1, 1940 and at par or cost, whichever is lower, for subsequent purchases; Stocks at cost when purchased or at inventory value when received as gifts or bequests; and Real Estate at amount of

foreclosed mortgage plus costs of acquisition and subsequent improvements, and appraised or assessed value when acquired as gifts or devises. The Associated Fund investments are at December 31, 1942 market values and subsequent purchases at cost. We have not determined the current market value of any of the investments of the Society.

Income due for the year from the investments has been received and recorded on the books prior to December 31st.

Comprehensive tests have been made of the income receivable from other sources, except as to real estate, for which we have not examined leases, rental statements or other data in connection with income recorded as being received.

Building Fund

Girard Trust Company, Trustee

We have examined statements submitted by the Girard Trust Company, Trustee, of the Building Fund for the year ended December 31, 1946, and have prepared the appended statement of Cash Receipts and Disbursements and Summary of the Assets for the year—Schedules VIII and IX.

The cash and investments are in accordance with a statement obtained by us from the Girard Trust Company, Trustee, setting forth in detail the assets in their possession at December 31, 1946. All of the investments are at par value except stocks, which are at cost, with real estate (participations) at amount of foreclosed mortgage plus costs of acquisition and subsequent improvements. We have not determined the present value of any of the investments.

We have examined into the changes during the year in the investments, and have accounted for all income due for the year from Bonds, Stocks and Mortgages.

Respectfully submitted,

Linvill & Parry
Certified Public Accountants

SCHEDULE I

CASH RECEIPTS AND DISBURSEMENTS

Year ended December 31, 1946

GENERAL FUND

Principal Account

Balance—January 1, 1946		$ 4,153.48
Receipts:		
Investments Sold or Redeemed:		
U. S. Government Bonds ($95,000.00)	$ 97,056.68	
Industrial Bonds ($47,000.00)	47,680.60	
Public Utility Bonds ($5,000.00)	5,240.01	
Preferred Stocks	10,905.00	
Common Stocks	23,339.26	
Fine Arts All Risks Insurance (one year's charge)	1,480.00	
Contribution	100.00	
Transferred from Income Account	52,000.00	
		237,801.55
		$241,955.03
Disbursements:		
Investments Purchased:		
U. S. Government Bonds ($20,000.00)	$ 20,650 00	
Preferred Stocks	28,343.50	
Common Stocks	117,189.27	
		166,182.77
Balance—December 31, 1946		$ 75,772.26

Income and Operating Account

Overexpended—January 1, 1946 (Temporarily Invested)			*$ 10,346.57*
Receipts:			
Income from Investments		$ 51,204.47	
Sale of Publications		8,596.70	
Royalties on W. B. Scott's book, "History of Land Mammals in the Western Hemisphere"		305.67	
The Henry LaBarre Jayne Lecture Foundation		200.00	
Girard Trust Company Building Fund Reimbursement for Building Account Disbursements		2,826.72	
Sale of Microfilms, etc.		404.93	
Refunds, Penrose Research Fund Grants		1,192.33	
Refunds, Daland Research Fund Grants		8.39	
Transfer of Income from Trust Funds:			
Richard A. F. Penrose, Jr. Endowment Fund	$174,343.83		
Johnson Endowment Fund	11,150 00		
Whitfield Fund	1,805 89		
Carnegie Library Fund	2,613 76		
Charles F. Brush Endowment Fund	495.92		
		190,409.40	
			255,148.61
Amount forwarded			$244,802.04

Brought forward			$244,802.04
Disbursements:			
Salaries:			
Executive Office	$ 10,050.00		
Library	10,740.03		
Publication	5,400.00		
		$ 26,190.03	
Pensions		1,800.00	
Executive Office Expenses		4,151.53	
Telephone		689.48	
Publication Expenses		11,834.18	
Franklin-Greene Letters		5,000.00	
Franklin-Strahan Letters		1,405.00	
Franklin-Cadwalader-Evans Letters		900.00	
Franklin-Ellery Letters		525.00	
Franklin Passport		950.00	
Peale-Sellers Papers		5,000.00	
Vaughan Letters		4,000.00	
Strahan-Hall Letters		1,000.00	
Miscellaneous Manuscripts		100.00	
Contribution toward renovation of Franklin House, London		2,000.00	
Books and Binding		2,500.00	
Insurance		1,454.48	
Meetings		9,451.78	
Hall Expenses		4,517.12	
Hall Expenses "Building"		2,826.72	
Library Administration		2,386.52	
Library Rental (Drexel Building)		8,700.00	
Investment Counsel Fees		3,000.00	
Auditing Fees		1,250.00	
Treasurer's Expense		41.75	
Research Fund Grants:			
Penrose Fund	$ 56,521.37		
Johnson Fund	12,475.00		
		68,996.37	
Transfer to Daland Fund—Grant Refunds		8.39	
Miscellaneous Expenses		5.11	
Treasurer's Compensation	$ 8,000.00		
Agent's Commission (Girard Trust Company, Carnegie Fund)	95.86		
	$ 8,095.86		
Charged Other Funds	95.86		
		8,000.00	
			178,683.46
			$ 66,118.58
Transfer to Principal Account for Investment			52,000.00
Balance—December 31, 1946—General Fund			$ 14,118.58

Brought forward (Balance Dec. 31, 1946—General Fund)		$ 14,118.58

COMMITTEE ON EDUCATION AND PARTICIPATION IN SCIENCE

Grant from Carnegie Corporation of New York

Balance Unexpended—January 1, 1946	$ 6,434.07	
Disbursed:		
To Academy of Natural Sciences of Philadelphia	6,434.07	
Balance—December 31, 1946		$ 14,118.58

Note:

The following General Fund appropriations are carried forward:

Publication Expenses		$ 18,000.00
Research Fund:		
Penrose Fund	$ 38,472.33	
Johnson Fund	3,297.25	
		$ 41,769.58
Total General Fund appropriations carried forward		$ 59,769.58

SCHEDULE II

SUMMARY OF CASH RECEIPTS AND DISBURSEMENTS

Year ended December 31, 1946

TRUST FUNDS—PRINCIPAL ACCOUNT*

	Balance 1-1-1946	Receipts: Proceeds from Investments Sold or Matured	Receipts: Transferred from or to Income Account	Receipts: Miscellaneous	Receipts: Total	Disbursements: Investments Purchased	Disbursements: Transferred to Associated Fund	Disbursements: Total	Balance 12-31-46
Unrestricted Funds:									
Charles Francis Brush Endowment	$ 4,064.75	$ 84,854 46	$ 7,850 00		$ 96,769 21	$ 50,248.19		$ 50,248.19	$ 46,521.02
Johnson Endowment	55,572.10	690,067.56			745,639.66	713,759.92		713,759.92	31,879.74
Richard A. F. Penrose, Jr. Endowment			200.65		200.65		$200.65	200.65	
Whitfield									
	$59,636.85	$774,922 02	$ 8,050 65		$842,609 52	$764,008.11	$200.65	$764,208.76	$ 78,400.76
Semi-restricted Funds:									
Magellanic			$ 24.76		$ 24.76		$ 24.76	$ 24 76	
François André Michaux			235.63		235.63		235.63	235.63	
			$ 260.39		$ 260.39		$260.39	$ 260.39	
Restricted Funds:									
Library Funds:									
Thomas Balch International Law			$ 107 54		$ 107.54		$107.54	$ 107.54	
Martin Boyé			62 20		62 20		62 20	62.20	
Auguste Carlier					19,820 75	$ 17,664.07		17,664.07	$ 2,156.68
Carnegie Library	$ 8,200.47	$ 11,620.28							
Benjamin Franklin									
Thomas Jefferson									
Joseph Parker Norris				$23.19(A)	23.19		$ 23 19	23.19	
Henry Phillips, Jr.									
Robert Proud									
Henry Seybert									
William Tilghman									
	$ 8,200 47	$ 11,620 28	$ 169 74	$23.19	$ 20,013 68	$ 17,664.07	$192.93	$ 17,857.00	$ 2,156.68
Special Funds:									
Judson Daland	738 00	12,093.82	9,062 09		21,893 91	9,447.50		9,447.50	12,446.41
John F Lewis Prize			127.16		127 16		127.16	127.16	
Henry M. Phillips Prize Essay	766 38				766 38				766.38
	$ 9,704 85	$ 23,714 10	$ 9,358 99	$23 19	$ 42,801 13	$ 27,111 57	$320 09	$ 27,431.66	$ 15,369.47
			$ 757 94	*$23 19*	*$ 781 13*		*$781 13*	*$ 781.13*	
Transferred to Associated Funds						$ 21,159 26		$ 21,159 26	$ 10,699 23
Associated Fund	$ 835 21	$ 30,242 15	$ 757 94	$23 19	$ 31,858 49				
Totals	$70,176 91	$828,878 27	$17,670 03	$23 19	$916,748 40	$812,278.94		$812,278 94	$104,469.46

* Exclusive of: Wood Fund—See Schedules IV and V. Building Fund—See Schedules VIII and IX.
(A) Distribution—Penna. Co., etc., Executor u/w Henry Phillips.

Year ended December 31, 1946

TRUST FUNDS—INCOME ACCOUNT*

	Balance 1-1-46	Receipts: Income from Investments	Receipts: Total	Disbursements: For Purpose of Fund	Disbursements: Miscellaneous	Disbursements: Transferred to or *from* General Fund	Disbursements: Transferred to or *from* Principal Account	Disbursements: Total	Balance 12-31-46
Unrestricted Funds:									
Charles Francis Brush Endowment	——	$ 495 92†	$ 495 92	——	——	$ 495.92	——	$ 495 92	——
Johnson Endowment	$16,893.22	23,363 34	40,256 56	——	$ 23 53	11,150 00	$ 7,850.00	19,023.53	$21,233.03
Richard A. F. Penrose, Jr. Endowment	——	174,367 08	174,367.08	——	23.25	174,343.83	——	174,367.08	——
Whitfield	——	2,006 54†	2,006 54	——	——	1,805 89	200.65	2,006 54	——
	$16,893 22	$200,232 88	$217,126.10	——	$ 46.78	$187,795.64	$ 8,050.65	$195,893.07	$21,233.03
Semi-restricted Funds:									
Magellanic	$ 1,228 65	$ 247 58†	$ 1,476.23	$ 43 95	——	——	$ 24 76	$ 68 71	$ 1,407.52
François André Michaux	9,752 31	2,356 26†	12,108 57	755 00	——	——	235.63	990.63	11,117.94
	$10,980 96	$ 2,603.84	$ 13,584 80	$ 798.95	——	——	$ 260.39	$ 1,059.34	$12,525.46
Restricted Funds:									
Library Funds:									
Thomas Balch International Law	$ 235 53	$ 215 08†	$ 450 61	$ 13 00	——	——	$ 107.54	$ 120 54	$ 330 07
Martin Boyé	900 42	149 04†	1,049 46	523 25	——	——	——	523.25	526.21
Auguste Carlier	428 14	621 97†	1,050 11	321 21	——	——	62.20	383 41	666.70
Carnegie Library	——	2,737 43	2,737 43	——	$123 67**	$ 2,613.76	——	$ 2,737.43	——
Benjamin Franklin	396 06	439 47†	835 53	395 00	——	——	——	395 00	440 53
Thomas Jefferson	152 51	165 50†	318 01	91 87	——	——	——	91.87	226.14
Joseph Parker Norris	190 39	205 98†	396 37	186 70	——	——	——	186 70	209.67
Henry Phillips, Jr.	15,919 01	4,088 44†	20,007 45	1,167.93	——	——	——	1,167 93	18,839.52
Robert Proud	227 85	252 34†	480 19	218.15	——	——	——	218 15	262.04
Henry Seybert	152 80	169 15†	321 95	142 65	——	——	——	142.65	179.30
William Tilghman	99 92	90 00†	189 92	8 00	——	——	——	8.00	181.92
	$18,702.63	$ 9,134 40	$ 27,837 03	$3,067 76	$123.67	$ 2,613.76	$ 169 74	$ 5,974 93	$21,862 10
Special Funds:									
Judson Daland	5,154 90	10,536 97	15,691 87	——	——	*8.39*	9,062.09	9,053 70	6,638.17
John F Lewis Prize	427 16	483 25†	910 41	300 00	——	——	127.16	427 16	483 25
Henry M. Phillips Prize Essay	1,760 08	304 50	2,064 58	——	——	——	——	——	2,064 58
	$26,044 77	$ 20,459 12	$ 46,503 89	$3,367 76	$123 67	$ 2,605.37	$ 9,358.99	$ 15,455.79	$31,048.10
Associated Fund	——	.60†	.60	——	.60	——	——	.60	——
Totals	$53,918 95	$223,296 44	$277,215 39	$4,166 71	$171 05	$190,401.01	$17,670.03	$212,408.80	$64,806.59

*Exclusive of: Wood Fund—See Schedules IV and V. Building Fund—See Schedules VIII and IX.
†Income from Investments—Associated Funds Total $11,987 12.
**(Maintenance of Real Estate (Investments) $27.81.
(Agent's Commissions $95 86.

SCHEDULE IV

CASH RECEIPTS AND DISBURSEMENTS

Year ended December 31, 1946

WOOD FUND—PERSONALTY

Principal Account

Balance—January 1, 1946		$16,897.92
Receipts:		
Transfer from Wood Fund—Personalty Income Account	$ 8,524.93	
Transfer from Wood Fund—Real Estate Principal Account	8,956.74	
Estate of Walter Wood, deceased	7,353.82	
		24,835.49
		$41,733.41
Disbursements:		
Investments Purchased		17,819.81
Balance—December 31, 1946		$23,913.60

Income Account

Receipts:		
Income from Investments		$ 8,526.50
Disbursements:		
Transferred to Wood Fund—Personalty Principal Account	$ 8,524.93	
Miscellaneous	1.57	
		$ 8,526.50

SCHEDULE V

CASH RECEIPTS AND DISBURSEMENTS

Year ended December 31, 1946

Wood Fund—Real Estate

Principal Account

Receipts:		
Transferred from Wood Fund—Real Estate Income Account		$14,532.86
Disbursements:		
Driveways, Piers, etc., Parking Lot	$ 1,376.12	
Demolition of Wood Building	4,200.00	
Transferred to Wood Fund—Personalty Principal Account	8,956.74	
		$14,532.86

Income Account

Receipts:		
Income from Real Estate	$36,579.25	
Miscellaneous	46.46	
		$36,625.71
Disbursements:		
Taxes on Real Estate	$ 8,899.10	
Water and Sewer Rents	613.76	
Maintenance and Repairs	10,337.55	
Treasurer's Commission	282.50	
Rental Commissions	1,540.20	
Insurance	419.74	
Transferred to Wood Fund—Real Estate Principal Account	14,532.86	
		$36,625.71

SCHEDULE VI

SUMMARY OF CASH

December 31, 1946

	Principal	Income	Total
Unrestricted Funds:			
General	$75,772.26	$14,118.58	$ 89,890.84
Johnson Endowment	46,521.02	21,233.03	67,754.05
Richard A. F. Penrose, Jr.	31,879.74	——	31,879.74
	$154,173.02	$35,351.61	$189,524.63
Semi-restricted Funds:			
Magellanic	——	$ 1,407.52	$ 1,407.52
François André Michaux	——	11,117.94	11,117.94
Wood Memorial—Personalty	$23,913.60	——	23,913.60
	$23,913.60	$12,525.46	$ 36,439.06
Restricted Funds:			
Library Funds:			
Thomas Balch International Law	——	$ 330.07	$ 330.07
Martin Boyé	——	526.21	526.21
Auguste Carlier	——	666.70	666.70
Carnegie Library	$ 2,156.68	——	2,156.68
Benjamin Franklin	——	440.53	440.53
Thomas Jefferson	——	226.14	226.14
Joseph Parker Norris	——	209.67	209.67
Henry Phillips, Jr.	——	18,839.52	18,839.52
Robert Proud	——	262.04	262.04
Henry Seybert	——	179.30	179.30
William Tilghman	——	181.92	181.92
	$ 2,156.68	$21,862.10	$ 24,018.78
Special Funds:			
Judson Daland	$12,446.41	$ 6,638.17	$ 19,084.58
John F. Lewis Prize	——	483.25	483.25
Henry M. Phillips Prize Essay	766.38	2,064.58	2,830.96
	$15,369.47	$31,048.10	$ 46,417.57
Associated Fund	$10,699.23	——	$ 10,699.23
Totals	$204,155.32	$78,925.17	$283,080.49

On deposit with Fidelity-Philadelphia Trust Company (Treasurer's Account)	$ 78,925.17
Included among the Trust Funds (Cash) of Fidelity-Philadelphia Trust Co.	201,998.64
Included among the Trust Funds (Cash) of Girard Trust Company (Carnegie Library Fund)	2,156.68
	$283,080.49

SCHEDULE VII

GENERAL AND SPECIAL FUNDS

PRINCIPAL

December 31, 1946

	Uninvested Cash 12-31-1946	Invested 12-31-1946	Total Funds at Book Value 12-31-1946	Total Funds at Book Value 12-31-1945
Unrestricted Funds:				
General:				
Publication Reserve Fund		$ 25,430.90	$ 25,430.90	$ 16,834.20
Manuscripts and Imprints Fund				383.06
Reserve for Post War Expenditures		177,446.62	177,446.62	177,446.62
Undesignated	$75,772.26	965,928.86	1,041,701.12	1,009,678.24
Total General Fund	$ 75,772.26	$1,168,806.38	$1,244,578.64	$1,204,342.12
Johnson Endowment	46,521.02	509,828.35	556,349.37	545,050.94
Richard A. F. Penrose, Jr. Endowment	31,879.74	4,410,261.47	4,442,141.21	4,407,396.24
Total Unrestricted Funds	$154,173.02	$6,088,896.20	$6,243,069.22	$6,156,789.30
Semi-restricted Funds:				
Wood Memorial:				
Personalty	$ 23,913.60	$ 200,694.78	$ 224,608.38	$ 199,772.89
Real Estate		545,076.00	545,076.00	545,076.00
For the construction of a building adequate to the needs of the Society, any surplus remaining to be applied to such useful purpose as counsel and officers of the Society may determine				
Total Semi-restricted Funds	$ 23,913.60	$ 745,770.78	$ 769,684.38	$ 744,848.89
Restricted Funds:				
Library Fund:				
Carnegie Library For maintenance of Library	$ 2,156.68	$ 85,036.13	$ 87,192.81	$ 89,635.68
Henry Phillips, Jr.		132.91*	132.91	156.10
(See Associated Fund for additional $94,549.28 in Fund)				
Special Funds:				
Judson Daland For research in Clinical Medicine	12,446.41	211,076.57	223,522.98	213,483.61
Henry M. Phillips Prize Essay Prize for essay on Science and Philosophy of Jurisprudence	766.38	13,412.97	14,179.35	14,179.35
	$ 15,369.47	$ 309,658.58	$ 325,028.05	$ 317,454.74

* Held by Pennsylvania Co., etc., as agent.

GENERAL AND SPECIAL FUNDS (Continued)

	Uninvested Cash 12-31-1946	Invested 12-31-1946	Total Funds at Book Value 12-31-1946	Total Funds at Book Value 12-31-1945
Associated Fund:				
Thomas Balch International Law For books relating to the Law of Nations			$ 5,080.33	$ 4,960.28
Martin Boyé For books—Chemistry and Geology			3,445.69	3,437.02
Charles Francis Brush Endowment For general purposes			11,465.75	11,436.91
Auguste Carlier For books			14,442.29	14,343.92
Benjamin Franklin For books			10,160.58	10,135.02
Thomas Jefferson For books			3,826.32	3,816.69
John F. Lewis Prize For an award to the American Citizen who shall announce at any general or special meeting of the Society and publish among its papers some truth which the Council of the Society shall deem worthy of the award			11,300.36	11,145.09
Magellanic Fund Prize for discovery or invention and for books in field of Navigation, Astronomy or Natural Philosophy			5,748.86	5,709.70
François André Michaux For books on Forestry			54,713.03	54,340.36
Joseph Parker Norris For books			4,762.44	4,750.46
Henry Phillips, Jr. For books on Archaeology and Philology (See Restricted Funds for Additional $132.91 in Fund)			94,549.28	94,288.30
Robert Proud For books			5,834.12	5,819.44
Henry Seybert For books			3,910.59	3,900.75
William Tilghman For books			2,080.77	2,075.54
Whitfield Fund For general purposes			46,592.50	46,275.15
Total Associated Fund	$ 10,699.23	$ 267,213.68	$ 277,912.91	$ 276,434.63
Total All Funds	$204,155.32	$7,411,539.24	$7,615,694.56	$7,495,527.56

GENERAL AND SPECIAL FUNDS (Continued)

	Uninvested Cash 12-31-1946	Invested 12-31-1946	Total Funds at Book Value 12-31-1946	Total Funds at Book Value 12-31-1945
Brought forward—Total all Funds	$204,155.32	$7,411,539.24	$7,615,694.56	$7,495,527.56
Invested in:				
U. S. Government Obligations			$2,302,658.75	$2,240,633.75
Foreign Government Bonds			—	68,957.00
State, County and Municipal Bonds			8,000.00	73,000.00
Railway, Utility, Industrial and Other Bonds			1,133,595.47	1,260,562.55
Stocks			3,394,759.98	3,178,718.64
Mortgages and Mortgage Participations			20,736.13	29,135.21
Real Estate and Real Estate Participations			545,076.00	545,076.00
Sundry Assets—Held by Pennsylvania Co., etc.			132.91	156.10
Perpetual Fire Insurance Policies (including prepaid value—Fine Arts Policy)			6,580.00	8,060.00
			$7,411,539.24	$7,404,299.25
Uninvested Cash			204,155.32	191,228.31
			$7,615,694.56	$7,495,527.56

Summary of Increase in Investments

Balance at Book Value 12-31-1945		$7,404,299.25
Add:		
Investments Purchased at cost		996,281.52
		$8,400,580.77
Deduct:		
Investments sold and redeemed ($1,013,123.01) at book value	$ 980,559.96	
Premiums charged off on Bonds purchased	7,001.57	
Insurance premiums charged to expense	1,480.00	
		989,041.53
Balance at Book Value 12-31-1946		$7,411,539.24

SCHEDULE VIII

BUILDING FUND—GIRARD TRUST COMPANY, TRUSTEE

CASH RECEIPTS AND DISBURSEMENTS

Year ended December 31, 1946

Principal Account

Balance—January 1, 1946		$ 58,534.77
Receipts:		
Bonds sold or redeemed (Par $35,000.00)	$37,690.37	
Stocks sold	4,992.48	
On Account of Mortgages	6,953.84	
Settlement of Judgment—re foreclosure	740.45	
Transferred from Income Account	19,719.99	
		70,097.13
		$128,631.90
Disbursements:		
Invested in Bonds (Par $35,000.00)	$36,609.38	
Invested in Stocks	83,913.89	
Forwarding Charges	3.44	
		120,526.71
Balance—December 31, 1946		$ 8,105.19

Income Account

Receipts:		
Income from Investments	$24,646.92	
Estate of Henry G. Bryant, deceased—on account of income	30.02	
		$ 24,676.94
Disbursements:		
Hall Fund Expenditures	$ 3,977.52	
Commission—Girard Trust Company	749.61	
Notary Fees	.50	
Transferred to Principal Account	19,719.99	
Accrued Interest on Bonds Purchased	229.32	
		$ 24,676.94

SCHEDULE IX

BUILDING FUND—GIRARD TRUST COMPANY, TRUSTEE

Summary of Assets

	Balance 1-1-1946	Additions	Deductions	Balance 12-31-1946
Investments:				
Bonds (Par Value)	$309,000.00	$ 35,000.00	$ 35,000.00	$309,000.00
Stocks (At Cost)	258,151.58	83,913.89	4,824.62	337,240.85
Mortgages (Participations)	11,794.76	——	6,953.84	4,840.92
Real Estate (Participations)	2,986.55	——	——	2,986.55
Cash—Principal	58,534.77	70,097.13	120,526.71	8,105.19
Cash—Income	——	24,676.94	24,676.94	——
	$640,467.66	$213,687.96	$191,982.11	$662,173.51*

* Includes bonds at Par Value. Total Fund including bonds at cost is $659,982.89.

Summary of Increase in Fund

Year ended December 31, 1946

Income from Investments	$24,646.92		
Less:			
Accrued Interest on Bonds Purchased	229.32		
		$24,417.60	
Proceeds—Sale of Bonds in excess of par value		2,690.37	
Profit on sale of Stocks		167.86	
Estate of Henry G. Bryant, Deceased—on Account of Income		30.02	
Settlement of Judgment—re foreclosure		740.45	
			$ 28,046.30
Less:			
Bond Premiums—charged off		$ 1,609.38	
Hall Fund Expenditures		3,977.52	
Commission—Girard Trust Company		749.61	
Postage, Insurance, etc.		3.44	
Notary Fee		.50	
			$ 6,340.45
Increase in Fund			$ 21,705.85
Balance—January 1, 1946			640,467.66
Balance—December 31, 1946			$662,173.51

5. REPORT OF THE COMMITTEE ON LIBRARY

The Committee on Library presents the following report for the calendar year 1946.

COMMITTEE: PERSONNEL AND MEETINGS

The Committee consists of William E. Lingelbach, *Chairman,* Julian P. Boyd, Gilbert Chinard, George W. Corner, Karl K. Darrow, Waldo G. Leland, Harry M. Lydenberg, J. Percy Moore, A. S. W. Rosenbach, Richard H. Shryock, St. George L. Sioussat, Carl Van Doren, and *ex officio,* Thomas S. Gates, *President,* and Luther P. Eisenhart, *Executive Officer.*

Four regular meetings were held during the year, namely on February 6, May 16, October 3, and December 19.

THE ROLE OF THE LIBRARY IN THE SOCIETY

The Library of the American Philosophical Society occupies a unique place in the vast library system of the country.[1] Even in its own limited group of highly specialized libraries it stands very much alone, for unlike the Henry E. Huntington, the John Carter Brown, and the William L. Clements, it is the product, not of a great collector, or a Maecenas, but of the interest and devotion of the officers and members—scientists and scholars—of a great Society "for promoting useful knowledge." Like that of the Royal Society, and of other European academies, it reflects the history and activities of the body that founded and nourished it through successive generations. Born in colonial days, it also shares to some extent the character of the early state historical society libraries.

Because of its remarkable history, its fine traditions and reputation for efficient service, the Library shares in the general respect and prestige accorded libraries in all great civilizations. More specifically, it commands the enthusiastic commendation of the scholars who use it, and the loyal affection of all those who know it well. However, since many of our own members have little or no occasion to make its acquaintance, this report is given a somewhat broader scope than usual, indicating in passing not only the routine functions, but also the different special services, which the Library per-

[1] For the story of the Library of the American Philosophical Society, see the article by W. E. Lingelbach in *William and Mary Quart.,* ser. 3, 3:48-69, 1946.

forms in the work of the Society and the life of the community. By thus clarifying the role of the Library, the reasons for the action of the Society in extending its unqualified support for its continuance will become more apparent.

Scientists and scholars, no less than men of affairs, demand, and have the right to demand, satisfactory reasons when asked to appropriate funds entrusted to their care. Honored traditions and historical associations, though excellent, are not enough. In addition they demand efficient stewardship, good service to scholarship, and, above all, constructive policies in line with approved objectives. The challenge is one that every good specialized library should welcome. Indeed, it cannot escape it. Sooner or later it must be met, for it is reasonable and cannot be brushed aside as irrelevant and academic. Less than a year ago the greater part of the library of our sister society, the American Academy of Arts and Sciences, founded in 1780 and second only to our own as the oldest scientific and learned society of the country, was sold to the Linda Hall Library of Kansas City, Missouri.

Many will recall that a somewhat similar crisis arose not so very long ago in regard to the Library of our Society. In the late twenties and early thirties a plan developed to remove the Society entirely from its old home on Independence Square to a projected palace on the city Parkway.[2] Fortunately, the plan was defeated, and the Society remained in its fine old historic Hall. Meanwhile, however, the Library, which had been growing rapidly, threatened to overflow the capacity of the third story which had been added in the nineties to accommodate it. Something had to be done. Finally, in 1934, it was removed to the former quarters of the Philadelphia Stock Exchange in the Drexel Building, across the street from the Hall.

During the discussions, considerable opposition to the Library appeared. Largely unaware of its role in the general work of the Society, and not impressed by sentimental reasons, some proposed its complete liquidation. In order to obtain the factual data necessary for intelligent decisions a special committee on the Library was appointed to study the situation. It consisted of the late Dr. Max Farrand, *Chairman,* Dr. Harry M. Lydenberg, Dr. Harlow Shapley, and Dr. St. George L. Sioussat. Its personnel inspired the

[2] See Edwin G. Conklin, Brief History of the Amer. Philos. Soc. *supra,* pp. 7-26.

greatest confidence, and its Report, strongly recommending the continuance of the Library and its future development on the basis of certain recognized principles, was formally adopted by the Society in Executive Session at the annual meeting in April, 1941.

Among the different reasons for the continuance of the Library, the Report stressed the extraordinary historical value of its holdings, its intimate associations with the men of the colonial and early national period of our history, and finally, its worth-while service to the Society and to scholarship. In the words of the Report:

> A collection of books has been an integral part of the American Philosophical Society from its very beginning—even in the days of the Junto. As soon as the joint societies organized, they formed a library. Through the devotion of the Society's officers and members, during its formative years and notably again when Philadelphia was the seat of the federal government, the Library was the recipient of many gifts and bequests. . . .
>
> The ownership of such treasures entails a responsibility for their preservation and care, and an obligation to make them available for use. The American Philosophical Society owes it to itself, to the community, to the United States, and to the world at large, to preserve its Library and to make its contents known. To the Special Committee, accordingly, the essential question was, not the maintenance of the Library, but how economically and productively it is managed.

Since the Report laid down the principles rather than the practical details under which the Library was to function, the responsibility of its implementation, that of translating it into practice, fell upon the Librarian and the Committee on Library. In general it has been assumed that the Library was not, and never should become, a library for the use of the general public. It is a scholar's library—a library for the specialist. Its policies and program are therefore being developed on this assumption. This does not, however, mean the collecting of rarities or museum items, but rather the bringing together of basic materials for the nation's history in the fields in which the Library has a special interest. Its collections should attract the scholar and stimulate research and creative writing.

Moreover, since American history falls entirely within the period since men began to write in the vernacular and make use of the invention of printing, a library devoted to Americana is concerned with books, manuscripts, and imprints, and not with archæological remains—buildings, ruins, inscriptions, coins, and medals. For-

tunately too, the men who shaped our early history and founded the Republic not only knew how to write, but wrote much and well. They belonged to an epistolatory age. What is more, they were intensely conscious of the dynamic character of ideas, and the power of the printing press in their dissemination. Not even the Encyclopedists understood this better than did Franklin, the first great American to seize upon the potential influence of the press in shaping public opinion.

With these things in mind, the Library begun by Franklin and his friends naturally emphasizes the acquisition of Americana. In its accessions it is not the rarity, or high market value, that determines the criteria for acquisition, but the character of the content, and the light it throws on the men and institutions of the period of the Library's interest. More specifically, implementation of the policy has proceeded on the following lines: (1) the careful selection of special fields in which the Library had, or could develop, a preferred interest, and which it should "cultivate . . . to a point of superiority"; (2) a vigorous policy to build up the holdings in those chosen as the special fields of the Library's activities; (3) the elimination of holdings unrelated to them and not of a special interest because of association value; (4) the coordination of the Library's program and holdings with those of other libraries of the Philadelphia metropolitan area; (5) an active policy to stimulate the use of the Library—"to make its contents known"; and (6) the consideration of "the possibilities of a separate building" commensurate with the dignity of the Society, and adequate for the needs of an up-to-date special library.

Selecting the fields of specialization is necessarily dependent on a number of factors, and the Library is proceeding with great care, often making tentative rather than final decisions. Among the fields that have commended themselves as capable not only of cultivation "to a point of superiority," but also of especial appeal because of their association significance, the writings of Benjamin Franklin naturally come first. Frankliniana are in a class by themselves so far as our Library is concerned. Moreover, since Franklin's activities touched so many phases of the life of the colonial, revolutionary, and early national periods of our history, the field is quite extensive. Another important field relates to the early history of the West because of the possession by our Library of the Lewis and Clark Journals and other records of early explorations, like the Hunter,

Dunbar, and Michaux Journals. Closely paralleling this are subjects or fields especially represented in the papers of some of the Society's prominent members like the Michaux, Peale, Vaughan, LeConte, Lesley, Lyman, Thomson, Boas, and other collections. Other fields relate to early American Indian languages and archæology, the history of American science and culture, especially for the early periods, and also for the major trends in this field down to the Civil War. Another subject in which the Library and the Society have a deep interest is the impact of the intellectual and scientific activities of Europe and America on each other, especially as they appear in the inter-relations of academies and other scientific and learned societies. In this connection the study and exploitation of the Society's own archives, by continuing the index for the later period also, and a more vigorous solicitation of communications, personal papers, and correspondence of members is being inaugurated. On the fields just mentioned there is more or less general, if not unanimous, approval. Others, as they come up from time to time, are given careful consideration by the Committee, with decisions depending largely on the possibilities of adequate integration of new accessions with the older holdings.

The principle of specialization is being strictly applied both in the matter of acquisitions and in the process of eliminating irrelevant holdings. However, since the program is, so to speak, *in media res,* the main features of the policy can perhaps be best illustrated by a survey of the Library's activities of 1946.

In the matter of accessions[3] the year brought quite exceptional opportunities and gratifying results for the Library. Three collections of manuscripts and a considerable number of individual manuscripts were acquired. Two of the three collections were purchased; the third, like a number of rare fugitive items, came as a gift. First among the former is the correspondence of Franklin with Catharine Greene, described in the current LIBRARY BULLETIN by the Director of the Rhode Island Historical Society, William Greene Roelker, who, as Library Research Associate, is also preparing the letters for publication in the Society's MEMOIRS series.

Other important Frankliniana acquired during the year consist of a portion of a Letter Book of 1772, in which are found eleven letters in Franklin's hand, all written on August 22 of that year.

[3] For detailed list of selected accessions, see pp. 258-263.

Since Franklin's Letter Books were apparently lost, or carried off by the British in the trunks he left with Galloway, this would seem to be unique. Of more general interest are the Franklin-Hall Account and Letter Books kept by David Hall for the years after Franklin retired from active participation in the firm's business in 1748, but during which he continued as a silent partner till 1766 They are replete with information, not only on the conduct of the printing and publishing business, but on numerous other aspects of the cultural life of Philadelphia when it was the first city of the colonies, and in the Empire only second in size to London itself. Closely integrated with these business records is a group of letters acquired at the same time, written by Will Strahan, Franklin's close friend in London, to David Hall. They frequently interject into the otherwise formal business accounts a personal touch that is most illuminating.

A second group of papers acquired about the same time is a collection of letters to John Vaughan, Librarian of the Society from 1803 to 1841, and one of its most active members. It contains more than two hundred items, including three unpublished letters by Franklin, one from Washington, twenty-two by Jefferson, thirteen from John Jay, etc. Vaughan's life-long service to the Society gives them a peculiar association significance quite apart from their intrinsic value, and the Library is particularly beholden to Edward W. Madeira, Esq., for his keeping them together, and making them available.

The third collection was presented to the Library by the heirs of the late Franz Boas. It consists of the voluminous correspondence of Dr. Boas. Extending over more than seventy years, it has much valuable material on the beginnings and progress of the study of linguistics and anthropology in this country. Processing and cataloguing the collection is nearly completed, and the papers, arranged by topics chronologically in cartons, are now available for the biographer, and subject to controlled use by research students in the field. Incidentally, the correspondence throws much light on the manuscripts and papers by Dr. Boas and his students acquired earlier through the auspices of the American Council of Learned Societies, and considerably augmented during the year by gifts of new manuscripts.

In passing it should be noted that in thus acquiring entire collections of papers the Library becomes the beneficiary of the study and

work of the scholars and collectors who assembled and organized the scattered individual items. The Franklin-Greene Correspondence, for example, like the Franklin-Mecom letters, the Peale-Sellers Collection, and others acquired earlier, owe their existence very largely to members of the respective families concerned, who in successive generations devoted much patient labor and often rare special knowledge to locating and conserving them. If the Library were obliged to do this, both the time and the expense required, even if the opportunity still existed, would make the task almost prohibitive.

Side by side with the acquisition of collections of manuscripts, which often advances the strength of the Library enormously at a single stroke, is the acquisition of rare individual items scattered here and there, but which, both by content and association, integrate closely with one or other of the Library's collections. While they are quantitatively not so impressive, they often rate very high in quality, and because of their relation to our other holdings in the same field should be secured whenever opportunity offers. In a letter to Du Ponceau, of January 22, 1816, Jefferson, a few years after he retired from the presidency of the Society, after expressing his satisfaction at "the enlargement by the Philosophical society of the scope of their institution by the establishment of a standing committee for History, the moral sciences and general literature . . . " added:

> This Committee will become a depository for many original MS. many loose sheets, of no use by themselves and in the hands of the holder, but of great value when brought into a general depot open to the use of the future historian or literary enquirer.

This idea, so clearly stated by Jefferson, has become almost axiomatic among the criteria governing the acquisition of individual items. It is strikingly illustrated in the acquisition during the year of two rare Jefferson items, and one of like character by Franklin. The first (fig. 1) is a letter from Thomas Jefferson to Charles Willson Peale in answer to the latter's request for a passport letter for his son, Rembrandt, about to go to Paris to study his art and to paint portraits. The letter dated March 13, 1808, is in Jefferson's own hand and signed "Th. Jefferson." Its content is significant in the light it throws on Jefferson's friendship for his artist friend and his talented son, both of whom had painted his portrait. At the same time, it reveals Jefferson's delicate sense of the proprieties in the

Dear Sir Washington Mar 13 08

Yours of Feb. 21 was recieved in due time. a public vessel will be going to France & England once in every month during the embargo on board of which mr Rembrandt Peale can obtain his passage by application to the Captain as usual. very soon after I came into office I found it not even proper, but necessary that I should make it a rule never to write letters of recommendation to persons travelling beyond seas. but being desirous of doing any thing I can in favor of your son, I inclose a ~~Special~~ passport under my own hand, which being entirely distinct from the one in common form which he will get as every other one does, from the Secretary of State, will sufficiently mark to foreigners a special collecture in his favor. you wish him to draw the portraits of about a dozen of the celebrated characters of France & Rome. in the latter place I know nobody; ~~and~~ but in compliance with your request I will name those which appear to me most remarkable in France, confining myself to living characters, of whom alone he can take originals.

Lafayette & Kosciuzko, two of our revolutionary heroes

Carnot, who make the celebrated speech against the Constables for life

Dupont, well known here, & unquestionably one of the great men of France

Volney. of the same description

Say. author of the best work ever written on Political economy. great

La Grange (if living) long admitted to be the first mathematician of Europe

Cabanis, the first Physician & author of the ablest works on that subject in France

Vicq d'Azyr, (if living) very great as a medical writer

Cuvier whom you mention & whose eminence you know

Faujas de St. Fond. of first rate eminence on geological theory

Accept my affectionate salutations

Th: Jefferson

C W. Peale.

FIG. 1

Thomas Jefferson President of the United States of America to all to whom these presents shall come, greeting

The bearer hereof, Rembrandt Peale, a native citizen of these United States, proposing to travel into foreign parts for his private concerns, and especially to visit the countries of France & Italy with a view to improve himself in the art of painting, of which art he is a professor these are to certify, that the said Rembrandt Peale is an inhabitant of the city of Philadelphia in the state of Pennsylvania, that he is of a family highly respected & esteemed, and that his conduct through life has been correct honourable & orderly, supporting in all cases the character of an excellent citizen These are therefore to request of all persons whatsoever that they will permit the said Rembrandt Peale to pass, without hindrance or molestation, in pursuit of his lawful concerns & views aforesaid, he conducting himself peaceably and orderly, as we are assured he will: and that they extend to him, whensoever he shall have occasion, the protection of the laws and hospitalities of their countries, in like manner as we have done & shall continue to do to their strangers travelling or sojourning with us. Given under my hand & private seal at Washington this 13th. day of March 1808.

Th: Jefferson

Rem. Peale

FIG. 2

use of official endorsements. While Peale wanted Rembrandt to study his art in Paris he also wanted him to bring back as many portraits as possible for the Museum, an institution whose integration into the educational system of the country he continued to urge on Jefferson in and out of season.

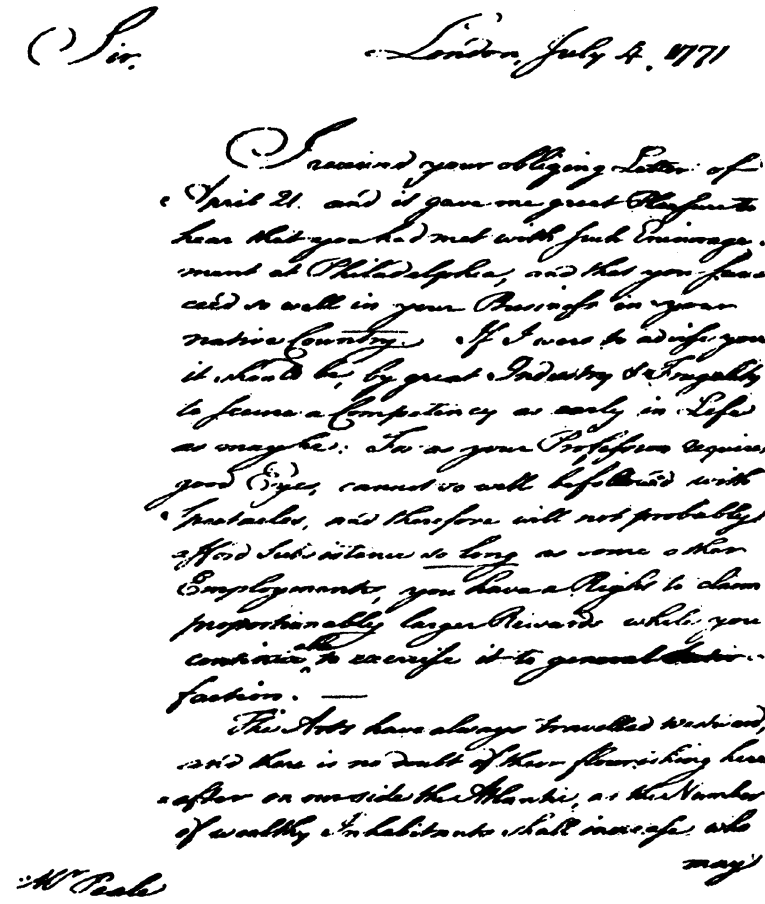
The passport (fig. 2) speaks for itself. Given by the President of the Republic, who, like Franklin, had resided in Paris in both a private and official capacity and made many friends, it is unique in form and content. Furthermore, it is the initial step in the acquisition by the Peales of portraits of distinguished Europeans, many of which are found today in Independence Hall. A careful check on these and a critical study of Peale portraits in general is being made by Charles Coleman Sellers, Library Research Associate, in preparation for a third and supplementary volume of his two-volume life of Charles Willson Peale, which will be devoted exclusively to the portraits.[4]

A third fugitive piece (fig. 3), if a rare Franklin letter can be so designated, is likewise a Peale item, for it is not only addressed to Peale, but it is one of the few instances where Franklin comments on the arts. After suggesting to the young artist that since painting portraits is very exacting on the eyes he has "a Right to claim proportionably larger Rewards," he concludes:

> The Arts have always travelled westward, and there is no doubt of their flourishing hereafter on our side the Atlantic, as the Number of wealthy Inhabitants shall increase, who may be able and willing suitably to reward them, since from several Instances it appears that our People are not deficient in Genius.

In thus rounding out its collections by the acquisition of rare originals, the Library does not lose sight of the possibilities of microfilms, photostats, and transcriptions. While these are, of course, of less interest to collectors, they are of very practical value to students and the historian. This is well illustrated in our acquisition during the year of photostats and microfilms of all known letters exchanged between Thomas Jefferson and Charles Willson Peale. Through the courtesy of the custodians of the manuscripts in the Library of Congress, the Massachusetts Historical Society, the Historical Society of Pennsylvania, Haverford College, the University of Texas, and the

[4] For an account of this interesting and important contribution to the biographical literature of Charles Willson Peale, and incidentally to the history of art and the cultural life of the period, see *supra*, p. 81.



Dear Sir. London, July 4. 1771

I received your obliging Letter of April 21. and it gave me great Pleasure to hear that you had met with such Encouragement at Philadelphia, and that you seem'd to settle in your Business in your native Country. If I were to advise you it should be, by great Industry & Frugality to become a Competency as early in Life as may be: for as your Profession requires good Eyes, cannot so well be followed with Profitable, and therefore will not probably afford Subsistance so long as some other Employments, you have a Right to claim proportionably larger Rewards while you continue able to exercise it to general Satisfaction. —

The Arts have always travelled Westward, and there is no doubt of their flourishing here after on our side the Atlantic, as the Number of wealthy Inhabitants shall increase, who may

W Peale

---

may be able and willing suitably to reward them, since from several Instances it appears that our People are not deficient in Genius.

You have my best Wishes for your Prosperity & Happiness, being with great Regard

Dear Sir

Your faithful humble Servant

B Franklin

FIG. 3

State Library of Virginia, and the assistance of The Papers of Thomas Jefferson project, a complete set of these numbering nearly two hundred items has been secured.

These and other additions to the manuscripts are paralleled by additions to the books, imprints, and pamphlets, which, like the long runs of transactions and proceedings of learned and scientific societies, integrate closely with them and with the Society's own archives. At the same time, bibliographical, biographical, and other tools for research and reference are being added as they appear or become available, in order to keep the Library abreast of the times as a research library.[5]

The Committee acknowledges the receipts of gifts from the following persons and institutions: Miss Katy J. Aiken, American Physiological Society, Miss A. Margaretta Archambault, Argentine Republic, Municipal Museum of Baltimore, Mrs. Ruth F. Benedict, Estate of A. Beekman Bergen, Ernst P. Boas, Julian P. Boyd, Carl Bridenbaugh, Edmund Bury, Lyman H. Butterfield, Carnegie Corporation of New York, Carnegie Endowment for International Peace, Carnegie Foundation for the Advancement of Teaching, Carnegie Institution of Washington, Gilbert Chinard, Combs College of Music, Edwin G. Conklin, Cooper Union for the Advancement of Science and Art, Thomas D. Cope, Edward S. Corwin, William S. Deming, Dropsie College, Luther P. Eisenhart, Engineering Foundation, España Consejo Superior de Investigaciones Científicas, Waldron Faulkner, Fondation Universitaire de Belgique, Philip S. Foner, Francis A. Foster, Ministère de l'Education de France, Free Library of Philadelphia, Carroll Frey, Bessie T. Geiser, Samuel W. Geiser, General Education Board, General Electric Company, Mrs. Arthur W. Goodspeed, Greenwich Observatory, Astronomisches Laboratorium zu Groningen, John Simon Guggenheim Memorial Foundation, H.M.S. Stationery Office, Alfred J. Hanna, Heye Foundation, Historical and Philosophical Society of Ohio, Alban W. Hoopes, Indian Rights Association, Instituto Panamericano de Bibliografia y Documentación, Italian Embassy, The Papers of Thomas Jefferson [project], John Rylands Library, Mrs. Marie G. Kimball, Alfred L. Kroeber, Lankenau Hospital, William R. LeFanu, Albert H. Lieber-

[5] Accessions for the year include 427 volumes, of which 276 are serials; 403 pamphlets; 537 individual items and 32 letter-box files of manuscripts; 314 photostats, microfilms and facsimiles; 70 photographs, engravings and prints; 217 maps; and 1 newspaper. Total holdings consist of 102,877 volumes, of which 70,815 are serials; 39,118 pamphlets; and 6,925 maps.

man, Eli Lilly & Company, William E. Lingelbach, Edward W. Madeira, Republic of Mexico, Milbank Memorial Fund, Miss Lillian Moore, Lawrence J. Morris, Einar Munksgaard, Robert Cushman Murphy, New York Zoological Society, Antonio Pace, Parke-Bernet Galleries, Peabody Museum of Salem, Pennsylvania Forestry Association, Geological Survey of Pennsylvania, Philadelphia Bibliographical Center and Union Library Catalogue, Philadelphia Museum of Art, Philadelphia Transportation Company, Princeton University, Mrs. Horace C. Richards, Museo Nacional de Rio de Janeiro, E. N. Robertson, William G. Roelker, A. S. W. Rosenbach, Philip H. Rosenbach, San Fernando Instituto y Observatoria, Department of Zoology of São Paulo, Charles Scribner's Sons, Charles Coleman Sellers, Social Science Research Council, Sociedad Geográfica de Cuba, Sociedad Mexicana de Historia Natural, Societas pro Fauna et Flora Fennica, Public Library of South Australia, Morris Swadesh, Swarthmore College, Union Pacific Railroad, U. S. National Archives, University of Cambridge, University of Montreal, University of North Carolina, University of Paris, University of Pennsylvania, University of Pittsburgh, Robert W. G. Vail, Viking Fund, Virginia State Library, Mabel C. Weaks, Westinghouse Electric Corporation, William Andrews Clark Memorial Library, Herbert E. Winlock, Woods Hole Oceanographic Institution, World Calendar Association, Esther Clark Wright, Mrs. Helene Boas Yampolsky, and Zoological Society of Philadelphia.

Perhaps the most radical change in the administration of the Library is the modification of the long established system of the exchange of the Society's publications. As the years passed a constantly increasing number of institutions were added to the list of those with whom publications were exchanged. The result, as the critical survey revealed, was that a great deal of material was coming to the Library on exchange which had little or no relation to its interests or policies. Binding, cataloguing, and otherwise processing this material is costly, and in the end crowds the shelves with irrelevant holdings. With the conviction, first, that the Library's needs can be better met by judicious purchasing than by a somewhat promiscuous exchange system, and second, that the Society's own publications can be more effectively distributed on a subscription plan, the exchange with institutions whose publications were obviously unrelated to the Library's interests has been discontinued. This does not mean the discontinuance of the system

of exchange with scientific and learned organizations of high standing, whose interests are closely allied to those of the Society. On the contrary, these are being fostered and even extended, and there will be no disruption of the long runs of transactions and proceedings of such institutions.

Following earlier studies of the holdings in zoology by Dr. J. Percy Moore and of those in the field of medicine by Dr. George W. Corner, a special study of the materials on archæology was made this year. It resulted in the listing of many items for sale or exchange and the discontinuance of a considerable number of expensive journals in the field of classical and oriental archæology.

Carrying through this basic reconstruction of the Library in accord with the approved policy of the Society for a highly specialized research library is both exacting and time consuming. Progress is necessarily slow. With a relatively small staff, and routine duties steadily increasing, the transition cannot be hurried even though it is always on the agenda. In addition to the usual library work of processing and cataloguing accessions, the day by day service to readers and researchers, a steadily growing number of inquiries by telephone or letter from libraries and institutions of the Philadelphia area, requests for information, microfilms, or photostats from individual scholars, especially recipients of grants-in-aid of research, the Library also performs the functions of a research institution in the work of the standing committees and of the Society as a whole. Not infrequently, answers to the questions and problems raised in this way involve much time and research on the part of the staff. Moreover, as the activities of the Society and of the Library increase, demands of this character naturally increase also.[6]

In the matter of making the Library and its rich resources known, a number of important steps have been taken. The LIBRARY BULLETIN started in 1943 is now a recognized publication of the Society. It carries research and appraisal articles on the collections and holdings of the Library, and, taken in connection with individual articles

[6] During the year 560 persons consulted material in the Library, and 45 institutions borrowed 188 items on the interlibrary loan. There have been catalogued 479 printed items and 1,095 manuscripts and photostats; 944 analytics, 2,017 association items, 307 autographs, 1 broadside, 6 bookplates, 86 duplicates, and 326 early imprints have been noted; 64 items have been added to the grantees file. Altogether, 9,419 cards have been added to the main catalogue and special files, of which 2,276 were L.C. and 7,143 were typed. The Photoduplication Service has filled 62 outside orders in addition to the work for the Library, all of which amounted to 7,807 frames of microfilm and 1,115 enlargement prints.

on the Library published elsewhere, is contributing much towards bringing the Library and its treasures to the attention of scholars. This has already considerably increased the number of serious research students, and the Library is doing its best to facilitate their work. It maintains a liberal policy of interlibrary loans, and a microfilm service on a cost basis, as far as possible, to meet the requests for data that come by letter from scholars about materials in the Library concerning their research projects.

Another constructive step in this direction taken by the Society is the establishment of a system of Library Research Associates. Fully described in last year's BULLETIN it is here considered only in connection with the research projects developed during the year. As a part of the Library plan to make its archives and library productive, a definite program of study, editing, and publication of its collections is being developed. Under the system, scholars engaged in studies based chiefly on these can be appointed as Research Associates, compensation varying in accordance with the nature of the study. During the year eight research and editorial projects of this character by scholars of distinction in their respective fields were in progress. The first is a critical edition of the Franklin-Jackson Correspondence acquired by the Library a year ago and now being edited by Carl Van Doren for publication early in 1947 as a volume in the Society's MEMOIRS series. The second is associated with the Society's acquisition of Benjamin Rush's Commonplace Book, by Dr. George W. Corner, which will appear as a MEMOIR under the title, "Travels through Life; the Autobiography and Commonplace Book of Benjamin Rush." The third, as stated above, represents a continuation of the studies by Charles Coleman Sellers of the life of Charles Willson Peale, based on the Peale-Sellers Collection, the second volume of which will appear in the spring, and the third, which is to be devoted entirely to the portraits, is well started. The fourth project is a study of the Franklin-Greene Correspondence by William Greene Roelker, for another volume of the MEMOIRS. The fifth is a continuation of Dr. Gilbert Chinard's work on André and François André Michaux. The sixth is a sort of by-product of Mr. L. H. Butterfield's study of the writings of Benjamin Rush in the form (1) of a volume of selected writings of Rush, and (2) a critical manuscript catalogue of the writings of Rush for the Library. The seventh is the first of four studies on Kwakiutl, one of

the basic Indian languages represented in the Boas Collection, by Dr. Zellig S. Harris and Mrs. Helene Yampolsky, daughter of Dr. Boas. The eighth, just in its beginnings, is a comparative study of the structure of American Indian languages by Dr. C. F. Voegelin. Five of these are to appear as volumes in the Society's MEMOIRS. Publication of the others has not as yet been determined, the content and form of presentation suggesting the TRANSACTIONS as a more suitable format. Meanwhile, shorter research articles in the LIBRARY BULLETIN are appearing as further evidence of the scholarly activities being carried on week by week in your Library by members and research associates quite apart from the study and research by individuals entirely independent of the work of the Society.

In conclusion, no report on the Library is complete without a reference to the urgent need of new quarters for the constantly expanding treasures it is called upon to house. Having drawn attention to this on previous occasions,[7] it is a matter of much satisfaction to report that the subject is being given careful consideration in anticipation of an ameliorization of the present stringency in housing and building conditions.

FINANCIAL STATEMENT

Administration Fund

Appropriation for 1946	$ 2,000.00
Receipts from microfilm work	404.93
	2,404.93
Expended during 1946	2,386.52[8]

Book Fund

Appropriation for 1946	7,000.00
Transferred from Miscellaneous Fund	5,000.00
	12,000.00
Expended during 1946	12,000.00

Manuscripts and Imprints Fund

Carried forward from 1945	383.06
Appropriation for 1946	9,000.00
	9,383.06
Expended during 1946	9,380.00

Special Library Funds

Balances 1/1/46	Income	Expended	Transferred to Principal	Balances 12/31/46
$29,683.59	$9,000.81	$3,866.71	$430.13	$34,387.56

[7] See *Yr. Bk. Amer. Philos. Soc.* for 1944: 55-56, 1945, and *William and Mary Quart.*, ser. 3, 3: 68-69, 1946.

[8] Includes salary of photographer.

SELECTED ACCESSIONS

FRANKLINIANA

Franklin-Greene Correspondence

Franklin, B. Letter to Katy [Ray]; Philadelphia, Sept. 11, 1755. A.L.S. 4 p.

—— to Catherine Ray; Philadelphia, Oct. 16, 1755. A.L.S. 2 p.

—— to Katy Ray [*ca.* 1755–1756]. A.L.S. last 2 p. only.

—— to Catharine Ray; Philadelphia, Aug. 26, 1756. A.L.S. 1 p. and add.

—— to [Mrs. Catharine Greene]; Philadelphia, Nov. 25, 1762. Copy of L.

—— to Mrs. [Catharine] Greene; Philadelphia, Jan. 23, 1763. A.L.S. 2 p.

—— to Katy [Greene]; Philadelphia, June 6, 1763. Copy of L.

—— to Mrs. Cath[arine] Greene; Boston, Aug. 1, 1763. A.L.S. 2 p.

—— to Mrs. Katharine Greene [Philadelphia, Nov. 10, 1763]. A.L.S. 1 p. and add.

—— to Mrs. Catharine Greene; Philadelphia, Feb. 15, 1764. A.L.S. 2 p. and add.

—— to [Mrs. Catherine Greene]; Philadelphia, June 17, 1775. Copy of L.

—— to Mrs. Cath[arine] Ray [Greene]; Paris, Feb. 28, 1778. A.L.S. 2 p. and add.

—— to W[illia]m Greene; Passy, June [4, 1779]. L.S. 2 p.

—— to Gov. [William] Green[e]; Passy, May 20, 1783. L.S. 2 p.

—— to [Mrs. Catharine Greene]; Philadelphia, March 2, 1789. Copy of L.

Franklin, Sally. Letter to Mrs. Catharine Green[e]; Philadelphia, June 14, 1764. A.L.S. 1 p. and add.

Greene, Caty. Letter to Mrs. Jane Mecom; Warwick, Feb. 20, 7,1776. Copy of L.

—— to Mrs. Jane Mecom; Warwick, March 12, [1776 ?]. Copy of L.

—— to Mrs. Jane Mecom; Warwick, June 21, 1776. Copy of L.

—— to [ ]; Warwick, Jan. 16, 1784. Copy of L.

—— to Mrs. Jane Mecom; Warwick, Feb. 12 [1784?]. Copy of L.

—— to [Jane Mecom?]; "August after the 22d forget yr" [1784?] Copy of L.

Mecom, Jane. Letter to Mrs. [Catharine] Greene; Philadelphia, Nov. 24, Dec. 2, 1775. A.L.S. 2 p. and add.

—— to W[illia]m Green[e]; Philadelphia, May 8, 1776. A.L.S. 2 p. and add.

Castillo, Laureano Donado de el. Letter to Catharine Ray; Cadiz Bay, June 7, 1751. A.L.S. 4 p. In Spanish. With this letter there is an English translation in B. Franklin's hand.

—— to Thomas Hubbart; 1751. A.L.S. 4 p. In Spanish.

Portion of a letter book kept by Benjamin Franklin. Contains autograph drafts of 11 letters written on Aug. 22, 1772 to Messrs. Towers and Leacock, the Library Company, Mr. Tyler, Sam. Rhoads, Dr. Evans, John Bartram, Dr. Smith, Messrs. Reynell, Rhoads and Pemberton, Anth. Benezet, Dr. Rush, and Rev. Mr. Coombe.

Franklin, B. Letter to Tho[ma]s Cushing; London, Sept. 3, 1774. A.L.S. 2 p. and end.

Deposited by William E. Lingelbach

—— to Dr. [Cadwalader] Evans; London, July 13, 1765. A.L.S. 1 p.

—— to [Mrs. Catharine Greene]; Boston, Sept. 5, 1763. A.L.S. 1 p.

—— to [C. W. Peale]; London, July 4, 1771. A.L.S. 2 p.

—— to [William] Strahan; Philadelphia, July 5, 1775. Facsimile of A.L.S. Philadelphia, Republished by M. Thomas, 1817.

—— to [William] Strahan; Philadelphia, July 5, 1775. Photostat of original owned by the Library of Congress.

—— to [William] Strahan; Passy, Jan. 24, 1780. 3 A.Dr's of same letter. 2 p.

—— to Dr. [William] Withering; Passy, March 1, 1784. A.L.S. 1 p. and end.

—— Passport issued to Elkanah Watson; Passy, Sept. 7, 1782. Passy imprint.

Bache, Mary. Letter to Rich[ar]d Bache; Preston, Jan. 9, 1775. A.L.S. 2 p. and add.

Bache, S[arah]. Letter to Dr. Franklin; Philadelphia, Sept. 14, 1779. A.L.S. 6 p. and add.

Braddock Expedition

Commission to [John] Read, as wagon master; Fort Cumberland, May 21, 1755. D.S. by E[dward] Braddock. 1 p. and end.

Read, John. Power of attorney to Benjamin Franklin, relative to wages due him as wagon master during the Braddock campaign; Oct. 8, 1775. 1 p.

Scott, Thomas. Certification that wages were due to John Read for services as wagon master; Oct. 1, 1755. 1 p.

Franklin, W. T. Letter to G[eorge] Fox; Passy, Jan. 15, 1781. A.L.S. 4 p.

—— to [George] Fox; Passy, Nov. 19, 1781. A.L.S. 2 p. and add.

Account and letter books kept by David Hall during the period of his partnership with Benjamin Franklin:
Letter book—June 2, 1750–March 24, 1759
Letter book—June 23, 1750–Dec. 24, 1755
Letter book—March 27, 1759–April 12, 1764
Letter book—May 3, 1764–Nov. 16, 1767
Index to volume of accounts
Account book for work done for the Province of Pennsylvania, Nov. 11, 1756–June 18, 1767.—Franklin & Hall
Book of bills of exchange, 1745–1752
Account book, 1748–1767
Along with these volumes the Library acquired a collection of 79 letters from William Strahan to David and William Hall, 1745–1775, many of which mention Dr. Franklin.

Microfilms of Franklin items and items of close association to the Society from the Jonathan Williams Collection in the possession of Indiana University.

For additional Franklin items see under the Madeira-Vaughan Collection, below.

MANUSCRIPTS OTHER THAN FRANKLINIANA

American Philosophical Society. Report of a committee appointed to examine the geology of the route of the Chesapeake & Delaware Canal [1829]. 12 p.
Presented by the Free Library of Philadelphia

Atterbury, W. W. Brigadier General Herman Haupt; 1933. 11 p.
Presented by Miss A. Margaretta Archambault

Franz, Boas Correspondence. See article by Zellig S. Harris, p. 210.
Presented by the heirs of Dr. Boas
Additions have been made also to the Franz Boas Collection of American Indian Linguistics by Ruth F. Benedict, Ernst P. Boas, A. L. Kroeber, Morris Swadesh, and Helene Boas Yampolsky.

Du Ponceau, P. S. Letters to Edmund Randolph; Oct. 10, 14, 1791. 2 A.L.S's.
Presented by Charles Coleman Sellers

Jefferson, Thomas. Letter to Mr. Clay; Pop[lar] For [est], April 28, 1819. A.N.S. 1 p.
Presented by Charles Coleman Sellers

—— Manuscript catalogue of library, 1783. Microfilm.
Presented by Mrs. Marie G. Kimball

—— Plan for an agricultural society, March 1811. A.D. 4 p.

Knox, William. Letters to Samuel Hodgdon; Philadelphia, Sept. 1, 8, 1791. 2 A.L.S's.

Madeira-Vaughan Collection. Consists of about 200 manuscripts and 80 photostats, principally letters to John Vaughan, including 3 unpublished Franklin letters, 22 letters from Jefferson, 13 from John Jay, 1 from Washington, etc.

Mason-Dixon Line. Microfilms of material pertaining to the running of the Line, from the originals in the National Archives.
Presented by Thomas D. Cope

Peale-Sellers Papers. Photostat and microfilm copies of all known Peale-Jefferson correspondence have been added to this collection, in addition to several individual manuscripts presented by Charles Coleman Sellers.

Philological Society of Philadelphia. Miscellaneous papers, 1809–1811. 35 pieces.
Presented by Miss Katy J. Aiken

Rush, Benjamin. Letter to John Warren; Philadelphia, Feb. 10, 1807. A.L.S. 2 p. and add.

Elihu Thomson Papers. Thirty-two letter box files have been added.
Presented by the General Electric Company

Selected Printed Titles

Adams, F. D. The birth and development of the geological sciences. Baltimore, William & Wilkins, 1938.

Adams, John. The selected writings of John and John Quincy Adams, ed. . . by Adrienne Koch and William Peden. New York, Knopf, 1946.

[Austen, Ralph] A treatise of fruit-trees. . . . Oxford, Printed by H. Hall for T. Robinson, 1657.

Barbour, Thomas. A naturalist's scrapbook. Cambridge, Harvard University Press, 1946.

Bathe, Greville. Citizen Genet . . . Philadelphia, Allen, Lane and Scott, 1946.
Presented by the author

Benjamin, M. A. Autographs: a key to collecting. New York, Bowker, 1946.

Boas, Franz. Race and democratic society. New York, Augustin, 1945.

Botta, Carlo. History of the war of the independence of the United States of America . . . tr . . . by G. A. Otis. 3d ed. rev. and corr. New Haven, Whiting, 1834. 2v.
Presented by E. W. Robinson

Bullock, H. C. D. My head and my heart, a little history of Thomas Jefferson and Maria Cosway. New York, Putnam's Sons, 1945.

Chittenden, R. H. The first twenty-five years of the American society of biological chemists. New Haven, The Society, 1945.

Cole, F. J. A history of comparative anatomy, from Aristotle to the eighteenth century. London, Macmillan, 1944.

Cooper, Thomas. An account of the trial of Thomas Cooper . . . on a charge of libel against the President of the United States . . . Philadelphia, Bioren, 1800.

Corwin, E. S. The president, office and powers . . . 2nd ed. New York, New York University Press, 1941.
Presented by the author

Darwin, C. R. Charles Darwin and the voyage of the Beagle, ed. . . . by Nora Barlow. London, Pilot Press, 1945.

Dorfman, Joseph. The economic mind in American civilization, 1606–1865. New York, Viking Press, 1946. 2v.

Dumbald, Edward. Thomas Jefferson, American tourist . . . Norman, University of Oklahoma Press, 1946.

Fisher, William. An interesting account of the voyage and travels of Captains Lewis and Clark, in the years 1804, 1805, and 1806 . . . Baltimore, Miltenberger, 1812.

Flanders, B. H. Early Georgia magazines, literary periodicals to 1865. Athens, University of Georgia Press, 1944.

Ford, J. E. David Rittenhouse, astronomer—patriot, 1732–1796. Philadelphia, University of Pennsylvania Press, 1946.

France. Ordonnance de Louis XIV . . . sur le fait des eaux et forests . . . new ed. [Paris, Prault] 1753.

Godman, J. D. American natural history. Pt. 1—Mastology. 2nd ed. Philadelphia, Stoddart, 1831. 3v.
Presented by Charles Coleman Sellers

Greenslet, Ferris. The Lowells and their seven worlds. Boston, Houghton Mifflin, 1946.

Hitt, Thomas. A treatise on fruit-trees. 3d ed. London, Robinson and Roberts, 1768.

Hoffman, F. J. The little magazine . . . by F. J. Hoffman, Charles Allen, C. F. Ulrich. Princeton, Princeton University Press, 1946.

Hornberger, Theodore. Scientific thought in the American colleges, 1638–1800. Austin, University of Texas Press, 1945.

Jefferson, Thomas. Correspondence of Thomas Jefferson and Francis W. Gilmer, 1814–1826; ed. . . . by R. B. Davis. Columbia, University of South Carolina Press, 1946.

Lewis, W. S. The Yale collections. New Haven, Yale University Press, 1946.

Matthews, William, comp. American diaries; an annotated bibliography of American diaries written prior to the year 1861 . . . Berkeley, University of California Press, 1945.

Mirsky, Jeannette. The westward crossings; Balboa, Mackenzie, Lewis and Clark. New York, Knopf, 1946.

Morris, R. B. Government and labor in early America. New York, Columbia University Press, 1946.
Presented by the author (grantee)

New York Historical Society. Catalogue of American portraits . . . New York, The Society, 1941.
Presented by R. W. G. Vail

Paine, Thomas. The complete writings of Thomas Paine . . . ed. by P. S. Foner. New York, Citadel Press, 1945. 2v.
Presented by the editor

Rafinesque, C. S. Analyse de la nature . . . Palerme, 1815.
Presented by the Union Library Catalogue

—— Caratteri di alcuni nuovi generi e nuove specie di animali e piante della Sicilia . . . Palermo, Sanfilippo, 1810.
Presented by the Union Library Catalogue

—— Principes fondamentaux de somiologie . . . Palerme, Abate, 1814.
Presented by the Union Library Catalogue

Rush, Benjamin. Benjamin Rush's reminiscences of Boswell & Johnson . . . [ed.] by L. H. Butterfield. [Princeton, Princeton University Press] 1946.
Presented by the editor

Schachner, Nathan. Alexander Hamilton. New York, Appleton-Century, 1946.

Stoddard, H. L. Horace Greeley . . . New York, Putnam's Sons, 1946.

Sumner, F. B. The life history of an American naturalist. Lancaster, Cattell Press, 1945.

To Doctor R.—essays . . . collected and published in honor of the seventieth birthday of Dr. A. S. W. Rosenbach . . . Philadelphia, Rosenbach Company, 1946.
Presented by Philip H. Rosenbach

University of North Carolina. Studies in science. Chapel Hill, University of North Carolina Press, 1946.
Presented by the University of North Carolina

University of North Carolina. Library. Library resources of the University of North Carolina . . . ed . . . by C. E. Rush. Chapel Hill, University of North Carolina Press, 1945.

University of Pennsylvania. Portraits in the University of Pennsylvania; ed. by Agnes Addison. Philadelphia, University of Pennsylvania Press, 1940.
Presented by William E. Lingelbach

Woodrow Wilson; some Princeton memories . . . W. S. Myers, ed. Princeton, Princeton University Press, 1946.
Presented by Luther P. Eisenhart

Wing, D. G. comp. Short-title catalogue of books printed in England, Scotland, Ireland, Wales, and British America and of English books printed in other countries, 1641–1700. New York, Index Society, 1945.

Winship, G. P. The Cambridge press, 1638–1692 . . . Philadelphia, University of Pennsylvania Press, 1945.
Presented by A. S. W. Rosenbach

Wroth, L. C. The first century of the John Carter Brown library. Providence, Associates of the John Carter Brown Library, 1946.

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VII
AWARDS OF PRIZES

MAGELLANIC FUND, established in 1786 by the gift of 200 guineas by John Hyacinth de Magellan, of London, for a gold medal to be annually awarded under prescribed terms, to the author of the best discovery or most useful invention relating to navigation, astronomy, or natural philosophy (mere natural history only excepted). Any surplus of interest remaining to be used for such purposes as may be authorized under the Society's Charter and Laws.

Awards of the Magellanic Premium

December 1790. To FRANCIS HOPKINSON, Philadelphia, Penna. For the Invention of the Spring Block. "Description of a Spring Block Designed to Assist a Vessel in Sailing" (TRANS. Amer. Philos. Soc. **3**, Art. 40, 1793).

December 1792. To ROBERT PATTERSON, Philadelphia, Penna. For the Improvement of Electrical Rods, or Lightning Conductors, by Pointing them with Black-lead. "An Improvement on Metalic Conductors or Lightning-rods in a Letter to Dr. David Rittenhouse from Robert Patterson" (TRANS. Amer. Philos. Soc. **3**, Art. 35, 1793).

December 1792. To WILLIAM THORNTON, London, England. For "Cadmus" or a Philosophical Dissertation on the Elements of Written Language. "Cadmus, or a Treatise on the Elements of Written Language, illustrating, by a Philosophical Division of Speech, the power of each Character, thereby mutually fixing the Orthography and Orthoepy. With an Essay on the Mode of Teaching the Surd, or Deaf and Consequently Dumb to Speak" (TRANS. Amer. Philos. Soc. **3**, Art. 33, 1793).

December 1794. To NICOLAS COLLIN, Philadelphia, Penna. For a Paper on an Elevator (Nititor [*sic*] in ardua virtus). "Description of a Speedy Elevator by the Inventor" (TRANS. Amer. Philos. Soc. **4**, Art. 75, 1799).

November 1804. To CAPTAIN WILLIAM MUGFORD, Salem, Mass. For the Invention of a Temporary Rudder. "An account and description of a Temporary Rudder Invented by Capt. William Mugford of Salem, Mass." (TRANS. Amer. Philos. Soc. **6**, Art. 34, 1809).

December 1804. To DR. BEN SMITH BARTON, Philadelphia, Penna. For a Paper on a "Number of the Pernicious Insects of the United States."

October 1807. To JOHN GARNETT, New Brunswick, N. J. For a Paper on "A New Simple Nautical Chart." "Description and use of a new and simple Nautical Chart, for working the different problems in Navigation" (TRANS. Amer. Philos. Soc. **6**, Art. 49, 1809).

April 1809. To JAMES HUMPHRIES, JR., Philadelphia, Penna. For a Model and Description of Steering Apparatus.

April 1820. To JOSHUA CHAPMAN, Bristol, Penna. For an Improvement in the Manufacture of Canvas.

March 1823. To DR. JAS. EWING, Philadelphia, Penna. For the invention of the "Improved Hydrant."

May 1825. To C. C. BRODIE. For an invention to repair the side of ships, under the surface of the water.

March 1836. To JAMES P. ESPY, Philadelphia, Penna. Author of the paper signed "Investigator."

December 1864. To PLINY EARLE CHASE, Philadelphia, Penna. For a paper on "The discovery of Certain new relations between the solar- and lunar- diurnal variations of magnetic force and of barometric pressure" (PROC. Amer. Philos. Soc. **9**: 487–495, 1864).

December 1887. To LEWIS M. HAUPT, Philadelphia, Penna. For a paper on "The Physical Phenomena of Harbor Entrances. Their Causes and Remedies. Defects of Present Methods of Improvement" (PROC. Amer. Philos. Soc. **25**: 19–41, 1888).

April 1922. To PAUL R. HEYL AND LYMAN J. BRIGGS, U. S. Bureau of Standards, Washington, D. C. For the invention of the Earth Inductor Compass. "The Earth Inductor Compass" (PROC. Amer. Philos. Soc. **61**: 15–32, 1922).

PHILLIPS PRIZE ESSAY FUND, established in 1888 by the gift of $5,000 by Miss Emily Phillips, of Philadelphia, in memory of her brother, Henry M. Phillips. Income to be used in the awarding of a prize for the best essay of real merit on the science and philosophy of jurisprudence.

Awards of the Henry M. Phillips Prize Essay

May 1895. To GEORGE H. SMITH, ESQ., Los Angeles, Calif. $500. "The Theory of State" (PROC. Amer. Philos. Soc. **34**: 181–334, 1895).

June 1900. To W. H. HASTINGS, ESQ., Wilber, Neb. $2,000. "The Development of Law as Illustrated by the Decisions Relating to the Police Power of the State" (PROC. Amer. Philos. Soc. **39**: 359–554, 1900).

April 1912. To CHARLES H. BURR, ESQ., Philadelphia, Penna. $2,000. "The Treaty-Making Power of the United States and the Methods of its Enforcement as Affecting the Police Powers of the States" (PROC. Amer. Philos. Soc. **51**: 271–422, 1912).

April 1921. To QUINCY WRIGHT, ESQ., Minneapolis, Minn. $2,000. "The Relative Rights, Duties and Responsibilities of the President, of the Senate and the House, and of the Judiciary in Theory and Practice" (PROC. Amer. Philos. Soc. **60**: 99–455, 1921).

October 1935. To LON L. FULLER, Dean of the Law School, Duke University, Durham, N. C. $1,500 and Diploma. "American Legal Realism" (PROC. Amer. Philos. Soc. **76**: 191–235, 1936).

April 1942. To EDWARD S. CORWIN, Princeton University, Princeton, N. J. $1,500 and Diploma. *The President: Office and Powers* (New York Univ. Press, 1940–1941), and his articles on "American Constitutional Law."

LEWIS FUND, established in 1935 by the gift of Mrs. John F. Lewis, of Philadelphia, of $10,000 in memory of her late husband; the income to be used each year as an award to the American citizen who shall announce at any general or special meeting of the Society, and publish among its papers some truth which the Council of the Society shall deem worthy of the award.

Awards of the John F. Lewis Prize

April 1937. To RALPH E. CLELAND, Goucher College, Baltimore, Md. $300 and Diploma, for presentation to the Society and publishing in its PROCEEDINGS: "Cyto-taxonomic Studies on Certain Oenotheras from California" (Read April 19, 1934,—PROC. Amer. Philos. Soc. **75**: 339–429, 1935). "A Cyto-genetic and Taxonomic Attack upon the Phylogeny and Systematics of Oenothera (Evening Primrose) with Special Reference to the Sub-genus Onagra" (Read April 18, 1935,—PROC. Amer. Philos. Soc. **77**: 477–544, 1937).

April 1938. To ARTHUR J. DEMPSTER, University of Chicago, Chicago, Ill. $300 and Diploma, for presentation to the Society and publishing in its PROCEEDINGS: "New Methods in Mass Spectroscopy" (Read in part April 20, 1935,—PROC. Amer. Philos. Soc. **75**: 755–767, 1935). "Further Experiments on the Mass Analysis of the Chemical Elements" (Read April 25, 1936,—PROC. Amer. Philos. Soc. **76**: 491–496, 1936).

April 1939. To HENRY NORRIS RUSSELL, Princeton University Observatory, Princeton, N. J. $300 and Diploma, for presentation to the Society and publishing in its PROCEEDINGS: "Stellar Energy" (Read February 17, 1939,—PROC. Amer. Philos. Soc. **81**: 295–307, 1939).

April 1940. To EARLE RADCLIFFE CALEY, Princeton University, Princeton, N. J. $300 and Diploma, for presentation to the Society and publishing in its MEMOIRS: "The Composition of Ancient Greek Bronze Coins" (Read November 27, 1937,—MEM. Amer. Philos. Soc. **11**: 1–203, 1939).

April 1941. To GEORGE HOWARD PARKER, Professor Emeritus of Zoology, Harvard University, Cambridge, Mass. $300 and Diploma, for presentation to the Society and publishing in its PROCEEDINGS: "Integumentary Color Changes of Elasmobranch Fishes especially of Mustelus" (Read November 26, 1936,—PROC. Amer. Philos. Soc. **77**: 223–247, 1937). "Melanophore Responses and Blood Supply (Vasomotor Changes)" (Read November 27, 1937,—PROC. Amer. Philos. Soc. **78**: 513–527, 1937). "On the Neurohumors of the Color Changes in Catfishes and on Fats and Oils as Protective Agents for such Substances" (Read April 18, 1940,—PROC. Amer. Philos. Soc. **83**: 379–408, 1940).

April 1943. To GEORGE GAYLORD SIMPSON, Associate Curator of Vertebrate Paleontology, American Museum of Natural History. $300 and Diploma, for presentation to the Society and publishing in its PROCEEDINGS: "The Beginnings of Vertebrate Paleontology in North America" (Read February 14, 1942,—PROC. Amer. Philos. Soc. **86**: 130–188, 1942).

April 1944. To SAMUEL NOAH KRAMER, Associate Curator in the Babylonian Section, University Museum, University of Pennsylvania. $300 and Diploma, for presentation to the Society and publishing in its PROCEEDINGS and MEMOIRS: "Sumerian Literature: a Preliminary Survey of the Oldest Literature in the World" (Read April 26, 1941,—PROC. Amer. Philos. Soc. **85**: 293–323, 1942). "Sumerian Mythology: a Study of Spiritual and Literary Achievement in the Third Millennium B.C. (MEM. Amer. Philos. Soc. **21**: 1–125, 1944).

April 1946. To ENRICO FERMI, Professor of Physics, University of Chicago. $300 and Diploma for his part in the development and application of the concept of chain reactions, and in particular, for presentation to the Society and publishing in its PROCEEDINGS: "The Development of the First Chain Reacting Pile" (Read November 17, 1945,—PROC. Amer. Philos. Soc. **90**: 1–79, 1946).

VIII

GENERAL MEETING LECTURES

THE R. A. F. PENROSE, JR., LECTURES

1934. Edwin G. Conklin, "A Generation's Progress in the Study of Evolution"
1935. W. F. G. Swann, "Is the Universe Running Down?"
1936. Dixon Ryan Fox, "The American Tradition in a New Day"
1937. Irving Langmuir, "The Surfaces of Solids and Liquids"
1938. S. A. Mitchell, "With an Astronomer on an Eclipse Expedition"
1939. Eduard Beneš,* "Politics as Art and Science"
1940. Archibald MacLeish, "Writers and Scholars"
1941. Edward C. Tolman, "Motivation, Learning, and Adjustment"
1942. James R. Angell, "The Problem of Education in a World at War"
1943. Carl L. Becker, "What is Still Living in the Political Philosophy of Thomas Jefferson?"
1944. Harold Butler, "The International Labor Organization—Lessons of Twenty-Five Years"
1946. George Wells Beadle, "The Gene"

SPECIAL LECTURES

November 1936. D'Arcy W. Thompson, "Astronomy in the Classics"
February 1937. Frederick P. Keppel, "The Responsibility of Endowments in the Promotion of Knowledge"
November 1937. William Lyon Phelps,* "Truth and Poetry"
February 1938. Dumas Malone, "The Scholar and the Public"
Donald P. Bean, "The Riddle of Research"
November 1938. Alfred J. Lotka, "Contacts of Population Study with Related Branches of Science"
February 1939. Henry Norris Russell, "Stellar Energy and the Evolution of Atoms"

* Franklin Medal presented.

November 1939. Carlton J. H. Hayes, "The Novelty of Totalitarianism in the History of Western Civilization"

February 1940. Laurence M. Gould, "Glaciers of the Antarctic"

April 1940. Dayton C. Miller, "The Pipes of Pan, Old and New"

November 1940. Edward S. Corwin,* "Some Aspects of the Presidency"

February 1941. John A. Fleming, "Geomagnetism: World-Wide and Cosmic Aspects with Especial Reference to Early Research in America"

April 1941. Hugh S. Taylor,* "Large Molecules Through Atomic Spectacles"

November 1941. Vilhjalmur Stefansson, "Military Aspects of the Arctic"

April 1942. Sylvanus Griswold Morley, "The Carnegie Institution's Work in Central America and Mexico"

November 1942. John Dickinson, "The Philosophy of Government in Our Earlier and Later History"

November 1943. James B. Conant,* "The Advancement of Learning in the United States in the Post-War World"

April 1944. René J. Dubos, "Trends in the Study and Control of Infectious Diseases"

November 1944. Gilbert Chinard, "The American Philosophical Society and the Early History of Forestry in America"

November 1945. Arthur H. Compton,* "Atomic Energy as a Human Asset"

IX

REPRESENTATION AT CELEBRATIONS OF SOCIETIES, INSTITUTIONS, ETC.

February 2. One Hundredth Anniversary of the founding of Beloit College, Beloit, Wis. Joel Stebbins.

April 5-6. Fiftieth Annual Meeting of the American Academy of Political and Social Science, Philadelphia. Thomas S. Gates.

April 12-13. Sesquicentennial Celebration of the University of North Carolina. Guy Stanton Ford.

April 23-25. Inauguration of James Lewis Morrill as President of the University of Minnesota. Harlow Shapley.

September 23. National Commission on Educational, Scientific and Cultural Cooperation Conference. Thomas S. Gates, Guy Stanton Ford.

October 3. Inauguration of Arthur Gardiner Coons as President of Occidental College, Los Angeles. Ernest M. Patterson.

October 11. Inauguration of Sarah Gibson Blanding as President of Vassar College. William B. Dinsmoor.

October 19-21. Bicentennial Celebration of West Nottingham Academy. Roy F. Nichols.

October 20. Inauguration of Martin Dewey Whitaker as President of Lehigh University. W. F. G. Swann.

October 24. Centenary Celebration of the Smithsonian Institution. Luther P. Eisenhart.

October 25. Inauguration of James Herbert Case, Jr., as President of Washington and Jefferson College. Paul D. Foote.

November 15-16. Inauguration of George Matthews Modlin as President of the University of Richmond. Douglas S. Freeman.

November 16. Inauguration of Gilbert Fowler White as President of Haverford College. Thomas S. Gates.

November 23. Inauguration of Thomas Elsa Jones as President of Earlham College. Harold C. Urey.

September 22, 1946-June 17, 1947. Princeton University Bicentennial.

October 12, 1946-June 19, 1947. City College of New York Centennial.

American Council of Learned Societies. Guy Stanton Ford, 1944-1948; William E. Lingelbach, 1942-1946; Gilbert Chinard, 1947-1950.

American Documentation Institute. St. George L. Sioussat, 1944-1947; Waldo G. Leland, 1947-1950.

National Research Council, Division of Foreign Relations. Detlev W. Bronk, 1945-1948.

American Year Book Corporation, Supervisory Board. Gilbert Chinard, 1943-.

X

BIOGRAPHICAL MEMOIRS

THOMAS BARBOUR

(1884–1946)

Thomas Barbour was born in Martha's Vineyard on August 19, 1884, eldest son of the late William and Adelaide (Sprague) Barbour of New York City.

A colleague has pointed out, in an earlier obituary, that the pattern of his later career as zoologist, traveler, sportsman, lover of the tropics, and museum director, began to appear in childhood; that he visited most of the European Natural History Museums when eight years old; that he caught his first trout when nine; that he began natural history exploration in Florida and in the Bahamas at fourteen; and even before he entered college, he had already chosen zoology as his future profession. He prepared for college at the Browning School in New York City, graduated from Harvard in 1906, and returned to Harvard for his Master's and Doctor's Degrees. Before completing his graduate studies he had already gone on collecting trips to the West Indies, Chile, Mexico, and, on his honeymoon, to India, Burma, and the East Indies. He also took many subsequent field trips to Florida, which he regarded as almost his second home, to Cuba and the other West Indian Islands, to Panama and to Central America, departing from Cambridge in most years in February, to return in May with the zoological spoils from which the Museum greatly benefited.

On receiving his Doctorate in 1910 he was appointed Associate Curator of Amphibians and Reptiles at the Museum of Comparative Zoology. In 1925 he became Curator of these collections, and in 1927 he was chosen as Director of the Museum, being fourth in line from Louis Agassiz who founded the institution. In the following year he was appointed Professor of Zoology, and in 1944 Alexander Agassiz Professor of Zoology. He was also a member of the Council of the University Library, and a Syndic of the University Press.

The son of wealthy parents, he was one of those numerous voluntary servants of Harvard who have done so much for the

University. Yearly he contributed large sums from his personal income for the support of the Museum, and he gave liberally to other institutions. He assisted in the establishment and maintenance of the Barro Colorado Island Laboratory in Gatun Lake, Panama, for which he long served as executive officer; he took an active part in the development of the Atkins Institution of the Arnold Arboretum near Cienfuegos, Cuba, of which he was Custodian and which he visited on many occasions. He served as President of the New England Museum of Natural History from 1925; was the leading spirit in the recent rejuvenation of the Peabody Museum in Salem; was a trustee of Radcliffe College and of the Carnegie Institution of Washington, was a member of the Advisory Board of the Guggenheim Institution, also a trustee of the Woods Hole Oceanographic Institution. And he was largely responsible for the manufacture of antivenin in North America for the treatment of snake bite.

In the First World War he was sent to Cuba to undertake intelligence work because of his familiarity with Latin American conditions, politics, and language.

His own particular fields of study were the reptiles and amphibians on which he was a world authority. But he also wrote on mammals and fishes and extensively on the birds of Cuba, while it was largely in recognition of his contributions to the zoogeography of the West Indies and of the lands surrounding the Caribbean that he was chosen a member of the National Academy of Sciences in 1933 and of the American Philosophical Society in 1937.

His earliest paper, an annotated list of reptiles found near a summer camp in New Hampshire, appeared in 1901; four other titles came from his pen while he was still a school boy, and he had already proven himself a promising investigator even before he had received his doctorate. His memoir on the zoogeography of the East Indies, 1912, followed two years later by a companion memoir on the zoogeography of the West Indies, at once established him as one of the foremost students of the geographic distribution of the animals of these island groups. And the problems of animal life of Florida, of the West Indies generally, and of Central America were his unceasing interest throughout his later life.

Altogether, his published papers number more than four hundred, over two hundred of them on reptiles, on amphibians or on

both, while the *Check list of North American Amphibians and Reptiles,* of which he was joint author with the late Dr. Leonard Stejneger, has seen five editions; his *Birds of Cuba* and a popular book on Amphibians and Reptiles, two each, the latter based on a series of lectures delivered in 1923 under the auspices of the Lowell Institute in Boston. He has himself said that in his earlier years writing did not come easily to him; later on, however, he had become a master of English prose, which found expression in the three volumes of reminiscences that appeared during the last three years of his life, and which give a better picture of the man himself than anything I could write here.

Among the numerous domestic and foreign societies that elected him to membership are, the Natural Academy of Sciences, the American Philosophical Society, the American Academy of Arts and Sciences, the Royal Asiatic Society, the Royal Geographic Society of London, the Linnaean Society of London, the Zoological Society of London, the Nederlandsche Dierkundige Vereen, and the Academy of Sciences of Havana. He also received honorary degrees from the University of Havana (1930), from Dartmouth College (1933), from Harvard University (1940), and from the University of Florida (1944).

This enumeration of positions held and honors received reflects his ranking in the university and scientific world, but it falls far short of picturing the impress that he left upon every undertaking with which he was associated. In his own words, he was, "by inclination an old-fashioned naturalist, many tell me perhaps the last of the breed. My colleagues prefer to know more and more about less and less, and so are infinitely more erudite than I." But if by erudition we mean breadth of knowledge as well as knowledge of details, this self-criticism had no foundation, for he had a remarkable acquaintance with animals of groups other than those on which he worked the most assiduously.

He could, at sight, recall the names of an extensive range of organisms, plant or animal, while his knowledge of their habits and especially of their geographical ranges was equally wide and precise. In part this ability reflected the unusually retentive memory with which he was endowed, but equally the interesting lines of thought aroused, for him, by every creature that came under his observation, great or small.

His interest in recent "finds" in vertebrate palaeontology is made evident to every visitor to the Museum by the beautiful mounts of fossil vertebrates exhibited there. And his frequent and extensive contributions in support of collecting trips to various productive regions reached its climax in his purchase and gift to the University of Florida of the so-called "Thomas Farm" site which is important as the only good collecting ground yet known in the Eastern United States for Tertiary mammals. He kept constantly abreast of the developments of geologic opinion, especially as regards the West Indian Island areas and Central America; he was in touch, through his connection with the Woods Hole Oceanographic Institution, with advances made in oceanic biology, and his interest in archaeology is reflected in the numerous and important collections that he brought from Central America to the Peabody Museum at Harvard.

T. B., as so many of his colleagues called him, came to the directorship of the Museum of Comparative Zoology after a period of quiescence, that for seventeen years had followed upon its brilliant achievements of the Agassiz régime. With Barbour's accustomed energy as the stimulus, within the first year the building had been modernized, and the public exhibitions largely rearranged and renovated, while the discard of many old and unattractive specimens freed space much needed for study and storage rooms, as he himself has described in vivid terms in his reminiscences. Thenceforth, and for the remainder of his life, his chief care was for the welfare of the Museum—the results evident in the vast accessions to its collections and in the additions to its staff; nor was it long, under his directorship, before the Museum had regained the high rank among scientific institutions of the world that it had formerly held and that it has since maintained.

His greatest service to the Museum, however, and through it to Harvard, was his almost phenomenal ability to sympathize with his fellow workers, to encourage them, and in every way to forward their investigations. It is not too much to say that he played a part, indirect if not direct, in every major contribution that came from the Museum during the years of his stewardship. That he was able to do so much for so many, is a tribute not only to his catholic interest in the various phases of natural science, but equally to his decidedly unusual personality, finding expression in his ability to arouse the spirit of comradeship.

An individual of striking appearance with a height of six feet, five inches, topped with curly hair, silvery grey in his later years, he commanded attention at any gathering.

His grandfather came from Northern Ireland, and like most members of his race he was blessed with an unusually keen sense of humor, combined in his case with remarkable ability as a conversationalist, and with a readiness to speak out in no uncertain terms when occasion seemed to demand. He also had in a high degree the delightful trait of hospitality, so much so that the guest book in what he liked to call the "Eateria" in his back office in the Museum where he entertained his friends, contains many hundreds of signatures of visiting zoologists from far and near, besides those of his most frequent companions. Nothing pleased him more than to serve some curious exotic dish at these little gatherings, where the talk might range from the affairs of the Museum, or from some phase of technical research in zoology, to means of support for some struggling student, to plans for some new expedition, or to the welfare of some one of his many friends scattered through the museums and universities of Europe as well as of the Americas, with whom he maintained a voluminous correspondence up to the end of his life.

If the company suited, as it often did, the talk might equally be of salmon fishing or of duck or deer shooting, for he was an eager sportsman from boyhood, a skilled woodsman, could—in his younger days—outwalk most men, had the patience in the woods of the proverbial Indian, and was blessed with keenness of vision far beyond the ordinary. Among my treasured memories are those of days afield with him in the uplands of New England and in the marshes of Virginia.

When all is said, the vertebrate species that interested him most was his fellow man; his door was always open to beginners and young students, many of whom came to the Museum to find in him a friend and a counsellor in their zoological studies. Many rising biologists in this country and abroad benefited by his encouragement and aid. Indeed, his best monument is not the Museum even, as he left it, nor his own very extensive contributions to the science in which he labored, but rather the students who by his help are able to carry on after him.

In 1906 he married Miss Rosamund Pierce of Brookline and his family life was a full and harmonious one.

During the last two years of his life, he had been in failing health following a blood clot that had developed while he was in Miami. On the night of January 4, 1946, he was stricken with a cerebral hemorrhage, and he died on January 8. His wife survives him, also three daughters and two brothers.

HENRY B. BIGELOW

HARRY BATEMAN
(1882–1946)

Harry Bateman was born in Manchester, England, on May 29, 1882, the son of Samuel and Marnie Elizabeth (Bond) Bateman. He died in Utah on January 21, 1946, *en route* to a meeting of the Institute of Aeronautical Sciences in New York where he was to receive a medal for his contributions to aeronautics. With him passes one of the most gifted spirits of the Cambridge school of analysis, a mathematician who throughout his productive life addressed himself to the applications of mathematics to the physical sciences.

The young Bateman attended the Manchester Grammar School, where he showed such promise that he was able to enter Trinity College, Cambridge, in 1900 by the scholarship route. There he received his B.A. degree in 1903, one of the last Senior Wranglers in the now extinct Mathematical Tripos. He was a Fellow of Trinity College from 1905 to 1911, and was awarded the M.A. degree in 1906. Acquaintance with the Continental schools was gained by an extended trip in 1905-1906, principally to Göttingen and Paris. After a year as Lecturer in Liverpool, Bateman became Reader in Mathematical Physics in the university in his native city, where he remained until his migration to the United States in 1910.

During this English period of a scant seven years, Bateman branched out from the more purely mathematical disciplines to applications of analysis to physics. Especially fruitful were his applications to the theory of electromagnetism, through which he became one of the pioneers in the theory of relativity enunciated by Einstein in 1905.

In 1910 Bateman was called to Bryn Mawr College as Lecturer in Mathematics; although he subsequently made many visits to the land of his birth, he henceforth was to live his scientific life in the

new country. Two years later he accepted a teaching scholarship at the Johns Hopkins University, where for a brief time he devoted himself to geometry under the inspiration of Professor Frank Morley and his school. Here he received the Ph.D. degree in 1913, on a thesis entitled "The quartic curve and its inscribed configurations." Remaining on at the Hopkins as Johnston Scholar, Bateman returned to his true *métier* of applied mathematics. In 1917 he accepted an appointment as Professor of Aeronautical Research and Mathematical Physics at the little-known Throop College in Pasadena. With this move Bateman's star took a decided upswing, for, when on the advent of Millikan and Noyes the College became the California Institute of Technology, he stayed on for the remainder of his life as Professor of Mathematics, Theoretical Physics, and Aeronautics in what was soon to become one of the leading centers of science in this country.

Although the most of Bateman's researches are devoted to applications, the mathematical thread upon which they are strung is always an integral part of the finished pattern. The heavy role played by mathematics does not make for easy comprehension by those who would take their physics straight. Many a conscientious student has reeled from Bateman's renowned lectures visibly shaken—called upon, for example, to perform an inversion in four-dimensional space in order to solve a problem in electricity! But there was meat in it for those who would persevere; the famed Dutch physicist Paul Ehrenfest once spent the better part of a month clarifying for himself—as well as for those who were called upon to assist in the operation—Bateman's theory of "light-darts." The mathematical structure of his thinking shows clearly in his published works, particularly clearly in his books *Electrical and Optical Wave Motion* (1915) and *Partial Differential Equations of Mathematical Physics* (1931). During the latter years of his life he brought together a great catalogue of mathematical functions and their properties, a tremendous undertaking which, it is hoped, will be found in a form available for publication.

Recognition of his work was not lacking, for despite his retiring disposition it sought him out. Beginning with the Smiths Prize in 1905, it included the John Winholt Prize in 1926 and the Vice-Presidency of the American Mathematical Society in 1935. He was elected to the American Philosophical Society in 1925, and made a Fellow of the Royal Society in 1928. Two years later, after adopt-

ing American citizenship, he was elected to the National Academy of Science.

In 1912 Bateman married Ethel Horner Dodd, also of Manchester. His wife outlived him by but a few months; one daughter, Joan, survives.

The life of Harry Bateman, the man, was the highest expression of true scholarship. He carried his science on a high plane with the simplicity of a great man, a plane to which he was always ready to assist the eager seeker after knowledge. Gentle in manner, he seldom fought for the material things in life; strong in spirit, he lived his high principles without flaunting them.

H. P. ROBERTSON

GEORGE DAVID BIRKHOFF
(1884–1944)

George David Birkhoff was born at Overisel, Michigan, on the twenty-first of March, 1884. His ancestry was Dutch on both sides. His father, David Birkhoff, came from Holland in 1870, and during George David's growing years was a physician in Chicago. Birkhoff studied at the Lewis Institute, Chicago, from 1896 to 1902, and at the University of Chicago for a year. After this he went to Harvard, where he received the Bachelor's degree in 1905.

Beginning in the year 1900 there appeared in the problem department of the *American Mathematical Monthly,* edited by B. F. Finkel, a series of notes, solutions, and problems by H. S. Vandiver, of Bala, Pennsylvania. In 1901 Birkhoff, who had doubtless found the *Monthly* in the old John Crerar Library, began exchanging letters about various questions in the theory of numbers with Vandiver, who was then nineteen years old. This correspondence resulted in the publication in 1904 of their joint paper in the *Annals of Mathematics* "On the integral divisors of $a^n - b^n$." So far as I know this was Birkhoff's only publication in the theory of numbers, but Vandiver has told me that Birkhoff was in possession in those days of at least one number-theoretical theorem which is now counted among the notable contributions of a distinguished mathematician in another part of the world. In later life Birkhoff often showed an interest in number theory, but seems never to have taken the deep plunge which would have been necessary in order to bring up new results of the sort that would have

satisfied him. It was not until his Princeton period that he met Vandiver personally.

During his undergraduate years he also made a definite beginning in analysis, as is proved by the fact that he read a paper entitled "A general remainder theorem" before the American Mathematical Society in New York in February 1904 (*Amer. Math. Soc. Bulletin* **10**: 280). This was the basis of a paper entitled "General mean value and remainder theorems with applications to mechanical differentiation and quadrature," published in the *Transactions of the American Mathematical Society,* volume 7 (1906).

Birkhoff returned to the University of Chicago in the fall of 1905 and received his Ph.D. *summa cum laude* in 1907 at the age of twenty-three. This is not an unusual age for a European doctorate but, unfortunately for the New World, it is an exceptionally early one in the United States. Birkhoff's student period had been divided between the only two great mathematical centers which existed in America at that time. From Osgood and Bôcher he obtained a thorough introduction to the classical methods of analysis, and from E. H. Moore who was then at the outset of his adventure in "General Analysis," a grasp of the abstract modernistic ideas which have characterized so much of mathematics during the last four decades. Birkhoff reacted rather strongly against the latter and in favor of the former. His view was that while one should understand the analogies between the linear problems of analysis and those of classical geometry and algebra, his attention should be concentrated on strategically important specific problems of the classical type.

His doctoral dissertation on asymptotic problems of ordinary linear differential equations does in fact continue the tradition to which Bôcher belonged. But it also uses the powerful methods of the Fredholm theory of integral equations and the broad general ideas which E. H. Moore was trying to exploit. It initiated a series of studies by which he left his mark on most of the principal branches of the theory of linear differential equations: regular and irregular singular points, expansion and boundary value problems, separation theorems, and his generalization of the Riemann problem. With these researches it seems reasonable to group his work on matrices of analytic functions and his remarkable contributions to the theory of linear difference equations, as constituting one of the three principal periods of Birkhoff's scientific activity.

In time, this period overlaps his whole career, but his most intense effort in these fields belongs to his earlier years.

After receiving his doctorate in 1907, Birkhoff spent two years in Madison as an instructor in the University of Wisconsin. Here he learned more analysis from E. B. Van Vleck, and in particular had his attention directed toward linear difference equations. This period also includes his marriage in 1908 to Miss Margaret Elizabeth Grafius, a union of mutual devotion and helpfulness which lasted throughout the rest of his life. There were three children, Barbara (Mrs. Robert Treat Paine, Jr.), Garrett, and Rodney. Garrett has already gained distinction as a mathematician of quite different tendencies from those of his father.

In 1909 he came to Princeton University as a preceptor and was promoted to a professorship on the occasion of a call to Harvard in 1911. At Princeton during this period a third significant current of American mathematical thought, a geometrical one, was gathering force. Birkhoff shared in the exploratory studies then being made of analysis situs, as it was called before being formalized into "topology," and saw their close relation to the class of dynamical problems which were at this time taking definite form in his mind. Incidentally, he had more than one try at the four-color map problem, to solve which remained throughout life one of his dearest aspirations.

In 1912 Birkhoff reconsidered the question of returning to Harvard, and accepted an assistant professorship in that university, in which rank he remained for another seven years. He thus returned to the most stable academic environment then available in this country, and settled into a long period of creative work undisturbed by the necessity, common in American universities of this epoch, to build an environment in which scientific work can bear fruit. The final transition to Harvard was recognized by Birkhoff himself and his most intimate friends as marking the end of the formative period of his career. I remember in particular a delightful letter which he received from E. H. Moore, ending with the words written out in bold characters, AVE ATQUE VALE.

As remarked by Marston Morse, however, "Poincaré was Birkhoff's true teacher." I remember well how frequently, in the walks which we used to take together during his sojourn in Princeton, Birkhoff used to refer to his reading in Poincaré's *Les Méth-*

odes Nouvelles de la Mécanique Céleste, and I know that he was intensively studying all of Poincaré's work on dynamics. In a very literal sense Birkhoff took up the leadership in this field at the point where Poincaré laid it down.

Poincaré died in 1912 and his last paper reached Princeton in the summer of that year. In it Poincaré showed that the existence of periodic solutions of the restricted problem of three bodies can be deduced from a very simple-sounding geometric theorem. But he had not been able to prove the theorem except in special cases, and he felt that at his age (he was only fifty-eight when he died) he could not be sure of being able to return to it again, as he should have liked to do, after letting his ideas lie fallow for a while. Before the year was over Birkhoff had given a simple but profound proof of "Poincaré's Geometric Theorem." The publication of this proof in the *Transactions of the American Mathematical Society* for January 1913 brought immediate and world-wide fame to its author, an acclaim which, for once, was justified by subsequent events.

His researches in dynamics constitute the middle period of Birkhoff's scientific career, that of maturity and greatest power. Their chief characteristics can be seen already in his first publication, "Quelques théorèmes sur le mouvement des systèmes dynamiques," which appeared in the *Bulletin de la Société Mathématique de France* in 1912. In this paper after a careful examination of the properties of stable motion, Birkhoff introduced his concept of "recurrent motion" which has played a role alongside the classical concept of periodic motion in all further discussions of the descriptive properties of dynamical trajectories. It is, for example, the starting point of the "symbolic dynamics" of Morse and Hedlund. While Poincaré had made good use of topology in the theory of dynamical systems, it was Birkhoff's merit to have powerfully supplemented this by the use of the Lebesgue measure theory. In the unfolding of the geometric picture of the general case in dynamics, one of the significant stages was the introduction of the concept of "metric transitivity" which appeared for the first time in his joint paper with Paul Smith on "Structure analysis of surface transformations" in *Liouville's Journal* (1928) where it was applied to two-dimensional problems of a class more general than those of dynamics. This line of thought reached its climax in the winter of 1931-1932 when under the stimulus of closely related

discoveries by Koopman and von Neumann he succeeded in proving his justly famous "ergodic theorem." Birkhoff's ergodic theorem, though it does not completely solve the basic problem of statistical mechanics at which it is aimed, has reduced that problem to a definite question about metric transitivity, and is also a milestone in the progress of measure theory. Birkhoff's proof, which, characteristically, used the rough and ready tools picked up along the path which led him to it, has been replaced by simpler and more sophisticated methods, and there has grown up a rather extensive literature of "ergodic theory."

Most of Birkhoff's publications in dynamics are devoted to dynamical systems of two or three degrees of freedom. Here he employed Poincaré's concept of a "surface of section" and the transformations in it determined by a family of dynamical trajectories. Poincaré's geometric theorem is a case in point. He also carried the use of the representation of trajectories by means of geodesics on surfaces considerably beyond the stage reached by Poincaré and Hadamard. His "minimax principle" was the starting point of Morse's "Analysis in the Large" which has done so much to make topology effective in analysis.

Although Birkhoff's most notable successes were in the geometrical aspects of dynamics, he did not neglect, nor was he deficient in power over the analytic formalism. He achieved as good a view of the whole field of theoretical dynamics as did anyone in his time. For more authoritative accounts and evaluations of Birkhoff's work both in this field and in what I have called his first period, I should like to refer the reader to the notices by E. T. Whittaker in the *Journal of the London Mathematical Society,* volume 20 (1945), and by Marston Morse in the *Bulletin of the American Mathematical Society,* volume 52 (1946). In addition, there are many interesting comments on his own work and revelations of his point of view toward that of his contemporaries, in Birkhoff's address on "Fifty years of American mathematics" which was published in 1938 in a volume celebrating the semicentennial of the American Mathematical Society.

The third phase of Birkhoff's scientific career was that in which he sought to extend mathematical methods into other fields of thought,—physics, aesthetics, and even ethics. He was already speculating on the possibility of a mathematical theory of music, and indeed of art in general, while he was in Princeton. But he

did not give these ideas to the world until 1928 when he delivered one of the principal addresses of an international mathematical congress under the title, "Quelques eléments mathématiques de l'art," in the Salone dei Cinquecento of the Palazzo Vecchio at Florence. Later on, after much reflection and a trip around the world, he published his book *Aesthetic Measure,* in 1933. In 1942, "A mathematical approach to ethics" appeared in the *Rice Institute Pamphlets* (vol. 28). These studies, though Birkhoff took them quite seriously, seem to me to be definitely less likely than his purely mathematical work to survive.

Something similar, I think, must be said about his efforts in physics. Like Goethe and Hilbert, he always remained an outsider. It may have been that the very strength of his faith in mathematical insight prevented him from properly appreciating the insight of the physicists. His active interest in physics seems to have begun with a course in relativity which he gave in the winter of 1921-1922, and it continued increasingly up to the time of his death when he was engaged in exploiting a gravitational theory of his own. As his contribution to physics there remain some unquestionable improvements in mathematical technique, some criticisms of present tendencies, and a physical theory which can survive only if it passes the tests both of experiment and assimilability into the growing body of science.

Among the unconscious revelations of the address on "Fifty years of American mathematics," one of the most vivid is that of the depth and sincerity of Birkhoff's devotion to the cause of mathematics, and particularly of "American mathematics." This, along with his devotion to Harvard, was always a primary motive. It may be added that a sort of religious devotion to American mathematics as a "cause" was characteristic of a good many of his predecessors and contemporaries. It undoubtedly helped the growth of the science during this period. By now, mathematics is perhaps strong enough in the United States to be less nationalistic. The American mathematical community has at least been healthy enough to absorb a pretty substantial number of European mathematicians without serious indigestion.

Birkhoff was always on the lookout for talent among the young mathematical aspirants who came to Harvard. I recently looked over some of his letters and found them full of comments on the young men for whom he had hopes. Some of the names I had

forgotten, but many of the comments are still enjoyable. His capacity for intelligent study of the qualifications and needs of younger mathematicians was used for the benefit of science on a much wider stage during the years (1925 to 1937) that Birkhoff, Bliss, and I were the mathematical members of the National Research Fellowship Board. I am sure that Bliss will agree with me about Birkhoff's remarkable capacity for picking "the good ones" and guessing what they needed. While Birkhoff was subject to as many prejudices as most of us, he kept always what most of us lose as we grow older, the power to see people and events simply and naively rather than with reference to current opinion.

Birkhoff unhesitatingly accepted the public responsibilities that came his way. He served as Dean of the Faculty of Arts and Sciences at Harvard from 1937 to 1939. He carried his share of military research work during both World Wars. He traveled extensively and accepted a large number of invitations to lecture, both those of an honorific sort and those that simply afforded an opportunity to extend mathematical culture into new areas. He did much of the unrewarded administrative work of the American Mathematical Society. For example, he served on the committee which, after a lively debate, decided to undertake the publication of *Mathematical Reviews*. After the main issues had been decided against his judgment, he cooperated loyally and actively in the working out of details.

It is pleasant to record that Birkhoff received nearly all the distinctions, such as honorary degrees and elections to societies and academies, that can come to a mathematician, and received many of them at an unusually early age. He became a member of the American Philosophical Society in 1921 and was a frequent attendant at its meetings.

During the last few years of his life Birkhoff knew that his heart was no longer as strong as it had been, but he never slackened up his scientific and other work. He died in his sleep on November 12, 1944.

OSWALD VEBLEN

CHARLES FREDERICK TUCKER BROOKE
(1883–1946)

It was evident from the beginning of Tucker Brooke's career at Oxford—he was the first Rhodes Scholar from West Virginia that he was to be a genuine scholar. In his early twenties, and

before he had completed his professional training, the editorship of the important *Shakespeare Apocrypha* was entrusted to him. It consists of some fourteen Elizabethan plays, which at one time or another in the seventeenth century were attributed to William Shakespeare. In value they range all the way from the charm of *The Two Noble Kinsmen* (in which it is easy to feel that Fletcher may have had the assistance of Shakespeare) to the worthlessness of the anonymous *Fair Em.*

All true scholarship involves an originality of approach, and in his early as in his later work Brooke revealed a pronounced angle of incidence. His fruitful originality may be traced in his history of the Tudor drama and in his study of Marlowe, but becomes conspicuous in his *Shakespeare of Stratford* (1926) and in his rearrangement of the Sonnets (1936). In the former he defends—or shall we say, demonstrates—the proposition that Shakespeare was not in any full sense the exponent of his age, but "distinctly a traditionalist in politics and social theory." The poet's attitude was not Tudor, but Plantagenet, not renaissance but feudal.

In his edition of the sonnets, he boldly abandoned the view that the poems were mere conventional utterance, in which the author assumed the traditional pose of the distressed suitor, in order more ardently to express the passion and the fever of love. He contended, in contrast, that in the sonnets could be read the secrets of Shakespeare's life—that with this key Shakespeare unlocked his heart.

But Brooke was more than an Elizabethan, confining his activity to a limited field. He interested himself in the long stream of English literature as well as in related arts and neighboring fields. Latin, Italian, and Scottish literatures were his delight, and he was at ease in discussing Theocritus, Ariosto, or Hawes. Learning was to him an agreeable comrade. No one could take him for anything but a scholar, but the austerity of scholarship never oppressed anyone who came into his presence, since for himself he had doubtless long since forgotten that there is anything austere about the author's toil.

In the classroom his students did not always know what to make of the loose-jointed man who swayed and rocked before them as he talked, but they speedily found that they required a very eager attention to follow the darting swiftness of his mind. His lectures were never set pieces of erudition; they were a glad invitation to

come for an hour into a very pleasant retreat. When his matter was lofty, he sometimes seemed to draw away from the plane of the classroom, as if he had passed into a region of more burnished sunlight, to ride in triumph through Persepolis. Occasionally in the midst of his remarks, his face would shine with a surprised delight, and presently his body would be shaking with noiseless mirth, aroused, as it were, by some inner fancy that seemed to have run beyond the thoughts that he was conveying to his hearers.

Captured thought, one would say, did not delight him so much as quarry that was still to be brought to bag. Among his friends he had his best moments, when he would give his thoughts free rein. Perhaps some entirely listless conversation might suddenly spur his mind to the gallop, on the trace of some monstrously logical bit of nonsense, which he could chase in and out among the sluggish thoughts of his companions, until they too broke down and joined in the laugh. Or again he would bring forth some shining gem of common sense such as only a mind so thoroughly schooled could fetch up out of the clutter of desultory talk.

Tucker Brooke could make himself at home in any company, but his rightful place was among scholars. Not that he had about him the faintest trace of the schoolman's stuffiness. Academic garb no man ever wore more clumsily. The trappings of learning slipped from his shoulders, tripped up his feet, and fell out of alignment at neck-band, waist, and elbow. No academic tailor ever got his measure. What he wore gracefully among his peers was the magic garment of true learning.[1]

CHAUNCEY BREWSTER TINKER
ROBERT DUDLEY FRENCH

ULRIC DAHLGREN
(1870–1946)

Ulric Dahlgren, Professor Emeritus of Biology in Princeton University, died on May 30, 1946. In his death the American Philosophical Society has suffered the loss of an able and stimulating scientist.

Of distinguished Swedish ancestry, Professor Dahlgren was born in Brooklyn, New York, December 27, 1870. His great grand-

[1] Elected to membership in the American Philosophical Society in 1938, he was a member of its Council and of several committees.

father, after whom he was named, was a graduate of the University of Upsala, receiving a diploma signed by Linnaeus. His grandfather was Admiral John A. Dahlgren, eminent in United States naval history. Professor Dahlgren graduated from Princeton University in the Class of 1894 and for the next two years carried on graduate work there, receiving the degree of Master of Science in 1896. Immediately thereafter he was appointed Instructor in Biology and from then on, for an uninterrupted period of forty-three years, he was an active member of the staff of the Department of Biology at Princeton. Reaching the retirement age, he became Professor Emeritus in 1939.

Colleagues and students alike recognized Professor Dahlgren as a "born biologist." From his youth he was filled with a zeal for the study of living things. The striking and the unusual phenomena in nature always fascinated him and he vigorously carried on pioneer investigations on such subjects as the histology of light-producing organs and of those which produce electricity. Between 1906 and 1928 he published numerous papers on these subjects. In 1917 he was awarded the Potts' gold medal by the Franklin Institute for his work on bioluminescence.

In his research, however, Professor Dahlgren never confined himself to a narrow field. His interests often carried him into far-flung fields of microscopic anatomy and natural history, both of the vertebrates and invertebrates. One of his first published papers dealt with the giant ganglion cells in the spinal cord of fishes and another early interest was the breathing valves of teleosts. In his later years his attention turned more and more to problems in invertebrate zoology and among his last papers was one in which he reported a genus of fresh-water bryozoon new to North America. One of his best known publications is the book on *Principles of Animal Histology,* which he wrote with the collaboration of one of his early students, Professor W. A. Kepner. This book, a highly original volume, has long occupied a unique position in the field of comparative histology.

For many years Professor Dahlgren's summers were spent at marine stations in various parts of the world. He worked at Naples and the Dry Tortugas as well as at Woods Hole and Mount Desert Island. As a young man, he was for a time Assistant Director of the Marine Biological Laboratory at Woods Hole. Later he became one of the organizers of the Mount Desert Island Bio-

logical Laboratory at Salisbury Cove, Maine, and served as its first Director. For many years he was a Trustee of this Laboratory and from 1937 to the time of his death he was President of the Corporation. After his retirement as an active member of the Princeton Faculty much of his time and energies was devoted to the work of the Mount Desert station.

Professor Dahlgren became a member of the American Philosophical Society in 1919 and took an active interest in its meetings. He was a member of several other scientific societies, including the American Association for the Advancement of Science, the American Society of Naturalists, the American Society of Zoologists, the Academy of Natural Sciences of Philadelphia, and the Society of Sigma Xi.

Professor Dahlgren's scientific abilities and his personal characteristics combined to make him a gifted teacher. Hundreds of Princeton students recall the stimulating manner in which he taught histology and invertebrate zoology. For years he annually had working with him during the summer two or three young men and under his direction they received a grounding in and a love for marine biology. His laboratory door was always open to students and his breadth of knowledge and infectious enthusiasm for nature stimulated many students in their beginning biological work.

All who knew Professor Dahlgren were charmed by his ever gracious and friendly manner. He was a pleasant companion in the laboratory, on a scientific expedition or a simple fishing trip. He was equally at home in the company of Maine coast fishermen, at a scientific session, or a social gathering. Biological science has lost a distinguished and productive worker and his many friends a stimulating and delightful associate.

E. G. Butler

SIMON FLEXNER
(1863–1946)

Simon Flexner was born in Louisville, Kentucky, on March 25, 1863, and died in New York City on May 2, 1946. Within the eighty-three years spanned by his life, modern scientific medicine developed phenomenally abroad and in this country. He came into the field as a graduate in medicine at about the time when the new era of the discoveries of Pasteur, Koch, and a host of brilliant

investigators in Europe had reached a peak, carrying bacteriology, immunology, and pathology to heights from which the topography of the biology of disease could be seen. Within the half century of his own work in experimental medicine the extraordinary growth of medical science in the United States took place, constituting a revolution in thought and action in America, the "heroic age of American medicine," as Dr. Flexner described it in his biography of Dr. William H. Welch. An able investigator, constant in his faith that advance in biological knowledge would increase freedom from disease, a wise director and adviser, Dr. Flexner was one of the great figures of those times. Through the part he played in some of the largest undertakings of the period, he was one of the makers of the history of this new era.

Simon Flexner, the fourth son of Morris Flexner, a merchant, and Esther Abraham Flexner, was one of a large family of seven brothers and two sisters. The troubles of the Civil War followed by the depression of the early seventies made it necessary for the boys to earn money to help meet the family expenses. While still in public school Simon Flexner went to work as an errand boy in a drugstore. It is reported that in the drugstore he found a microscope which started his interest in the laboratory aspects of medicine. To improve himself he graduated from a school of pharmacy. Later, while still serving as a clerk for a druggist, who was wise enough to let him take time off to attend lectures, he studied medicine at the Medical Department of the University of Lousiville, and graduated there with the degree of M.D. in 1889, at the age of twenty-six. Of his medical training Dr. Flexner wrote: "A druggist in Louisville, I had studied medicine at an old fashioned school, the University of Louisville. I had not attempted to practise, but had used Delafield and Prudden's book, as well as some other simple texts, to teach myself a little pathology. My preparation was thus most rudimentary."

However rudimentary his formal preparation may have been, he had a feeling for pathology and a straightforward interest in that field. His first papers, published in the Louisville medical journal *The American Practitioner and News* in the first year after his graduation, were on clinical chemistry, laboratory diagnosis, and anatomical pathology. They show that by 1890 he was familiar with the *Bulletin of the Johns Hopkins Hospital* and was well aware of discoveries made abroad, as he writes about the tubercle

bacillus, the bacillus of typhoid, the gonococcus, and Laveran's protozoan (the malarial parasite), and other pathogenic microorganisms. At this time the *American Practitioner and News* like the *New Orleans Medical and Surgical Journal* was full of abstracts of foreign articles and in almost every issue published a "London letter" or a "Paris letter." Indeed, these Southern medical journals carried so much medical and scientific news that any discerning and intelligent reader of the time would become well informed and would find plenty of ideas and connections for his work. It is no belittlement of the great and effective advances that stemmed from Baltimore and the Northeastern seaboard region to point out the simultaneous inflow of new knowledge into the South from foreign sources. No doubt this medical intelligence influenced and served Dr. Flexner well. He appears to have entered into correspondence with Dr. Welch first through seeking opinions on "anomalous tumors." Dr. Flexner's selection of pathology as his main interest and his letters to Dr. Welch in 1889 and 1890 were momentous for the lives of both men and for medical science. In the fall of 1890 he went to Baltimore eager to work in Welch's laboratory. At this time he had no great plans for the future, intending on his return home to eke out a living from pathology and bacteriology. Within a few months Dr. Welch had recognized Dr. Flexner's gift for investigation, and through an influence more subtle than is indicated by such words as "inspiration and guidance," set him on the course of his career. Thus began a life-long friendship which was of the greatest consequence to their separate and joint attainments, as it was also to the advancement of science.

The next nine years were a happy and productive period for Dr. Flexner in teaching and research at the Pathological Laboratory at Johns Hopkins. In a somewhat paradoxical manner he throve *systematically* in the *laissez-faire* life of the place, investigating typhoid fever, pancreatitis, tuberculosis, and other infections, learning as he went and contributing to basic knowledge by his own experiments. In 1895 he was made Assistant Professor of Pathology and in 1899 he was promoted to Professor of Pathologic Anatomy at the Johns Hopkins University Medical School.

When the United States Army board for the investigation of tropical diseases in the Philippine Islands was formed in 1899, under the presidency of Dr. Richard Pearson Strong, Dr. Flexner

was selected to assist with the pathological and bacteriological work. Entering upon this expedition with enthusiasm he utilized every opportunity for investigation of diseases in different strange places. He studied plague in Hong Kong and in the Philippines discovered the important type of dysentery bacillus which became famous as the Flexner bacillus.

In 1899 Dr. Flexner was appointed Professor of Pathology at the University of Pennsylvania and he took up that position on his return from the Philippines in 1900. At the same time he was appointed Director of the Ayer Clinical Laboratory and Pathologist of the University Hospital. He entered upon teaching and research with enthusiasm and soon had around him a group of promising students and associates among whom was Dr. Hideyo Noguchi. Many problems of infectious diseases were attacked and an important line of investigation was opened by his work on toxalbumins, the biochemical constitution of snake venoms and the preparation and study of anti-venins. In 1901 he was elected to membership in the American Philosophical Society. During the two years from 1900 to 1902 he demonstrated his capacity to organize and conduct an important laboratory and strengthened his position as an original investigator, now internationally recognized. During the same time events were impending which contained his destiny as a leader in great new developments in experimental medicine in America.

The beginning of these events was probably the conversations which the Reverend Frederick T. Gates, about 1897, had with Mr. John D. Rockefeller about his conviction that medicine could hardly hope to become a science until it should be endowed and until qualified men could devote themselves to uninterrupted study and investigation, entirely independent of practice, and that the best way to do this was to establish an institute for medical research in the United States. The Rockefeller Institute for Medical Research, founded in 1901 by Mr. John D. Rockefeller and supported thereafter by large gifts from himself and Mr. John D. Rockefeller, Jr., was the final embodiment of these discussions.

The beginnings were cautious and slow. The first funds were expended in grants-in-aid. Soon it was realized that a central laboratory would be needed and that a director would be required. The first selection for this post was Dr. Theobald Smith, who as Dr. Flexner has written "had from the first been regarded as the

natural choice for the director of the laboratory . . . since he had been proved America's leading investigator by his brilliant investigations of Texas fever of cattle, which demonstrated conclusively the principle of insect transmission of disease, thus opening a new chapter in the study of parasitology." Dr. Smith declined the directorship because he felt it would be better to have as director a man thoroughly identified with advances in human pathology. Dr. Simon Flexner then became the unanimous choice of the board of advisers, composed of Drs. Welch, Smith, Herter, and Prudden, and he was invited to accept this appointment in the spring of 1902. Dr. Flexner accepted in June 1902 after thorough study of the situation and examination of his own prospects.

In accepting the directorship of the institute laboratory, Dr. Flexner had to consider giving up an assured academic position for one of indefinite tenure, and exchanging an established department for an adventure into experimental medicine in a new laboratory which would depend for its future entirely upon its output. He was happy at the University of Pennsylvania. He had many misgivings about the proposed change. Modestly he was doubtful about his competence to conduct a purely research laboratory. What would happen if the prop of teaching was wholly removed? What about tenure and what would happen at the end of the ten years for which support of the new laboratory had been pledged? He was shy about the great commercial city of New York which was said to be cold to scientific medicine. The prospect seemed to be full of terrors. In accepting the directorship of the Rockefeller Institute of Medical Research in 1902, Dr. Flexner showed characteristically great courage. He had vision and audacity. While realizing that the future of the institute would depend upon initial success, he laid broad plans for fundamental research. Convinced that the future of scientific medicine lay in basic research and trusting in the means to conduct studies and to assemble the best men to make them, he committed his life to this adventure. For the rest of his years the Rockefeller Institute became largely his life.

This is not the place to review the scientific contributions of the distinguished members of the Institute or its organization and physical growth. It is to be said, however, that the staff, their ways of work, both independent and directed, the organization and the great buildings were all reflections of Dr. Flexner's ideals, phil-

osophy, methods, and innate directive power. Departing from the structure of the existing prototypes, the Pasteur and Koch Institutes, he evolved an organization best suited to his ideas. This organization resembled that of a university, with the prime emphasis on research, but providing also for education and training. His vision of the unity of pathology gradually took final form. The first small laboratory in a rented building at 127 East 50th Street in New York, opened in 1904, became in 1906 the great Central Laboratory located on the tract of land overlooking the East River at 66th Street. The Hospital of the Rockefeller Institute for Medical Research, adjacent to the Central Laboratory, was opened in 1910. In 1914 the Department of Animal Pathology was created at Princeton, New Jersey, and in 1931 the Laboratory of Plant Pathology was added at Princeton. Thus was provision made in one organization for the study of disease as it occurs in all the main orders of living things. In 1933, perhaps thinking of this organization, Dr. Flexner said: "There are no closed compartments in nature into which man, animals and plants can be separately placed. All are related organically and, as we may say, united physiologically and pathologically. No essential biological division exists between men and the lower animals and plants, whether in respect to health or to disease."

In 1904, when the Rockefeller Institute for Medical Research was barely under way a severe epidemic of cerebrospinal meningitis struck New York City and the adjacent country. Dr. Flexner immediately devoted himself and the resources of the Institute to an attack on the problems of meningococcal infection. A long series of valuable studies followed, the most notable being his production of a serum for use in the treatment of the disease. The use of this serum reduced the case fatality rate by half and until the advent of the sulfanilamide drugs was the most hopeful treatment.

The epidemic of poliomyelitis which struck the eastern states in 1908 aroused Dr. Flexner's keenest interest. At a time when relatively little was known about viruses he made this infection a major field for study. In 1909, through independent research, and at about the same time as Landsteiner's discovery abroad, he and Lewis succeeded in transmitting the disease to monkeys and showed that the infection could be produced not only by intraperitoneal inoculation, but also by subcutaneous, intravenous, and in-

traneural inoculation, and he proved that the virus occurred in the nasopharyngeal mucus and that monkeys could be infected by the intranasal application of virus containing material. This pointed to the respiratory transmission of the disease and, until others showed that the virus occurs in feces and sewage, it stood as the only approximately proved mode of transmission. The facts he discovered have been basic contributions. The problems of poliomyelitis held his interest for the rest of his life.

The final major problem that Dr. Flexner took up was the intricate one of experimental epidemiology, which he approached through the methods of observation of "mouse-villages," the effects of herd immunity and the rise and fall of outbreaks of infection following the introduction of susceptibles or newly infected individuals into the animal populations.

From the first, education and dissemination of knowledge was one of the aims of the Rockefeller Institute for Medical Research. It was natural, therefore, that Dr. Flexner took satisfaction in the transfer of the *Journal of Experimental Medicine* from Johns Hopkins, where it had been started by Dr. Welch and others, after discussions lasting over two years from 1893 to 1895, to the Rockefeller Institute for Medical Research in October 1904. Dr. Flexner undertook the editorship and served as editor until he died in 1946. The qualities of his editorship, as summarized in the July 1946 issue of the journal, are so much the character of the man that the passage is quoted.

> Dr. Flexner respected the individuality of authors. . . . He was no believer in the editorial reconditioning of papers nor did he become intolerant of certain words met too often, as is the unhappy way of editors. His own style was pellucid, and simplicity and clarity meant so much to him that stylistic adventurings made him uneasy, though he countenanced them for the greater good. Indeed he was liberal to everything except repetitive work and trivial discovery.

Devoted with unvarying singleness of purpose to the Rockefeller Institute for Medical Research, Dr. Flexner restricted his activities in outside affairs as much as possible. There were however, notable exceptions. He visited Europe on numerous occasions. A notable trip abroad was in 1911 when he, the first American so honored, received the Cameron Prize and delivered distinguished lectures. In the First World War he was commissioned in the Medical Corps and went abroad to improve the laboratory service

of the Army. Through years he served on the Advisory Board of the American Red Cross. Year after year at legislative hearings he successfully defended medical progress against the anti-vivisectionists. For years he was a member of the Public Health Council of New York State and became its chairman.

Two of his greatest contributions made outside of the Institute were connected with the Rockefeller Foundation. In 1913 he became one of the charter members of the Rockefeller Foundation and through the years that followed he exerted an extraordinary influence in the group of strong and positive men who constituted its board. The establishment of the National Research Council fellowships in physics and chemistry and in the biological sciences was based upon plans which he initiated and developed. In 1915 he was one of the members of the China Medical Board Commission which was sent to China to survey medical conditions and to develop plans for the promotion of Western medicine in China. The establishment of the Peking Union Medical College was largely a result of his creative mind.

In 1935, at the age of seventy-two, Dr. Flexner retired as Director of the Rockefeller Institute for Medical Research. Dr. Herbert S. Gasser, his successor, has described the becoming manner in which Dr. Flexner after his retirement cut himself off completely from the administrative affairs of the Institute. Still energetic and keenly interested he continued during the remaining years of his life to write scientific papers, and devoted himself particularly to the writing, in collaboration with his son, Dr. James Thomas Flexner, of the biography of his great friend Dr. Welch. This work appeared in 1941 under the title: *William Henry Welch and the Heroic Age of American Medicine.* It was a fitting final volume for his life history as for the great leader and his age.

Shortly after his retirement Dr. Flexner became Eastman Professor at Oxford University. This was only one of many honors that he received during his life-time. Eighteen universities in this country and abroad gave him honorary degrees. He was a Fellow of Balliol College, Oxford. He was a member of the National Academy of Science, Foreign Member of the Royal Society of London, Foreign Associate of the Institute of France, and Commander of the French Legion of Honor. He was a member of numerous scientific bodies in the United States, South America, and Europe.

In 1903 Dr. Flexner married Miss Helen Whitall Thomas of Bryn Mawr, Pennsylvania. They had two sons, William Welch Flexner and James Thomas Flexner.

Dr. Flexner was a medium sized man, rather frail looking, with fine features and fine hands. He was modest, apparently almost shy. His soft-toned voice was rarely, if ever, raised in pitch. He was gentle but firm, courageous and steadfast. Within his personality there was a force which seemed not to need a large physique. These are impressions. The tributes of his intimates were paid in eloquent descriptions by Dr. Peyton Rous, Dr. Herbert S. Gasser, Mr. Raymond Fosdick, Judge Learned Hand, and Mr. John D. Rockefeller, Jr. at the memorial exercises held in the library of the Rockefeller Institute for Medical Research on June 12, 1946. After telling of his accomplishments they spoke of his courage and attractive leadership, his simplicity and modesty, his gentleness and force, and his kindliness and wisdom.

S. BAYNE-JONES

DIXON RYAN FOX

(1887–1945)

Dixon Ryan Fox, distinguished American historian, President of Union College, died suddenly on January 30, 1945. At the moment he was stricken, he was engaged, with characteristic zest and imagination, in the form of creative activity that marked his entire career, and for which he was endowed with superlative qualifications—that of bringing together seemingly unrelated forces for the accomplishment of a mutually advantageous good. It was this quality, more than any other, that made his life one of such immeasurable value to his family, to the academic institutions with which he was connected, to his professional colleagues and friends, and to his country. The annals of his teaching, his writing, his stimulating influence upon young minds, his work among historical societies, his almost evangelical activities in support of a broad public understanding of what to him was always the "living past," might be related in brief outline. Even so, they would serve to distinguish him as a man of remarkable versatility and accomplishment. But the range, variety, and complexity of the forces that he brought together, the animosities and jealousies that he caused to be annealed, the enthusiasms and ambitions that he stirred, the linking together

of disparate energies that he brought about—these valiant and enduring contributions to a better culture can never be measured and few, save those who were fortunate enough to be closely associated with him in one or more of his manifold enterprises, can appreciate the dynamic energy, the unflagging zeal, and the understanding of human nature that he lavished upon these undertakings. To be engaged with him in some useful and ennobling enterprise (his abilities were not at the disposal of any other kind) and to receive one of his inimitable letters, almost illegible in its tiny script, was to receive the impact of an enormous and vital force, calculated to awaken in the beneficiary a knowledge of unsuspected resources and to kindle the flames of an eager purpose.

"Every man, to live fully, must have at least one strong enthusiasm, preferably more than one," Dixon Ryan Fox declared in one of his felicitous addresses. This was a precept exemplified in rich measure throughout his own career. He was, first of all, a teacher, and one who gladly taught. For twenty-two years, following his graduation from Columbia University in 1911, he continued in the same institution as a teacher of history, proceeding through all the academic ranks from lecturer (1911–1913) to full professor (1927–1934). The generations of students who went out from his undergraduate classes and his graduate seminars did so in full knowledge that nothing short of excellence was the standard required of them; that history was not an isolated study to be passed but a force to be experienced with understanding; that the commonplace things, the currency of social custom and habit, could be significant provided the student eschewed the trivialities and the irrelevancies that obscured understanding; and that standards of conduct could be elevated, appreciation deepened and made more sensitive, and horizons widened and perspectives more accurately drawn by a proper knowledge of the past and of its continuity. Fundamentally, Dixon Ryan Fox as a teacher was a moralist, but a practical and enlightened sort of moralist.

His writings were extensive, considering the enormous demands made upon his time by administrative duties, by his popularity as a lecturer and after-dinner speaker, and by his unremitting efforts in behalf of former students, colleagues, and all who were associated with him in the promotion of the cause of history. His scholarly contributions, moreover, were uniformly characterized by a mastery of language and a style almost lapidary in its finish. Though this

quality makes his writing seem effortless in its rhythm, it is apparent that composition was difficult with him and that the distinction he achieved was less the result of native gift than of his uncompromising insistence upon good writing and of an indomitable will that caused him to sit long hours at the desk, often after he had finished a full day's schedule at other tasks. (He has been known to spend two full days of teaching at Columbia, interrupted only by an all-night session in his study on the affairs of the historical society that engaged his loyalties so deeply.) His doctoral dissertation, *The Decline of Aristocracy in the Politics of New York* (1917), exhibited these qualities of style and commanded wide attention not only because of its fresh knowledge and understanding of the intricate maze of New York political groupings, but also because of its unusual mastery of literary, scientific, and other sources not customarily investigated by students of political history. *Caleb Heathcote, Gentleman Colonist* (1926), his only attempt at biography save a few contributions to the *Dictionary of American Biography,* is less the study of a personality than of the relations of Church and Colony, though here, as in his doctoral dissertation, he was more predisposed than most toward a sympathetic treatment of aristocracy because of its standards of taste, behavior, and social responsibility, though at the same time he deprecated its claims of privilege. These two works, like most of the remainder of his writings, exhibit also the quality comprehended in one of Dr. Johnson's remarks that Dixon Ryan Fox was fond of quoting: "To abstract the mind from all local emotion would be impossible, and would be foolish if it were possible." This quality of emotion, of a deep love of American history, especially of New York history, and most particularly of the history of the people of New York, was undoubtedly responsible for such works as *Yankees and Yorkers* (1940); the ten-volume *History of the State of New York,* to which he contributed and which could scarcely have come into being if it had not had his dynamic support; the twelve-volume *History of American Life,* which he edited with Arthur M. Schlesinger and to which he contributed, with John A. Krout, the volume entitled *The Completion of Independence;* and the great number of articles, addresses, reviews, and editorial comments that came from his pen. His "President's Page" that appeared in each quarterly issue of *New York History* during his unprecedented leadership of the New York State Historical Association, through a period of sixteen years, was a combined ex-

hortation, enthusiastic appeal, dynamo of ideas, and penetrating comment on history that could only have proceeded from a profound "local emotion" that amounted to a deep-seated love of his native country and state. Yet no trace of chauvinism or of narrow prejudice appears in his writings. He was editor of the stimulating group of essays entitled *Sources of Culture in the Middle West,* one of the earliest and most provocative of the critical appraisals of the Turner Frontier Thesis. The remark that Fox applied to Turner in the preface to this volume is also applicable to him: "the vanity and intolerance which so often mark the zealot were wholly lacking in his disposition." When delivering his finished addresses, which captivated his audiences by his impressive and even eloquent platform manner as much as by his thoughtful words, he drew his historical allusions from the locality in which he appeared, whether it was Pennsylvania ("Greetings from a Neighbor," 1933) or Massachusetts ("Are we better than our Ancestors?" 1931). His admiring and sensitive tribute to his father-in-law, *Herbert L. Osgood, an American Scholar* was at once an act of love and an act of faith. It is doubtful whether Dixon Ryan Fox ever wrote anything in which his affections as well as his discriminating mind were not engaged. This is unquestionably true of his last historical work, the posthumously published *Union College, an Unfinished History,* an informed and loving essay which ends abruptly but on a note of optimism and faith.

In 1929, at the age of forty-two, he became President of the New York State Historical Association. This body, like most others of the sort, had found by experience that frequent rotations in its chief office were wise. But Dixon Ryan Fox threw into its many activities such vigor and such yeasty exuberance that, for the next sixteen years, he was drafted year after year in a wholly unprecedented manner to direct the affairs of the Association. Not many professional scholars have the time or inclination to devote much of their energies to these earnest groups made up largely of antiquarians, genealogists, and lay historians; often their attitude is one of indifference or amused tolerance. What Dixon Ryan Fox did for the New York State Historical Association was to bring together, through the magic of his own personality, the laymen and the professional on a meeting ground of mutual respect. The meetings of the Association lost none of their spirit or congeniality, for Fox saw that this was the basis of the loyalty of the membership and

nourished it carefully, but as his presidency wore on the meetings and the publications came more and more to reflect the exacting standards of the trained scholar. Today, though the members were stunned by the sudden loss of their tower of strength, the New York State Historical Association, so long regarded as synonymous with Dixon Ryan Fox, remains one of his greatest monuments as a teacher. Institutional minutes in memoriam are often perfunctory, but those adopted by the Trustees of the Association for Dixon Ryan Fox are instinct with sincerity:

> Historian of penetrating thought and lofty utterance; editor and author of works portraying national growth and promoting the good life among our people; scholar and educator of infinite patience and original methods; gifted interpreter of American life, manners, and letters; champion of youth; counselor of mature vision and spokesman for dignified and cultured age, whose superb and varied abilities were poured into this organization so abundantly that for years to come all our works and deliberations will in some degree flow from his example and be guided by his genius.

This achievement, the extent and labor of which can only be appreciated by those who have been associated with him in it, was largely unknown to those who knew him as an industrious scholar, as a teacher in a metropolitan university, as officer and active participant in national learned societies, and as a busy college president. His presidency of Union College, in which he threw himself wholeheartedly, was similarly exacting. He not only improved the plant, took courageous stands against reactionary proposals, improved the salary scale of the faculty, infused new enthusiasm into the student and alumni bodies, and uncompromisingly insisted upon the usefulness of the role of the small college in American life, but also introduced some innovations, among them the first cooperative enterprise effected between an American college and the professional stage—the Mohawk Drama Festival. He also introduced a system of apprenticeships in government work which gave selected students the opportunity to coordinate their studies with practical experience in governmental offices. In addition to these outstanding achievements, added to the normal pressures, administrative duties, and formal functions that beset the life of an American college president, Dixon Ryan Fox, always in demand as a speaker, delivered literally

hundreds of addresses during the eleven years of his presidency of Union College from 1934 to 1945.[1]

All of this, though it is but the barest sort of outline, was crowded into a relatively short life that ended suddenly at full tide. It was a life of unrelenting activity, in which every vacation and every moment of relaxation, such few as there were, were purposefully directed. Dixon Ryan Fox was a man of geniality, who loved the friendly activities of human beings, whether represented by the intellectual enterprises of scholars or the robust atmosphere of circuses. He was a man of humor and of wit, though neither ever sank beneath the level of his kindly, appraising eyes. Yet, in a sense, he never relaxed: if any trip or social gathering embraced the remotest possibility of releasing useful potentialities, no one perceived the fact earlier than he and no one seized the opportunity with more alacrity. In all of his associations, his keenest pleasure came with the announcement of new ideas, new plans, new proposals for enterprises of "large and lasting public usefulness." Few scholars could rival him in the number of such that he advanced, and none could surpass him in his effectiveness in persuading professional colleagues and interested amateurs to unite with him to bring them to realization. His superb qualities commanded respect and affectionate loyalty as well.

JULIAN P. BOYD

EDWIN FRANCIS GAY

(1867–1946)

Edwin Francis Gay died in Pasadena, California, February 7, 1946. He was born in Detroit, Michigan, October 27, 1867, the son of Aaron F. and Mary Loud Gay. In 1890 he was graduated A.B. by the University of Michigan and two years later Ph.D. by the University of Berlin.

For thirty-four years he was a member of the Faculty of Harvard University, beginning as Instructor in Economics in 1902. In 1908 he was appointed the first Dean of the newly established Harvard School of Business Administration in which post he served until 1919, after which he became President of the New York *Evening Post* and was elected to the Board of Overseers of

[1] Elected to membership in the American Philosophical Society in 1936, and Penrose Lecturer the same year.

Harvard College. Returning to Harvard in 1924, as Professor of Economic History and becoming later Henry Lee Professor of that subject, he became *emeritus* in 1936. On leaving Harvard he joined the staff of the Huntington Library in San Marino, California, a post he held until his death. He was the first Secretary-Treasurer and later Director of Research of the Council on Foreign Relations, and Director of Research for the National Bureau of Economic Research. From its beginning to the time of his death he was a member of the Editorial Board of *Foreign Affairs*. During World War I he served on the Board of Council for National Defense, and from February 1918 was Director of the Division of Planning and Statistics, United States Shipping Board.

His scholarly achievements were recognized by the award of the degree of Doctor of Laws by Harvard, Washington, and Tulane Universities, of the degree of D.Litt. by Manchaster College, England, and by election to membership in the American Philosophical Society in 1932.

It was one of Professor Gay's great regrets that he could never find time in the midst of these many administrative duties to write at length on the subject of his special interest, a feeling in which all who knew his mastery of that subject will share, but the existing record of his achievements as an organizer of research and administration and the inspirer of numberless students in his chosen field, many of them in the foremost rank, are enough to mark him as one of the great leaders of our time. His enthusiasm was unfailing and infectious, his judgment of men unerring, and there was no limit to the help he willingly gave at all times to his students and his colleagues. The standing of the Harvard School of Business Administration is in very large part the result of his wise planning and early guidance, his contribution to the war effort was outstanding, and the same might be truly said of his part in all the many commissions and boards fortunate enough to secure his services; but his friends are likely to think of him above all as the modest and unassuming man to whom they could always turn for guidance, in the full knowledge that it would be wise, generous, and without a trace of self-interest of any kind.

CHARLES H. MCILWAIN

ROBERT ALMER HARPER

(1862–1946)

Looking for evidence to support the theory that heredity and not environment mainly accounts for what a person accomplishes during his life, we can point to Robert Almer Harper who was for forty years one of the world's leading botanists. Not much is known of his more remote ancestors. From what we do know of his grandparents and nearer relatives, we must believe that at his birth he had already been endowed, mentally and physically, with a rich inheritance. His contributions to our knowledge of the lower forms of plant life are too well known to biologists to warrant extensive consideration here. Few of his colleagues and students or even his nearest friends know, however, that his grandfather was a "southern gentleman," with all that that connotes. This grandfather, Edward Harper, was born in 1779. The first United States Census, 1790, records for South Carolina six Robert Harpers as heads of families. One Edward Harper was reported and he was from the Charleston district. Family records indicate that this family was living near Charleston in 1800 when Edward married Charity Reed. She was a teacher of ability who had come down to that state from Connecticut. If her husband was actually a preacher or a teacher, as we might suspect, this would account for their moving from place to place during those years when their nine children were being born. We have no direct evidence as to his real occupation, however.

Their first child was recorded as born in 1802 in Iredell County, North Carolina, and the fifth in 1812 back in Charleston; the sixth in Pendleton in 1815. This was a sparsely settled wilderness at that time. It was just the region to which a church council would send one of its ministers to spread the gospel. The family next moved farther west to Connersville, Indiana, where the next child was born in 1818. The ninth and last child, Almer Sexton, father of Robert A. Harper, was born in 1826 in Rush County not far from Connersville. The parents made their last move to Michigan City in 1836. There were no doubt other moves during those thirty-six years but those records are not available. So we had in this Harper family real pioneers who went west along with the advance of civilization and the extension of Christianity.

Almer Sexton Harper clerked in a grocery store so that he

could go to school. He later went to Oberlin College to prepare himself for the ministry. He worked his way through the College and graduated from the Seminary in 1853. Soon after he married his classmate, Eunice Thompson. The Thompsons were connected with old and well known New Jersey and New York families, members of which were often leaders in their communities. Therefore we had in the union of the Thompson and Harper families an excellent heredity which came well to fruition in the three brothers, Edward T., the theologian, Robert A., the botanist, and Eugene H., the zoologist.

As a Congregational minister, Almer Harper first preached at Rochester, New York. He soon moved to Sabula, Iowa, then to nearby Le Claire, and finally, in 1863, to Port Byron, Illinois, just across the Mississippi River. He preached there for forty years. Those of us who were privileged to meet this gentleman and his remarkable wife can better understand how their son Robert came by his many admirable characteristics. Reverend Harper was naturally interested in all educational matters. He was the leader in founding the Port Byron Academy. His wife was the one who first cultivated in her sons an interest in botany and in the outdoors. She was a great church worker and there is still a "circle" in the Port Byron Church called the Eunice Harper Circle.

The first son, Edward T. Harper, born at Sabula, Iowa, in 1857, was a puny lad. This fact, some would insist, was, more than heredity or anything else, "the incident in early life" that influenced his brother Robert later to specialize in the plant sciences to become a great leader in the botanical field. The County Superintendent of Schools of Illinois County and the minister, having common interests, naturally became great friends. Mr. Southwell, the school-man, was well informed on the plant life and geology of that region. He recognized in the Harper sons very promising traits, and in order to improve the health of the oldest son and in a way to compensate the Harpers for favors extended to himself, he enjoyed taking the two oldest sons on field trips in the forests and along the Mississippi River, camping and botanizing on the way. They made large collections of plants and insects which were identified and classified so far as was possible with their limited library facilities. The Harper barn, especially the haymow, was always filled with specimens being dried and thus preserved for study during the winter months.

Heredity was no doubt an important factor in the lives of all three sons, and contributed largely to their success in life. We must admit, however, that family traditions, early environment, and their home life at Port Byron also played a part in shaping their careers. None of them ever lost interest in the plants and animals of the fields and forests wherever they lived.

As a minister's salary in these early days was very small, working on the Harper farm must have been good training for the boys who, one after the other, went to Oberlin College to obtain a more or less classical education. They all worked their way through college just as their father had done before them.

Edward T. who had served, after graduation, for six years as Principal of the Port Byron Academy took his Ph.D. degree at Leipzig, Germany in 1891. He became Professor of Assyriology and Comparative Religions in the Chicago Theological Seminary. His contributions along theological lines are well known. After he retired in 1910 he devoted the rest of his life to the study of the fleshy fungi, publishing eleven important papers on this subject. He left his fine collections of photographs and notes to the Field Museum. During these last years he and his brother Robert cooperated enthusiastically in their studies of the larger fungi and had many arguments over the proper naming of species.

To show still further how strong were these brotherly ties and how heredity worked true to its laws in this family, we shall add a brief statement regarding the third son, Eugene Howard, born at Port Byron in 1867. He graduated from Oberlin and then taught school for some years in western colleges. He later studied economics at Harvard but his first love, love of living things, was too strong in him so he turned back to his earlier studies of animals and took his Ph.D. degree in zoology at Chicago. After teaching this subject for twenty years he retired to a farm near Bedford, Virginia, because of the illness of a member of his family. This move had an important bearing on the later life of his brother Robert who made frequent visits to this farm which enabled them to study together the diseases caused by such parasitic fungi as species of *Gymnosporangium, Peridermium* and apple heart-rot organisms. The specimens they collected were always brought back to Columbia and made available to graduate students for their studies. Eugene's son Edwin, keeping up family tradition, graduated from the Harvard Medical College and is now a physician of standing at Lynchburg, Virginia.

Robert Almer Harper, the second son, was born at Le Claire, Iowa, January 21, 1862. He graduated from Oberlin in 1886, became Professor of Greek and Latin at Gates College, 1886–1888, and then Instructor in the Academy, 1889–1891. He received the A.M. degree from Oberlin in 1891. From 1891 to 1898 he held the position of Professor of Botany and Geology at Lake Forest University. Following his brother Edward's example he went to Germany and took his Ph.D. degree in botany under Strasburger at Bonn in 1906. He returned to Lake Forest for a short time before he was called to the University of Wisconsin in 1898 as head of the Department of Botany. He was elected to membership in the American Philosophical Society on April 24, 1909.

By 1911 his reputation as a leader among cytologists had become firmly established.

When the position as Torrey Professor of Botany at Columbia University became vacant Professor Harper was the first to be considered for the place. From 1911 until his retirement in 1930 he filled this position with great distinction. His retirement as head of this department did not affect in the least his interests in research or limit his activities in behalf of the scientific societies of which he was a strong supporter. It simply gave him more time to continue his studies on morphogenesis and to counsel with graduate students and his associates on their problems.

Dr. David Fairchild, one of Professor Harper's most intimate friends, has written me a beautiful letter in which he tells of his associations with Harper during their early days when they were doing graduate work in Germany. We are privileged to quote certain passages from it.

> It was a beautiful morning in early summer when that tall broad shouldered form of R. A. Harper darkened the doorway of the little laboratory in Muenster over which Professor Brefeld and his wife lived in modest quarters, and introduced himself to me as R. A. Harper of Wisconsin. He had come from Strasburger's laboratory in Bonn to meet Brefeld, the then recognized authority on the culture of spores of the higher fungi. I was overjoyed to see Harper and felt his charming personality immediately, as I think Brefeld did, for he had a smile that was irresistible and a way of looking at you that made you conscious of a presence, a great presence, an outstanding presence. . . .
>
> So it was with a soup plate of fresh horse dung in front of us that Harper and I started our discussions in those days before the conception

of genetics had taken form and when the scientific world was wondering if the phenomenon of sexuality was a universal thing. Brefeld had convinced himself that there was no such phenomenon as sexuality in the higher fungi. (There are those among our biologists today, unfortunately, who still hold this same view!) Harper had revealed to me that he had been working with Strasburger and had discovered that there was in the ascogone of a *Peziza* a nuclear behavior analygous at least to that characteristic of sexuality in other fungi. It was understandable that when he showed his slides to Brefeld and Brefeld perceived the crash of his theory, his sensitive nature should have revolted and he concluded that Harper was trying to undermine his theory, and he was unable to face the collapse of his pet conception of the fungi.

. . .

Brefeld was a pupil of the great Naegli, author of the micellar theory, and he had often related to his own students the story of how he had once gone to his Professor and said "Ihre Theorie ist angegriffen, Herr Professor. Ihre Feinden haben es angegriffen. Was werden Sie thun?" "Ach" remarked Naegli, "was ist wahr, das bleibt oben, und was ist nicht wahr, das fehlt nach weg." Brefeld could not stand it, however, to see that Harper was on the way to overthrow his own theory. It was not until years afterwards when Harper's discoveries were recognized among the botanists of Germany that Brefeld began to boast of once having Harper as a student.

Once while Fairchild and Harper were still in Brefeld's laboratory they had sent some mushrooms they had collected to Lindau for identification. When Brefeld heard of this he remarked rather forcibly "Was? Nach Lindau schicken? Aber, er hat alles bei mir gelernt. Nach Lindau schicken!!!" It was, therefore, not comfortable for them to continue working in Brefeld's laboratory because he no longer came near them.

So we went back to Bonn, and in the old Schloss there gathered what I always felt was a distinguished group of fellows. We always lunched together in one of the beer halls. Harper was not fond of beer much more than I was and we usually got a glass of hot milk instead. This attracted some attention but it was not until Osterhaut arrived on the scene that we got the degree of ridicule which we might have suffered earlier. I seem to see the large laboratory in which the students worked and hear the crash which his chair made when Osterhaut leaned too far back. The American students paid no tuition yet they were fast smashing up their professor's furniture. He used to come at the same hour every morning and make the rounds, "Well, what have you dis-

covered?" If you had anything you thought was new you showed him and his keen vision took it in at a glance at the microscopic field. I recall hearing him saying over my shoulder to one of the younger students, "Ach, eine Luftblase." At Harper's table he always lingered for Harper had a way of making discoveries. It was perhaps natural that in the beautiful sunshine Harper and I should have gone after the fleshy fungi that grew in the beach forest of Westphalia; I never think of him without seeing before me his form stretched out on the leaves and hear his enthusiastic exclamations when either he or I dug up a fine truffle. It was at those times that we talked about the importance of the study of the cell and the difficulties of finding the centrosome and the question of what the reduction divisions of the nucleus meant.

One could well say of Harper what he said of one of his associates who had died suddenly from an accident. "For one so young he had already given evidence that he possessed to an unusual degree the quality of genuine critical insight which discerns the crucial point in the real problem." This associate, he said, was singularly free from that tendency to publish as a form of advertising which leads to a deluge of fragmentary undigested work with which minor scientific journals are sometimes loaded. Even though Harper worked incessantly on his researches into the cytology and morphogensis of the lower types of plants, his results were all reported in fewer than forty papers, every one of which is a gem. Each contribution enriched our knowledge of plant life and gave us good examples of how to use the English language. They were all written and illustrated in a style that is an inspiration to all students of botany and related sciences. As Fairchild said of Harper, "he was one of those noblemen who tolerated no deceits and kept his friends closely attached to him no matter how many years separated him from them."

One of Harper's early students, Dr. L. O. Kunkle, whose work he always admired, writes that when he arrived at Columbia for the purpose of doing graduate work under Harper, he was surprised to find that the Professor who was fifty years old at that time did not seem even that old. "He had dark hair with a sprinkle of gray and impressed me as looking more like a business man than like a professor." Harper in fact would have made a good business man had he chosen to enter that field. Those who know how he managed his farms first in Ridgewood, New Jersey, and then in Virginia, know that he made both places pay dividends,

not only financially but educationally. He realized that to grow a crop of apples free from blemishes and insect troubles it was necessary to carry out a spray schedule, but he sometimes neglected to do this. If his plants became infested he made the most of it to learn about the nature of the parasites causing the trouble. He never tired of showing his friends his fields and many kinds of ornamental plants he grew. His Virginia home was a combination farm and botanical garden.

Professor Harper recognized that those of his associates who gave that sort of personal help and inspiration which created interest in their students were the ones who would become successful, more so than those who confine their teaching to formal class work. His students must have tried his patience sorely with all sorts of trivial and inconsequential questions. They were always interrupting him, often when he was busy preparing material for an important lecture. He would quietly lay aside his pencil and give them a hearing, always with encouragement and helpful suggestions. Those characteristics which he admired in others such as "tireless patience, persistence and unusual capacity for taking pains in all the details of an experiment," these were features which we all recognized in Harper's nature. His students seldom realized how much time and labor he expended in making accurate notes and photographs to illustrate and describe, for example, the lowly colonial alga *Pediastrum* or the simple fungus *Dictyostelium*. If he gathered mushrooms from the woodlands he made voluminous notes and took an endless number of photographs to bring out their characteristics. He believed that if it was worth while to take his students out on field trips it was incumbent on him to see that they, as well as he himself, profited by the trip. His volumes of photographs and descriptive notes are all safely stored in his library in the Virginia home, and are available to any one for study. So thoroughly did he believe in the use of living things in teaching that he purchased a large Panhard car with which to take his graduate students on field trips. On such forays it was his custom to bear all expenses even to hotel bills when overnight stands were necessary. Although a careful investor where material things were concerned, he was lavish when it came to entertaining his colleagues and students on every occasion. He had a way of always being the one to capture the meal check.

Professor Harper had no patience with species makers and he was not one to collect the fleshy fungi solely for food. Nevertheless he was much interested in the taxonomy of the fungi. This interest was of course not readily apparent because in his lectures he emphasized their ontogeny and phylogeny. He believed that the fungi arose from the algae at various points in their evolution; in other words, they were polyphyletic rather than monophyletic, as Brefeld held. One has only to examine the fascicles of Rhems Exsiccati to see how many specimens, numbers of them representing new species, Harper sent to Rhem from Wisconsin for identification. His herbarium of species of fungi was always used by students in his laboratory courses.

Not all his graduate students had been fortunate enough to have had a broad education in the use of the English language. The work of writing a thesis under Harper was equivalent to a good course in graduate English. He was a master at showing a student how to condense and clarify his long drawn out ambiguous sentences so that they would read well and yet convey all the information desired. One student writes that he had been required to rewrite his first paper several times before it was ready for publication. (We all had the same experience!) Professor Harper's analyses and criticisms of scientific papers in the lecture courses made a deep impression on this student who said he never prepared for publication a paper without asking himself what Harper would have said about it if it should have come under his critical eye. In preparing his own papers he was just as particular. We have all admired those classic plates with which he illustrated the papers he published in Germany. He was not in any sense an artist but his illustrations were always artistic and beautifully drawn. He would never admit that those plates which he made to illustrate his studies on the nuclear history in the hazel powdery mildew published by the Carnegie Institution were equal to those published in the German journals. To the writer, however, they were far superior as showing to the students how best to bring out the details of the nuclear and cytoplasmic structures. We rarely, if ever, see their equal in botanical literature these days.

One who had abundant opportunities to know him intimately writes that he was "one of the kindest men that ever lived, so patient, and so generous. He always tried to add a bit to the sum total of human knowledge. He stimulated every one to do his best.

He showed a great interest in his own greenhouse and garden. This was contagious and stimulated his helpers to achieve results which they never could have done without his guidance. There on his farm in Virginia we still see the results of his thought and planning and we now miss his stimulating influence."

In 1899 Professor Harper married Alice Jean McQueen whom he had known at Lake Forest University. Although she contracted arthritic rheumatism soon after marriage and remained an invalid, constantly suffering from the disease, she cheerfully joined her husband in entertaining his students and associates in whom she became greatly interested. It was a familiar sight at Madison to see him taking her for rides in the sunshine, tenderly pushing her wheel-chair. From the onset of the disease he had her taken to the best doctors, health resorts, and sanitariums, but she could not be cured. She died in 1909. Nine years later, 1918, he married Helen Sherman who had specialized in botany in his department at the University of Wisconsin. This was also an ideal marriage. It was characteristic of both of them to keep open house for students and friends who were always heartily welcomed to share their hospitality. They had one son, Robert Sherman, who has chosen to carry on with the plans which his father had in mind for the development of their Virginia estate. He is making a fine home for his mother and his own family.

While Professor Harper was a Christian in every sense of the word he was not ostentatious about this phase of his life. He lived a Christian life without parading it. He was a member of the Congregational Church but when he moved to Bedford, Virginia, he transferred his membership to the Presbyterian Church which was located near his place.

During his active career he received several honorary degrees and was elected to high offices in a number of scientific organizations. He was too modest, however, to record these honors in his biographical sketches which appeared in such publications as *Who's Who* in America. For example, when his biography first appeared in this red book it was limited to ten lines. During the next thirty-eight years only two more lines were added.

This very inadequate sketch is closed with another quotation from Kunkel's letter.

He enjoyed his little grandson and I must believe he had a happy old age with his family, his books and his plants. His last resting place

is in a small cemetery he gave to the nearby country church. There on a little knoll in full view of the farm house and the Twin Peaks of Otter he was buried. The irises he had planted along the road leading from the house to the church and in the churchyard were in full bloom at the time of his death, May 12, 1946.

B. O. DODGE

JOHN STORY JENKS
(1876–1946)

John Story Jenks, a member of an old Philadelphia Quaker family, was born in Philadelphia in 1876, the son of William H. and Hannah M. (Hacker) Jenks. Following his education at Westtown School and Haverford College he entered upon his career as a banker, first as a clerk in the Girard Trust Company of Philadelphia and later as a partner in other banking firms.

Withdrawing from active business early in life, he participated actively in many Philadelphia enterprises. For forty years he was a director of the Girard Trust Company as had been his father and grandfather. He served also on many other boards of directors, notably the Insurance Company of North America, the Pennsylvania Salt Company, the Alliance Insurance Company, the Penn Mutual Life Insurance Company, and a number of railroad companies.

A patron of art, particularly in Chinese antiques, he was a member of the Board of Managers and one time President of the University Museum of the University of Pennsylvania; of the Philadelphia Museum of Art, the Thomas W. Evans Museum and Institute Society, and the Fairmount Park Art Association. His interest and leadership in the field of art were recognized by the French Government in awarding him the decoration Chevalier Légion d'Honneur in 1937.

Following his election to membership in the American Philosophical Society in 1936, he became an active and valued member of its Finance Committee and the Committee on Hall, of which latter he became Chairman upon his election as Curator in 1943. He served the Society with his characteristic fidelity, and ever made available to it his wide experience and knowledge.

Those of us who saw him frequently miss from our midst this courtly and gracious gentleman.

CHARLES J. RHOADS

ELDRIDGE REEVES JOHNSON
(1867–1945)

Elridge Reeves Johnson played an important role in the scientific, artistic, and industrial life of his times. By his development of means for the recording and reproduction of music and by his generous philanthropies he has also laid the foundations for richer lives of future generations.

Johnson was born in Wilmington, Delaware, on the sixth of February 1867, the son of Asa and Caroline Reeves Johnson. Following his elementary education, he attended the Spring Garden Institute of Philadelphia where he received a thorough training in the mechanic arts.

Soon after graduation the youthful Johnson became foreman and manager of the Scull Machine Shop of Camden. This business had been started a few years earlier by a sea captain, Andrew Scull, in order to provide a career for Scull's son, but the son had soon died, and the uncertain opportunity was given to Johnson. Also of importance to his future career was the fact that the primary responsibility of his new position was the completion of an invention of an automatic bookbinder begun by the younger Scull. This was the first of Johnson's many contributions in the field of invention, as an inventor and as one who transformed the ideas of inventors into practically useful devices. After perfecting the binder, Johnson terminated his employment. He then wandered through the West for several years, working as a journeyman machinist and gaining a broad vision of the potential role of the machine arts in American life.

In 1891 he returned to Philadelphia and resumed his association with Captain Scull, as partner in the firm of Scull and Johnson, Manufacturing Machinists. During this period, his natural instinct for invention, stimulated by his previous work on the Scull binder, led to his first invention, which was an improved bookbinding machine. This device was so successful that it gave rise to the New Jersey Wire Stitching Machine Company.

The shop of Scull and Johnson, which came under the complete control of Johnson in 1894, fulfilled an industrial function that has now largely disappeared as a consequence of mass production. In those days, such a shop played an important role in industry, by repairing the machines of production and by manufacturing

parts for replacement. These establishments also carried on an important service now fulfilled by the developmental laboratories of the large corporations. Then, the small machine shops were the haunts of the independent inventor, and there the work of development and the construction of experimental models was carried forward. In this work Johnson's creative talents found a natural outlet, and such agreeable activities brightened somewhat the hard financial struggle to keep alive his business.

One day in those years there was brought to his shop an early model of a "talking machine." Despite the poor acoustic qualities of the crude device, it stirred Johnson's imagination, and he saw in the machine an instrument with vast potentialities for human use.

Immediately, he began to experiment with these machines, working with great intensity, and soon made many discoveries that improved the quality of their sound reproduction. Also, his practical experience in the development and construction of inventors' models enabled him to design an instrument that could be produced commercially and would withstand the demands of wide, popular use.

Johnson realized from the beginning that the new invention should make it possible to preserve for all time the transient artistry of the musician and make available to many the best music that had until then been enjoyed by only a few. But he also realized that this could not be accomplished unless the mechanism of sound recording was improved as well as the mechanics of reproduction. Accordingly, he spent great effort in the development of a more satisfactory recording process.

About 1887 Emile Berliner achieved several important improvements on the original Edison system for the reproduction of sound. In Berliner's gramophone the movement of the reproducing diaphragm was positively controlled by the record which consisted of a laterally wavy groove on a flat disc. Johnson immediately recognized that these were fundamental advances and based his developments, improvements, and practical constructions on Berliner's principles. Complicated patent questions regarding the use of these principles ultimately led to the formation in 1901 of the Victor Talking Machine Company which brought the Johnson patents and the Berliner patents into one corporation. Johnson was president and the guiding genius of this company from

the time of its small beginnings until 1927, when it was sold as a great American industry to the Radio Corporation of America.

Throughout the history of this organization Johnson had a strong sense of obligation to use the invention, which he had done so much to develop, as a means for enriching human life. As the business grew he could no longer devote himself personally to its improvement, but he delegated to a large staff of scientists and engineers the continuing responsibility for achieving better tonal quality. Also, he brought to the Victor recording studios the finest musicians of the world so that they might be heard by people everywhere for generations to come.

The fortune which came to Johnson as a reward for these services to his fellow men was, in turn, used by him for many humanitarian purposes.

When the American Philosophical Society, to which Johnson was elected in 1928, was considering the erection of a new home on the Parkway, he contributed $500,000 for the new building. And when that purpose was abandoned by the Society, he generously permitted its officers to use the gift for other purposes. It now constitutes the Johnson Fund for the support of research.

With characteristic vision, he foresaw the benefits that could come from the application to biology and medicine of new discoveries in the physical sciences. Accordingly, beginning in 1927, he made a series of gifts to the University of Pennsylvania, totaling more than a million dollars, for the housing and endowment of the Eldridge Reeves Johnson Foundation for Research in Medical Physics. His hopes were realized, for the Foundation, which is a permanent memorial to his name and to his humanitarian purposes, has become recognized as a pioneer in the development of a new science.

His interests also reached into many other phases of the work of the University of Pennsylvania and he had been a Life Trustee of that institution since 1927. The University awarded him the honorary degree of Doctor of Fine Arts in 1928.

It was natural for one with Johnson's warm human sympathies to aid in the social development of the communities in which he lived and worked. He was the donor of the Merion (Pennsylvania) War Tribute House for community activities. To Camden, which was the site of his great manufacturing plant, he gave a park, a library, a building for the Young Men's Christian Association, and

a building for the Deaconess Home. In Moorestown, New Jersey, where he and Mrs. Johnson lived for many years, he built a Catholic lyceum building, the Community House, and the beautiful buildings of the Trinity Episcopal Parish. For Dover, Delaware, his early home, he constructed People's Christian Church in memory of his mother.

During his active career in science and manufacturing his instinct for adventure had found an outlet in new inventions and the creation of a great industry. After retirement, this spirit of adventure appeared in his love of boats and the sea, an interest he shared with his only son. In those years he built the Yacht *Caroline* in which he cruised to many parts of the world, and he generously made her available for scientific exploration.

Eldridge Reeves Johnson was a man of great simplicity and wisdom; he was modest and generous, and he possessed a warm kindliness that endeared him to his associates and to the workmen in his plants. He had a strong instinct for the human values of science. He was fittingly a member of our Society, founded for the promotion of useful knowledge.

DETLEV W. BRONK

GILBERT NEWTON LEWIS
(1875–1946)

Gilbert Newton Lewis, the second of three children, was born at Weymouth, Massachusetts, October 23, 1875, and died in Berkeley, California on March 23, 1946. He received his early education from his parents, Frank Wesley Lewis and Mary Burr White Lewis.

His mother, who had been educated in a Massachusetts seminary, taught him to read at the age of three. At the age of five he read Robinson Crusoe and from then on read everything that was allowed to come to his hand. His father taught him arithmetic and mathematics which he enjoyed and in which he excelled.

His father, a graduate of Dartmouth, who taught for two years after leaving college, was a lawyer in Boston. He was a promoter and trustee of the Weymouth Public Library for which he also selected books. His father in later life published a book entitled, *State Insurance, A Social and Industrial Need,* which shows him to

have been a vigorous and independent thinker at the age of sixty-nine.

When Gilbert Lewis was nine years old he was taken by his parents to live in Lincoln, Nebraska, where his father was a lawyer and broker. He had not attended any school in Massachusetts and had little formal schooling during his first five years in Nebraska. A brief attendance in high school terminated when his algebra teacher insisted that all work should be done in ink. His parents, knowing his eagerness for learning and his capacity for getting his own education, supported him in his withdrawal from school.

The family had taken residence on a small farm in the outskirts of Lincoln and took advantage of the circumstances to keep some farm animals and cultivate some of the land. Much of Gilbert Lewis' time during his first five years in Nebraska was taken up by such work but he was always experimenting. He became interested in the effects of cross pollenization on such vegetables as squash and cucumbers. He experimented with the cross breeding of chickens and produced a desired type. At about this time he was given lessons on the violin but impatience with broken E strings caused him to end his formal musical education.

The following quoted sections are taken from Professor Lewis' own brief account of his life written by request a few years before his death.

"In 1889 he was admitted to the preparatory school of the University of Nebraska, in which University he remained until the end of his sophomore year." In 1893 he transferred to Harvard College where he was primarily interested in the study of chemistry, however he had broad interests and among these he was particularly impressed by a course in political economy under Professor Taussig which gave him a life-long interest in that subject.

"After graduating from Harvard in 1896 he spent a year in teaching at the Phillips Academy at Andover after which he returned to Harvard for graduate work and received the M.A. degree in 1898 and the Ph.D. in 1899."

His first publication, which reported an experimental investigation on "Some Electrochemical Relations of Zinc and Cadmium Amalgams" in collaboration with T. W. Richards, appeared in 1898. The following year he published a paper entitled "The Development and Application of a General Equation for Free Energy and Physico-Chemical Equilibrium." These early papers

showed a thorough grasp of the power of the thermodynamic method in chemistry which was to influence much of his later work.

"After remaining for one year at Harvard as an Instructor, he went abroad on a traveling fellowship and had a semester with Ostwald at Leipzig and one with Nernst at Göttingen. The following three years he spent at Harvard as Instructor, and then accepted a position as Superintendent of Weights and Measures in the Philippine Islands, and chemist in the Bureau of Science at Manila."

His researches continued despite the limited facilities at Manila, where his study of the decomposition of silver oxide, in a high temperature thermostat, controlled to one or two hundredths of a degree, and constructed with an improvised mercury regulator controlling a bunsen burner, with the assistance of a telegraph instrument, is a simple example of his desire to investigate.

"In 1905 he joined the Research Laboratory of Physical Chemistry at the Massachusetts Institute of Technology, under the direction of Professor A. A. Noyes. In this laboratory he remained, passing through the several professorial grades, until 1912 when he accepted the position of Professor of Chemistry and Dean of the College of Chemistry of the University of California. In 1917 he received a commission as Major in the Gas Service, later the Chemical Warfare Service, and went immediately to France, where, after a few weeks of work in the scientific laboratory, he was made Chief of the Defense Division of the Service, in which position he served until the end of the war, but during the last two months, being in Washington, he served also as Chief of the Training Division of the Chemical Warfare Service, having been promoted to the rank of Lieutenant Colonel.

"For his war service he received the Cross of the Legion of Honor from the French Government, and the Distinguished Service Medal from the Congress of the United States. Returning to the Department of Chemistry at Berkeley he was engaged for some years in writing, with Professor Randall, their treatise on thermodynamics, which appeared in 1923, and in the same year he published 'Valence and the Structure of Atoms and Molecules.' Three years later he published 'The Anatomy of Science,' comprising the Silliman Lectures given at Yale University.

"Professor Lewis' researches include the following topics: thermodynamic theory and its application to chemistry, free

energy tables, equilibrium in numerous reactions, electrode potentials of the common elements, properties of solutions and the activity of ions, the structure of the atom and the molecule and the theory of valence, rates of chemical reactions, the entropy of elements, the third law of thermodynamics, primary and secondary acids and bases, and color and chemical constitution.

"In 1912 he was married to Mary Sheldon, daughter of Professor Sheldon of Harvard University, and has two sons and a daughter. He has received honorary degrees from the University of Liverpool, Madrid, Chicago, Wisconsin, and Pennsylvania, and is an honorary member of the Royal Institution of Great Britain, the Chemical Society of London, and the National Academies of Sweden, Denmark, and India. Professor Lewis was a Fellow of the American Academy of Arts and Sciences, a member of the American Chemical Society, the American Philosophical Society, elected in 1918, the American Physical Society, and an Honorary Member of the Franklin Institute. He has been awarded the Nichols Medal, the Willard Gibbs Medal, the Davy Medal of the Royal Society, the Fourth Gold Medal of the Society of Arts and Sciences, the Theodore William Richards Medal (awarded by the Northeastern Section of the American Chemical Society), and the Arrhenius' Gold Medal by the Royal Swedish Academy of Sciences."

At the time Professor Lewis organized his own research laboratory and department at the University of California he had published 39 out of a total of 164 scientific papers. He was insistent that facilities for research at Berkeley should be made available without delay and, when it became evident that a new building agreed upon to house the activities of the group could not be erected without too much lost time, he insisted on the erection of a temporary research laboratory prior to his arrival. He took pride in the fact that many researches were in very active progress a few weeks after he arrived in Berkeley.

Professor Lewis thoroughly reorganized the undergraduate instruction in his department. He believed the teaching of highly specialized courses to younger men to be an unfortunate use of the too limited time of the student; specialization should come after thorough training in the fundamental laws and principles of science by means of a moderate number of substantial courses. His interest in the University of California extended beyond his own

department and he exerted his strong influence toward the best instruction and the acquisition of the most competent men obtainable throughout the University. He was one of the organizers of the Research Board of the University of California, an organization which was apparently the first of its kind. Such boards, with their own budgets, are now, and will increasingly be, regarded as essential to educational institutions which participate in fundamental scientific research. He also stimulated interest in research by taking a leading part in the selection of a long succession of the world's foremost scientists as visiting professors and lecturers at the University of California. By such methods and constant discussion he took an important part in gaining recognition for scientific research as an indispensable part of the functions of the University.

In his department, graduate instruction entirely by seminars and much informal and outspoken discussion and mutual assistance by the group created a research spirit that will carry on in many places through the lives of colleagues and students who had the good fortune to come under his influence. During this period 290 students received the Ph.D. degree in chemistry at Berkeley.

He particularly enjoyed making important discoveries with simple apparatus and he was impatient with unnecessary elaboration of experiment or explanation. However he did not hesitate to use complicated methods and delicate equipment when the circumstances and importance of an experiment made it necessary.

The fifty years between the graduation and death of Professor Lewis comprise the greatest period of scientific discovery in history and his name ranks among the highest of the leaders in this accomplishment. Through his personal researches, and the great number by the men he inspired he has contributed more to the rigorous experimental application of the three laws of thermodynamics to important chemical problems than has any other scientist. His deep insight into chemical phenomena led to his great contributions to the theory of valence and molecular structure. To quote from Professor Linus Pauling's recent book *The Nature of the Chemical Bond,* which he dedicated to Professor Lewis, "The foundation of the modern theory of valence was laid by G. N. Lewis in his 1916 paper." Through his experimental skill he was the first to concentrate deuterium in the quantities required for numerous experiments on this material and its compounds and, in addition to

determining many of these properties himself, he supplied deuterium to many scientists when it was still unavailable elsewhere and his work made possible the early use of the deuteron in the transmutation of the elements.

At the age of seventy Professor Lewis worked daily in his laboratory. His last experiments provided most of our basic understanding of fluorescence and phosphorescence, and included a very difficult measurement of the change in magnetic susceptibility accompanying transformation to the triplet phosphorescent state by the exciting light. He was very active and was planning many new investigations when he died suddenly of a heart attack while performing his last experiment, in which he was investigating the effect of a highly polar medium on phosphorescence. Gilbert Newton Lewis was one of the greatest of American chemists.

Professor Lewis, who knew so well the enjoyment of successful original work, enjoyed providing scientific opportunity for his students and colleagues. He gave all of them great freedom to pursue their patricular scientific interests and was intolerant only of letting such things as avoidable administrative details and unnecessary rules interfere with their researches. They felt a very great respect and affection for him.

W. F. GIAUQUE

CLARENCE ERWIN McCLUNG
(1870–1946)

In the sudden death of Dr. C. E. McClung on January 17, 1946, the American Philosophical Society lost one more of that group of brilliant zoologists who arose at the turn of the century to illuminate American science. He was born at Clayton, California, April 5, 1870, but spent much of his early life in Kansas where he received his education and became established in his professional career. His father was a civil and mining engineer and his mother the daughter of a physician. An early interest in chemistry and employment in an uncle's drug store led to a course in pharmacy at the University of Kansas where he received the Ph. G. degree in 1892.

After teaching chemistry and pharmacy for a year at the University of Kansas, young McClung entered the college and continued in graduate studies. Keenly interested in the microscope,

he enrolled in Professor Williston's course in histology and thence turned to zoology as his major field of interest. He studied for one semester with E. B. Wilson at Columbia University and one summer with W. M. Wheeler at the University of Chicago. The University of Kansas awarded him the A. B. degree in 1896, the A. M. in 1898, and the Ph. D. in 1902.

In the summer of 1898 Professor Wheeler suggested to young McClung that he investigate the spermatogenesis of *Xiphidium fasciatum,* a "long-horned" grasshopper. Out of this study grew his recognition of the chromosomal mechanism for the determination of sex, which brought him world-wide renown, and initiated a life-time of researches on chromosomes and their relation to taxonomy and evolution.

In addition to his many papers on chromosomes, Dr. McClung wrote on a wide variety of topics beginning with pharmacy and including paleontology, microscopy, photography, and various educational and philosophical subjects. Interest in the microscope and its uses led to the publication of the *Handbook of Microscopical Technique,* prepared with the help of a group of collaborators.

Dr. McClung's keen intellect, genial personality, and administrative ability brought him many responsibilities. At the University of Kansas he became head of the department of zoology in 1901. In 1902 he also was made Curator of Vertebrate Paleontology, and from 1902 to 1906 he was acting Dean of the Medical School. In 1912 he became Director of the Zoological Laboratory at the University of Pennsylvania, where he worked energetically for improvements in curricula and in facilities for graduate studies and research. Outside the universities he was given important assignments in such connections as the Marine Biological Laboratory, Woods Hole, Massachusetts, the national scientific societies, the National Research Council, and the organization of *Biological Abstracts.*

Various interests and responsibilities took Dr. McClung abroad. In the summer of 1924 he toured Europe in the interests of *Biological Abstracts.* He spent the academic year 1927–1928 in travel, research, and writing in Europe. In 1930 he represented the U. S. Government, the National Academy of Science, and the American Philosophical Society at the International Congress of Biology at Montevideo. During 1933–1934 he was Visiting Professor at Keio University, Tokyo, Japan, returning through Europe. In 1939 he

made a collecting trip to South Africa and completed a second encirclement of the globe.

In 1934 Dr. McClung's name was engraved with twenty-seven other great American scientists on tablets at the entrance to the Louise C. Buhl Hall of Science, Pennsylvania College for Women. In 1935 the "McClung Award" was established by the Beta Beta Beta honorary scientific fraternity. He received the honorary degree of Doctor of Science from the University of Pennsylvania in 1940 and from Franklin and Marshall College in 1942. In 1941 he was granted a Distinguished Service Citation by the Alumni Association of the University of Kansas. During 1940–1941 he was acting head of the department of zoology at the University of Illinois and in 1943 became acting chairman of the department of zoology at Swarthmore College.

Dr. McClung was well-known for his analytical mind, active sense of humor, natural simplicity, and sympathetic friendliness. He was always ready to offer kindly counsel to the many students and others who sought his advice, and his unselfish devotion to the interests of his associates was proverbial. The artistic side of his nature revealed itself in a liking for composition and literature; in his devotion to music in its varied forms, and to pictorial art; in his mastery of different methods of drawing as shown by the expertly executed illustrations of his scientific papers; in his enthusiasm for photography; and an abiding interest in dramatics.

As a teacher, Dr. McClung sought to develop the natural capabilities of each student. Individual projects were a regular feature of his courses. Personal conferences with students served to reveal causes of difficulties and the best methods for improvement.

On various occasions Dr. McClung's students and associates have expressed their admiration and affection for him. Two examples may be cited. At Boston in 1922 they held a testimonial dinner celebrating his completion of twenty-five years as a teacher of zoology and presented him with a volume of personal greetings. Upon his retirement in 1940 more than two hundred of them from all parts of the world sent letters of greeting which were bound and presented to him at the dinner held in his honor. This volume is dedicated as follows:

To Clarence Erwin McClung who, in more than forty years of teaching and research has been a leader in: painstaking and significant research; explaining the mechanism of heredity; advancing better methods

of teaching science; training young men and women for teaching and research; perfecting microscope design and refining microscopical technique; improving the preparation of scientific papers; providing biologists with a comprehensive abstracting service; furthering cooperation among scientists for the advancement of research thru the National Research Council, at the Woods Hole Marine Biological Laboratory and in our universities; radiating friendship and sympathetic understanding to friends, students and associates at home, thruout the nation and in foreign lands.

Dr. McClung's many friends in all parts of the world therefore mourn the passing of a distinguished scientist, a great teacher, and a true friend.

D. H. WENRICH

ALBERT MATTHEWS
(1860–1946)

The death of Albert Matthews on April 13, 1946, terminated a membership of over forty-five years in the Society.[1]

Matthews' life was outwardly uneventful. Born in Boston, June 26, 1860, the son of Nathan and Albertine (Bunker) Matthews, he was graduated from Harvard College in 1892. The condition of his health, as he explained in one of his early class Reports, prevented him from preparing for the active practice of any profession. He never married and, except for his travels, he lived in Boston all his life. But a persistent susceptibility to hay fever compelled him to make summer journeys for many years, and he travelled extensively in both America and Europe. This was by no means to the disadvantage of his scholarship, and the very circumstances which kept him from having an active professional career were perhaps the determining influence in making him a notable example of a type that has been less common in this country than in Europe, the private scholar. A member of a Harvard class which was distinguished for scholars and writers, he was always in close association with his friends at the University. But he never taught there, though he served usefully for a number of years on the Visiting Committee to the Department of English.

He is described in the roll of the Society as "modern philologist and historian." His contributions to philology were mainly in the field of lexicography, and they were due in great measure to the circumstance that during his early travels he came into contact

[1] Elected in 1899.

with Dr. J. A. H. Murray of Oxford. He consequently enlisted in the service of the great *Oxford Dictionary,* and being one of the best read men in the literature of the American Colonial period he placed at the disposal of the *Dictionary* a rich store of information on the English language of the time.

But his chief services to scholarship were rendered in his historical work as Editor of the publications of the Colonial Society of Massachusetts. He held that office for twenty years, and the Minute prepared by Professor Kittredge and adopted by this Society upon his retirement in 1920 gives the final appraisal of his work as an historical editor:

> The Society, in the last twenty years, has received many gifts from its members, but no gift that equals in value the prodigal expenditure of time, of learning, and of exact scholarship that the Editor has bestowed upon our publications. His wonderfully extensive knowledge of English and American History and literature, his accuracy, his independence of judgment, his sureness of touch, his good taste and sense of style, and his almost miraculous keenness on the trail of truant details and elusive evidence are equalled only by the modesty and tact which he has always shown, though with no lack of firmness in dealing with the contributions that have passed under his editorial eye and through his editorial hands. He has written many papers for the Society, ranging from brief notes to elaborate monographs—all of characteristic excellence. And, finally, it is to his initiative that the Society owes a considerable number of the communications offered by his associates. "Here was a Caesar, Whence comes such another?"

Those of us who sat with him for years on the Council of the Colonial Society, while subscribing heartily to this testimonial to his distinction as a scholar and editor, would wish to record also our memory of his companionability, his unfailing courtesy, and the quiet humor with which he enlivened the meetings of the board. These social graces never failed him, though increasing deafness seriously limited his social activity in his later years.

FRED N. ROBINSON

JOHN ANTHONY MILLER
(1859–1846)

Although John Miller had reached the age of forty before he became a member of the Society of Friends, his entrance into the Quaker meeting did not have the nature of a conversion, but rather

that of a fulfillment. By temperament and by personality, he was at home in the community of which he became a member when he joined the faculty of Swarthmore College in 1906. The simplicity and directness of his character, the impression of genuineness which he left even upon the most casual acquaintance, endeared him to many people with whom, during the many years of an active life, he traveled for shorter or longer stretches. For numerous students he was the respected counselor. He was the friend to whom colleagues turned for advice in times of difficulty, for encouragement when doubt as to their future handicapped them in their work. Dr. Aydelotte, President of Swarthmore College during the greater part of Miller's work there and now Director of the Institute for Advanced Study, "depended constantly upon his advice in regard to all sorts of college problems."

These same qualities, joined with unlimited loyalty to responsibilities which he undertook, brought to him positions of leadership in the American Philosophical Society, which occupied a large place in his life for many years. Elected to membership on April 24, 1915, he served as Secretary from January 1920 until April 1941. For many years, until his retirement from active work in 1942, he acted on various important committees. But these bare facts alone give but an incomplete picture of the bonds which attached him to the Society, of the deep concern he had for its welfare, of the thought he gave to its problems during the more difficult and critical years before the Penrose bequest eased the Society's finances, and to the new responsibilities which this bequest placed upon the officers in 1932.

As deeply rooted in his character as his concern for persons and for institutions which he valued was his devotion to the pursuit of science. This aspect of Dr. Miller's life was manifested both in the unswerving determination with which he carried on his investigation of the sun's corona and of other astronomical problems, and in the faithful care which he gave to the teaching of undergraduates. Doubtlessly, many of his former students still value the lessons he taught them, although they may have forgotten the distinction between right ascension and declination. But, valuable as these effects may have been, the principal scientific value of his teaching lies in the careers which have carried so many of his former students to positions of importance in observatories throughout the country. It is to his inspiration that the initiation of these

careers is due, from his advice and support that the courage to adhere to them was derived.

John Miller began life on a farm in Indiana. His path was not made for him by his parents. He was, in many respects, a self-made man; throughout his life he preserved a good deal of the ruggedness which his early struggles awakened in him. Married when he was twenty-one to Mary Catherine Goodwine, he had been a country school teacher for several years before he entered the University of Indiana. He was past thirty when he received the A. B. from this institution, his alma mater, which honored him with the degree of LL.D. in 1928. Perhaps the most important influence experienced in his undergraduate years was that exercised by Joseph Swain, who inspired in him an interest in mathematics and thus determined his future career. This influence continued in after years and ripened into a friendship which lasted until Swain's death in 1927. It was Swain who brought him to Stanford as a member of the mathematics department (Instructor, 1891–1893; Assistant Professor, 1893–1894), back to Indiana in 1894 and to Swarthmore in 1906. A very unusual consummation of this friendship occurred in 1932 when Miller ended the widowerhood, begun two years earlier, by marrying his deceased friend's widow.

Before he received the degree of Doctor of Philosophy in mathematics from the University of Chicago in 1899, only three such doctorates had been conferred by that institution. His dissertation on elliptic modular functions does not contain a hint of his interests toward astronomy which began soon afterwards. When he returned to the University of Indiana in 1899 after the two years spent on leave at the University of Chicago, he was put in charge of the teaching of mechanics and astronomy. It was then that the weight of his interest shifted to astronomy. In 1905 he was in charge of an expedition sent by the University of Indiana to observe a total solar eclipse in Spain, the first of a long sequence of such expeditions which were to follow in later years. Swain became President of Swarthmore College in 1902. Four years later he invited Miller to come to Swarthmore as Professor of Mathematics and Astronomy. By that time his astronomical program and ambitions had developed to such a point that he made his acceptance of the invitation contingent upon the acquisition of a 24-inch telescope. This condition was met through the generous aid of William Cameron Sproul (1870–1928; Governor of Pennsyl-

vania, 1919–1923), whose name has remained associated with the observatory which houses the telescope.

An amusing incident, related to this event, is told in the following story. When informing Miller that his wishes for a telescope would be fulfilled, Swain added the reminder that Swarthmore is a Quaker College and that "thee should give up thy smoking. Please wire thy acceptance." Miller replied, "I cannot accept under the condition."[1] His indulgence in the minor vice was not allowed to remain an obstacle to his appointment. Miller came and he remained faithful to his pipe until the end of his life.

It accompanied him not only in his office but also on his eclipse expeditions. He went to Colorado in 1918, to Mexico in 1923, to New Haven in 1925, to Sumatra in 1926 and again in 1929, to Vermont in 1932. These expeditions formed the basis for a large part of his scientific work. His studies of the solar corona, and also his parallax determinations undertaken as part of a large cooperative program, gave rise to many papers scattered in various astronomical periodicals, the *Sproul Observatory Publications,* the *Astronomical Journal, Popular Astronomy,* and others. Frequently Miller's reports were the result of joint authorship; he collaborated with his Swarthmore colleagues, Ross W. Marriott and John H. Pitman, and with friends from other institutions with whom he was associated in his scientific enterprises. Indeed, in the organization of his expeditions, he exhibited, quite apart from his deep devotion to the scientific purpose which inspired them, an extraordinary skill in bringing together an effective and harmonious group of collaborators; in marshaling the interest and securing the support of his friends and of public-spirited outsiders for his aims.

It was this skill, joined with his warm-hearted simplicity and a remarkable ease in dealing with men, which made him so important a member of the Swarthmore College faculty and administration. During more than twenty years he carried the chairmanship of the Department of Mathematics and Astronomy as well as actively directed the work of the Sproul Observatory. For fifteen years, from 1914 to 1929, he was the college's Vice-president, taking over on two occasions for extended periods the responsibilities of

[1] For this characteristic detail of Miller's personality I am indebted to my colleague John H. Pitman, one of Miller's pupils, for many years a member of the Swarthmore faculty; see his article, Quaker astronomer—John A. Miller, in *The Sky,* March 1941.

the President. In all of his work he won the confidence of the Board of Managers, the respect of his colleagues, the admiration of his students, the love of everyone. Perhaps more important than all of this is the contribution which he made to the intellectual work of the college by convincing, in the words of President Aydelotte, "the members of the Board of Managers and the Alumni that one of the functions of a professor in a small college was to do research. . . . It is easy for the supporters of a small college to take the line that the only important work which a college professor should do is teaching. In my opinion that is fatal. The best undergraduates need contact with creative minds, and John Miller taught that lesson to everyone at Swarthmore."

A few excerpts from a characterization by a friend and colleague of many years, Professor Emeritus Harold C. Goddard of Swarthmore's Department of English, will bring us back to our opening theme, Miller's natural friendliness:

> Miller was an essentially simple man, . . . a man of strong feelings and affections. . . . If at some point John Miller found himself in disagreement with you, he said so straightforwardly, but he did it in a tone and with a spirit that seemed to say: "Of course at bottom and in principle we are at one. This momentary difference that has intruded concerns an incidental aspect of the subject." And in the end you generally discovered that each of you had moved over, if not to actual agreement, at any rate to a point measurably nearer the other's position.

ARNOLD DRESDEN

WILLIAM ALLAN NEILSON

(1869–1946)

What one principally remembers about William Allan Neilson is neither the erudition, which was great, nor the academic honors he received, which were many; rather it is a quality of imaginative common sense. In scholarship as in other highly specialized occupations imagination is frequent enough, and common sense is at least not infrequent. But the imagination that shapes a problem and moves towards its scholarly solution is not always balanced by common sense; and the common sense that permits mediocrities to fill learned journals with blameless articles is not illumined by imagination. Dr. Neilson combined the two elements. The combination

made him approachable and human, vivid and kindly. Both attributes endeared him to students, who forgot the specialist in the friend. And in any academic crisis he began by imaginatively putting himself into the other man's place, and then, as it were simultaneously, brought to bear upon his duplicate self the shrewd, kindly common sense that was his.

His scholarly career began with *Origins and Sources of the Court of Love* (1899), a contribution to medieval lore, later balanced by that immensely useful handbook, *Essentials of Poetry* (1912). In the meantime his one-volume Shakespeare (1906; rev. ed., 1942) put thousands of readers in his debt—indeed, there was a dark rumor that Neilson, not Bacon, might be the author of the plays. Equally magisterial was his collection of *Chief Elizabethan Dramatists* (1911), followed by the useful *Facts about Shakespeare* (1913). And who but Neilson could write *Burns, How to Know Him* (1917)? But to chronicle his many scholarly and editorial jobs, all thoroughly done, all done with the Neilson touch, would be a work of supererogation, not necessary to salvation.

Fourteen colleges and universities gave honorary degrees to the President of Smith College (1917–1939). He was probably the best known president of a woman's college in the United States, and legends grew up about him. There was, for example, the immortal retort to the travelling salesman, who, conceiving that Neilson was a fellow bagman, inquired what his line was. "Skirts," was the brief reply. There is also the tale of his gravely helping an undergraduate up an illegal fire-escape, it being after-hours and the dance having been prolonged. Unfortunately, the history of Smith College he was writing was interrupted by his death (he was seventy-seven when he died, but nobody believed it); perhaps the continuator will devote a chapter to the Neilson touch, the Neilson legend.

It can be recorded that he received his M. A. from the University of Edinburgh in 1891, an M. A. from Harvard University in 1896, and a Ph.D. in 1898; that he commenced teaching at eighteen in Upper Canada College, Toronto; came to Bryn Mawr College in 1898; went to Columbia University as Professor of English in 1905; served at Harvard from 1906 to 1917; and was exchange professor in France in the fateful year of 1914–1915. He was elected a member of the American Philosophical Society in 1944. But what the academic honors do not say is that he was a fearless

liberal, who made conservatives like liberalism because, as he presented its case, liberalism was plain good sense.

Excessive erudition makes men afraid. Balancing this against that, bringing critical and destructive judgment to bear upon hypotheses, learning with what painful struggles truth is born, the specialist comes too often to be a paralytic in action, content with phrases of good will. Not so Neilson. Fighting anti-Semitism, he beamingly announced that he was a pro-Semite. Concerned for minority rights, he really attacked the majority. His chapel talks at Smith were lessons in active and responsible citizenship, not remote discourses about life in a utopian republic. He was not only a scholar and a gentleman, he was a citizen of the state.

His life was filled with honors. But the affection of students and colleagues and the admiration of younger men were more to him than all the rainbow-colored hoods in his closet.

HOWARD MUMFORD JONES

ADOLPH G. ROSENGARTEN
(1870–1946)

In 1819 David George Rosengarten, a young man belonging to a family of well known bankers in Cassel, crossed the ocean and came to Philadelphia bearing letters of introduction to some of the leading citizens of the town. Four years later he purchased an interest in a recently established chemical firm which had been organized by two young men, a Swiss and a German, and was not succeeding as well as they hoped. A year later Rosengarten bought the whole business and established the firm which later under the name of Rosengarten and Sons became one of the most successful chemical manufacturing concerns in the United States. In 1826 David George Rosengarten married Miss Elizabeth Bennet, and their numerous progeny have been succeeded by descendants who in each generation to the present day have been represented by members who have achieved eminence not only in the profession of chemistry but as soldiers and financiers, and in various cultural and philanthropic activities. For many years the firm he founded was continued by his direct descendants from father to son, until the business was merged with Merck and Company in 1927. Besides his chemical firm David George Rosengarten was prominent in financial matters, a director of the Pennsylvania Railroad and the Mechanics' National Bank and at the time of his death in 1890

he was the oldest member of the Franklin Institute and the Philadelphia Club.

Harry Bennet Rosengarten, fourth son of David George Rosengarten, was President of Rosengarten and Sons at the time when that firm was incorporated in 1901, and was so when the firm acquired the Powers, Weightman Company in 1905, and remained President of the merged concerns until his death in 1921.

In 1868 he married Miss Clara J. Knorr by whom he had seven children, of which the second was Adolph G. Rosengarten, born on February 22, 1870. Most of his preparatory education was acquired at the excellent Faries Classical Institute. In 1888 he entered the University of Pennsylvania, from which he graduated with the degree of Bachelor of Science in 1892, after taking the course in chemistry in the Towne Scientific School. Immediately afterwards he began work in the Rosengarten Company, of which in 1898 he became a partner. On the incorporation of the firm in 1901 he was elected Secretary and Treasurer, continuing as such until the Rosengartens took over the business of Powers and Weightman in 1905, when he was elected Treasurer of the Powers-Weightman-Rosengarten Company. In 1917 he was elected Vice-President of the Company, and in 1921 its President, a position which he held until the business was merged in that of Merck and Company, Inc. in 1927, of which he was elected a Director. His financial ability was recognized by his election as a Director of the Philadelphia National Bank, the Fidelity-Philadelphia Trust Company, and the Pennsylvania Salt Manufacturing Company. He was also on the directorates of the Penn Mutual Life Insurance Company, and the Mutual Assurance Company for Insuring Houses from Loss by Fire. Rosengarten was also a Trustee of the University of Pennsylvania and served as a Trustee, and at one time President, on the Board of the Lankenau Hospital.

Like so many members of his family he had military instincts. He was a member of the First Troop of Philadelphia City Cavalry for many years and served with it during the Puerto Rico campaign in the Spanish-American War. In World War I he served with the War Industries Board in Washington, D. C., as Chief of the Miscellaneous Chemical Section of the Board.

In addition to membership in the American Chemical Society and the American Institute of Chemical Engineers, Rosengarten was a Director of the Philadelphia Zoological Society. He was elected a member of the American Philosophical Society in 1940

and was very much interested in its work, attending meetings whenever possible. In the same year Rosengarten was elected a member of the Wistar Association. At the annual meeting of the Wistar Association held November 9, 1944, a resolution was adopted appointing Adolph G. Rosengarten and Francis R. Packard, M. D., a committee to draft a revised and up-to-date edition of the histories of the Association written by Job R. Tyson in 1845, reprinted and edited by Dr. I. Minis Hays in 1898, and the Centennial address by Hampton Carson, Esq. in 1918. The book was completed in the autumn of 1945, chiefly because of Adolph's enthusiastic interest. He did what he called the "spade work," choosing some interesting pictures for reproduction, and chiefly attending to the arrangements for the printing, binding, etc. We both thoroughly enjoyed in cooperating in what he termed "this pleasant task." We lunched together at the Philadelphia Club to celebrate its completion only a few days before his departure for Florida, where he was taken very ill and brought back to die shortly after. His death occurred on April 22, 1946.

Adolph Rosengarten was a most delightful companion and loyal friend; always cheerful and self-effacing. This is amply testified to by his popularity in the City Troop and the Philadelphia Club. His wide culture, keen intelligence, and quick understanding were appreciated by all who knew him. He was devoted to out-door sports, especially shooting and fishing. In his early life he went up to Canada to pursue these occupations, but in the latter years of his life until 1939 he went to England or Scotland, with the exception of one trip in Hungary and Czechoslovakia.

In 1901 Adolph Rosengarten married Christine Penrose, daughter of Walter Elliot Penrose, by whom he had two children, Adolph G. Rosengarten, Jr., who married Janet C. Newlin, daughter of Dr. Arthur Newlin in 1933, and Emily Penrose Rosengarten, who married Samuel Goodman in 1935.

FRANCIS R. PACKARD

HARLAN FISKE STONE

(1872–1946)

It was characteristic of Harlan Stone's zest for life that he made no preparations for death. And the circumstances of his death were characteristic of his good fortune. There was no tapering off; rather was he interrupted in labor which engaged the whole

of him and just after he had pronounced the principle which should be the pole star of the Supreme Court as he understood its place in our scheme. "It is not the function of this Court to disregard the will of Congress in the exercise of its Constitutional power"—such was the message he uttered from the seat of the Chief Justiceship at the very moment that death summoned him on April 22, 1946.

One may be preoccupied with law professionally in five different ways, as teacher, practitioner, administrator, judge, and philosopher. No one can pursue all these callings at the same time and the name does not readily occur of anyone who has done so in due succession if philosophy of law implies dwelling on the high plateau of original thought worthy of the company of thinkers like Holmes. But Stone followed all the other four callings and in each he achieved the acclaim of his professional compeers.

Little imagination is needed to clothe the bare facts of his life with the meaning and significance of his career. Harlan Fiske Stone, the second child of Frederick L. and Anne Sophia (Butler) Stone, was born on October 11, 1872, in Chesterfield, New Hampshire, one of those very small towns of New England with a shrinking population. He was of English stock, but, while professionally he was rooted in English legal traditions, in him, as in many a Yankee, a critical attitude of British policy could easily assert itself. During his childhood the Stone family moved to Amherst, Massachusetts, where the future Chief Justice attended the district school and Amherst High School. Harlan was destined by his father to become a scientific farmer and to that end entered the Massachusetts Agricultural College in 1889. The inscrutable fates evidently had purposes of their own. Harlan's student days at that College, and thereby his paternal predestination as a farmer, were quickly terminated by a row in which blows were said to have been exchanged between the sturdy freshman and a member of the faculty. Harlan went back to the ancestral farm until he entered Amherst the next fall. His college career gave promise of all that followed. Under a strong faculty and in rivalry with contemporaries who subsequently became notable in affairs as well as in the world of scholarship, Harlan was an outstanding man of his time at Amherst, attaining distinction both in the classroom and on the gridiron. On graduation in 1894, he followed a familiar American pattern by teaching for a year at the Newburyport, Massachusetts,

High School. He taught science, for which he had a bent which happily stood him in good stead when as a judge he had to decide patent law cases. But science as a dominant strain emerged not in him but in his son, Marshall, a distinguished mathematician.

Harlan's drive was for law. He received this training at the Columbia Law School from men of eminence as scholars and teachers. A year after he was graduated, he returned as a part-time lecturer while he quickly made his way at the bar. From 1905 to 1910, he devoted himself exclusively to practice with his firm, Satterlee, Canfield & Stone. In 1910 he accepted the call to head his Law School. Throughout his deanship, he taught two of the basic courses in the training of lawyers, Equity and Trusts. These specialties were likewise reflected in his judicial work, for they are aspects of law bringing into play, perhaps more than others, ethical principles and their resourceful adaptation to changing circumstances. Only a man endowed with Stone's great vitality and his disciplined powers of concentration could have successfully led a great law school and at the same time met the demands of a large practice. Whether because the burden finally became too heavy even for him or the allurements of practice, particularly of advocacy, too great, he resigned from Columbia in 1923 to become a member of Sullivan & Cromwell.

Again the fates willed otherwise. Attorney General Harry M. Daugherty's malodorous administration of the Department of Justice had so shocked the public conscience that when he was finally retired, that other Yankee, President Calvin Coolidge, saw clearly enough that the imperative need of the situation was an appointment that would at once restore public confidence in the integrity of the Department of Justice. And so, on April 7, 1924, President Coolidge appointed his Amherst collegemate, Harlan F. Stone. Thereby, the public disquietude was lifted. This restoration of confidence in the country's ministry of justice was Stone's dominant contribution as Attorney General. He was there too short a time for much else. Within the year a vacancy on the Supreme Court fell in, through the retirement of Mr. Justice McKenna. On January 5, 1925, President Coolidge nominated Harlan Fiske Stone to fill the place left vacant, and he took his seat on the Supreme Bench on March 2, 1925. Because of professional association between Stone and a son-in-law of the elder Morgan there was opposition to his confirmation in the Senate,

led by Senator George W. Norris. This is worth noting because of its sequel. When, upon the retirement of Chief Justice Hughes in 1941, Mr. Justice Stone was nominated by President Roosevelt to be Chief Justice, he was promptly confirmed and Senator Norris in the handsomest way recanted his opposition of 1925. This episode in the too uncommon chapter of candor in American politics did credit alike to Senator Norris and Mr. Justice Stone.

Stone's career divides into two major epochs: for twenty years he was a teacher, for twenty years he was a judge. For him these were not disparate callings. One was the logical fruition of the other. His academic career deeply infused his judicial work. As teacher he was concerned with the place of law and lawyers in society. As a judge he made heavy drafts upon the intellectual capital he had laid up in his own career as an academician, and he continued to draw freely upon the common property of scholarship.

As academician he helped to promote the movement of the study of law, primarily not as occupational training but as a branch of the social sciences. He recognized that a shift in economic and social forces demanded a corresponding shift in the training and the functions of the bar. The history and the technique of law were related to its social purposes and its study required to be pursued by application to working hypotheses, constantly subjected to reexamination, of those standards of accuracy and thoroughness which are the essentials of the scientific method. He was hospitable to new ideas, responsive to critical reconsideration of methods of teaching and student examination as well as of the validity of particular institutions for contemporary needs, no matter what historical title deeds they might have. (See "The Public Influence of the Bar," November 1934, 48 *Harv. Law Rev.* 1, and "The Common Law in the United States," November 1936, 50 *Harv. Law Rev.* 4, the two papers by which, perhaps, he would most want to be judged.) There are ample reflections in his opinions of his regard for learning as the path to understanding and as indispensable to wise adjudication.

While recognizing necessary adaptations to changes in economic fact, he insisted, in his utterances, on the perdurance of the conditions essential for a free society, no matter how much direction or control comes increasingly from the center. Indeed, because of the almost inevitable extension and concentration of governmental authority, those conditions become more and not less necessary.

He believed in freedom of utterance to the extent that he was ready to face the hazards of thought, even of murky or reckless thought.

His years on the Court, interestingly enough, made him feel more rather than less the importance of the law teacher in the circumstances of our time. Partly because of the influence of specialization and undue identification with interests of clients that are less than those of society, active practitioners had not the opportunity nor do they form the habit of seeing law as an historic process, or of helping to fashion it as a fair social instrument. The law teachers are set apart, as it were, for these services to law. Indeed, the life of a law teacher was probably the most congenial to him, if one is to judge from his memorial writings of colleagues in teaching. Almost invariably he speaks of "the durable satisfactions" of a law teacher's life.

His experience on the Court had an expanding influence on his mind, partly because of the intimacy that it gave him with Holmes and Brandeis, and, for too few years, with Cardozo, but partly no less because the nature of the issues that come before the Supreme Tribunal made him plow deeper into his own mind than the demands of his life in New York had permitted. It made him realize not merely how profoundly right Holmes was in insisting that we need more theory and not less, but that no judge is fit for his task, certainly on the highest court, unless he be truly cultivated. Stone had always had an interest in the arts. He had visited the best of the European museums and he took full advantage of the opportunities that Washington afforded. When as Chief Justice he became *ex officio* Chairman of the Board of Trustees of the National Gallery of Art and Chancellor of the Smithsonian Institution, and, as a distinguished son of Amherst, Chairman of the Folger Shakespeare Library, he brought zeal to these offices and drew enrichment from them.[1]

During his twenty years on the Court, Stone wrote either for the Court or in dissent some five hundred opinions. This constitutes a comprehensive body of views on the major legal issues of our time. What is no less important, perhaps even more important, such a body of opinions inevitably discloses the author's philosophy regarding a judge's function in our society, whether explicitly avowed or to be read between the lines. To these opinions,

[1] Stone was elected to membership in the American Philosophical Society in 1939.

spread through sixty volumes of the Reports (268 U. S.–328 U. S.), the curious and the learned alike must be referred.

Stone was totally devoid of side, instinctively friendly alike with his colleagues, with his law clerks and with the world at large. He was a great believer in dispatching promptly the business of the Court, knowing that justice unduly delayed is justice denied. He sought to maintain the standards set by his predecessors, particularly those of the Chief Justice whom he succeeded. It was his endeavor to dispose of the business of the Court with all deliberate speed, but only after the freest discussion by every Justice preceding decision and with due regard for the deliberative process of opinion-writing.

As is true in every calling, men vary greatly in the temperaments they bring to judging. Some decide without great inner turmoil and others suffer anguish in the process. Some are serene once the inner debate is concluded; with some the throes of conflict linger long and are easily revived. Some are painfully slow workers, trace and retrace their steps, others swiftly strike at the jugular of a case and are done. Stone's writing is deceptive. It does not give the impression of fluency. He was a quick writer. He was not, however, a quick decider. His was not the temperament that decided without much inner contest, or even rested securely after descending from the fence. A friendly wag of a colleague at Columbia once introduced him at a Law School function as a person who turned neither to partiality on the one hand, nor to impartiality on the other.

He had his share in the "historic shift of emphasis in constitutional interpretation" which, he said, marked the magistracy of Chief Justice Hughes. But the shift had been made by the time he became Chief Justice. His work as such must be left for the judgment of the scholars of the future. Certainly it cannot now be attempted by one who served with him. Suffice it to say, he came to the great succession qualified by a national outlook, not the worse for having been rooted in New England, by an extraordinarily diversified professional experience, and with full appreciation of the demands that the business of the Court makes on legal learning.

He had a strong historic sense and naturally enough was concerned with his place in history. Chief Justices of the United States are rarer than Presidents. A Chief Justice cannot escape history.

FELIX FRANKFURTER

XI

LIST OF MEMBERS

MEMBERS RESIDING WITHIN THE UNITED STATES

Date of Election

Abbot, Charles Greeley, M.Sc., D.Sc., LL.D. 1914
Astrophysicist, Research Associate,
Smithsonian Institution, Washington 25, D. C.

Adams, Edwin Plimpton, M.S., Ph.D., Sc.D. 1915
Professor of Physics, Princeton University,
Princeton, N. J.

Adams, James Truslow, A.M., LL.D., Litt.D., L.H.D. 1938
Author, American Historian.
Sheffield House, Southport, Conn.

Adams, Roger, A.B., A.M., Ph.D., Sc.D. 1935
Head of the Chemistry Department, University of Illinois.
603 Michigan Avenue, Urbana, Ill.

Adams, Walter Sydney, A.M., ScD., LL.D. 1915
Astronomer, Director, Mount Wilson Observatory,
Pasadena 4, Calif.

Aitken, Robert Grant, A.M., Sc.D., LL.D. 1919
Astronomer, Director Emeritus, Lick Observatory.
1109 Spruce Street, Berkeley 7, Calif.

Albright, William F., Ph.D., Litt.D., D.H.L., Th.D. 1929
Orientalist and Archaeologist, Professor of Semitic
Languages, Johns Hopkins University, Baltimore 18, Md.

Alexander, James W., A.M., Ph.D., A.A. 1928
Professor of Mathematics, Institute for Advanced Study.
29 Cleveland Lane, Princeton, N. J.

Allen, Charles Elmer, Ph.D., Sc.D. 1922
Professor Emeritus of Botany, University of Wisconsin.
2014 Chamberlin Avenue, Madison 5, Wis.

Anderson, Carl David, Ph.D. 1938
Professor of Physics, California Institute
of Technology, Pasadena 4, Calif.

Date of Election

Andrews, Donald Hatch, A.B., Ph.D. 1933
Chairman, Chemistry Department, Director, Chemistry Laboratory, Johns Hopkins University.
204 Southway, Guilford, Baltimore 18, Md.

Andrews, Roy Chapman, A.B., A.M., Sc.D. 1927
Zoologist, Honorary Director, American Museum of Natural History. Colebrook, Conn.

Angell, James Rowland, A.B., A.M., Ph.D., Litt.D., LL.D. 1924
Psychologist, President Emeritus, Yale University; Educational Counselor, National Broadcasting Company.
155 Blake Road, Hamden, New Haven, Conn.

Armstrong, Hamilton Fish, A.B. 1940
Writer; Editor, *Foreign Affairs*.
58 East 68th Street, New York 21, N. Y.

Aydelotte, Frank, A.M., B.Litt., L.H.D., LL.D., D.Litt., D.C.L. 1923
Director, Institute for Advanced Study,
Princeton, N. J.

Bailey, Irving Widmer, A.B., M.F., Sc.D. 1926
Professor of Plant Anatomy, Harvard University.
17 Buckingham Street, Cambridge 38, Mass.

Bailey, Liberty Hyde, Litt.D., LL.D. 1896
Botanist, Professor Emeritus of Agriculture (Horticulture), Director, Bailey Hortorium, Cornell University, Ithaca, N. Y.

Bancroft, Wilder Dwight, A.B., Ph.D., Sc.D., LL.D. 1920
Professor Emeritus of Physical Chemistry, Cornell University. 7 East Avenue, Ithaca, N. Y.

Barnard, Chester Irving, Sc.D., LL.D. 1943
Economist and Administrator, President, New Jersey Bell Telephone Company,
540 Broad Street, Newark 1, N. J.

Bartlett, Harley Harris, A.B. 1929
Chairman, Department of Botany, Director, Botanical Garden, University of Michigan. 1601 Brooklyn Avenue, Ann Arbor, Mich.

Baugh, Albert Croll, Ph.D., LL.D. 1946
Felix E. Schelling Memorial Professor of English, University of Pennsylvania, Philadelphia 4, Pa.

Date of Election

Bayne-Jones, Stanhope, M.D., M.A., Sc.D. 1944
Professor of Bacteriology, Yale University School of Medicine, 333 Cedar Street, New Haven 11, Conn.

Beadle, George Wells, Ph.D. 1945
Professor of Biology, California Institute of Technology, Pasadena 4, Calif.

Beams, Jesse Wakefield, Ph.D. 1939
Professor of Physics, University of Virginia. Monroe Hill, University, Va.

Beard, Charles Austin, LL.D., Litt.D., Ph.D. 1936
Historian, Formerly Professor of Politics, Columbia University. New Milford, Conn.

Beeson, Charles Henry, Ph.D. 1940
Professor of Latin, University of Chicago. 1228 East 56th Street, Chicago 37, Ill.

Bell, Eric Temple, Ph.D. 1937
Professor of Mathematics, California Institute of Technology. 434 South Michigan Avenue, Pasadena 5, Calif.

Benedict, Francis Gano, Ph.D., Sc.D., M.D. 1910
Physiologist, Director (ret.), Nutrition Laboratory, Carnegie Institution of Washington (1907–37). Machiasport, Maine.

Berkey, Charles Peter, B.S., M.S., Ph.D., Sc.D. 1928
Newberry Professor Emeritus of Geology, Columbia University, New York 27, N. Y.

Bigelow, Henry Bryant, Ph.D. 1937
President, Woods Hole Oceanographic Institution; Alexander Agassiz Professor of Zoology, Harvard University. Museum of Comparative Zoology, Cambridge 38, Mass.

Birge, Edward Asahel, Ph.D., LL.D., Sc.D. 1923
Zoologist, President Emeritus, University of Wisconsin. 2011 Van Hise Avenue, Madison 5, Wis.

Birge, Raymond Thayer, A.M., Ph.D. 1943
Professor of Physics, University of California. 1639 La Vereda Street, Berkeley 4, Calif.

Blackwelder, Eliot, Ph.D. 1939
Professor Emeritus of Geology, Stanford University, Calif.

Date of Election

Blake, Robert Pierpont, Ph.D., LL.D. 1944
Professor of History, Harvard University.
40 Appleton Street, Cambridge 38, Mass.

Blakeslee, Albert Francis, B.A., M.A., Ph.D., D.Sc. 1924
Visiting Professor of Botany, Director, Genetics Experiment Station, Smith College, Northampton, Mass.

Blegen, Carl William, Ph.D., M.A. 1941
Professor of Classical Archaeology, Fellow of the Graduate School of Arts and Sciences, University of Cincinnati, Cincinnati 21, Ohio.

Bliss, Gilbert Ames, B.S., M.S., Ph.D., Sc.D. 1926
Professor Emeritus of Mathematics, University of Chicago, Chicago 37, Ill.

Bloomfield, Leonard, Ph.D. 1942
Professor of Linguistics,
Yale University, New Haven 11, Conn.

Bogert, Marston Taylor, A.B., Ph.B., Sc.D., LL.D., R.N.D. 1909
Professor Emeritus of Organic Chemistry,
Columbia University, New York 27, N. Y.

Bolton, Herbert Eugene, Ph.D., D.Litt., L.H.D., LL.D. 1937
Sather Professor Emeritus of History,
University of California, Berkeley 4, Calif.

Bonbright, James Cummings, B.S., Ph.D. 1946
Professor of Finance, Columbia University.
29 Claremont Avenue, New York, N. Y.

Bonner, Campbell, A.M., Ph.D. 1938
Professor of the Greek Language and Literature, University of Michigan. 1025 Martin Place,
Ann Arbor, Mich.

Boring, Edwin Garrigues, M.E., Ph.D. 1945
Professor of Psychology, Emerson Hall,
Harvard University, Cambridge 38, Mass.

Bowen, Ira Sprague, Ph.D. 1940
Professor of Physics, Mount Wilson Observatory,
Pasadena 4, Calif.

Bowen, Norman L., M.A., B.Sc., Ph.D., Sc.D., LL.D. 1930
Geologist, Charles L. Hutchinson Distinguished Service Professor of Petrology, and Chairman, Department of Geology and Paleontology, University of Chicago,
Chicago 37, Ill.

Date of Election

Bowman, Isaiah, B.S., Ph.D., M.A., D.Sc., LL.D. 1923
Geographer, President, Johns Hopkins University, Baltimore 18, Md.

Boyd, Julian Parks, A.B., A.M,. D.Litt. 1943
Librarian, Princeton University, Princeton, N. J.

Bridgman, Percy Williams, A.M., Ph.D., Sc.D. 1916
Physicist, Hollis Professor of Mathematics and Natural Philosophy, Harvard University. Research Laboratory of Physics, Cambridge 38, Mass.

Briggs, Lyman J., Ph.D., Sc.D., D.Eng., LL.D. 1935
Physicist, Director Emeritus, National Bureau of Standards. 3208 Newark Street, Cleveland Park, Washington 8, D. C.

Bronk, Detlev W., M.S., Ph.D., Sc.D. 1934
Professor of Biophysics, Director, Eldridge Reeves Johnson Foundation for Medical Physics; Director, Institute of Neurology, University of Pennsylvania, Philadelphia 4, Pa.

Brooks, Van Wyck, Litt.D. 1939
Author and Literary Historian, 350 East 57th Street, New York 22, N. Y.

Brown, W. Norman, A.B., Ph.D. 1946
Professor of Sanskrit, University of Pennsylvania, Philadelphia 4, Pa.

Bryant, William L. 1935
Paleontologist, Director, Park Museum, Providence 5, R. I.

Buck, Carl Darling, A.B., Ph.D., Litt.D. 1923
Professor Emeritus of Comparative Philology, University of Chicago. 5609 Kenwood Avenue, Chicago 37, Ill.

Buckley, Oliver Ellsworth, B.S., D.Sc., Ph.D. 1942
Physicist and Engineer, President, Bell Telephone Laboratories, 463 West Street, New York 14, N. Y.

Buddington, Arthur F., Ph.D., Sc.D. 1931
Professor of Geology, Chairman, Department of Geology, Princeton University, Princeton, N. J.

Burgess, Warren Randolph, Ph.D., LL.D. 1942
Banker and Statistician, Vice Chairman, National City Bank of New York. 30 West 54th Street, New York 19, N. Y.

Date of Election

Bush, John Nash Douglas, B.A., M.A., Ph.D. 1946
Professor of English, Harvard University.
3 Clement Circle, Cambridge 38, Mass.

Bush, Vannevar, Sc.D., Eng.D., LL.D. 1937
Engineer, President, Carnegie Institution of Washington, Washington 5, D. C.

Butler, Nicholas Murray, Ph.D., LL.D. 1938
President Emeritus, Columbia University, New York 27, N. Y.

Byrd, Richard Evelyn, Ph.D., D.Eng., Sc.D., LL.D. 1930
Geographer, Navigator, Rear-Admiral (ret.), United States Navy. 9 Brimmer Street, Boston, Mass.

Calvert, Philip Powell, Ph.D. 1918
Professor Emeritus of Zoology, University of Pennsylvania. P. O. Box 14, Cheyney, Pa.

Campbell, Douglas Houghton, Ph.D., LL.D. 1910
Professor Emeritus of Botany, Stanford University, Calif.

Capps, Edward, Ph.D., LL.D., Litt.D., L.H.D. 1920
Professor Emeritus of Classics, Princeton University, 42 Mercer Street, Princeton, N. J.

Carlson, Anton Julius, A.M., Ph.D., M.D., LL.D., Sc.D. 1928
Professor Emeritus of Physiology, University of Chicago. 5228 Greenwood Avenue, Chicago, Ill.

Carmichael, Leonard, Ph.D., Sc.D., Litt.D., LL.D. 1942
Psychologist, President, Tufts College, Medford 55, Mass.

Carpenter, Rhys, Ph.D., Litt.D. 1935
Professor of Archaeology, Bryn Mawr College. Jerry Run, R. D. 2, Downingtown, Pa.

Case, Ermine Cowles, A.B., A.M., M.S., Ph.D. 1931
Professor Emeritus of Historical Geology and Paleontology, University Museums Building, University of Michigan, Ann Arbor, Mich.

Castle, William Bosworth, M.D., S.M. 1939
Professor of Medicine, Harvard University; Associate Director, Thorndike Memorial Laboratory, and Director, Second and Fourth Medical Services (Harvard), Boston City Hospital, Boston 18, Mass.

Castle, William Ernest, A.M., Ph.D., Sc.D., LL.D. 1910
Professor Emeritus of Genetics, Harvard University; Research Associate in Genetics, University of California. Hilgard Hall, Berkeley 4, Calif.

Date of Election

Cather, Willa, Litt.D., LL.D. 1934
Author. Care A. A. Knopf, 501 Madison Avenue, New York 22, N. Y.

Chafee, Zechariah, Jr., A.B., LL.B., LL.D., D.C.L. 1946
Professor of Law, Harvard University Law School. 26 Elmwood Avenue, Cambridge, Mass.

Chamberlain, Joseph Perkins, Ph.D., LL.D. 1940
Professor of Public Law, Columbia University. 8 Sutton Square,, New York 22, N. Y.

Chamberlin, Rollin Thomas, Ph.D., Sc.D. 1943
Professor of Geology, University of Chicago. 9300 Pleasant Avenue, Chicago 20, Ill.

Chandrasekhar, Subrahmanyan, M.A., Ph.D., Sc.D. 1945
Professor of Theoretical Astrophysics, Yerkes Observatory, University of Chicago, Williams Bay, Wis.

Chaney, Ralph Works, B.S., Ph.D. 1943
Professor of Paleontology and Curator of Paleobotanical Collections, University of California; Research Associate, Carnegie Institution of Washington. University of California, Berkeley 4, Calif.

Chase, George Henry, A.B., A.M., Ph.D., L.H.D., Litt.D. 1929
Professor of Archaeology, Dean of the University, Harvard University. 1 Bryant Street, Cambridge 38, Mass.

†Cheyney, Edward Potts, A.M., Litt.D., LL.D. 1904
Professor Emeritus of European History, University of Pennsylvania. R. F. D. 3, Media, Pa.

Chinard, Gilbert, B.L., L.èsL., LL.D. 1932
Professor of French Literature, Princeton University. 93 Mercer Street, Princeton, N. J.

Clark, John Maurice, L.H.D., Ph.D., LL.D. 1944
Professor of Economics, Columbia University. Westport, Conn.

Clark, William Mansfield, Ph.D., Sc.D. 1939
De Lamar Professor of Physiological Chemistry, Johns Hopkins University, School of Medicine, Baltimore 5, Md.

† Deceased February 1, 1947.

Date of Election

Clarke, Hans Thacher, D.Sc. 1943
Professor of Biochemistry, College of Physicians and Surgeons, Columbia University.
630 W. 168th Street, New York 32, N. Y.

Cleland, Ralph Erskine, A.B., M.S., Ph.D. 1932
Professor and Head, Department of Botany and Bacteriology, Indiana University, Bloomington, Ind.

Coble, Arthur Byron, Ph.D., LL.D. 1939
Professor of Mathematics, University of Illinois.
702 W. Washington Boulevard, Urbana, Ill.

Cockerell, Theodore Dru Alison, D.Sc. 1928
Professor Emeritus of Zoology, University of Colorado.
908 10th Street, Boulder, Colo.

Cole, Fay-Cooper, Ph.D., Sc.D., LL.D. 1941
Professor of Anthropology, Chairman of the Department, University of Chicago. 5626 Dorchester Avenue, Chicago 37, Ill.

Compton, Arthur Holly, B.Sc., Ph.D., Sc.D., LL.D. 1925
Physicist, Chancellor, Washington University, St. Louis 5, Mo.

Compton, Karl Taylor, Ph.D., Sc.D., D.Eng., LL.D. 1923
Physicist, President, Massachusetts Institute of Technology, Cambridge 39, Mass.

Conant, James Bryant, Ph.D., LL.D., S.D., L.H.D., D.C.L., D.Sc. 1935
Chemist, President, Harvard University.
11 Quincy Street, Cambridge 38, Mass.

Conklin, Edwin Grant, Ph.D., Sc.D., LL.D. 1897
Professor Emeritus of Biology, Princeton University, Princeton, N. J.

Coolidge, William David, Ph.D., Sc.D. 1938
Physicist, Director, Research Laboratories of the General Electric Company. 1480 Lenox Road, Schenectady 8, N. Y.

Corner, George Washington, M.D. 1940
Director, Department of Embryology, Carnegie Institution of Washington, Wolfe and Madison Streets, Baltimore 5, Md.

Corwin, Edward Samuel, Ph.D., LL.D., Litt.D. 1936
Professor Emeritus of Jurisprudence, Princeton University, Princeton, N. J.

Date of Election

Cottrell, Frederick Gardner, Ph.D., LL.D. 1938
Chemist, Consultant to Research Corporation, New York.
1557 Waverley Street, Palo Alto, Calif.

Crane, Robert Treat, Ph.D., LL.B. 1941
Formerly Executive Director, Social Science
Research Council. 7 Temple Street, Stonington, Conn.

Crew, Henry, Ph.D. 1921
Professor Emeritus of Physics, Northwestern University.
620 Library Place, Evanston, Ill.

Crocker, William, A.B., A.M., Ph.D. 1931
Botanist, Director, Boyce Thompson Institute
for Plant Research, Inc. 1086 North Broadway,
Yonkers 3, N. Y.

Cross, Whitman, B.S., Ph.D., Sc.D. 1915
Geologist, Member (ret.), United State Geological Survey.
101 E. Kirke Street, Chevy Chase 15, Md.

Cross, Wilbur L., A.B., Ph.D., Litt.D., L.H.D., LL.D. 1934
Governor of Connecticut (1931–39); Professor
Emeritus of English, Yale University; Editor of
The Yale Review. 24 Edgehill Road, New Haven 11, Conn.

Daly, Reginald Aldworth, A.M., Ph.D., Sc.D. 1913
Professor of Geology, Harvard University.
23 Hawthorn Street, Cambridge 38, Mass.

Damrosch, Walter Johannes, Mus.D. 1939
Musician, Conductor. 168 East 71st Street,
New York 21, N. Y.

Danforth, Charles Haskell, Ph.D., Sc.D. 1944
Professor of Anatomy, Stanford University.
607 Cabrillo Avenue, Stanford University, Calif.

Darrach, William, A.B., A.M., M.D., Sc.D., LL.D. 1929
Professor of Clinical Surgery, Dean Emeritus of
the Medical Faculty, Columbia University.
180 Fort Washington Avenue, New York 32, N. Y.

Darrow, Karl Kelchner, Ph.D. 1936
Research Physicist, Bell Telephone Laboratories.
230 West 105th Street, New York 25, N. Y.

Davis, Bradley Moore, A.M., Ph.D. 1914
Professor Emeritus of Botany, University of Michigan,
Ann Arbor, Mich.

Date of Election

Davis, Harvey Nathaniel, A.B., A.M., Ph.D., Sc.D., LL.D., D.Eng. 1935
Mechanical Engineer, President, Stevens Institute of Technology. Hoxie House, Castle Point, Hoboken, N. J.

Davis, John William, A.B., LL.B., LL.D. 1923
Lawyer. 15 Broad Street, New York 5, N. Y.

Davisson, Clinton J., Ph.D., D.Sc. 1929
Physicist, Member (ret.), Bell Telephone Laboratories. 31 Campbell Road, Short Hills, N. J.

Day, Arthur L., Ph.D., Sc.D. 1912
Geophysicist, Director (ret.), Geophysical Laboratory (1907–36), Carnegie Institution of Washington. 9113 Old Georgetown Road, Bethesda 14, Md.

Day, Edmund Ezra, Ph.D., LL.D. 1937
Economist, President, Cornell University, Ithaca, N. Y.

Debye, Peter 1936
Chairman, Department of Chemistry, and Professor of Chemistry, Cornell University, Ithaca, N. Y.

Delano, Frederic Adrian 1935
Administrator. 2400 16th Street, Washington 9, D. C.

Dempster, Arthur Jeffrey, A.B., A.M., Ph.D., Sc.D. 1932
Professor of Physics, University of Chicago. 5757 Kenwood Avenue, Chicago 37, Ill.

Derleth, Charles, Jr., C.E., LL.D. 1936
Engineer, Professor Emeritus of Civil Engineering, University of California, Berkeley 4, Calif.

Detwiler, Samuel Randall, Ph.D. 1940
Professor of Anatomy, Columbia University. 630 West 168th Street, New York 32, N. Y.

Dewey, Bradley, A.B., B.S., Hon. D.Sc., Hon. LL.D. 1945
Chemical Engineer, President, Dewey and Almy Chemical Company, Cambridge, Mass.

Dewey, John, A.B., Ph.D., LL.D. 1911
Professor Emeritus of Philosophy, Columbia University. 1158 Fifth Avenue, New York 29, N. Y.

Dickinson, John, Ph.D., LL.B., LL.D. 1940
Professor of Law, University of Pennsylvania; General Counsel, Pennsylvania Railroad Company. 1740 Broad Street Station Building, Philadelphia 3, Pa.

Date of Election

Dinsmoor, William Bell, Litt.D. 1933
Professor of Archaeology, Columbia University.
9 East 77th Street, New York 21, N. Y.

Dobzhansky, Theodosius 1942
Professor of Zoology, Columbia University,
New York 27, N. Y.

Dodds, Harold Willis, Ph.D., LL.D. 1935
Administrator, President, Princeton University,
Princeton, N. J.

Doisy, Edward Adelbert, M.S., Ph.D. 1942
Professor of Biochemistry, St. Louis University School of Medicine. 310 Glen Road, Webster Groves 19, Mo.

Douglas, Lewis Williams, B.A., LL.D. 1942
United States Ambassador to Great Britian;
President, Mutual Life Insurance Company of New York.
34 Nassau Street, New York 5, N. Y.

Douglass, Andrew Ellicott, D.Sc. 1941
Professor of Astronomy and Dendrochronology,
University of Arizona, Tucson, Ariz.

Dresden, Arnold, M.S., Ph.D. 1932
Professor of Mathematics, Swarthmore College.
606 Elm Avenue, Swarthmore, Pa.

Duane, Morris, A.B., LL.B. 1940
Lawyer, Duane, Morris and Heckscher.
1617 Land Title Building, Philadelphia 10, Pa.

DuBois, Eugene Floyd, M.D. 1940
Professor of Physiology, Cornell University Medical College. 1300 York Avenue, New York 21, N. Y.

DuBridge, Lee Alvin, A.M., Ph.D., Sc.D. 1942
Physicist, President, California Institute of Technology,
Pasadena 4, Calif.

Duggar, Benjamin Minge, A.M., Ph.D., LL.D. 1921
Professor Emeritus of Plant Physiology and Plant Pathology,
University of Wisconsin. Care Lederle Laboratories, Inc.,
Pearl River, N. Y.

Dunbar, Carl Owen, A.B., Ph.D. 1942
Professor of Paleontology and Stratigraphy,
Director, Peabody Museum, Yale University,
New Haven 11, Conn.

Date of Election

Dunn, Gano, M.S., E.E., D.Sc., D.Eng. 1924
Engineer, President, J. G. White Engineering Corporation; President, Cooper Union for the Advancement of Science and Art. 80 Broad Street, New York 4, N. Y.

Dunn, L(eslie) Clarence, B.S., M.S., Sc.D. 1943
Professor of Zoology and Executive Officer, Department of Zoology, Columbia University, New York 27, N. Y.

Du Pont, Pierre Samuel, B.S. 1917
Chemist, Manufacturer, E. I. du Pont de Nemours and Company. Du Pont Building, Wilmington 98, Del.

Durand, William Frederick, Ph.D., LL.D. 1917
Professor Emeritus of Mechanical Engineering, Stanford University, Calif.

Edgerton, Franklin, Ph.D. 1935
Professor of Sanskrit and Comparative Philology, Yale University. 1504 "A" Yale Station, New Haven, Conn.

Einstein, Albert, Ph.D., M.D. 1930
Professor Emeritus of Theoretical Physics, Institute for Advanced Study, Princeton, N. J.

Eisenhart, Luther Pfahler, A.B., Ph.D., Sc.D., LL.D. 1913
Professor Emeritus of Mathematics, Dean Emeritus, Graduate School, Princeton University. 25 Alexander Street, Princeton, N. J.

Erlanger, Joseph, B.S., M.D., LL.D., Sc.D. 1927
Professor of Physiology, Washington University. 4580 Scott Avenue, St. Louis 10, Mo.

Evans, Griffith Conrad, Ph.D. 1941
Professor of Mathematics, University of California. 820 San Diego Road, Berkeley 7, Calif.

Eyring, Henry, Ph.D. 1941
Chemist, Dean, Graduate School, University of Utah, Salt Lake City, Utah.

Fels, Samuel S., LL.D. 1939
President, Fels and Company, Paschall Oxygen Company. 39th and Walnut Streets, Philadelphia 4, Pa.

Fenn, Wallace Osgood, Ph.D. 1946
Professor of Physiology, University of Rochester, School of Medicine and Dentistry, 260 Crittenden Boulevard, Rochester 7, N. Y.

Date of Election

Ferguson, William Scott, A.M., Ph.D., LL.D., Litt.D. 1937
MacLean Professor of Ancient and Modern History, Harvard University. 8 Scott Street, Cambridge 38, Mass.

Fermi, Enrico, Ph.D. 1939
Professor of Physics, University of Chicago, Chicago 37, Ill.

Fernald, Merritt Lyndon, S.B., D.C.L., D.Sc. 1936
Professor of Natural History, Director, Gray Herbarium, Harvard University, Cambridge 38, Mass.

Fetter, Frank Albert, Ph.D., LL.D. 1935
Professor Emeritus of Political Economy, Princeton University. 168 Prospect Avenue, Princeton, N. J.

Fieser, Louis Frederick, Ph.D. 1941
Sheldon Emery Professor of Organic Chemistry, Harvard University. 27 Pinehurst Road, Belmont 38, Mass.

Fisher, Irving, B.A., Ph.D., LL.D. 1927
Professor Emeritus of Economics, Yale University. Box 1825, New Haven 8, Conn.

Foote, Paul Darwin, A.B., M.A., Ph.D. 1927
Physicist, Executive Vice-president, Gulf Research and Development Company. P.O. Drawer 2038, Pittsburgh 30, Pa.

Forbes, Alexander, A.B., A.M., M.D. 1931
Professor of Physiology, Harvard Medical School, Shattuck Street, Boston 15, Mass.

Ford, Guy Stanton, Ph.D., Litt.D., LL.D., L.H.D. 1939
Executive Secretary and Editor, *American Historical Review*. Study 274, Library of Congress Annex, Washington 25, D. C.

Fosdick, Raymond Blaine, B.A., M.A., LL.B., LL.D. 1930
Lawyer, President, Rockefeller Foundation and General Education Board, 49 West 49th Street, New York 20, N. Y.

Franck, James, Ph.D., LL.D. 1937
Professor of Physical Chemistry, University of Chicago, Chicago 37, Ill.

Frankfurter, Felix, LL.B. 1939
Associate Justice, Supreme Court of the United States, Washington, D. C.

Date of Election

Fred, Edwin Broun, Ph.D. 1945
Bacteriologist, President, University of Wisconsin, Madison 6, Wis.

Freeman, Douglas Southall, Ph.D., LL.D., D.Litt., Litt.D., L.H.D. 1943
Editor, *The Richmond News Leader,* Richmond 13, Va.

Frost, Robert, L.H.D., Litt.D. 1937
Poet, Professor of English, Amherst College. South Shaftsbury, Vt.

Gaposchkin, Cecilia Payne, B.A., Ph.D. 1936
Astronomer, Harvard College Observatory, Cambridge 38, Mass.

Gasser, Herbert Spencer, A.M., M.D., Sc.D., LL.D. 1937
Physiologist, Director, Rockefeller Institute for Medical Research, 66th Street and York Avenue, New York 21, N. Y.

Gates, Thomas Sovereign, Ph.B., LL.B., LL.D., Ph.D. 1930
Administrator, Chairman of the Trustees, University of Pennsylvania. 2015 Packard Building, Philadelphia 2, Pa.

Giauque, William Francis, Ph.D., Sc.D. 1940
Professor of Chemistry, University of California, Berkeley 4, Calif.

Gies, William J., B.S., Ph.B., M.S., Ph.D., Sc.D., LL.D. 1915
Professor of Biological Chemistry, Columbia University Medical School. 630 West 168th Street, New York 32, N. Y.

Gifford, Walter Sherman, A.B., LL.D., D.Sc., D.C.L. 1931
Administrator, President, American Telephone and Telegraph Company. 195 Broadway, New York 7, N. Y.

†Gomberg, Moses, B.S., Sc.D., LL.D. 1920
Professor Emeritus of Chemistry, University of Michigan. 712 Onondaga Street, Ann Arbor, Mich.

Goodpasture, Ernest William, M.D., M.S., D.Sc. 1943
Professor of Pathology, School of Medicine, Vanderbilt University, Nashville 4, Tenn.

Goodrich, Carter, A.B., Ph.D. 1946
Professor of Economics, Columbia University. New York 27, N. Y.

† Deceased February 12, 1947.

Date of Election

Goodrich, Herbert Funk, A.B., LL.B., LL.D. 1937
Judge, United States Circuit Court of Appeals, Third Circuit. 8128 St. Martin's Lane, Chestnut Hill, Philadelphia 18, Pa.

Graham, Evarts Ambrose, M.D., Sc.D., LL.D., M.S. 1941
Professor of Surgery, Washington University School of Medicine, St. Louis 10, Mo.

Graves, Frank Pierrepont, Ph.D., Litt.D., L.H.D., LL.D., J.U.D., D.C.L. 1927
Educator. 303 Woodlawn Avenue, Albany, N. Y.

Greene, Evarts B., Ph.D., Litt.D., L.H.D., LL.D. 1931
Professor Emeritus of American History, Columbia University. Box 285, Croton-on-Hudson, N. Y.

Gregg, Alan, M.D. 1944
Director for the Medical Sciences, The Rockefeller Foundation. 30 Cambridge Road, Scarsdale, N. Y.

Gregory, Herbert Ernest, Ph.D., D.Sc. 1923
Silliman Professor Emeritus of Geology, Yale University; Director Emeritus, Bernice P. Bishop Museum, Honolulu, Hawaii.

Gregory, William King, A.M., Ph.D., D.Sc. 1925
Professor of Vertebrate Paleontology, Columbia University; Curator Emeritus, Department of Comparative Anatomy, Department of Ichthyology, American Museum of Natural History, New York 24, N. Y.

Gulick, Charles Burton, Ph.D. 1940
Eliot Professor Emeritus of Greek Literature, Harvard University. 59 Fayerweather Street, Cambridge 38, Mass.

Haney, John Louis, A.B., A.M., B.S., Ph.D., LL.D. 1929
Educator, President (ret.), Central High School of Philadelphia. 6419 Woodbine Avenue, Overbrook, Philadelphia 31, Pa.

Harkins, William Draper, A.B., Ph.D. 1925
Professor of Physical Chemistry, University of Chicago. 5437 Ellis Avenue, Chicago, Ill.

Harrison, Ross G., M.A., Ph.D., M.D., Sc.D., LL.D. 1913
Professor Emeritus of Biology, Yale University; Chairman, National Research Council. 142 Huntington Street, New Haven 11, Conn.

Date of Election

Harvey, E. Newton, Ph.D. 1929
Henry Fairfield Osborn Professor of Biology, Princeton University, Princeton, N. J.

Hastings, A. Baird, Ph.D., Sc.D., B.S. 1941
Hamilton Kuhn Professor of Biological Chemistry, Harvard Medical School, Boston 15, Mass.

Hawk, Philip Bovier, M.S., Ph.D. 1915
Chemist. 750 West 50th Street, Miami Beach, Fla.

Hayes, Carlton Joseph Huntley, Ph.D., Litt.D., LL.D., L.H.D. 1940
Seth Low Professor of History, Columbia University. 88 Morningside Drive, New York 27, N. Y.

Heaton, Herbert, M.A., M.Com., Litt.D. 1945
Professor of Economic History, University of Minnesota. 141 Bedford Street, Minneapolis 14, Minn.

Heiser, Victor George, A.B., M.D., Sc.D., LL.D. 1918
Physician. Bantam, Conn.

Hendrickson, George Lincoln, A.B., L.H.D. 1932
Professor of Greek and Latin Literature, 851 Branford College, Yale University, New Haven 11, Conn.

Hisaw, Frederick Lee, Ph.D., LL.D. 1940
Professor of Zoology, Harvard University, Cambridge 38, Mass.

Hobbs, William Herbert, A.M., Ph.D., D.Eng., LL.D. 1909
Professor Emeritus of Geology, University of Michigan. 1005 Berkshire Road, Ann Arbor, Mich.

Hocking, William Ernest, Ph.D., L.H.D., D.D., Th.D., LL.D. 1943
Professor Emeritus of Philosophy, Harvard University. Madison, N. H.

Holland, Leicester Bodine, B.S., Ph.D. 1931
Professor of Fine Arts (on leave of absence), University of Pennsylvania. 415 West Price Street, Germantown, Philadelphia 44, Pa.

Hooton, Earnest A., B.A., M.A., Ph.D., B.Litt., Sc.D. 1931
Professor of Anthropology, Curator of Somatology, Peabody Museum, Harvard University, Cambridge 38, Mass.

Date of Election

Hoover, Herbert, Dr.Eng., M.D., Sc.D., LL.D., D.C.L., J.D. 1918
Engineer, Thirty-first President of the United States.
Stanford University, Calif.

Hopkins, B Smith, Ph.D., D.Sc., LL.D. 1927
Professor Emeritus of Inorganic Chemistry,
University of Illinois, Urbana, Ill.

Hopkinson, Edward, Jr., A.B., LL.B. 1938
Lawyer, Banker, Trustee, University of Pennsylvania.
P.O. Box 7468, Philadelphia 1, Pa.

Howard, Leland Ossian, M.D., Ph.D., Sc.D., LL.D. 1911
Zoologist, Consulting Entomologist, United States
Public Health Service. Bureau of Entomology,
United States Department of Agriculture,
Washington 25, D. C.

Hubble, Edwin P., B.Sc., Ph.D., B.A., D.Sc., LL.D. 1929
Astronomer, Mount Wilson Observatory,
Pasadena 4, Calif.

Hudson, Manley Ottmer, A.M., LL.B., S.J.D., LL.D., D.C.L. 1941
Judge, Permanent Court of International Justice;
Bemis Professor of International Law, Harvard
University, Cambridge 38, Mass.

Huebner, Solomon Stephen, Ph.D., Sc.D., B.L., M.L. 1930
Professor of Insurance and Commerce,
University of Pennsylvania.
697 South Highland Avenue, Merion, Pa.

Hughes, Charles Evans, A.B., A.M., LL.B., LL.D., D.C.L. 1926
Chief Justice of the United States (ret.).
2223 R Street, N.W., Washington 8, D. C.

Hulett, George A., A.B., Ph.D. 1913
Professor Emeritus of Physical Chemistry, Princeton
University. 44 Washington Road, Princeton, N. J.

Humphreys, William Jackson, A.B., C.E., Ph.D., Sc.D. 1929
Professor Emeritus of Meteorological Physics,
George Washington University; Collaborator,
United States Weather Bureau. Cosmos Club.
Washington 5, D. C.

Date of Election

Hunsaker, Jerome Clarke, D.Sc. 1940
Head, Department of Mechanical Engineering, Massachusetts Institute of Technology; Professor in Charge, Guggenheim Aeronautical Laboratory, Cambridge 39, Mass.

Hunter, Walter Samuel, Ph.D. 1941
Professor of Psychology, Director, Psychological Laboratory, Brown University. 61 Prospect Street, Providence 6, R. I.

Huntington, Edward Vermilye, A.B., A.M., Ph.D., Sc.D. 1933
Mathematician, Professor Emeritus of Mechanics, Harvard University. 48 Highland Street, Cambridge 38, Mass.

Ives, Herbert E., B.S., Ph.D., Sc.D. 1917
Physicist, Bell Telephone Laboratories. 32 Laurel Place, Montclair, N. J.

Jackson, Dugald Caleb, C.E., D.Sc., D.Eng. 1931
Professor Emeritus of Electrical Engineering, Massachusetts Institute of Technology. 5 Mercer Circle, Cambridge 38, Mass.

Jacobs, Merkel Henry, A.B., Ph.D. 1930
Professor of General Physiology, University of Pennsylvania, Philadelphia 4, Pa.

Jaeger, Werner Wilhelm, Ph.D., Litt.D. 1944
Professor of Classical Philology, Harvard University. 43 Bailey Road, Watertown, Mass.

Jayne, Horace Howard Furness, A.B., A.M. 1934
Archaeologist, Vice-director, Metropolitan Museum of Art, New York 28, N. Y.

Jenkins, Charles Francis, A.M., LL.D. 1944
Man of Affairs, President, Historical Society of Pennsylvania. "Far Country," Kitchen's Lane, Mt. Airy, Philadelphia 19, Pa.

Jennings, Herbert S., Ph.D., Sc.D., LL.D. 1907
Professor Emeritus of Zoology, Johns Hopkins University; Research Associate, University of California, Los Angeles 24, Calif.

Jessup, Philip C., LL.B., LL.D., Ph.D. 1939
Professor of International Law, Columbia University, New York 27, N. Y.

Date of Election

Jewett, Frank Baldwin, A.B., Ph.D., D.Sc., D.Eng., LL.D. 1938
Engineer, President, National Academy of Sciences, New York Museum of Science and Industry.
140 West Street, New York 7, N. Y.

Johnson, Alvin Saunders, Ph.D. 1942
Economist, Director and Chairman, Graduate Faculty of Political Science, New School for Social Research.
Nyack, N. Y.

Johnson, Emory R., Litt.M., Ph.D., Sc.D. 1915
Professor Emeritus of Transportation and Commerce, Logan Hall, University of Pennsylvania,
Philadelphia 4, Pa.

Johnston, John, B.Sc., D.Sc. 1946
Chemist, Research Director (ret.), U. S. Steel Corporation.
Box 115, Southwest Harbor, Me.

Jones, Howard Mumford, M.A., Litt.D., L.H.D. 1941
Professor of English, Harvard University,
Cambridge 38, Mass.

Joslin, Elliott Proctor, B.A., M.A., Ph.B., Sc.D., M.D. 1925
Physician, Clinical Professor Emeritus of Medicine, Harvard Medical School. 81 Bay State Road,
Boston 15, Mass.

Kármán, Theodor von, Ph.D., D.Eng., D.Sc. 1941
Professor of Aeronautics, Director, Guggenheim Aeronautics Laboratory, California Institute of Technology. 1501 South Marengo Avenue,
Pasadena, Calif.

Kelley, Nicholas, A.B., LL.B. 1942
Lawyer, Member of the Firm, Rathbone, Perry, Kelley, and Drye; Vice-president, General Counsel and Director, Chrysler Corporation. 70 Broadway, New York 4, N.Y.

Keniston, (Ralph) Hayward, A.B., A.M., Ph.D. 1944
Professor of Romance Languages and Chairman of the Department, University of Michigan.
1915 Austin Avenue, Ann Arbor, Mich.

Kettering, Charles Franklin, M.E., E.E., D.Eng., D.Sc. 1930
Research Engineer, Vice-president, General Motors Corporation; General Director, Research Laboratories Division, General Motors Corporation.
Ridgeleigh Terrace, Dayton, Ohio.

Date of Election

Keyes, Frederick George, M.S., Ph.D., D.Sc. 1938
Professor and Head, Department of Chemistry, Massachusetts Institute of Technology.
15 Berkeley Street, Cambridge, Mass.

Kidder, Alfred Vincent, Ph.D., LL.D. 1934
Archaeologist, Chairman, Division of Historical Research, Carnegie Institution of Washington.
10 Frisbie Place, Cambridge 38, Mass.

Kimball, Fiske, A.B., M.Arch., Ph.D., Dr. of Fine Arts 1943
Director, Philadelphia Museum of Art, Philadelphia 30, Pa.

Kirkwood, John Gamble, B.S., Ph.D. 1944
Todd Professor of Chemistry, Cornell University, Ithaca, N. Y.

Kistiakowsky, George Bogdan, Ph.D. 1940
Professor of Chemistry, Harvard University, 12 Oxford Street, Cambridge 38, Mass.

Kline, John Robert, A.B., A.M., Ph.D., Sc.D. 1941
Professor of Mathematics, Chairman of the Department, University of Pennsylvania, Philadelphia 4, Pa.

Kofoid, Charles A., A.M., Ph.D., Sc.D., LL.D. 1924
Professor Emeritus of Zoology, University of California, Berkeley 4, Calif.

Köhler, Wolfgang, Ph.D. 1939
Professor of Psychology, Swarthmore College.
603 Elm Avenue, Swarthmore, Pa.

Kraus, Charles August, Ph.D. 1939
Professor of Chemistry and Director of Research in Chemistry, Brown University.
92 Keene Street, Providence, R. I.

Kroeber, Alfred Louis, Ph.D. 1941
Professor of Anthropology, Director, Anthropological Museum, University of California, Berkeley 4, Calif.

Kunkel, Louis Otto, Ph.D. 1942
Botanist, Member, Rockefeller Institute for Medical Research, Princeton, N. J.

Lamb, Arthur Becket, Ph.D., D.Sc. 1936
Professor of Chemistry, Director, Chemical Laboratory, Harvard University. 12 Oxford Street, Cambridge, Mass.

Date of Election

Lamont, Thomas William, A.B., LL.D. 1932
Banker, Trustee. 23 Wall Street, New York 8, N. Y.

Lampland, Carl O., A.B., A.M., LL.D. 1931
Astronomer, Lowell Observatory, Flagstaff, Ariz.

Lancaster, Henry Carrington, M.A., Ph.D., D.Hon.Caus. 1938
Professor of French Literature, Chairman, Department of Romance Languages, Johns Hopkins University. 604 Edgevale Road, Baltimore 10, Md.

Landis, James McCauley, LL.B., S.J.D. 1942
Director, U. S. Office of Civilian Defense, Dean, Harvard Law School; Chairman, Civil Aeronautics Board. 2480 Sixteenth Street, N.W., Washington, D. C.

Langer, William Leonard, Ph.D., LL.D. 1944
Coolidge Professor of History, Harvard University. 1 Berkeley Street, Cambridge 38, Mass.

Langmuir, Irving, M.A., Ph.D., Sc.D., LL.D. 1922
Chemist and Physicist, Associate Director, Research Laboratory, General Electric Company, Schenectady, N. Y.

Lashley, Karl Spencer, M.S., Ph.D., Sc.D. 1938
Research Professor of Neuropsychology, Harvard University. Director, Yerkes Laboratories of Primate Biology, Orange Park, Fla.

Lattimore, Owen 1943
Director, Walter Hines Page School of International Relations, Johns Hopkins University, Baltimore 18, Md.

Lawrence, Ernest Orlando, B.S., A.M., Ph.D., Sc.D., LL.D. 1937
Professor of Physics, Director, Radiation Laboratory, University of California, Berkeley 4, Calif.

Lawson, Andrew Cowper, M.A., Ph.D., Sc.D., LL.D. 1925
Professor of Mineralogy and Geology (ret.), University of California, Berkeley 4, Calif.

Leeds, Morris Evans, D.Eng. 1940
Chairman of the Board, Leeds and Northrup Company. 1025 Westview Street, Philadelphia 19, Pa.

Lefschetz, Solomon, M.E., Ph.D. 1929
Henry B. Fine Professor of Mathematics, Princeton University. 129 Broadmead, Princeton, N. J.

Date of Election

Leith, Charles Kenneth, B.S., Ph.D., LL.D., D.Sc. 1926
Professor of Geology, University of Wisconsin.
Moraine, Old Sauk Road, Madison, Wis.

Leland, Waldo G., A.B., A.M., Litt.D., L.H.D., LL.D. 1931
Historian, Director Emeritus, American Council of Learned Societies, 1219 Sixteenth Street, N. W., Washington 6, D. C.

Leuschner, Armin Otto, A.B., Ph.D., Sc.D., LL.D. 1924
Professor Emeritus of Astronomy, Director Emeritus, Students' Observatory, University of California.
1816 Scenic Avenue, Berkeley 4, Calif.

Lewis, Clarence Irving, Ph.D., L.H.D. 1942
Professor of Philosophy, Harvard University.
23 Oakland Street, Lexington 73, Mass.

Lewis, Edwin Owen, LL.B. 1946
Judge, Court of Common Pleas No. 2, Room 344, City Hall, Philadelphia 7, Pa.

Lewis, George William, M.E., M.M.E., Sc.D., D.Eng. 1944
Aeronautical Engineer, Director, Aeronautical Research, National Advisory Committee for Aeronautics.
6502 Ridgewood Avenue, Chevy Chase, Md.

Lewis, Warren Harmon, B.S., M.D. 1943
Anatomist, Member, The Wistar Institute of Anatomy and Biology, Woodland Avenue and 36th Street, Philadelphia 4, Pa.

Lillie, Frank Rattray, B.A., Ph.D., Sc.D., LL.D. 1916
Andrew MacLeish Distinguished Service Professor Emeritus of Embryology, University of Chicago.
5801 Kenwood Avenue, Chicago 37, Ill.

Lillie, Ralph Stayner, B.A., Ph.D., Sc.D. 1937
Professor Emeritus of General Physiology, University of Chicago. 5545 Kenwood Avenue, Chicago 37, Ill.

Lind, Samuel Colville, A.B., S.B., Ph.D., D.Sc. 1943
Physical Chemist, Dean, Institute of Technology, University of Minnesota, Minneapolis 14, Minn.

Lingelbach, William E., B.A., Ph.D., Litt.D. 1916
Professor Emeritus of Modern European History, University of Pennsylvania.
4304 Osage Avenue, Philadelphia 4, Pa.

Date of Election

Livingston, Burton E., B.S., Ph.D. 1933
Professor Emeritus of Plant Physiology, Johns Hopkins University. Riderwood, Md.

Loeb, Leo, M.D. 1910
Professor Emeritus of Pathology, Washington University. 40 Crestwood Drive, St. Louis 5, Mo.

Long, Esmond Ray, Ph.D., M.D. 1940
Director, Henry Phipps Institute, Professor of Pathology, University of Pennsylvania. Henry Phipps Institute, Seventh and Lombard Streets, Philadelphia 47, Pa.

Loomis, Alfred Lee, A.B., LL.B., D.Sc., M.Sc., LL.D. 1930
Physicist, Director, Loomis Laboratories. Tuxedo Park, N. Y.

Lovejoy, Arthur Oncken, A.B., A.M., LL.D., L.H.D. 1932
Professor Emeritus of Philosophy, Johns Hopkins University. 827 Park Avenue, Baltimore 1, Md.

Lovett, Edgar Odell, Ph.D., Sc.D., LL.D. 1904
Mathematician and Astronomer, President Emeritus, The Rice Institute, Houston 1, Texas.

Lowie, Robert Harry, Ph.D., Sc.D. 1942
Professor of Anthropology, University of California. 2521 Benvenue Avenue, Berkeley 4, Calif.

Lydenberg, Harry Miller, L.H.D., Litt.D. 1939
Formerly Director, New York Public Library. Study 251, Library of Congress Annex, Washington 25, D. C.

Lyman, Theodore, A.M., Ph.D. 1918
Professor Emeritus of Physics, Director, Jefferson Laboratory, Harvard University, Cambridge 38, Mass.

McClelland, George William, Ph.D., LL.D. 1941
Professor of English, President, University of Pennsylvania. 4037 Pine Street, Philadelphia 4, Pa.

McClintock, Barbara, Ph.D. 1946
Resident Investigator, Department of Genetics, Carnegie Institution of Washington, Cold Spring Harbor, Long Island, N. Y.

McClure, Charles Freeman Williams, A.B., A.M., Sc.D. 1897
Professor Emeritus of Comparative Anatomy, Princeton University. 1 Battle Road, Princeton, N. J.

Date of Election

McCollum, Elmer Verner, Ph.D., Sc.D., LL.D. 1945
Biochemist, Professor and Head,
Department of Biochemistry, School of Hygiene
and Public Health, Johns Hopkins University,
615 North Wolfe Street, Baltimore, Md.

MacCurdy, George Grant, A.B., A.M., Ph.D. 1925
Professor Emeritus of Anthropology, Yale University;
Director, American School of Prehistoric Research.
Old Lyme, Conn.

McDaniel, Walton Brooks, A.B., A.M., Ph.D. 1917
Professor Emeritus of Latin Language and Literature,
University of Pennsylvania. 4082 Malaga Avenue,
Coconut Grove, Miami 33, Fla.

MacDougal, Daniel Trembly, M.A., M.S., Ph.D., LL.D. 1916
Botanist. R. F. D. L. No. 170, Carmel, Calif.

McGregor, James Howard, B.S., M.A., Ph.D. 1929
Professor of Zoology, Columbia University,
New York 27, N. Y.

McIlwain, Charles Howard, A.M., Ph.D., LL.D. 1938
Professor Emeritus of the Science of Government,
Harvard University. 110 Prospect Avenue,
Princeton, N. J.

MacInnes, Duncan Arthur, B.S., M.S., Ph.D. 1942
Physical Chemist, Member, Rockefeller Institute
for Medical Research, 66th Street and York Avenue,
New York 21, N. Y.

MacIver, Robert Morrison, M.A., Ph.D., B.A., Litt.D. 1942
Lieber Professor of Political Philosophy and Sociology,
Columbia University. Palisades, N. Y.

McMath, Robert Raynolds, B.C.E., A.M., D.Sc. 1942
Founder and Director, McMath-Hulbert Observatory,
University of Michigan, Lake Angelus, R. F. D. 4,
Box 104, Pontiac, Mich.

MacNider, William de Berniere, M.D., Sc.D., LL.D. 1939
Kenan Research Professor of Pharmacology,
University of North Carolina, Chapel Hill, N. C.

Malone, Kemp, A.B., Litt.D., Ph.D. 1945
Professor of English, Johns Hopkins University.
2710 Maryland Avenue, Baltimore 18, Md.

Date of Election

Mann, Thomas, D.Litt. 1942
Author. 1550 San Remo Drive, Pacific Palisades, Calif.

Marshall, George Catlett 1946
Secretary of State, Washington, D. C.

Marvel, Carl Shipp, A.B., Ph.D. 1945
Professor of Organic Chemistry, University of Illinois, Urbana, Ill.

Mason, William Smith, Ph.B., A.M., L.H.D., D.Litt. 1928
Man of Affairs, Collector of Frankliniana, University Trustee. 100 Los Altos Drive, Pasadena 2, Calif.

Mather, Frank Jewett, Jr., Ph.D., L.H.D. 1940
Professor Emeritus of Art and Archaeology, Princeton University. Evelyn Place, Princeton, N. J.

Mees, Charles Edward Kenneth, D.Sc., F.R.S. 1937
Chemist, Vice-president in Charge of Research, Eastman Kodak Company, Rochester 4, N. Y.

Menzel, Donald Howard, A.B., A.M., Ph.D. 1943
Professor of Astrophysics, Harvard University, Cambridge 38, Mass.

Meritt, Benjamin Dean, Ph.D., D.Litt., LL.D. 1938
Professor of Greek Epigraphy, Institute for Advanced Study, Princeton, N. J.

Merriam, Charles Edward, Ph.D., LL.D. 1935
Professor Emeritus of Political Science, University of Chicago. 6041 University Avenue, Chicago 37, Ill.

Merrill, Elmer Drew, B.S., M.S., Sc.D., LL.D. 1932
Arnold Professor of Botany, Harvard University. Arnold Arboretum, Jamaica Plain 30, Mass.

Merrill, Paul Willard, Ph.D. 1939
Astronomer, Mount Wilson Observatory, Carnegie Institution of Washington, Pasadena 4, Calif.

Metz, Charles William, Ph.D. 1941
Professor of Zoology, Director, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.

Miles, Walter Richard, Ph.D. 1944
Professor of Psychology, Yale University, 333 Cedar Street, New Haven 11, Conn.

Date of Election

Miller, Gerrit Smith, Jr., A.B. 1927
Associate in Biology, United States National Museum, Washington 25, D. C.

Miller, Hunter, LL.B., LL.M., D.C.L. 1928
International Law. Craiglands, R. M. D. 1, Victoria, B. C., Canada.

Millikan, Robert Andrews, Ph.D., LL.D., Sc.D. 1914
Chairman of Executive Council Emeritus, California Institute of Technology, Pasadena 4, Calif.

Minot, George Richards, A.B., M.D., S.D. 1935
Professor of Medicine, Harvard University; Director, Thorndike Memorial Laboratory, and Visiting Physician, Boston City Hospital, Boston 18, Mass.

Mitchell, Samuel Alfred, Ph.D., LL.D. 1923
Professor Emeritus of Astronomy, Director, Leander McCormick Observatory, University of Virginia, University, Va.

Mitchell, Wesley Clair, A.B., Ph.D., LL.D., D.Litt. 1931
Professor Emeritus of Economics, Columbia University; Director of Research, National Bureau of Economic Research. 2 Horatio Street, New York 14, N. Y.

Moe, Henry Allen, B.A., B.C.L., M.A., B.S., L.H.D. 1943
Lawyer, Secretary-General, Guggenheim Memorial Foundation, 551 Fifth Avenue, New York 17, N. Y.

Montgomery, James Alan, Ph.D., S.T.D., Litt.D., D.H.L. 1925
Philologist, Formerly Director and President, American Schools of Oriental Research; Professor Emeritus of Hebrew, Graduate School, University of Pennsylvania. 6806 Greene Street, Germantown, Philadelphia 19, Pa.

Moore, George Thomas, A.M., Ph.D. 1905
Botanist, Director, Missouri Botanical Garden, St. Louis 10, Mo.

Moore, J. Percy, Ph.D. 1918
Professor Emeritus of Zoology, University of Pennsylvania, Philadelphia 4, Pa.

Moore, John Bassett, LL.D. 1907
International Law, Diplomatist.
960 Park Avenue, New York 28, N. Y.

Date of Election

Morey, Charles Rufus, A.M., L.H.D., Litt.D. 1938
Marquand Professor Emeritus of Art and Archæology, Princeton University, Princeton, N. J.

Morgan, Marshall S., A.B. 1933
President, Fidelity-Philadelphia Trust Company, 135 South Broad Street, Philadelphia 9, Pa.

Morison, Samuel Eliot, Ph.D., M.A., Litt.D. 1937
Professor of History, Harvard University.
44 Brimmer Street, Boston 8, Mass.

Morley, Sylvanus Griswold, Ph.D. 1940
In Charge, Carnegie Institution of Washington Archaeological Expeditions to Central America; Director, Chichen Itza Project.
Apartado Postal 385, Merida, Yucatan, Mexico.

Morris, Harrison Smith 1899
Author, Formerly Managing Director, Pennsylvania Academy of the Fine Arts. 1600 Chelten Avenue, Philadelphia 26, Pa.

Morris, Lawrence J., A.B. 1936
Man of Affairs, Secretary, Pennsylvania Hospital.
48 Bourse Building, Philadelphia 6, Pa.

Morse, Marston, Ph.D., Sc.D. 1936
Professor of Mathematics, Institute for Advanced Study, Princeton, N. J.

Moulton, Forest Ray, A.B., Ph.D., Sc.D., LL.D. 1916
Mathematician, Astronomer, Permanent Secretary, American Association for the Advancement of Science, Smithsonian Institution Building, Washington 25, D. C.

Moulton, Harold Glenn, Ph.D., LL.D. 1938
Economist, President, The Brookings Institution, 722 Jackson Place, N.W., Washington 6, D. C.

Mulliken, Robert Sanderson, B.S., Ph.D., Sc.D. 1940
Professor of Physics, University of Chicago, Chicago 15, Ill.

Mumford, Lewis 1941
Author. Amenia, N. Y.

Murlin, John Raymond, A.M., Ph.D., Sc.D. 1932
Professor Emeritus of Physiology, Department of Vital Economics, University of Rochester, 260 Crittenden Boulevard, Rochester 7, N. Y.

Date of Election

Murnaghan, Francis Dominic, M.A., Ph.D. 1942
Professor of Applied Mathematics, Chairman of the Department of Mathematics, Johns Hopkins University.
6202 Sycamore Road, Baltimore 12, Md.

Murphy, Robert Cushman, M.A., Sc.D. 1946
Chairman, Department of Birds, American Museum of Natural History, Central Park West at 79th Street, New York 24, N. Y.

von Neumann, John, Ph.D., C.E. 1938
Professor of Mathematics, Institute for Advanced Study.
26 Westcott Road, Princeton, N. J.

Nicholas, John Spangler, Ph.D. 1946
Sterling Professor of Biology, Osborn Zoological Laboratory, Yale University, New Haven 11, Conn.

Nichols, Roy Franklin, A.B., A.M., Ph.D., Litt.D., L.H.D. 1945
Professor of History, University of Pennsylvania.
438 Riverview Road, Swarthmore, Pa.

Nicolson, Marjorie Hope, Ph.D., Litt.D., L.H.D., LL.D. 1941
Professor of English, Columbia University,
New York 27, N. Y.

Nitze, William Albert, Ph.D., L.H.D. 1936
Professor of French, University of California at Los Angeles. 411 Lomond Avenue, Los Angeles 24, Calif.

Nock, Arthur Darby, LL.D. 1941
Frothingham Professor of the History of Religion, Harvard University.
K21 Eliot House, Cambridge 38, Mass.

Norris, George William, B.A., M.D. 1922
Physician, Author, Erstwhile Chief, Medical Service "A", Pennsylvania Hospital. Dimock, Susquehanna County, Pa.

Northrop, John Howard, M.A., Ph.D., D.Sc., LL.D. 1938
Biochemist, Rockefeller Institute for Medical Research, Princeton, N. J.

Notestein, Frank W., B.S., Ph.D. 1945
Demographer, Professor, Director of Office of Population Research, School of Public and International Affairs, Princeton University, Princeton, N. J.

Notestein, Wallace, Ph.D., Litt.D. 1946
Sterling Professor of English History, Yale University.
236 Edwards Street, New Haven, Conn.

Date of Election

Novy, Frederick G., Sc.D., M.D., LL.D. 1934
Dean Emeritus, Medical School, Professor Emeritus of Bacteriology, University of Michigan, Ann Arbor, Mich.

Ogburn, William Fielding, Ph.D., LL.D. 1940
Sewell L. Avery Distinguished Service Professor of Sociology, University of Chicago.
1126 East 59th Street, Chicago 37, Ill.

Olivier, Charles P., M.A., Ph.D. 1932
Professor of Astronomy, Director, Flower and Cook Observatories, University of Pennsylvania,
Upper Darby, Pa.

O'Neill, Eugene Gladstone, Litt.D. 1935
Author, Playwright. Danville, Contra Costa County, Calif.

Oppenheimer, J. Robert, A.B., Ph.D. 1945
Professor of Theoretical Physics, University of California and the California Institute of Technology,
Pasadena 4, Calif.

Osgood, Charles Grosvenor, B.A., Ph.D. 1943
Professor Emeritus of English, Princeton University.
92 Stockton Street, Princeton, N. J.

Osterhout, Winthrop John Vanleuven, A.M., Ph.D., Sc.D. 1917
Physiologist, Member Emeritus, Rockefeller Institute for Medical Research, 66th Street and York Avenue,
New York 21, N. Y.

Packard, Francis Randolph, M.D., LL.D. 1933
Physician, Author. 304 South 19th Street,
Philadelphia 3, Pa.

Painter, Theophilus Shickel, Ph.D., Sc.D. 1939
Professor of Zoology, University of Texas.
610 West 33rd Street, Austin, Texas.

Panofsky, Erwin, Ph.D. 1943
Professor of History of Art, Institute for Advanced Study. 97 Battle Road, Princeton, N. J.

Parker, George Howard, Sc.D. 1911
Professor Emeritus of Zoology, Harvard University.
16 Berkeley Street, Cambridge 38, Mass.

Patterson, Ernest Minor, A.B., A.M., Ph.D., LL.D. 1932
Professor of Economics, University of Pennsylvania.
404 South 47th Street, Philadelphia 43, Pa.

Date of Election

Patterson, Lamar Gray 1898
Chemist. Perdido Beach, Ala.

Pauling, Linus Carl, Ph.D., Sc.D. 1936
Professor of Chemistry, Chairman, Division of Chemistry and Chemical Engineering, Director, Gates and Crellin Laboratories of Chemistry, California Institute of Technology, Pasadena 4, Calif.

Pender, Harold, A.B., Ph.D., Sc.D. 1917
Dean, Moore School of Electrical Engineering, University of Pennsylvania; Consulting Engineer. 200 South 33rd Street, Philadelphia 4, Pa.

Pepper, George Wharton, B.A., LL.B., LL.D., D.C.L. 1897
Lawyer. Formerly Professor of Law, University of Pennsylvania. 2231 Land Title Building, Philadelphia 10, Pa.

Pepper, O. H. Perry, B.S., M.D., Sc.D. 1944
Professor of Medicine, University of Pennsylvania. Ithan, Pa.

Pepper, William, A.B., M.D., Sc.D., LL.D. 1937
Dean Emeritus, School of Medicine, University of Pennsylvania. Prospect Avenue, Melrose Park, Philadelphia 26, Pa.

Perry, Ralph Barton, Ph.D., Litt.D., L.H.D., LL.D. 1939
Professor Emeritus of Philosophy, Harvard University. 445 Widener Library, Cambridge 38, Mass.

Post, Chandler Rathfon, A.B., A.M., Ph.D. 1946
Boardman Professor of Fine Arts, Harvard University. Fogg Museum of Art, Cambridge 38, Mass.

Pound, Roscoe, Ph.D., LL.D., J.U.D., L.H.D. 1940
University Professor at Harvard. 304 School Street, Watertown 72, Mass.

Putnam, Herbert, Litt.D., LL.D. 1937
Librarian Emeritus of Congress, Washington, D. C.

Quinn, Arthur Hobson, Ph.D., Litt.D. 1940
John Welsh Centennial Professor of History and English Literature, University of Pennsylvania. 401 Pembroke Road, Bala-Cynwyd, Pa.

Rabi, Isidor Isaac, B.Chem., Ph.D., 1941
Professor of Physics, Columbia University, New York 27, N. Y.

Date of Election

Read, Conyers, A.M., Ph.D., B.Litt., Litt.D. 1934
Professor of English History, University of Pennsylvania. Box 593, Villa Nova, Pa.

Repplier, Agnes, Litt.D. 1928
Author. 920 Clinton Street, Philadelphia 7, Pa.

Rhoads, Charles James, A.B. 1921
Man of Affairs. Trustee, Bryn Mawr College, Haverford College. Bryn Mawr, Pa.

Richards, Alfred Newton, Ph.D., Sc.D., M.D.(hon.), LL.D. 1935
Vice-president in charge of Medical Affairs, University of Pennsylvania.
6 Rugby Road, Bryn Mawr, Pa.

Richter, Gisela Marie Augusta, Litt.D., M.A., L.H.D., D.F.A. 1942
Archaeologist, Curator, Greek and Roman Department, Metropolitan Museum of Art. 1170 Fifth Avenue, New York 29, N. Y.

Riddle, Oscar, A.B., Ph.D., LL.D. 1926
Physiologist, Member (ret.), Carnegie Institution, Station for Experimental Evolution, Cold Spring Harbor. Route 4, Plant City, Florida

Rivers, Thomas Milton, M.D., Sc.D. 1942
Physician, Director, Hospital of the Rockefeller Institute for Medical Research.
163 Greenway South, Forest Hills, L. I., N. Y.

Robbins, William Jacob, Ph.D., Sc.D. 1941
Professor of Botany, Columbia University; Director, New York Botanical Garden, Bronx Park, New York 58, N. Y.

Roberts, Owen J., A.B., LL.B., LL.D., D.C.L. 1934
Associate Justice (ret.), Supreme Court of the United States. Birchrunville, R. D., Phoenixville, Pa.

Robertson, Howard Percy, Ph.D. 1940
Professor of Mathematical Physics, Princeton University. 175 Prospect Avenue, Princeton, N. J.

Robinson, David Moore, Ph.D., LL.D., L.H.D., Litt.D. 1936
Professor Emeritus of Archæology and Epigraphy, Lecturer in Greek Literature, Johns Hopkins University, Baltimore 18, Md.

Date of Election

Robinson, Fred Norris, Ph.D., Litt.D. 1944
Gurney Professor Emeritus of English, Harvard University. 6 Longfellow Park, Cambridge 38, Mass.

Rockefeller, John D., Jr., A.B., A.M. 1931
Administrator, Trustee, Rockefeller Institute for Medical Research. 30 Rockefeller Plaza, New York 20, N. Y.

Rogers, Lindsay, Ph.D., LL.B. 1941
Burgess Professor of Public Law, Columbia University. 175 Riverside Drive, New York 24, N. Y.

Rosenbach, A. S. W., B.S., Ph.D., D.F.A. 1928
Author, Bibliographer, President, Gratz College. 1618 Locust Street, Philadelphia 3, Pa.

Rossby, Carl-Gustaf Arvid, D.Sc. 1946
Professor of Meteorology, University of Chicago. Chicago 37, Ill.

Rostovtzeff, Michael I., Ph.D., LL.D. 1929
Sterling Professor Emeritus of Ancient History and Archaeology; Director of Dura-Europos Research, Yale University. 470 Whitney Avenue, New Haven 11, Conn.

Rous, Peyton, M.D., D.Sc. 1939
Member, Rockefeller Institute for Medical Research. 122 East 82nd Street, New York 28, N. Y.

Russell, Henry Norris, A.M., Ph.D., D.Sc. 1913
Professor of Astronomy, Director, Princeton University Observatory. 79 Alexander Street, Princeton, N. J.

Ruthven, Alexander G., B.S., Ph.D., LL.D., Sc.D. 1931
Zoologist, President, University of Michigan, Ann Arbor, Mich.

Sanders, Henry A., A.B., A.M., Ph.D., L.H.D. 1932
Professor Emeritus of Latin, University of Michigan. 2037 Geddes Avenue, Ann Arbor, Mich.

Sarton, George, Sc.D., L.H.D., LL.D. 1934
Historian of Science, Associate, Carnegie Institution of Washington, Professor, Harvard University. Harvard Library 185, Cambridge 38, Mass.

Sauer, Carl O., Ph.D. 1944
Professor and Chairman, Department of Geography, University of California. 1340 Arch Street, Berkeley 8, Calif.

Date of Election

Scattergood, J. Henry, A.B. 1931
Man of Affairs, Treasurer, Haverford College, Bryn Mawr College. Villa Nova, Pa.

Schaeffer, J. Parsons, A.M., M.D., Ph.D., Sc.D. 1927
Professor of General Anatomy, Director, Daniel Baugh Institute of Anatomy, Jefferson Medical College. 4634 Spruce Street, Philadelphia 39, Pa.

Schlesinger, Arthur Meier, Ph.D., Litt.D., L.H.D. 1941
Francis Lee Higginson Professor of History, Harvard University. 19 Gray Gardens East, Cambridge 38, Mass.

Schmitt, Bernadotte Everly, M.A. (Oxon.), Ph.D., LL.D., Litt.D. 1942
Andrew MacLeish Distinguished Service Professor of Modern History, University of Chicago. 323 S. St. Asaph Street, Alexandria, Va.

Schramm, Jacob Richard, A.B., Ph.D. 1932
Professor of Botany, Director, Department of Botany, Director, Morris Arboretum, University of Pennsylvania, Philadelphia 4, Pa.

Schultz, Adolph H., Ph.D. 1936
Associate Professor of Physical Anthropology, School of Medicine, Johns Hopkins University, Baltimore 5, Md.

Schuyler, Robert Livingston, Ph.D., L.H.D. 1942
Gouverneur Morris Professor of History, Columbia University. 1170 Fifth Avenue, New York 29, N. Y.

†**Scott, William Berryman, M.A., Ph.D., Sc.D., LL.D.** 1886
Blair Professor Emeritus of Geology. Princeton University. 7 Cleveland Lane, Princeton, N. J.

Seares, Frederick Hanley, B.S., LL.D. 1917
Astronomer, Research Associate, Carnegie Institution of Washington. Mount Wilson Observatory, Pasadena 4, Calif.

See, Thomas Jefferson Jackson, A.M., Lt.M., Sc.M., Ph.D., D.Sc. 1897
Physicist, Astronomer, Geometer, Professor of Mathematics, United States Navy (ret.). 614 Ohio Street, Vallejo, Calif.

Seitz, Frederick, Jr., A.B., Ph.D. 1946
Professor and Head of the Department of Physics, Carnegie Institute of Technology, Schenley Park, Pittsburgh 13, Pa.

† Deceased March 29, 1947.

Date of Election

Seymour, Charles, Ph.D., Litt.D., LL.D., L.H.D. 1939
Historian, President, Yale University.
43 Hillhouse Avenue, New Haven 11, Conn.

Shapley, Harlow, A.M., Ph.D., LL.D., Sc.D., D.Hon.Caus., Litt.D. 1922
Astronomer, Director, Harvard College Observatory, Cambridge 38, Mass.

Shope, Richard Edwin, M.D. 1944
Pathologist, Member, Rockefeller Institute for Medical Research, Princeton, N. J.

Shotwell, James Thomson, Ph.D., LL.D. 1936
Professor Emeritus of the History of International Relations, Columbia University; Trustee and Director, Division of Economics and History, Carnegie Endowment for International Peace.
405 West 117th Street, New York 27, N. Y.

Shryock, Richard Harrison, Ph.D. 1944
Professor of History (on leave of absence), University of Pennsylvania; Acting Director, American Council of Learned Societies. 317 Cherry Bend, Merion Station, Pa.

Shull, George Harrison, B.S., Ph.D., Sc.D., LL.D. 1918
Professor Emeritus of Botany and Genetics, Princeton University. 60 Jefferson Road, Princeton, N. J.

Sigerist, Henry Ernest, M.D., D.Litt., LL.D. 1945
Professor and Director of the Institute of the History of Medicine, Johns Hopkins University,
1900 East Monument Street, Baltimore 5, Md.

Simpson, George Gaylord, Ph.D. 1936
Curator of Fossil Mammals, American Museum of Natural History, New York 24, N. Y.

Singer, Edgar Arthur, Jr., B.S., Ph.D., LL.D. 1925
Professor of Philosophy, University of Pennsylvania.
4224 Chester Avenue, Philadelphia 4, Pa.

Sinnott, Edmund Ware, Ph.D. 1939
Sterling Professor of Botany, Yale University,
New Haven 11, Conn.

Sioussat, St. George Leakin, Ph.D. 1928
Chief, Division of Manuscripts, Incumbent, Chair of American History, Library of Congress.
6309 Connecticut Avenue, Chevy Chase 15, Md.

Date of Election

Slater, John Clarke, Ph.D. 1940
Professor of Physics, Massachusetts Institute of Technology, Cambridge 39, Mass.

Slichter, Sumner Huber, A.B., M.A., Ph.D. 1946
Economist, Lamont University Professor, Harvard University, 229 Littauer Center, Cambridge 38, Mass.

Slipher, Vesto Melvin, A.M., Ph.D., LL.D., Sc.D. 1921
Astronomer, Director, Lowell Observatory, Flagstaff, Ariz.

Smyth, Charles Phelps, Ph.D. 1932
Professor of Chemistry, Princeton University. 22 Morven Street, Princeton, N. J.

Speiser, Ephraim Avigdor, M.A., Ph.D. 1941
Professor of Semitics, University of Pennsylvania. 7601 West Avenue, Elkins Park, Philadelphia 17, Pa.

Spier, Leslie, Ph.D. 1946
Professor of Anthropology, University of New Mexico. Post Office Box 880, Santa Cruz, Calif.

Spoehr, Herman Augustus, Ph.D., Sc.D. 1931
Chairman, Division of Plant Biology, Carnegie Institution of Washington, Stanford University, Calif.

Sprague, Oliver Mitchell Wentworth, A.M., Ph.D., Litt.D. 1938
Edmund Cogswell Converse Professor of Banking and Finance, Harvard Graduate School of Business, Soldier's Field, Boston, Mass.

Stadler, Lewis John, Ph.D. 1941
Professor of Field Crops, University of Missouri; Principal Geneticist, Bureau of Plant Industry, United States Department of Agriculture. 308 Thilly Avenue, Columbia, Mo.

Stakman, Elvin Charles, Ph.D., Dr.Nat.Science 1940
Professor and Chief, Division of Plant Pathology and Botany, University of Minnesota Experiment Station; Agent, United States Department of Agriculture. University Farm, St. Paul 8, Minn.

Stanley, Wendell Meredith, Ph.D., Sc.D. 1940
Biochemist, Member, Rockefeller Institute for Medical Research, Princeton, N. J.

Stebbins, Joel, Ph.D., Sc.D., LL.D. 1925
Professor of Astronomy, Director, Washburn Observatory, University of Wisconsin, Madison 6, Wis.

Date of Election

Stefansson, Vilhjalmur, Ph.D., LL.D. 1923
Arctic Explorer, Geographer and Adviser on Northern Operations to Pan-American Airways.
67 Morton Street, New York 14, N. Y.

Stern, Otto, Ph.D., LL.D. 1946
Professor Emeritus of Physics, Carnegie Institute of Technology, Pittsburgh. 759 Cragmont Avenue, Berkeley 8, Calif.

Stewart, Walter W., A.B., LL.D. 1943
Economist, Professor, School of Economics and Politics, Institute for Advanced Study, Princeton, N. J.

Stock, Chester, Ph.D. 1946
Professor of Paleontology, California Institute of Technology, Pasadena 4, Calif.

Stone, Marshall Harvey, A.M., Ph.D., Sc.D., D.Hon.Caus. 1943
Andrew MacLeish Distinguished Service Professor of Mathematics and Chairman, Department of Mathematics, University of Chicago, Chicago 37, Ill.

Streeter, George L., A.B., A.M., M.D., D.Sc., LL.D. 1943
Research Associate, Carnegie Institution of Washington. Johns Hopkins Medical School, Baltimore 5, Md.

Struve, Otto, Ph.D., Sc.D. 1937
Professor of Astrophysics, University of Chicago; Director, Yerkes Observatory, Williams Bay, Wis.

Sturtevant, Alfred Henry, Ph.D. 1936
Professor of Genetics, California Institute of Technology, Pasadena 4, Calif.

Sturtevant, Edgar Howard, Ph.D., L.H.D., LL.D. 1939
Professor Emeritus of Linguistics, Yale University. 408 Whitney Avenue, New Haven, Conn.

Sverdrup, Harald Ulrik, Ph.D. 1944
Professor of Oceanography, Director, Scripps Institution of Oceanography, University of California, La Jolla, Calif.

Swann, William Francis Gray, M.A., D.Sc. 1926
Physicist, Director, Bartol Research Foundation, Whittier Place, Swarthmore, Pa.

Swindler, Mary Hamilton, A.B., A.M., LL.D., Ph.D. 1943
Professor of Classical Archaeology, Bryn Mawr College. Low Buildings, Bryn Mawr, Pa.

Date of Election

Taliaferro, William Hay, Ph.D. 1941
Eliakim H. Moore Distinguished Service Professor of Parasitology, Chairman, Department of Bacteriology and Parasitology, Advisor to the President in the Biological Sciences, University of Chicago.
5724 Ellis Avenue, Chicago 37, Ill.

Tate, John Torrence, Ph.D., D.Sc. 1941
Research Professor of Physics, University of Minnesota.
518 Southeast 7th Street, Minneapolis, Minn.

Tatlock, J. S. P., Ph.D., Litt.D., LL.D. 1937
Professor Emeritus of English, University of California.
50 Driad's Green, Northampton, Mass.

Taylor, Deems, A.B., Mus.D., Litt.D. 1934
Musician, Composer, Writer. The Haviland Road, Stamford, Conn.

Taylor, Francis Henry, A.B., L.H.D. 1946
Director, Metropolitan Museum of Art, New York 28, N. Y.

Taylor, Hugh Stott, D.Sc., LL.D., F.R.S. 1928
David B. Jones Professor of Chemistry,
Dean, Graduate School, Princeton University,
Princeton, N. J.

Taylor, Lily Ross, A.B., Ph.D., Litt.D. 1945
Professor of Latin and Dean of the Graduate School, Bryn Mawr College, Bryn Mawr, Pa.

Thorndike, Edward L., A.B., A.M., Ph.D., Sc.D., LL.D. 1932
Professor Emeritus of Educational Psychology, Teachers College, Columbia University, New York 27, N. Y.

Thorndike, Lynn, Ph.D., L.H.D. 1939
Professor of History, Columbia University,
New York 27, N. Y.

Timoshenko, Stephen P., D.Sc. 1939
Professor of Theoretical and Applied Mechanics, Stanford University. 536 West Crescent Drive,
Palo Alto, Calif.

Tolman, Richard Chace, Ph.D. 1932
Professor of Physical Chemistry and Mathematical Physics, California Institute of Technology,
Pasadena 4, Calif.

Tozzer, Alfred Marston, A.B., A.M., Ph.D. 1937
Professor of Anthropology, Harvard University.
7 Bryant Street, Cambridge 38, Mass.

Date of Election

Tucker, Richard Hawley, C.E., Sc.D. 1908
Astronomer, Formerly of Lick Observatory.
1525 Waverly Street, Palo Alto, Calif.

Tuve, Merle Antony, B.S., A.M., Ph.D. 1943
Chief Physicist, Department of Terrestrial Magnetism, Carnegie Institution of Washington,
5241 Broad Branch Road, Washington 15, D. C.

Tyzzer, Ernest Edward, Ph.B., A.M., M.D., Sc.D. 1931
Professor Emeritus of Comparative Pathology and Tropical Medicine, Harvard Medical School.
175 Water Street, Wakefield, Mass.

Urey, Harold Clayton, Ph.D., D.Sc. 1935
Professor of Chemistry, University of Chicago,
Chicago 37, Ill.

Van Doren, Carl 1942
Author and Historian.
41 Central Park West, New York 23, N. Y.

Van Slyke, Donald Dexter, Ph.D., Sc.D., M.D. 1938
Biochemist, Rockefeller Institute for Medical Research,
66th Street and York Avenue, New York 21, N. Y.

Van Vleck, John Hasbrouck, Ph.D. 1939
Professor of Mathematical Physics,
Harvard University, Cambridge 38, Mass.

Vaughan, Thomas Wayland, B.Sci., A.M., Ph.D., LL.D. 1923
Director Emeritus, Scripps Institution of Oceanography; Principal Scientist (ret.), United States Geological Survey; Associate in Paleontology, United States National Museum. 3333 P Street, Washington 7, D. C.

Veblen, Oswald, A.B., Ph.D., D.Sc. 1912
Professor Emeritus of Mathematics, Institute for Advanced Study. 58 Battle Road, Princeton, N. J.

du Vigneaud, Vincent, B.S., M.S., Ph.D. 1944
Professor of Biochemistry, Cornell University Medical College. 41 Cohawney Road, Scarsdale, N. Y.

Viner, Jacob, Ph.D. 1942
Professor of Economics, Princeton University,
Princeton, N. J.

Wallace, Henry Agard, B.S., Hon. M.S. 1943
Editor, *The New Republic*,
40 East 49th Street, New York, N. Y.

Date of Election

Warren, Charles, A.B., A.M., LL.D. 1939
Lawyer. 1527 Eighteenth Street, Washington 6, D. C.

Warren, Charles Hyde, Ph.B., Ph.D. 1928
Dean Emeritus, Sheffield Scientific School,
Professor of Mineralogy, Yale University.
100 High Street, New Haven 11, Conn.

Weaver, Warren, B.S., C.E., Ph.D. 1944
Mathematician, Director, Division of Natural Sciences,
Rockefeller Foundation, 49 West 49th Street,
New York 20, N. Y.

Webster, David Locke, A.B., Ph.D. 1922
Professor and Executive Head, Department of Physics,
Stanford University, Calif.

Weed, Lewis Hill, M.D., Sc.D., LL.D. 1942
Chairman, Division of Medical Sciences,
National Research Council.
3908 North Charles Street, Baltimore 18, Md.

Wertenbaker, Thomas Jefferson, B.A., M.A., Ph.D., L.H.D., Litt.D. 1941
Edwards Professor of American History,
Princeton University. 164 Prospect Avenue,
Princeton, N. J.

Westergaard, Harald Malcolm, B.S., Ph.D., Dr.Ing., Dr.Tech., Sc.D. 1942
Gordon McKay Professor of Civil Engineering, Dean,
Graduate School of Engineering, Harvard University,
Pierce Hall, Cambridge 38, Mass.

Westermann, William Linn, Ph.D., LL.D., H.L.D. 1944
Professor of History, Columbia University.
23 Donellan Road, Scarsdale, N. Y.

Wetherill, Samuel Price, B.S., LL.D. 1933
Man of Affairs. 1203 Morris Building,
Philadelphia 2, Pa.

Wetmore, Alexander, A.B., M.S., Ph.D., D.Sc. 1930
Zoologist, Secretary, Smithsonian Institution;
Director, United States National Museum,
Washington 25, D. C.

Weyl, Hermann, Ph.D., D.Eng., D.Sc. 1935
Professor of Mathematics, Institute for Advanced Study,
Princeton, N. J.

Date of Election

Whipple, George Hoyt, M.D., M.A., D.Sc., LL.D. 1938
Professor of Pathology, Dean, School of Medicine and Dentistry, University of Rochester.
320 Westminster Road, Rochester 7, N. Y.

Whitmore, Frank Clifford, A.B., A.M., Ph.D., Sc.D. 1943
Dean, School of Chemistry and Physics, Pennsylvania State College, State College, Pa.

Whitney, Willis R., S.B., Ph.D., Sc.D., Ch.D., LL.D. 1931
Chemist, Honorary Vice-president,
General Electric Company, Research Laboratory,
Schenectady 5, N. Y.

Wigner, Eugene Paul, Dr.Ing. 1944
Thomas D. Jones Professor of Mathematical Physics,
Princeton University, Princeton, N. J.

Williams, John Henry, Ph.D., Sc.D. 1942
Nathaniel Ropes Professor of Political Economy, Dean, Graduate School of Public Administration, Harvard University; Vice-president, Federal Reserve Bank of New York. 148 Coolidge Hill, Cambridge 38, Mass.

Williams, Robert R., M.S., D.Sc. 1942
Chemical Director (ret.), Bell Telephone Laboratories.
297 Summit Avenue, Summit, N. J.

Willis, Bailey, E.M., C.E., Ph.D. 1905
Professor Emeritus of Geology, Stanford University.
Box 1365, Stanford University, Calif.

Willits, Joseph Henry, A.M., Ph.D., LL.D. 1938
Director for the Social Sciences, Rockefeller Foundation,
49 West 49th Street, New York 20, N. Y.

Wilson, Edgar Bright, Jr., B.S., Ph.D. 1946
Associate Professor of Chemistry, Harvard University.
12 Oxford Street, Cambridge 38, Mass.

Wilson, Edwin Bidwell, A.B., Ph.D. 1917
Professor Emeritus of Vital Statistics, Harvard School of Public Health. 42 Brington Road, Brookline 46, Mass.

Wilson, George Grafton, Ph.D., LL.D. 1936
Professor Emeritus of International Law,
Langdell Hall, Harvard University, Cambridge 38, Mass.

Wilson, Harold Albert, M.A., M.Sc., D.Sc. 1914
Professor of Physics, The Rice Institute, Houston, Texas

Date of Election

Winlock, Herbert Eustis, Art.D., Litt.D. 1939
Director Emeritus and Formerly Curator of the Egyptian Department, Metropolitan Museum of Art. 1010 Fifth Avenue, New York 28, N. Y.

Wissler, Clark, A.M., Ph.D., LL.D. 1924
Curator Emeritus of Anthropology, American Museum of Natural History, New York 24, N. Y.

Witmer, Lightner, A.M., Ph.D. 1897
Professor Emeritus of Psychology, University of Pennsylvania. Box 186, Devon, Pa.

Wolman, Leo, Ph.D. 1941
Professor of Economics, Columbia University. National Bureau of Economic Research, 1819 Broadway, New York 23, N. Y.

Woodworth, Robert Sessions, A.B., A.M., Ph.D., Sc.D., LL.D. 1936
Professor Emeritus of Psychology, Columbia University, New York 27, N. Y.

Wright, Frederick E., Ph.D., Sc.D. 1914
Petrologist. 2134 Wyoming Avenue, Washington 8, D. C.

Wright, Quincy, A.B., A.M., Ph.D., LL.D. 1943
Professor of International Law, University of Chicago, Chicago 37, Ill.

Wright, Sewall, B.S., M.S., Sc.D. 1932
Ernest D. Burton Distinguished Service Professor of Zoology, University of Chicago. 5762 Harper Avenue, Chicago 37, Ill.

Wright, William Hammond, D.Sc. 1935
Astronomer, Director (ret.), Lick Observatory, Mount Hamilton, Calif.

Yeatman, Pope, E.M., D.E. 1920
Mining Engineer. 165 Broadway, New York 6, N. Y.

Yerkes, Robert Mearns, Ph.D., D.Sc., LL.D. 1936
Professor Emeritus of Psychobiology, Yale University, 333 Cedar Street, New Haven 11, Conn.

Young, Donald Ramsey, A.B., A.M., Ph.D. 1945
Professor of Sociology (on leave of absence), Wharton School, University of Pennsylvania. Executive Director, Social Science Research Council, 230 Park Avenue, New York 17, N. Y.

Date of Election

Young, James Thomas, Ph.D., Litt.D. 1933
Political Scientist, Professor Emeritus of Public Administration, University of Pennsylvania, Philadelphia 4, Pa.

Young, Owen D., A.B., D.H.L., LL.B., Litt.D., D.C.S. 1929
Lawyer, Honorary Chairman, General Electric Company. 570 Lexington Avenue, New York 22, N. Y.

Zeleny, John, M.A., Ph.D. 1915
Professor Emeritus of Physics, Yale University. 44 Cold Spring Street, New Haven, Conn.

Total Resident Members—481.

December 31, 1946.

FOREIGN MEMBERS

Date of Election

Adrian, Edgar Douglas, M.A., M.D., Sc.D., LL.D., F.R.S. 1938
Professor of Physiology, Cambridge University.
St. Chad's, Grange Road, Cambridge, England.

Alexandroff, Paul 1946
Professor of Mathematics, University of Moscow,
and Academician of the U.S.S.R., Academy of Sciences,
Moscow, U.S.S.R.

Alonso, Amado, Ph.D., LL.D. 1942
Director, Instituto de Filología, and Professor,
University of Buenos Aires, Buenos Aires, Argentina.

Bartlett, Frederic Charles, B.A., M.A., C.B.E., Hon. D.Phil., F.R.S. 1945
Professor of Experimental Psychology, and
Director of the Psychological Laboratory,
University of Cambridge, Cambridge, England.

Beazley, John Davidson, M.A., F.B.A., Hon. Litt.A., Hon. Litt.D., Hon. Ph.D. 1943
Professor of Classical Archaeology, Oxford University,
Oxford, England.

Bell, Sir Harold Idris, D.Litt., F.B.A., F.S.A. 1941
Formerly Keeper of the Manuscripts and Egerton Librarian,
(ret.) British Museum. 8 Birchington Road, Crouch End,
London, N. 8, England.

Beneš, Eduard, Ph.D., LL.D. 1939
President, Czechoslovak Republic, Prague,
Czechoslovakia.

Bohr, Harald 1945
Professor of Mathematics, University of Copenhagen,
Copenhagen, Denmark.

Bohr, Niels Henrik David, Dr.phil. 1940
Professor of Theoretical Physics, University of
Copenhagen; Director, Institute of Theoretical Physics.
G. 1 Carlsberg, Copenhagen, Denmark.

Bragg, Sir William Lawrence, F.R.S., M.A., Hon. D.Sc., Hon. Ph.D. 1943
Professor of Experimental Physics, Cambridge
University, Cambridge, England.

Date of Election

de Broglie, Prince Louis Victor, D.Sc. 1939
Professor of Theoretical Physics, University of Paris.
94 Rue Perronet, Neuilly-sur-Seine, France.

Brouwer, Luitzen, Egbertus Jan, Ph.D. 1943
Professor of Mathematics, University of Amsterdam,
Amsterdam, Netherlands.

Carr, Sir Cecil Thomas, LL.D. 1944
Barrister-at-law, Counsel to the Speaker and the
House of Commons. The Athenæum,
Pall Mall, London, S.W. 1, England.

Cook, Arthur Bernard, Litt.D. 1944
Professor Emeritus of Classical Archaeology,
Queen's College, Cambridge, England.

Craigie, Sir William A., LL.D., D.Litt. 1942
Professor Emeritus of English, University of Chicago.
Ridgehurst, Watlington, Oxford, England.

Croce, Benedetto, Ph.D., Dr. honoris causa. 1944
Italian Historian, Art Critic, and Philosopher.
Naples, Italy.

Cumont, Franz Valery Marie, D.Litt. 1940
Authority on Religions of the Roman Empire.
19 Corso d'Italia, Rome, Italy.

Dale, Sir Henry Hallett, M.D., D.Sc., LL.D., F.R.S. 1939
Director, National Institute for Medical Research.
54 Campden Hill Court, Kensington, London,
W. 8, England.

De Sanctis, Gaetano 1946
Historian and Archaeologist. Pontificia Accademia
Romana di Archeologia (Via S. Chiara 61), Rome, Italy.

Dirac, Paul Adrien Maurice, Ph.D., F.R.S. 1938
Lucasian Professor of Mathematics, Cambridge University.
St. John's College, Cambridge, England.

Fisher, Ronald Aylmer, Sc.D., LL.D., F.R.S. 1941
Galton Professor of Eugenics, University College, London.
The Galton Laboratory, Rothamsted Experimental Station,
Harpenden, Hertfordshire, England.

García, Godofredo 1943
Engineer and Mathematician, Professor in the Faculty
of Sciences, University of San Marcos, Lima, Peru.

Date of Election

Gardiner, Alan Henderson, M.A., F.B.A. 1943
Egyptologist, Editor, *Journal of Egyptian Archaeology.*
Upton House, Wonston, Nr. Winchester, Hants,
London, England.

Gooch, George Peabody, D.Litt. 1939
Honorary Fellow, Trinity College, Cambridge University.
76 Campden Hill Road, London, W. 8, England.

Greg, Walter Wilson, F.B.A., Litt.D., Hon. D. Litt., Hon. LL.D. 1945
Authority on the English Drama.
Standlands, Petworth, Sussex, England.

Hardy, Godfrey Harold, D.Sc., LL.D., D.Phil. 1939
Sadleirian Professor of Pure Mathematics, University of Cambridge; Fellow, Trinity College, Cambridge, England.

Heckscher, Eli Filip, Ph.D., D.Sc. 1940
Research Professor of Economic History, University of Stockholm. Baldersgaten 10 a, Stockholm, Sweden.

Heisenberg, Werner, Ph.D. 1937
Professor of Theorétical Physics, University of Leipzig.
Bozenerweg 14, Leipzig, Germany.

Hertzsprung, Ejnar 1941
Director, Leiden Observatory, Leiden, Netherlands.

Hill, Archibald Vivian, Sc.D., LL.D., M.D. 1938
Physiologist, Foulerton Research Professor and Secretary of the Royal Society. University of London, University College, Gower Street, London, W.C. 1, England.

Hjort, Johan, Ph.D., Sc.D. 1939
Professor of Marine Biology, Oslo University,
Oslo, Norway.

Hopkins, Sir Frederick Gowland, M.A., M.B., D.Sc., LL.D., D.C.L., F.R.S. 1937
Physiologist, Professor of Biochemistry, University of Cambridge. Saxmeadham, Grange Road,
Cambridge, England.

Houssay, Bernardo Alberto, M.D., Dr. honoris causa 1944
Director, Instituto de Biologiá y Medicina Experimental,
Costa Rica 4185, Buenos Aires, Argentina.

Hu Shih, Ph.D., LL.D., Litt.D., L.H.D., D.C.L. 1936
Chairman, Academia Sinica; Chancellor,
Peking National University.
104 East 81st Street, New York 28, N. Y.

Date of Election

Irvine, Sir James Colquhoun, C.B.E., Ph.D., Sc.D., LL.D., D.C.L., F.R.S. 1933
Chemist, Principal and Vice-chancellor, University of St. Andrews, Fifeshire, Scotland.

Janet, Pierre, Dr. ès lettres, Dr. en médicine, Sc.D. 1940
Professor of Psychology, Collége de France; Director, Laboratoire de Psychologie pathologique, Clinique de la Salpêtrière. Rue de Varenne 54, Paris VII, France.

Jones, Harold Spencer, Sc.D., F.R.S. 1942
Astronomer Royal of Great Britain.
Flamsteed House, Greenwich Park, S.E. 10, England.

Keith, Sir Arthur, Kt., F.R.S., M.D., D.Sc., F.R.C.S., LL.D. 1931
Anthropologist, Master, Buckston Browne Research Farm, Downe, Farnborough, Kent, England.

Kenyon, Sir Frederic George, M.A., D.Litt., LL.D., L.H.D., Ph.D. 1937
Archaeologist and Philologist, Secretary, British Academy; Formerly President, London Society of Antiquaries; Formerly Director, British Museum.
Kirkstead, Godstone, Surrey, England.

Kramers, Hendrik Anthony, Dr. 1942
Professor of Theoretical Physics, University of Leiden, Leiden, Netherlands.

Krogh, August, Ph.D., LL.D., M.D., Sc.D. 1941
Professor of Zoophysiology, Copenhagen University, Copenhagen, Denmark.

Lemaitre, Georges, D.Sc., Ph.D. 1945
Professor of Mathematics, University of Louvain.
9 rue Henry de Braekleer, Brussels, Belgium.

de Margerie, Emmanuel 1932
Geologist, Formerly President, Geological Society of France. 110 Rue du Bac, Paris VII, France.

Méndez-Pereira, Octavio, Ph.D., LL.D. 1942
Formerly Rector, University of Panama;
Apartado 320, Panamá, Republica de Panamá.

Menéndez Pidal, Ramón, Dr. honoris causa 1940
Professor of Romance Philology, University of Madrid, Madrid, Spain.

Date of Election

Nilsson, Martin P., Ph.D. 1939
Professor of Classical Archaeology and Ancient History, University of Lund. Bredgatan 25, Lund, Sweden.

Planck, Max, Ph.D., M.D., D.Sc. 1933
Professor of Physics, University of Berlin, Berlin, Germany.

Rappard, William E., Dr.jur., Litt.D., LL.D. 1941
Professor of Public Finance and Political Science, University of Geneva; Director, Graduate Institute of International Studies, Geneva, Switzerland.

Richardson, Sir Owen Willans, Kt., M.A., D.Sc., LL.D., F.R.S. 1910
Physicist, Yarrow Research Professor of the Royal Society; Director of Research in Physics, Kings College, London. Chandos Lodge, Alton, Hants, England.

Rist, Charles, LL.D. 1938
Professor of Political Economy, University of Paris. 18 bis, Rue du Parç de Clagny, Versailles, France.

Robinson, Sir Robert, Kt., F.R.S., D.Sc., LL.D. 1944
Waynflete Professor of Chemistry, Oxford University. Dyson Perrins Laboratory, South Parks Road, Oxford, England.

Svedberg, Theodor, Ph.D. 1941
Professor of Physical Chemistry, Upsala University, Upsala, Sweden.

Tawney, Richard Henry 1942
Professor of Economic History, University of London, London, England.

Thompson, Sir D'Arcy Wentworth, D.Litt., D.Sc., LL.D. 1941
Professor of Natural History; St. Andrews University, St. Andrews, Scotland.

Toynbee, Arnold Joseph, D.Litt. 1941
Director of Studies, Royal Institute of International Affairs; Research Professor of International History, University of London, London, England.

Vinogradov, Ivan Matveitch, Dr. 1942
Director, Steklov Institute of Mathematics of the Academy of Sciences of the U.S.S.R., Moscow, U.S.S.R.

Wace, Alan J. B., M.A., Litt.D., LL.D., F.B.A. 1945
Professor Emeritus of Classical Archaeology, Cambridge University; Professor of Classics and Archaeology, Faruk I University, Alexandria, Egypt.

Whittaker, Edmund Taylor, LL.D., Sc.D. 1944
Professor of Mathematics, Edinburgh University. 48 George Square, Edinburgh 8, Scotland.

Wilkins, Sir Hubert, Kt., M.C., F.R.G.S., M.B.O.U. 1930
Geographer. 37 West 53rd St., New York 19, N. Y.

van Zeeland, Paul 1942
Formerly Prime Minister and Minister of Foreign Affairs and of Foreign Commerce of Belgium. Co-ordinating Foundation, 30 Rockefeller Plaza, New York 20, N. Y.

Total Foreign Members—60.

December 31, 1946.

CLASSIFIED LIST OF MEMBERS

CLASS I. MATHEMATICAL AND PHYSICAL SCIENCES

Mathematics

Alexander, James W.....Princeton, N. J.
Alexandroff, Paul.....Moscow, U.S.S.R.
Bell, Eric Temple.....Pasadena, Calif.
Bliss, Gilbert Ames.....Chicago, Ill.
Bohr, Harald.....Copenhagen, Denmark
Brouwer, Luitzen Egbertus Jan.....Amsterdam, Netherlands
Coble, Arthur Byron.....Urbana, Ill.
Dirac, Paul Adrien Maurice.....Cambridge, England
Dresden, Arnold.....Swarthmore, Pa.
Eisenhart, Luther Pfahler.....Princeton, N. J.
Evans, Griffith Conrad.....Berkeley, Calif.
Fisher, Ronald Aylmer.....Harpenden, Hertfordshire, England
García, Godofredo.....Lima, Peru
Hardy, Godfrey Harold.....Cambridge, England
Huntington, Edward Vermilye.....Cambridge, Mass.
Kline, John Robert.....Philadelphia, Pa.
Lefschetz, Solomon.....Princeton, N. J.
Lemaitre, Georges.....Brussels, Belgium
Lovett, Edgar Odell.....Houston, Texas
Morse, Marston.....Princeton, N. J.
Murnaghan, Francis Dominic.....Baltimore, Md.
von Neumann, John.....Princeton, N. J.
Stone, Marshall Harvey.....Chicago, Ill.
Veblen, Oswald.....Princeton, N. J.
Vinogradov, Ivan M.....Moscow, Russia
Weaver, Warren.....New York, N. Y.
Weyl, Hermann.....Princeton, N. J.
Whittaker, Edmund Taylor.....Edinburgh, Scotland

Astronomy

Abbot, Charles Greeley.....Washington, D. C.
Adams, Walter Sydney.....Pasadena, Calif.
Aitken, Robert Grant.....Berkeley, Calif.
Chandrasekhar, Subrahmanyan.....Williams Bay, Wis.

Douglass, Andrew Ellicott.....Tucson, Ariz.
Gaposchkin, Cecilia Payne.....Cambridge, Mass.
Hertzsprung, Ejnar.....Leiden, Netherlands
Hubble, Edwin P.....Pasadena, Calif.
Jones, Harold Spencer.....Greenwich Park, England
Lampland, Carl O.....Flagstaff, Ariz.
Leuschner, Armin Otto.....Berkeley, Calif.
McMath, Robert Raynolds.....Pontiac, Mich.
Menzel, Donald Howard.....Cambridge, Mass.
Merrill, Paul Willard.....Pasadena, Calif.
Mitchell, Samuel Alfred.....University, Va.
Moulton, Forest Ray.....Washington, D. C.
Olivier, Charles P.....Upper Darby, Pa.
Russell, Henry Norris.....Princeton, N. J.
Seares, Frederick Hanley.....Pasadena, Calif.
Shapley, Harlow.....Cambridge, Mass.
Slipher, Vesto Melvin.....Flagstaff, Ariz.
Stebbins, Joel.....Madison, Wis.
Struve, Otto.....Williams Bay, Wis.
Tucker, Richard Hawley.....Palo Alto, Calif.
Wright, William Hammond.....Mt. Hamilton, Calif.

Physics

Adams, Edwin Plimpton.....Princeton, N. J.
Anderson, Carl David.....Pasadena, Calif.
Beams, Jesse Wakefield.....University, Va.
Birge, Raymond Thayer.....Berkeley, Calif.
Bohr, Niels Henrik David.....Copenhagen, Denmark
Bowen, Ira Sprague.....Pasadena, Calif.
Bragg, William Lawrence.....Cambridge, England
Bridgman, Percy Williams.....Cambridge, Mass.
Briggs, Lyman J.....Washington, D. C.
de Broglie, Louis Victor.....Neuilly-sur-Seine, France
Buckley, Oliver Ellsworth.....New York, N. Y.
Compton, Arthur Holly.....St. Louis, Mo.
Compton, Karl Taylor.....Cambridge, Mass.
Coolidge, William David.....Schenectady, N. Y.
Crew, Henry.....Evanston, Ill.
Darrow, Karl Kelchner.....New York, N. Y.
Davisson, Clinton J.....Short Hills, N. J.
Debye, Peter.....Ithaca, N. Y.
Dempster, Arthur Jeffrey.....Chicago, Ill.
DuBridge, Lee Alvin.....Pasadena, Calif.

Einstein, Albert.....Princeton, N. J.
Fermi, Enrico.....Chicago, Ill.
Foote, Paul Darwin.....Pittsburgh, Pa.
Franck, James.....Chicago, Ill.
Heisenberg, Werner.....Leipzig, Germany
Humphreys, William Jackson.....Washington, D. C.
Ives, Herbert E.....Montclair, N. J.
Kramers, Hendrik A.....Leiden, Netherlands
Lawrence, Ernest Orlando.....Berkeley, Calif.
Loomis, Alfred Lee.....Tuxedo Park, N. Y.
Lyman, Theodore.....Cambridge, Mass.
Millikan, Robert Andrews.....Pasadena, Calif.
Mulliken, Robert Sanderson.....Chicago, Ill.
Oppenheimer, J. Robert.....Pasadena, Calif.
Planck, Max.....Berlin, Germany
Rabi, Isidor Isaac.....New York, N. Y.
Richardson, Owen Willans.....Alton, Hants, England
Robertson, Howard Percy.....Princeton, N. J.
Rossby, Carl-Gustaf A.....Chicago, Ill.
See, Thomas Jefferson Jackson.....Vallejo, Calif.
Seitz, Frederick, Jr.....Pittsburgh, Pa.
Slater, John Clarke.....Cambridge, Mass.
Stone, Otto.....Berkeley, Calif.
Swann, William Francis Gray.....Swarthmore, Pa.
Tate, John Torrence.....Minneapolis, Minn.
Tolman, Richard Chace.....Pasadena, Calif.
Tuve, Merle Antony.....Washington, D. C.
Van Vleck, John Hasbrouck.....Cambridge, Mass.
Webster, David Locke.....Stanford University, Calif.
Wigner, Eugene Paul.....Princeton, N. J.
Wilson, Harold Albert.....Houston, Texas
Zeleny, John.....New Haven, Conn.

Chemistry

Adams, Roger.....Urbana, Ill.
Andrews, Donald Hatch.....Baltimore, Md.
Bancroft, Wilder Dwight.....Ithaca, N. Y.
Bogert, Marston Taylor.....New York, N. Y.
Clark, William Mansfield.....Baltimore, Md.
Clarke, Hans Thacher.....New York, N. Y.
Conant, James Bryant.....Cambridge, Mass.
Cottrell, Frederick Gardner.....Palo Alto, Calif.
Du Pont, Pierre Samuel.....Wilmington, Del.
Eyring, Henry.....Salt Lake City, Utah

Fieser, Louis Frederick.....Belmont, Mass.
Giauque, William Francis.....Berkeley, Calif.
†Gomberg, Moses.....Ann Arbor, Mich.
Harkins, William Draper.....Chicago, Ill.
Hawk, Philip Bovier.....Miami Beach, Fla.
Hopkins, B Smith.....Urbana, Ill.
Hulett, George A.....Princeton, N. J.
Irvine, James Colquhoun.....Fifeshire, Scotland
Johnston, John.....Southwest Harbor, Me.
Keyes, Frederick George.....Cambridge, Mass.
Kirkwood, John Gamble.....Ithaca, N. Y.
Kistiakowsky, George Bogdan.....Cambridge, Mass.
Kraus, Charles August.....Providence, R. I.
Lamb, Arthur Becket.....Cambridge, Mass.
Langmuir, Irving.....Schenectady, N. Y.
Lind, Samuel Colville.....Minneapolis, Minn.
MacInnes, Duncan Arthur.....New York, N. Y.
Marvel, Carl Shipp.....Urbana, Ill.
Mees, Charles Edward Kenneth.....Rochester, N. Y.
Northrop, John Howard.....Princeton, N. J.
Patterson, Lamar Gray.....Perdido Beach, Ala.
Pauling, Linus Carl.....Pasadena, Calif.
Robinson, Robert.....Oxford, England
Smyth, Charles Phelps.....Princeton, N. J.
Stanley, Wendell Meredith.....Princeton, N. J.
Svedberg, Theodor.....Upsala, Sweden
Taylor, Hugh Stott.....Princeton, N. J.
Urey, Harold Clayton.....Chicago, Ill.
Van Slyke, Donald Dexter.....New York, N. Y.
du Vigneaud, Vincent.....Scarsdale, N. Y.
Whitmore, Frank Clifford.....State College, Pa.
Whitney, Willis R.....Schenectady, N. Y.
Williams, Robert R.....Summit, N. J.
Wilson, Edgar Bright, Jr.....Cambridge, Mass.

Engineering

Bush, Vannevar.....Washington, D. C.
Davis, Harvey N.....Hoboken, N. J.
Derleth, Charles, Jr.....Berkeley, Calif.
Dewey, Bradley.....Cambridge, Mass.
Dunn, Gano.....New York, N. Y.
Durand, William Frederick.....Stanford University, Calif.
Hoover, Herbert.....Stanford University, Calif.

† Deceased.

Hunsaker, Jerome Clarke.....Cambridge, Mass.
Jackson, Dugald Caleb.....Cambridge, Mass.
Jewett, Frank Baldwin.....New York, N. Y.
Kármán, Theodor von.....Pasadena, Calif.
Kettering, Charles Franklin.....Dayton, Ohio
Lewis, George William.....Chevy Chase, Md.
Pender, Harold.....Philadelphia, Pa.
Timoshenko, Stephen P.....Palo Alto, Calif.
Westergaard, Harald Malcolm.....Cambridge, Mass.
Yeatman, Pope.....New York, N. Y.

CLASS II. GEOLOGICAL AND BIOLOGICAL SCIENCES

Geology, Paleontology, Geography, Oceanography

Berkey, Charles Peter.....New York, N. Y.
Blackwelder, Eliot.....Stanford University, Calif.
Bowen, Norman L.....Chicago, Ill.
Bowman, Isaiah.....Baltimore, Md.
Bryant, William L.....Providence, R. I.
Buddington, Arthur F.....Princeton, N. J.
Byrd, Richard Evelyn.....Boston, Mass.
Case, Ermine Cowles.....Ann Arbor, Mich.
Chamberlin, Rollin Thomas.....Chicago, Ill.
Chaney, Ralph Works.....Berkeley, Calif.
Cross, Whitman.....Chevy Chase, Md.
Daly, Reginald Aldworth.....Cambridge, Mass.
Day, Arthur L.....Bethesda, Md.
Dunbar, Carl Owen.....New Haven, Conn.
Gregory, Herbert Ernest.....Honolulu, Hawaii
Gregory, William King.....New York, N. Y.
Hobbs, William Herbert.....Ann Arbor, Mich.
Lawson, Andrew Cowper.....Berkeley, Calif.
Leith, Charles Kenneth.....Madison, Wis.
de Margerie, Emmanuel.....Paris, France
Sauer, Carl O.....Berkeley, Calif.
†Scott, William Berryman.....Princeton, N. J.
Simpson, George Gaylord.....New York, N. Y.
Stefansson, Vilhjalmur .....New York, N. Y.
Stock, Chester.....Pasadena, Calif.
Sverdrup, Harald Ulrik.....La Jolla, Calif.
Vaughan, Thomas Wayland.....Washington, D. C.
Warren, Charles Hyde.....New Haven, Conn.

† Deceased.

Wilkins, Hubert.....New York, N. Y.
Willis, Bailey.....Stanford University, Calif.
Wright, Frederick E.....Washington, D. C.

Zoology, Anatomy

Andrews, Roy Chapman.....Colebrook, Conn.
Bigelow, Henry Bryant.....Cambridge, Mass.
Birge, Edward Asahel.....Madison, Wis.
Calvert, Philip Powell.....Cheyney, Pa.
Castle, William Ernest.....Berkeley, Calif.
Cockerell, Theodore D. A.....Boulder, Colo.
Conklin, Edwin Grant.....Princeton, N. J.
Corner, George Washington.....Baltimore, Md.
Danforth, Charles Haskell.....Stanford University, Calif.
Detwiler, Samuel Randall.....New York, N. Y.
Dobzhansky, Theodosius.....New York, N. Y.
Dunn, Leslie Clarence.....New York, N. Y.
Harrison, Ross G.....New Haven, Conn.
Hisaw, Frederick Lee.....Cambridge, Mass.
Hjort, Johan.....Oslo, Norway
Howard, Leland Ossian.....Washington, D. C.
Jennings, Herbert S.....Los Angeles, Calif.
Kofoid, Charles A.....Berkeley, Calif.
Lewis, Warren Harmon.....Philadelphia, Pa.
Lillie, Frank Rattray.....Chicago, Ill.
McClure, Charles F. W.....Princeton, N. J.
McGregor, James Howard.....New York, N. Y.
Metz, Charles William.....Philadelphia, Pa.
Miller, Gerrit Smith, Jr.....Washington, D. C.
Moore, J. Percy.....Philadelphia, Pa.
Murphy, Robert Cushman.....New York, N. Y.
Nicholas, John Spangler.....New Haven, Conn.
Painter, Theophilus Shickel.....Austin, Texas
Parker, George Howard.....Cambridge, Mass.
Ruthven, Alexander G.....Ann Arbor, Mich.
Schaeffer, J. Parsons.....Philadelphia, Pa.
Schultz, Adolph H.....Baltimore, Md.
Streeter, George Linius.....Baltimore, Md.
Sturtevant, Alfred Henry.....Pasadena, Calif.
Taliaferro, William Hay.....Chicago, Ill.
Thompson, D'Arcy Wentworth.....St. Andrews, Scotland
Weed, Lewis Hill.....Baltimore, Md.
Wetmore, Alexander.....Washington, D. C.
Wright, Sewall.....Chicago, Ill.

Botany, Bacteriology

Allen, Charles Elmer.....Madison, Wis.
Bailey, Irving Widmer.....Cambridge, Mass.
Bailey, Liberty Hyde.....Ithaca, N. Y.
Bartlett, Harley Harris.....Ann Arbor, Mich.
Bayne-Jones, Stanhope.....New Haven, Conn.
Beadle, George Wells.....Pasadena, Calif.
Blakeslee, Albert Francis.....Northampton, Mass.
Campbell, Douglas Houghton.....Stanford University, Calif.
Cleland, Ralph Erskine.....Bloomington, Ind.
Crocker, William.....Yonkers, N. Y.
Davis, Bradley Moore.....Ann Arbor, Mich.
Duggar, Benjamin Minge.....Pearl River, N. Y.
Fernald, Merritt Lyndon.....Cambridge, Mass.
Fred, Edwin Broun.....Madison, Wis.
Kunkel, Louis Otto.....Princeton, N. J.
Livingston, Burton E.....Riderwood, Md.
McClintock, Barbara.....Cold Spring Harbor, L.I., N. Y.
McCollum, Elmer V.....Baltimore, Md.
MacDougal, Daniel Trembly.....Carmel, Calif.
Merrill, Elmer Drew.....Jamaica Plain, Mass.
Moore, George Thomas.....St. Louis, Mo.
Novy, Frederick G.....Ann Arbor, Mich.
Robbins, William Jacob.....New York, N. Y.
Schramm, Jacob Richard.....Philadelphia, Pa.
Shull, George Harrison.....Princeton, N. J.
Sinnott, Edmund Ware.....New Haven, Conn.
Spoehr, Herman Augustus.....Stanford University, Calif.
Stadler, Lewis John.....Columbia, Mo.
Stakman, Elvin Charles.....St. Paul, Minn.

Anthropology, Psychology

Angell, James Rowland.....New Haven, Conn.
Bartlett, Frederic Charles.....Cambridge, England
Boring, Edwin Garrigues.....Cambridge, Mass.
Carmichael, Leonard.....Medford, Mass.
Cole, Fay-Cooper.....Chicago, Ill.
Hooton, Earnest A.....Cambridge, Mass.
Hunter, Walter Samuel.....Providence, R. I.
Janet, Pierre.....Paris, France
Keith, Arthur.....Farnborough, Kent, England
Köhler, Wolfgang.....Swarthmore, Pa.
Lashley, Karl Spencer.....Orange Park, Fla.

MacCurdy, George Grant.....Old Lyme, Conn.
Miles, Walter Richard.....New Haven, Conn.
Spier, Leslie.....Santa Cruz, Calif.
Thorndike, Edward L.....New York, N. Y.
Tozzer, Alfred Marston.....Cambridge, Mass.
Wissler, Clark.....New York, N. Y.
Witmer, Lightner.....Devon, Pa.
Woodworth, Robert Sessions.....New York, N. Y.
Yerkes, Robert Mearns.....New Haven, Conn.

Physiology, Pathology

Adrian, Edgar Douglas.....Cambridge, England
Benedict, Francis Gano.....Machiasport, Maine
Bronk, Detlev W.....Philadelphia, Pa.
Carlson, Anton Julius.....Chicago, Ill.
Dale, Henry Hallett.....London, England
Doisy, Edward Adelbert.....Webster Groves, Mo.
DuBois, Eugene Floyd.....New York, N. Y.
Erlanger, Joseph.....St. Louis, Mo.
Fenn, Wallace Osgood.....Rochester, N. Y.
Forbes, Alexander.....Boston, Mass.
Gasser, Herbert Spencer.....New York, N. Y.
Gies, William J.....New York, N. Y.
Goodpasture, Ernest William.....Nashville, Tenn.
Harvey, E. Newton.....Princeton, N. J.
Hastings, A. Baird.....Boston, Mass.
Hill, Archibald Vivian.....London, England
Hopkins, Frederick Gowland.....Cambridge, England
Houssay, Bernardo Alberto.....Buenos Aires, Argentina
Jacobs, Merkel Henry.....Philadelphia, Pa.
Krogh, August.....Copenhagen, Denmark
Lillie, Ralph Stayner.....Chicago, Ill.
Loeb, Leo.....St. Louis, Mo.
Long, Esmond Ray.....Philadelphia, Pa.
Murlin, John Raymond.....Rochester, N. Y.
Osterhout, Winthrop J. V.....New York, N. Y.
Richards, Alfred Newton.....Bryn Mawr, Pa.
Riddle, Oscar.....Plant City, Fla.
Shope, Richard Edwin.....Princeton, N. J.
Tyzzer, Ernest Edward.....Wakefield, Mass.
Whipple, George Hoyt.....Rochester, N. Y.

Medicine, Pharmacology, Surgery

Castle, William Bosworth.....Boston, Mass.
Darrach, William.....New York, N. Y.
Graham, Evarts Ambrose.....St. Louis, Mo.
Gregg, Alan.....Scarsdale, N. Y.
Heiser, Victor George.....Bantam, Conn.
Joslin, Elliott Proctor.....Boston, Mass.
MacNider, William de Berniere.....Chapel Hill, N. C.
Minot, George Richards.....Boston, Mass.
Norris, George William.....Dimock, Pa.
Packard, Francis Randolph.....Philadelphia, Pa.
Pepper, O. H. Perry.....Ithan, Pa.
Pepper, William.....Philadelphia, Pa.
Rivers, Thomas Milton.....Forest Hills, L. I., N. Y.
Rous, Peyton.....New York, N. Y.

CLASS III. SOCIAL SCIENCES

Economics, Statistics, Sociology

Barnard, Chester Irving.....Newark, N. J.
Bonbright, James Cummings.....New York, N. Y.
Clark, John Maurice.....Westport, Conn.
Day, Edmund Ezra.....Ithaca, N. Y.
Fetter, Frank Albert.....Princeton, N. J.
Fisher, Irving.....New Haven, Conn.
Goodrich, Carter.....New York, N. Y.
Heaton, Herbert.....Minneapolis, Minn.
Heckscher, Eli Filip.....Stockholm, Sweden
Huebner, Solomon Stephen.....Merion, Pa.
Johnson, Alvin Saunders.....Nyack, N. Y.
Johnson, Emory R.....Philadelphia, Pa.
MacIver, Robert Morrison.....Palisades, N. Y.
Mitchell, Wesley Clair.....New York, N. Y.
Moulton, Harold Glenn.....Washington, D. C.
Notestein, Frank W.....Princeton, N. J.
Ogburn, William Fielding.....Chicago, Ill.
Patterson, Ernest Minor.....Philadelphia, Pa.
Rappard, William E.....Geneva, Switzerland
Rist, Charles.....Versailles, France
Slichter, Sumner Huber.....Cambridge, Mass.
Stewart, Walter W.....Princeton, N. J.
Sprague, Oliver M. W.....Boston, Mass.

Tawney, Richard Henry.....London, England
Viner, Jacob.....Princeton, N. J.
Williams, John Henry.....Cambridge, Mass.
Willits, Joseph Henry.....New York, N. Y.
Wilson, Edwin Bidwell.....Brookline, Mass.
Wolman, Leo.....New York, N. Y.
Young, Donald Ramsey.....New York, N. Y.
Young, James Thomas.....Philadelphia, Pa.

Modern History

Adams, James Truslow.....Southport, Conn.
Armstrong, Hamilton Fish.....New York, N. Y.
Beard, Charles Austin.....New Milford, Conn.
Bolton, Herbert Eugene.....Berkeley, Calif.
Boyd, Julian Parks.....Princeton, N. J.
†Cheyney, Edward Potts.....Media, Pa.
Croce, Benedetto.....Naples, Italy
Ford, Guy Stanton.....Washington, D. C.
Freeman, Douglas Southall.....Richmond, Va.
Gooch, George Peabody.....London, England
Greene, Evarts B.....Croton-on-Hudson, N. Y.
Hayes, Carlton Joseph Huntley.....New York, N. Y.
Langer, William Leonard.....Cambridge, Mass.
Lingelbach, William E.....Philadelphia, Pa.
McIlwain, Charles Howard.....Princeton, N. J.
Morison, Samuel Eliot.....Canton, Mass.
Nichols, Roy Franklin.....Swarthmore, Pa.
Read, Conyers.....Villa, Nova, Pa.
Schlesinger, Arthur Meier.....Cambridge, Mass.
Schmitt, Bernadotte Everly.....Alexandria, Va.
Schuyler, Robert Livingston.....New York, N. Y.
Seymour, Charles.....New Haven, Conn.
Shotwell, James Thomson.....New York, N. Y.
Shryock, Richard Harrison.....Merion, Pa.
Sioussat, St. George Leakin.....Chevy Chase, Md.
Wertenbaker, Thomas Jefferson.....Princeton, N. J.

Jurisprudence

Carr, Cecil Thomas.....London, England
Chafee, Zechariah, Jr.....Cambridge, Mass.
Chamberlain, Joseph Perkins.....New York, N. Y.
Corwin, Edward Samuel.....Princeton, N. J.

† Deceased.

Davis, John William.....New York, N. Y.
Dickinson, John.....Philadelphia, Pa.
Duane, Morris.....Philadelphia, Pa.
Frankfurter, Felix.....Washington, D. C.
Goodrich, Herbert Funk.....Philadelphia, Pa.
Hudson, Manley Ottmer.....Cambridge, Mass.
Hughes, Charles Evans.....Washington, D. C.
Jessup, Philip C.....New York, N. Y.
Kelley, Nicholas.....New York, N. Y.
Landis, James McCauley.....Washington, D. C.
Lewis, Edwin Owen.....Philadelphia, Pa.
Miller, Hunter.....Victoria, B. C., Canada
Moe, Henry Allen.....New York, N. Y.
Moore, John Bassett.....New York, N. Y.
Pepper, George Wharton.....Philadelphia, Pa.
Pound, Roscoe.....Watertown, Mass.
Roberts, Owen J.....Birchrunville, Pa.
Rogers, Lindsay.....New York, N. Y.
Warren, Charles.....Washington, D. C.
Wilson, George Grafton.....Cambridge, Mass.
Wright, Quincy.....Chicago, Ill.

Administration, Government

Beneš, Eduard.....Prague, Czechoslovakia
Butler, Nicholas Murray.....New York, N. Y.
Crane, Robert Treat.....Stonington, Conn.
Delano, Frederic Adrian.....Washington, D. C.
Dodds, Harold Willis.....Princeton, N. J.
Fosdick, Raymond Blaine.....New York, N. Y.
Gifford, Walter Sherman.....New York, N. Y.
Lattimore, Owen.....Baltimore, Md.
McClelland, George William.....Philadelphia, Pa.
Marshall, George Catlett.....Washington, D. C.
Merriam, Charles Edward.....Chicago, Ill.
Putnam, Herbert.....Washington, D. C.
Rockefeller, John D., Jr.....New York, N. Y.
Wallace, Henry Agard.....New York, N. Y.
Young, Owen D.....New York, N. Y.
van Zeeland, Paul.....New York, N. Y.

Affairs

Burgess, Warren Randolph.....New York, N. Y.
Douglas, Lewis Williams.....New York, N. Y.
Fels, Samuel S.....Philadelphia, Pa.

Hopkinson, Edward, Jr.....Philadelphia, Pa.
Jenkins, Charles Francis.....Philadelphia, Pa.
Lamont, Thomas William.....New York, N. Y.
Leeds, Morris Evans.....Philadelphia, Pa.
Mason, William Smith.....Pasadena, Calif.
Morgan, Marshall S.....Philadelphia, Pa.
Morris, Lawrence J.....Philadelphia, Pa.
Rhoads, Charles James.....Bryn Mawr, Pa.
Scattergood, J. Henry.....Villa Nova, Pa.
Wetherill, Samuel Price.....Philadelphia, Pa.

CLASS IV. HUMANITIES

Philosophy, Education

Dewey, John.....New York, N. Y.
Gates, Thomas Sovereign.....Philadelphia, Pa.
Graves, Frank Pierrepont.....Albany, N. Y.
Haney, John Louis.....Philadelphia, Pa.
Hocking, William Ernest.....Madison, N. H.
Hu Shih.....New York, N. Y.
Lewis, Clarence Irving.....Lexington, Mass.
Lovejoy, Arthur Oncken.....Baltimore, Md.
Perry, Ralph Barton.....Cambridge, Mass.
Singer, Edgar Arthur, Jr.....Philadelphia, Pa.

Ancient, Medieval, and Cultural History

Bell, Harold Idris.....London, England
Blake, Robert Pierpont.....Cambridge, Mass.
Chinard, Gilbert.....Princeton, N. J.
Cumont, Franz Valery Marie.....Rome, Italy
De Sanctis, Gaetano.....Rome, Italy
Ferguson, William Scott.....Cambridge, Mass.
Leland, Waldo G.....Washington, D. C.
Lowie, Robert H.....Berkeley, Calif.
Nock, Arthur Darby.....Cambridge, Mass.
Rostovtzeff, Michael I.....New Haven, Conn.
Sarton, George.....Cambridge, Mass.
Sigerist, Henry Ernest.....Baltimore, Md.
Thorndike, Lynn.....New York, N. Y.
Westermann, William Linn.....Scarsdale, N. Y.

Archaeology, History of Art, and Architecture

Albright, Wiliam F.....Baltimore, Md.
Beazley, John Davidson.....Oxford, England
Blegen, Carl William.....Cincinnati, Ohio
Carpenter, Rhys.....Downingtown, Pa.
Chase, George Henry.....Cambridge, Mass.
Cook, Arthur Bernard.....Cambridge, England
Dinsmoor, William Bell.....New York, N. Y.
Gardiner, Alan Henderson.....London, England
Holland, Leicester Bodine.....Philadelphia, Pa.
Jayne, Horace Howard Furness.....New York, N. Y.
Kenyon, Frederic George.....Godstone, Surrey, England
Kidder, Alfred Vincent.....Cambridge, Mass.
Kimball, Fiske.....Philadelphia, Pa.
Kroeber, Alfred Louis.....Berkeley, Calif.
Meritt, Benjamin Dean.....Princeton, N. J.
Morley, Sylvanus Griswold.....Merida, Yucatan, Mexico
Nilsson, Martin P.....Lund, Sweden
Richter, Gisela M. A.....New York, N. Y.
Robinson, David Moore.....Baltimore, Md.
Swindler, Mary Hamilton.....Bryn Mawr, Pa.
Taylor, Francis Henry.....New York, N. Y.
Wace, Alan J. B.....Alexandria, Egypt
Winlock, Herbert Eustis.....New York, N. Y.

Languages and Literary History

Alonso, Amado.....Buenos Aires, Argentina
Baugh, Albert Croll.....Philadelphia, Pa.
Beeson, Charles Henry.....Chicago, Ill.
Bloomfield, Leonard.....New Haven, Conn.
Bonner, Campbell.....Ann Arbor, Mich.
Brown, W. Norman.....Philadelphia, Pa.
Buck, Carl Darling.....Chicago, Ill.
Capps, Edward.....Princeton, N. J.
Craigie, William A.....Oxford, England
Edgerton, Franklin.....New Haven, Conn.
Gulick, Charles Burton.....Cambridge, Mass.
Hendrickson, George Lincoln.....New Haven, Conn.
Jaeger, Werner Wilhelm.....Watertown, Mass.
Keniston, Hayward.....Ann Arbor, Mich.
Lancaster, Henry Carrington.....Baltimore, Md.
McDaniel, Walton Brooks.....Coconut Grove, Fla.
Malone, Kemp.....Baltimore, Md.

Méndez-Pereira, Octavio.....Panama City, Panama
Menéndez Pidal, Ramón.....Madrid, Spain
Montgomery, James Alan.....Philadelphia, Pa.
Nitze, William Albert.....Los Angeles, Calif.
Notestein, Wallace.....New Haven, Conn.
Osgood, Charles Grosvenor.....Princeton, N. J.
Robinson, Fred Norris.....Cambridge, Mass.
Sanders, Henry A.....Ann Arbor, Mich.
Speiser, Ephraim Avigdor.....Philadelphia, Pa.
Sturtevant, Edgar Howard.....New Haven, Conn.
Tatlock, John S. P.....Northampton, Mass.
Taylor, Lily Ross.....Bryn Mawr, Pa.
Toynbee, Arnold Joseph.....London, England

Letters and Fine Arts

Aydelotte, Frank.....Princeton, N. J.
Brooks, Van Wyck.....New York, N. Y.
Bush, John Nash Douglas.....Cambridge, Mass.
Cather, Willa.....New York, N. Y.
Cross, Wilbur L.....New Haven, Conn.
Damrosch, Walter Johannes.....New York, N. Y.
Frost, Robert.....South Shaftsbury, Vt.
Greg, Walter Wilson.....Petworth, Sussex, England
Jones, Howard Mumford.....Cambridge, Mass.
Lydenberg, Harry Miller.....Washington, D. C.
Mann, Thomas.....Palisades, Calif.
Mather, Frank Jewett, Jr.....Princeton, N. J.
Morey, Charles Rufus.....Princeton, N. J.
Morris, Harrison Smith.....Philadelphia, Pa.
Mumford, Lewis.....Amenia, N. Y.
Nicolson, Marjorie Hope.....New York, N. Y.
O'Neill, Eugene Gladstone.....Danville, Calif.
Panofsky, Erwin.....Princeton, N. J.
Post, Chandler Rathfon.....Cambridge, Mass.
Quinn, Arthur Hobson.....Bala-Cynwyd, Pa.
Repplier, Agnes.....Philadelphia, Pa.
Rosenbach, A. S. W.....Philadelphia, Pa.
Taylor, Deems.....Stamford, Conn.
Van Doren, Carl.....New York, N. Y.

GEOGRAPHICAL OR PROFESSIONAL LOCATIONS OF MEMBERS

RESIDENTS OF THE UNITED STATES

Alabama

PERDIDO BEACH
Patterson, Lamar Gray

Arizona

FLAGSTAFF
Lampland, Carl O.
Slipher, Vesto Melvin

TUCSON
Douglass, Andrew Ellicott

California

BERKELEY
Aitken, Robert Grant
Birge, Raymond Thayer
Bolton, Herbert Eugene
Castle, William Ernest
Chaney, Ralph Works
Derleth, Charles, Jr.
Evans, Griffith Conrad
Giauque, William Francis
Kofoid, Charles A.
Kroeber, Alfred Louis
Lawrence, Ernest Orlando
Lawson, Andrew Cowper
Leuschner, Armin Otto
Lowie, Robert H.
Sauer, Carl O.
Stern, Otto

CARMEL
MacDougal, Daniel Trembly

DANVILLE
O'Neill, Eugene Gladstone

LA JOLLA
Sverdrup, Harald Ulrik

LOS ANGELES
Jennings, Herbert S.
Nitze, William Albert

MT. HAMILTON
Wright, William Hammond

PALISADES
Mann, Thomas

PALO ALTO
Cottrell, Frederick Gardner
Tucker, Richard Hawley

PASADENA
Adams, Walter Sydney
Anderson, Carl David
Beadle, George Wells
Bell, Eric Temple
Bowen, Ira Sprague
DuBridge, Lee A.
Hubble, Edwin P.
Kármán, Theodor von
Mason, William Smith
Merrill, Paul Willard
Millikan, Robert Andrews
Oppenheimer, J. Robert

Pauling, Linus Carl
Seares, Frederick Hanley
Stock, Chester
Sturtevant, Alfred Henry
Tolman, Richard Chace

SANTA CRUZ
Spier, Leslie

STANFORD UNIVERSITY
Blackwelder, Eliot
Campbell, Douglas Houghton
Danforth, Charles Haskell
Durand, William Frederick
Hoover, Herbert
Spoehr, Herman Augustus
Timoshenko, Stephen P.
Webster, David Locke
Willis, Bailey

VALLEJO
See, Thomas Jefferson Jackson

Colorado

BOULDER
Cockerell, Theodore D. A.

Connecticut

BANTAM
Heiser, Victor George

COLEBROOK
Andrews, Roy Chapman

NEW HAVEN
Angell, James Rowland
Bayne-Jones, Stanhope
Bloomfield, Leonard
Cross, Wilbur L.
Dunbar, Carl O.
Edgerton, Franklin
Fisher, Irving
Harrison, Ross G.
Hendrickson, George Lincoln
Miles, Walter Richard
Nicholas, John Spangler
Notestein, Wallace
Rostovtzeff, Michael I.
Seymour, Charles
Sinnott, Edmund Ware
Sturtevant, Edgar Howard
Warren, Charles Hyde
Yerkes, Robert Mearns
Zeleny, John

NEW MILFORD
Beard, Charles Austin

OLD LYME
MacCurdy, George Grant

SOUTHPORT
Adams, James Truslow

STAMFORD
Taylor, Deems

STONINGTON
Crane, Robert Treat

WESTPORT
Clark, John Maurice

Delaware

WILMINGTON
Du Pont, Pierre Samuel

District of Columbia

WASHINGTON
Abbot, Charles Greeley
Briggs, Lyman J.
Bush, Vannevar
Cross, Whitman
Day, Arthur L.
Delano, Frederic Adrian
Ford, Guy Stanton
Frankfurter, Felix
Howard, Leland Ossian

Hughes, Charles Evans
Humphreys, William Jackson
Landis, James McC.
Leland, Waldo G.
Lewis, George William
Lydenberg, Harry Miller
Marshall, George Catlett
Miller, Gerrit Smith, Jr.
Moulton, Forest Ray
Moulton, Harold Glenn
Putnam, Herbert
Sioussat, St. George L.
Tuve, Merle Antony
Vaughan, Thomas Wayland
Warren, Charles
Wetmore, Alexander
Wright, Frederick E.

Florida

COCONUT GROVE
McDaniel, Walton Brooks

MIAMI BEACH
Hawk, Philip B.

ORANGE PARK
Lashley, Karl Spencer

PLANT CITY
Riddle, Oscar

Hawaii

HONOLULU
Gregory, Herbert Ernest

Illinois

CHICAGO
Beeson, Charles Henry
Bliss, Gilbert Ames
Bowen, Norman L.
Buck, Carl Darling
Carlson, Anton Julius
Chamberlin, Rollin Thomas
Cole, Fay-Cooper
Dempster, Arthur Jeffrey
Fermi, Enrico
Franck, James
Harkins, William Draper
Lillie, Frank Rattray
Lillie, Ralph Stayner
Merriam, Charles Edward
Mulliken, Robert Sanderson
Ogburn, William Fielding
Rossby, Carl-Gustaf Arvid
Stone, Marshall Harvey
Taliaferro, William Hay
Urey, Harold C.
Wright, Quincy
Wright, Sewall

EVANSTON
Crew, Henry

URBANA
Adams, Roger
Coble, Arthur Byron
Hopkins, B Smith
Marvel, Carl Shipp

Indiana

BLOOMINGTON
Cleland, Ralph Erskine

Maine

MACHIASPORT
Benedict, Francis Gano

SOUTHWEST HARBOR
Johnston, John

Maryland

BALTIMORE
Albright, William F.
Andrews, Donald Hatch
Bowman, Isaiah
Clark, William Mansfield
Corner, George Washington
Lancaster, Henry Carrington

Lattimore, Owen
Livingston, Burton E.
Lovejoy, Arthur Oncken
McCollum, Elmer Verner
Malone, Kemp
Murnaghan, Francis D.
Robinson, David Moore
Schultz, Adolph H.
Sigerist, Henry Ernest
Streeter, George Linius
Weed, Lewis H.

Massachusetts

BOSTON

Byrd, Richard Evelyn
Castle, William Bosworth
Forbes, Alexander
Hastings, A. Baird
Joslin, Elliott Proctor
Merrill, Elmer Drew
Minot, George Richards
Morison, Samuel E.
Sprague, Oliver M. W.
Tyzzer, Ernest Edward

BROOKLINE

Wilson, Edwin Bidwell

CAMBRIDGE

Bailey, Irving Widmer
Bigelow, Henry Bryant
Blake, Robert Pierpont
Boring, Edwin Garrigues
Bridgman, Percy Williams
Bush, John Nash Douglas
Chafee, Zechariah, Jr.
Chase, George Henry
Compton, Karl Taylor
Conant, James Bryant
Daly, Reginald Aldworth
Dewey, Bradley
Ferguson, William Scott
Fernald, Merritt Lyndon
Fieser, Louis Frederick
Gaposchkin, Cecelia Payne
Gulick, Charles Burton
Hisaw, Frederick Lee
Hooton, Earnest A.
Hudson, Manley Ottmer
Hunsaker, Jerome Clarke
Huntington, Edward V.
Jackson, Dugald Caleb
Jaeger, Werner Wilhelm
Jones, Howard Mumford
Keyes, Frederick George
Kidder, Alfred Vincent
Kistiakowsky, George B.
Lamb, Arthur Becket
Langer, William Leonard
Lyman, Theodore
Menzel, Donald Howard
Nock, Arthur Darby
Parker, George Howard
Perry, Ralph Barton
Post, Chandler Rathfon
Pound, Roscoe
Robinson, Fred Norris
Sarton, George
Schlesinger, Arthur Meier
Shapley, Harlow
Slater, John Clarke
Slichter, Sumner Huber
Tozzer, Alfred Marston
Van Vleck, John Hasbrouck
Westergaard, Harald M.
Williams, John H.
Wilson, Edgar Bright, Jr.
Wilson, George Grafton

LEXINGTON

Lewis, Clarence I.

MEDFORD

Carmichael, Leonard

NORTHAMPTON

Blakeslee, Albert F.
Tatlock, J. S. P.

Michigan

ANN ARBOR
Bartlett, Harley Harris
Bonner, Campbell
Case, Ermine Cowles
Davis, Bradley Moore
†Gomberg, Moses
Hobbs, William Herbert
Keniston, Hayward
Novy, Frederick G.
Ruthven, Alexander G.
Sanders, Henry A.

PONTIAC
McMath, Robert R.

Minnesota

MINNEAPOLIS
Heaton, Herbert
Lind, Samuel Colville
Tate, John Torrence

ST. PAUL
Stakman, Elvin Charles

Missouri

COLUMBIA
Stadler, Lewis John

ST. LOUIS
Compton, Arthur H.
Erlanger, Joseph
Graham, Evarts Ambrose
Loeb, Leo
Moore, George Thomas

WEBSTER GROVES
Doisy, Edward A.

New Hampshire

MADISON
Hocking, William Ernest

New Jersey

HOBOKEN
Davis, Harvey Nathaniel

NEWARK
Barnard, Chester Irving

PRINCETON
Adams, Edwin Plimpton
Alexander, James W.
Aydelotte, Frank
Boyd, Julian Parks
Buddington, Arthur F.
Capps, Edward
Chinard, Gilbert
Conklin, Edwin Grant
Corwin, Edward Samuel
Dodds, Harold Willis
Einstein, Albert
Eisenhart, Luther Pfahler
Fetter, Frank Albert
Harvey, E. Newton
Hulett, George A.
Kunkel, Louis O.
Lefschetz, Solomon
McClure, Charles F. W.
McIlwain, Charles Howard
Mather, Frank Jewett, Jr.
Meritt, Benjamin Dean
Morey, Charles Rufus
Morse, Marston
von Neumann, John
Northrop, John Howard
Notestein, Frank W.
Osgood, Charles Grosvenor
Panofsky, Erwin
Robertson, Howard Percy
Russell, Henry Norris
†Scott, William Berryman
Shope, Richard Edwin
Shull, George Harrison
Smyth, Charles Phelps

† Deceased.

Stanley, Wendell Meredith
Stewart, Walter W.
Taylor, Hugh Stott
Veblen, Oswald
Viner, Jacob
Wertenbaker, Thomas J.
Weyl, Hermann
Wigner, Eugene P.

SHORT HILLS
Davisson, Clinton J.

SUMMIT
Williams, Robert R.

New York

ALBANY
Graves, Frank Pierrepont

AMENIA
Mumford, Lewis

COLD SPRING HARBOR
McClintock, Barbara

ITHACA
Bailey, Liberty Hyde
Bancroft, Wilder Dwight
Day, Edmund Ezra
Debye, Peter
Kirkwood, John Gamble

NEW YORK
Armstrong, Hamilton Fish
Berkey, Charles Peter
Bogert, Marston Taylor
Bonbright, James Cummings
Brooks, Van Wyck
Buckley, Oliver E.
Burgess, Warren R.
Butler, Nicholas Murray
Cather, Willa
Chamberlain, Joseph Perkins
Clarke, Hans Thacher
Crocker, William
Damrosch, Walter Johannes
Darrach, William
Darrow, Karl Kelchner
Davis, John William
Detwiler, Samuel Randall
Dewey, John
Dinsmoor, William Bell
Dobzhansky, Theodosius
Douglas, Lewis W.
DuBois, Eugene Floyd
Dunn, Gano
Dunn, Leslie Clarence
Fosdick, Raymond Blaine
Gasser, Herbert Spencer
Gies, William J.
Gifford, Walter Sherman
Goodrich, Carter
Greene, Evarts B.
Gregg, Alan
Gregory, William King
Hayes, Carlton J. H.
Hu Shih
Ives, Herbert E.
Jayne, Horace H. F.
Jessup, Philip C.
Jewett, Frank Baldwin
Kelley, Nicholas
Lamont, Thomas William
McGregor, James Howard
MacInnes, Duncan A.
Mitchell, Wesley Clair
Moe, Henry Allen
Moore, John Bassett
Murphy, Robert Cushman
Nicolson, Marjorie Hope
Osterhout, Winthrop J. V.
Rabi, Isidor Isaac
Richter, Gisela M. A.
Rivers, Thomas M.
Robbins, William Jacob
Rockefeller, John D., Jr.
Rogers, Lindsay
Rous, Peyton
Schuyler, Robert L.
Shotwell, James Thomson

Simpson, George Gaylord
Stefansson, Vilhjalmur
Taylor, Francis Henry
Thorndike, Edward L.
Thorndike, Lynn
Van Doren, Carl
Van Slyke, Donald Dexter
du Vigneaud, Vincent
Wallace, Henry A.
Weaver, Warren
Westermann, William Linn
Wilkins, Hubert
Willits, Joseph Henry
Winlock, Herbert Eustis
Wissler, Clark
Wolman, Leo
Woodworth, Robert Sessions
Yeatman, Pope
Young, Donald Ramsey
Young, Owen D.
van Zeeland, Paul

NYACK
Johnson, Alvin S.

PALISADES
MacIver, Robert M.

PEARL RIVER
Duggar, Benjamin Minge

ROCHESTER
Fenn, Wallace Osgood
Mees, C. E. Kenneth
Murlin, John Raymond
Whipple, George Hoyt

SCHENECTADY
Coolidge, William David
Langmuir, Irving
Whitney, Willis R.

TUXEDO PARK
Loomis, Alfred Lee

† Deceased.

North Carolina

CHAPEL HILL
MacNider, William de B.

Ohio

CINCINNATI
Blegen, Carl William

DAYTON
Kettering, Charles Franklin

Pennsylvania

BRYN MAWR
Carpenter, Rhys
Swindler, Mary Hamilton
Taylor, Lily Ross

PHILADELPHIA
Baugh, Albert Croll
Bronk, Detlev W.
Brown, W. Norman
Calvert, Philip Powell
†Cheyney, Edward Potts
Dickinson, John
Duane, Morris
Fels, Samuel S.
Gates, Thomas Sovereign
Goodrich, Herbert Funk
Haney, John Louis
Holland, Leicester Bodine
Hopkinson, Edward, Jr.
Huebner, Solomon Stephen
Jacobs, Merkel Henry
Jenkins, Charles Francis
Johnson, Emory R.
Kimball, Fiske
Kline, John Robert
Leeds, Morris Evans
Lewis, Edwin Owen
Lewis, Warren Harmon
Lingelbach, William E.
Long, Esmond Ray
McClelland, George William

Metz, Charles William
Montgomery, James Alan
Moore, J. Percy
Morgan, Marshall S.
Morris, Harrison Smith
Morris, Lawrence J.
Nichols, Roy Franklin
Norris, George William
Olivier, Charles P.
Packard, Francis Randolph
Patterson, Ernest Minor
Pender, Harold
Pepper, George Wharton
Pepper, O. H. Perry
Pepper, William
Quinn, Arthur Hobson
Read, Conyers
Repplier, Agnes
Rhoads, Charles James
Richards, Alfred Newton
Roberts, Owen J.
Rosenbach, A. S. W.
Scattergood, J. Henry
Schramm, Jacob R.
Schaeffer, J. Parsons
Shryock, Richard Harrison
Singer, Edgar Arthur, Jr.
Speiser, Ephraim Avigdor
Wetherill, Samuel Price
Witmer, Lightner
Young, James Thomas

PITTSBURGH

Foote, Paul Darwin
Seitz, Frederick, Jr.

SWARTHMORE

Dresden, Arnold
Köhler, Wolfgang
Swann, W. F. G.

STATE COLLEGE

Whitmore, Frank Clifford

Rhode Island

PROVIDENCE

Bryant, William L.
Hunter, Walter Samuel
Kraus, Charles August

Tennessee

NASHVILLE

Goodpasture, Ernest William

Texas

AUSTIN

Painter, Theophilus Shickel

HOUSTON

Lovett, Edgar Odell
Wilson, Harold Albert

Utah

SALT LAKE CITY

Eyring, Henry

Vermont

S. SHAFTSBURY

Frost, Robert

Virginia

ALEXANDRIA

Schmitt, Bernadotte E.

RICHMOND

Freeman, Douglas Southall

UNIVERSITY

Beams, Jesse Wakefield
Mitchell, Samuel Alfred

Wisconsin

MADISON

Allen, Charles Elmer
Birge, Edward Asahel
Fred, Edwin Broun
Leith, Charles Kenneth
Stebbins, Joel

WILLIAMS BAY

Chandrasekhar, Subrahmanyan
Struve, Otto

FOREIGN RESIDENTS

Argentina

BUENOS AIRES

Amado, Alonso
Houssay, Bernardo Alberto

Belgium

BRUSSELS

Lemaitre, Georges

Canada

VICTORIA

Miller, Hunter

Czechoslovakia

PRAGUE

Beneš, Eduard

Egypt

ALEXANDRIA

Wace, Alan J.

Mexico

MERIDA, YUCATAN

Morley, Sylvanus Griswold

Panama

PANAMA CITY

Méndez-Pereira, Octavio

Denmark

COPENHAGEN

Bohr, Harald
Bohr, Niels Henrik David
Krogh, August

England

CAMBRIDGE

Adrian, Edgar Douglas
Bartlett, Frederic Charles
Bragg, William Lawrence
Cook, Arthur Bernard
Dirac, Paul Adrien Maurice
Hardy, Godfrey Harold
Hopkins, Frederick Gowland

DOWNE, KENT

Keith, Arthur

GREENWICH PARK

Jones, Harold S.

HARPENDEN, HERTFORDSHIRE

Fisher, Ronald Aylmer

LONDON

Bell, Harold Idris
Carr, Cecil Thomas
Dale, Henry Hallett
Gardiner, Alan Henderson
Gooch, George Peabody
Hill, Archibald Vivian
Kenyon, Frederic George
Richardson, Owen Willans
Tawney, Richard H.
Toynbee, Arnold Joseph

OXFORD

Beazley, John Davidson
Craigie, William A.
Robinson, Robert

SUSSEX
Greg, Walter Wilson

France

PARIS
de Broglie, Louis Victor
Janet, Pierre
de Margerie, Emmanuel
Rist, Charles

Germany

BERLIN
Planck, Max

LEIPZIG
Heisenberg, Werner

Italy

NAPLES
Croce, Benedetto

ROME
Cumont, Franz V. M.
De Sanctis, Gaetano

Netherlands

AMSTERDAM
Brouwer, Luitzen Egbertus J.

LEIDEN
Hertzsprung, Ejnar
Kramers, Hendrik A.

Norway

OSLO
Hjort, Johan

Peru

LIMA
García, Godofredo

Scotland

EDINBURGH
Whittaker, Edmund Taylor

ST. ANDREWS
Irvine, James Colquhoun
Thompson, D'Arcy W.

Spain

MADRID
Menéndez Pidal, Ramón

Sweden

LUND
Nilsson, Martin P.

STOCKHOLM
Heckscher, Eli Filip

UPSALA
Svedberg, Theodor

Switzerland

GENEVA
Rappard, William E.

U. S. S. R.

Moscow
Alexandroff, Paul
Vinogradov, Ivan M.

MEMBERS ELECTED APRIL 19, 1946

CLASS I. MATHEMATICAL AND PHYSICAL SCIENCES

Resident

John Johnston.....Kearny, N. J.
Carl-Gustaf Arvid Rossby.....Chicago, Ill.
Frederick Seitz, Jr.....Pittsburgh, Pa.
Otto Stern.....Pittsburgh, Pa.
Edgar Bright Wilson, Jr.....Cambridge, Mass.

Foreign

Paul Alexandroff.....Moscow, U.S.S.R.

CLASS II. GEOLOGICAL AND BIOLOGICAL SCIENCES

Resident

Wallace Osgood Fenn.....Rochester, N. Y.
Barbara McClintock.....Cold Spring Harbor, L. I., N. Y.
Robert Cushman Murphy.....New York, N. Y.
John Spangler Nicholas.....New Haven, Conn.
Leslie Spier.....Albuquerque, N. M.
Chester Stock.....Pasadena, Calif.

CLASS III. SOCIAL SCIENCES

Resident

James Cummings Bonbright.....New York, N. Y.
Zechariah Chafee, Jr.....Cambridge, Mass.
Carter Goodrich.....New York, N. Y.
Wallace Notestein.....New Haven, Conn.
Sumner Huber Slichter.....Cambridge, Mass.

CLASS IV. HUMANITIES

Resident

Albert Croll Baugh.....Philadelphia, Pa.
W. Norman Brown.....Philadelphia, Pa.
John Nash Douglas Bush.....Cambridge, Mass.
Chandler Rathfon Post.....Cambridge, Mass.
Francis Henry Taylor.....New York, N. Y.

Foreign

Gaetano De Sanctis.....Rome, Italy

COUNCIL NOMINEES

Edwin O. Lewis.....Philadelphia, Pa.
George Catlett Marshall.....Washington, D. C.

MEMBERS DECEASED DURING 1946

	Date of Election
Thomas Barbour, January 8, aet. 61	1937
Mazÿck Ravenal, January 14, aet. 84	1901
Clarence E. McClung, January 17, aet. 75	1913
Harry Bateman, January 21, aet. 63	1924
Edwin Francis Gay, February 8, aet. 78	1932
William Allan Neilson, February 13, aet. 76	1944
John Story Jenks, March 13, aet. 70	1936
Gilbert Newton Lewis, March 24, aet. 70	1918
Albert Matthews, April 13, aet. 86	1899
Adolph G. Rosengarten, April 22, aet. 76	1940
Harlan Fiske Stone, April 22, aet. 73	1939
Simon Flexner, May 2, aet. 83	1901
Robert Almer Harper, May 12, aet. 84	1909
Ulric Dahlgren, May 30, aet. 75	1919
John A. Miller, June 15, aet. 86	1915
C. F. Tucker Brooke, June 22, aet. 63	1938
Joseph Quincy Adams, November 10, aet. 65	1940
Leo S. Rowe, December 5, aet. 75	1911
Edward L. Mark, December 16, aet. 99	1907

TABLE OF TOTALS

	Resident Members	Foreign Members
December 31, 1945	476	59
Transferred from foreign to resident membership	1	—1
Elected during 1946	23	2
Deceased during 1946	19	0
December 31, 1946	481	60

FORMER RESIDENT MEMBERS

Before the union of the American Philosophical Society and the American Society into the American Philosophical Society held at Philadelphia for Promoting Useful Knowledge in 1769 (see Brief History of Society, p. 7), there were members of both societies and members of either society. It is impossible to establish the date of election of many of these members. Accordingly, in the list below, those marked "A" were members of the two societies at the time of the union, "B" those who were members only of the American Philosophical Society and "C" those who were members only of the American Society. Following each other name is the year of his election to membership in the American Philosophical Society.

A

Abbe, Cleveland 1871
Abbot, Henry L. 1862
Abbott, Alexander C. 1897
Abbott, Charles C. 1889
Abbott, Helen C. deS. *See* Michael, Helen A.
Abel, John J. 1915
Abercrombie, James 1796
Abert, J. J. 1832
Adams, Charles F. 1880
Adams, Charles F. 1901
Adams, Herbert B. 1886
Adams, John 1780
Adams, John Q. 1818
Adams, Joseph Q. 1940
Adamson, John C. 1856
Addison, Alexander 1791
Adler, Cyrus 1900
Adrain, Robert 1812
Agassiz, Alexander 1875
Agassiz, Elizabeth 1869
Agnew, D. Hayes 1872
Alderman, Edwin A. 1925
Alexander, James A. .....A
Alexander, John H. 1852
Alexander, Joseph A. 1845
Alexander, Stephen 1839
Alexander, William, claimed 6th Earl of Stirling 1770
Alison, Francis .....B
Alison, Robert H. 1878
Allen, Andrew .....B
Allen, Benjamin 1812
Allen, George 1856
Allen, Harrison 1867
Allen, Harrison 1896
Allen, James .....B
Allen, Joel A. 1878
Allen, John .....B
Allen, William .....B
Allen, W. H. 1858
Allibone, S. Austin 1865
Allison, Burgiss 1789
Allison, Joseph 1875
Allison, N. S. 1814
Ames, Charles G. 1881
Ames, Herman V. 1921
Ames, Joseph S. 1905
Anderson, Alexander 1791
Anderson, George L. 1886
Anderson, George W. 1869
Anderson, Henry J. 1828
Anderson, James .....B
Anderson, M. B. 1867
Andrews, Charles McL 1924
Andrews, E. B. 1871
Andrews, John 1786
Angell, James B. 1889

Anthon, Charles E. 1868
Antill, Edward .....A
Appleton, William H. 1893
Arbo, John C
Armstrong, Edward C. 1932
Arthur, Joseph C 1919
Ashburner, Charles A. 1880
Ashhurst, John 1884
Ashhurst, John 1928
Ashhurst, Richard L. 1884
Aspden, Matthias .....B
Atkinson, George F. 1913
Atterbury, William W.....1916
Audubon, John J.....1831

B

Bache, Alexander D.....1829
Bache, Franklin 1820
Bache, Hartman 1831
Bache, R. Meade 1884
Bache, Thomas H. 1877
Bache, William 1797
Bacon, W. .....B
Baekeland, Leo H. 1935
Baer, George F. 1898
Bailey, Joel 1770
Bailey, J. W. 1852
Baird, Absalom 1791
Baird, Henry C. 1869
Baird, Henry M. 1884
Baird, Robert 1848
Baird, Spencer F. 1855
Baker, John R. 1884
Baker, Newton D. 1936
Baker, William S. 1886
Balch, Edwin S. 1899
Balch, Thomas W. 1901
Baldwin, Henry 1838
Baldwin, James M. 1897
Baldwin, Matthias W. 1833
Baldwin, Simeon E. 1910
Bancker, Charles N. 1825
Bancker, Gerard 1772
Bancroft, George 1841
Barber, Edwin A. 1881
Barbour, Thomas 1937
Barca, Calderon de la 1848
Bard, Samuel C
Barker, George F. 1873
Barker, Wharton 1884
Barlow, Joel 1809
Barnard, Edward E. 1903
Barnard, F. A. P. 1871
Barnard, William T. 1887
Barnes, Albert 1855
Barnsley, Thomas .....B
Barnwell, William 1802
Bartholow, Roberts 1880
Bartlett, W. H. C. 1840
Barton, Benjamin S. 1789
Barton, George A. 1911
Barton, Richard P. 1792
Barton, Thomas .....B
Barton, W. P. C. 1813
Barton, William 1787
Bartram, Isaac C
Bartram, John .....A
Bartram, Moses C
Bartram, William C
Barus, Carl 1903
Bastin, Edson S. 1896
Bateman, Harry 1924
Bauer, Louis A. 1909
Baugh, Daniel 1899
Bayard, James A. C
Bayard, John 1787
Bayard, Thomas F. 1897
Baynton, John 1771
Beach, Samuel 1789
Beadle, E. R. 1870
Beasley, Frederick 1814
Beck, Charles F. 1845
Beck, James M. 1926
Beck, Samuel 1838
Beck, T. Romeyn 1839
Becker, Carl 1936
Becker, George F. 1907
Beckley, John 1791
Bedford, Nathaniel B. 1796
Bee, Thomas 1781
Belknap, Jeremy 1784
Bell, Alexander G. 1882

Bell, John 1832
Bell, Joseph S. 1882
Bement, Clarence S. 1895
Benbridge, Henry 1771
Benezet, John C
Bennett, Charles E. 1913
deBenneville, James S. 1897
Bensell, Charles C
Bentley, William 1811
Berry, Edward W. 1919
Bethune, George W. 1839
Bettle, William C
Betton, Samuel 1828
Betton, Thomas F. 1857
Biddle, A. Sydney 1889
Biddle, Alexander 1888
Biddle, Arthur 1888
Biddle, Cadwalader 1880
Biddle, Clement C
Biddle, Clement C. 1821
Biddle, Craig 1877
Biddle, Edward C
Biddle, George W. 1897
Biddle, James .....B
Biddle, John 1863
Biddle, John B. 1853
Biddle, John G. 1814
Biddle, Nicholas 1813
Biddle, Owen C
Biddle, Thomas 1829
Bigelow, Jacob 1818
Billings, John S. 1887
Bingham, William 1787
Binney, Barnabas 1784
Binney, Horace 1808
Binney, Horace 1869
Bird, Robert M. 1853
Birkhoff, George D. 1921
Bispham, George T. 1895
Blackwell, Robert 1784
Blair, Andrew A. 1889
Blair, Samuel 1797
Blair, Thomas S. 1866
Blake, William P. 1870
Blasius, William 1875
Bleakley, John 1789
Blodget, Lorin 1872
Bloomfield, Maurice 1904
Boardman, George D. 1880
Boardman, Henry A. 1851
Boas, Franz 1903
Bôcher, Maxime 1916
Boker, George H. 1884
Bollmann, Justus E. 1800
Boltwood, Bertram B. 1911
Bond, Phineas .....B
Bond, Thomas .....B
Bond, Thomas, Jr. .....B
Bond, W. C. 1852
Bonnycastle, Charles 1840
Bonwill, William G. A. 1885
Booth, James C. 1839
Borden, Simeon 1842
Bordley, John B. 1783
Borie, Adolph E. 1872
Boss, Lewis 1911
Bowditch, Henry P. 1904
Bowditch, Nathaniel 1809
Bowdoin, James 1787
Bowen, Samuel 1769
Boyé, Martin H. 1840
Boys, William 1799
Brackett, Cyrus F. 1877
Bradford, Thomas .....B
Bradford, William 1785
Branner, John C. 1886
Brashear, John A. 1902
Brearly, David 1789
Breasted, James H. 1919
Breck, Samuel 1838
Breckinridge, Robert J. 1866
Bridges, Robert 1844
Briggs, Isaac 1796
Briggs, Robert 1863
Bright, James W. 1914
Bringhurst, James 1774
Bringhurst, Joseph C
Brinton, Daniel G. 1869
Brinton, J. H. 1810
Brinton, John H. 1886
Britton, J. Blodget 1873
Britton, Nathaniel L. 1928
Brock, Robert C. 1899
Brockenbrough, John 1835
Brooke, ——— 1769
Brooke, C. F. Tucker 1938

Brooks, William K. 1886
Brown, Amos P. 1901
Brown, Arthur E. 1879
Brown, Ernest W. 1898
Brown, Henry A. 1877
Brown, James 1827
Brown, John P. 1856
Brown, Nathaniel B. 1867
Brown, Samuel 1800
Brown, William 1780
Brubaker, Albert P. 1895
Bruce, Archibald 1807
Brumbaugh, Martin G. 1908
Brush, Charles F. 1910
Brush, George J. 1865
Bryan, George .....A
Bryant, Henry G. 1898
Bryant, William 1774
Buchanan, George 1789
Buchanan, James 1846
Bull, Marcus 1827
Bullock, Charles 1869
Bumpus, Hermon C. 1909
Bumstead, Henry A. 1918
Burd, Ed. 1785
Burk, Isaac 1884
Burk, Jesse Y. 1884
Burrough, Marmaduke 1833
Butler, Benjamin F. 1844
Butler, William 1881
Butts. *See* De Butts

C

Cadwalader, John C
Cadwalader, John 1867
Cadwalader, John 1899
Cadwalader, John 1926
Cadwalader, Lambert C
Cadwalader, Thomas .....A
Cadwalader, Thomas 1825
Caldwell, Charles 1796
Caldwell, Samuel .....B
Calkins, Gary N. 1920
Camac, William 1874
Campbell, George 1837
Campbell, John L. 1875
Campbell, William W. 1903
Canby, William M. 1868
Cannon, Annie J. 1925
Cannon, Walter B. 1908
Carey, Henry C. 1833
Carey, Mathew 1821
Carleson. *See* Von Carleson
Carleton, Henry 1859
Carll, John F. 1875
Carmichael, William 1780
Carnegie, Andrew 1902
Carrel, Alexis 1909
Carson, Hampton L. 1880
Carson, John 1785
Carson, Joseph 1844
Carter, James C. 1895
Carter, Landon 1769
Carty, John J. 1921
Cassin, John 1852
Cass, Lewis 1826
Cassatt, Alexander J. 1872
Castner, Samuel 1887
Cathrall, Isaac 1796
Cattell, J. McKeen 1888
Cattell, W. C. 1871
Chalmers, Lionel C
Chamberlin, Thomas C. 1905
Chance, Henry M. 1880
Chandler, Charles F. 1875
Chapman, Frank M. 1921
Chapman, Henry C. 1875
Chapman, John C
Chapman, Nathaniel 1807
Charles, Jacques A. C. 1786
Chase, Pliny E. 1863
Chase, Thomas 1864
Chauncey, Charles 1813
Chauvenet, William 1851
Chevalier, Peter C
Cheves, Langdon 1821
Chew, Benjamin .....B
Chew, Benjamin 1787
Childs, George W. 1886
Chittenden, Russell H. 1904
Choate, Joseph H. 1906

Christie, James 1908
Church, John 1802
Clark, Alvan 1880
Clark, Clarence H. 1889
Clark, Daniel 1769
Clark, William B. 1902
Clarke, Frank W. 1904
Clarke, James F. 1874
Clarke, John M. 1911
Clarke, Thomas C. 1873
Clarkson, Gerardus C
Clarkson, Matthew C
Clay, Albert T. 1912
Clay, Joseph 1799
Claypole, Edward W. 1883
Cleemann, Richard A. 1895
Cleemann, Thomas M. 1885
Cleveland, Charles D. 1865
Cleveland, Grover 1897
Cleveland, Parker 1818
Clifford, Thomas C
Clinton, DeWitt 1814
Cloud, Joseph 1806
Clymer, George C
Coates, Benjamin H. 1823
Coffin, John H. C. 1869
Coghill, George E. 1935
Cohen, Joshua J. 1854
Cohen, J. Solis 1884
Colden, Cadwalader .....B
Coleman, William .....B
Coles, Edward 1839
Coles, Edward 1899
Colhoun, Samuel 1815
Collin, Nicholas 1789
Collins, Zaccheus 1804
Collitz, Hermann 1902
Colwell, Stephen 1857
Comegys, Benjamin B. 1879
Commons, John R. 1936
Comstock, John H. 1913
Condie, D. Francis 1835
Conover, Samuel F. 1806
Conrad, Solomon W. 1822
Conrad, Timothy A. 1865
Converse, John H. 1898
Conyngham, John N. 1848
Conyngham, Redmond 1819
Cook, George H. 1864
Cook, Gustavus W. 1934
Cook, Joel 1895
Coomb(e), Thomas .....A
Coombe, Thomas 1773
Cooper, James F. 1823
Cooper, Myles 1769
Cooper, Thomas 1802
Cope, Edward D. 1866
Cope, Thomas P. 1843
Coplin, W. M. Late 1911
Coppée, Henry 1856
Cornelius, Robert 1862
Coues, Elliott 1878
Coulter, John M. 1915
Councilman, William T. 1918
Courtenay, Edward H. 1835
Cox, Jacob D. 1870
Cox, John 1789
Coxe, Daniel 1772
Coxe, Eckley B. 1870
Coxe, John .....B
Coxe, John R. 1799
Coxe, Tench 1796
Crafts, James M. 1916
Craig, Isaac 1787
Cramp, Charles H. 1892
Crane, Thomas F. 1877
Crawford, J. P. Wickersham 1929
Cresson, Charles M. 1857
Cresson, John C. 1839
Cret, Paul P. 1928
Crile, George W. 1912
Crowell, Edward P. 1898
Culin, R. Stewart 1897
Currie, William 1792
Curtis, George W. 1892
Curtis, Cyrus H. K. 1930
Curtis, Heber D. 1920
Curwen, John 1861
Cutler, Manasseh 1785
Cushing, Frank H. 1896
Cushing, Harvey 1930
Cushing, Henry P. 1916
Cutbush, James 1814
Cuyler, Theodore 1857

D

DaCosta, John C. 1904
DaCosta, J. M. 1866
Dahlgren, Ulric 1919
D'Aligny, Henry F. 1870
Dall, William H. 1897
Dallas, Alexander J. 1791
Dallas, George M. 1840
Daly, Charles P. 1893
Dana, Charles E. 1899
Dana, Edward S. 1896
Dana, James D. 1854
Darlington, William 1823
Davenport, Charles B. 1907
Davidson, George 1866
Davidson, James .....B
Davidson, Robert 1783
Davis, Arthur P. 1927
Davis, Benjamin C
Davis, Charles H. 1852
Davis, Isaac R. 1851
Davis, John .....B
Davis, John 1811
Davis, William M. 1883
Davis, William M. 1899
Day, Charles 1925
Day, Frank M. 1899
Day, William C. 1899
Dearborn, Benjamin 1803
Deas, John C
De Butts, Elisha 1821
De Garmo, Charles 1897
De Lancey, Edward F. 1898
De Lancey, James .....B
De Lancey, William H. 1829
Delany, Sharp 1774
Demmé, C. R. 1840
Denny, Harmar 1848
De Normandie. *See* Normandie
Dercum, Francis X. 1892
Dewees, William P. 1819
Dewey, Chester 1863
De Witt, Simeon 1787
Dick, James C
Dickerson, Mahlon 1807
Dickinson, James .....B
Dickinson, John .....A
Dickson, Leonard E. 1920
Dickson, Samuel 1884
Dickson, Samuel H. 1859
Dillingham, William H. 1843
Dixon, Roland B. 1926
Dixon, Samuel G. 1892
Dobson, Judah 1840
Dodd, William E. 1936
Dolley, Charles S. 1886
Drake, Daniel 1818
Donaldson, Henry H. 1906
Doolittle, Charles L. 1881
Doolittle, Eric 1903
Dorr, Benjamin 1841
Dorsey, John S. 1814
Dougherty, Thomas H. 1899
Douglas, James 1877
Downes, John 1843
Draper, Daniel 1880
Draper, Henry 1877
Draper, John W. 1844
Drayton, William 1835
Dreer, Ferdinand J. 1897
Drexel, Anthony J. 1892
Drinker, Henry C
Drinker, John C
Drown, Thomas M. 1875
Duane, Russell 1906
Duane, William 1921
Du Bois, Patterson 1880
Du Bois, William E. 1844
Dubourg, William 1806
Ducatel, Julius T. 1832
Duché, Jacob .....A
Duché, Jacob C
Dudley, Charles B. 1879
Dudley, Thomas H. 1880
Duffield, Benjamin 1786
Duffield, Edward .....A
Duffield, George 1779
Duffield, Samuel .....B
Dugan, Raymond S. 1931
Dulaney, Daniel .....B
Dunbar, William 1800
Duncan, Louis 1886
Dundas, James 1851

Dunglison, Robley 1832
Dunlap, John 1784
Dunlap, Thomas 1837
Dunn, Nathan 1836
Dunning, George F. 1867
Du Ponceau, Peter S. 1791
Du Pont, Henry A. 1894
Du Pont, Francis I. 1930
Du Pont, Iréné 1807
Du Pont, La Motte 1872
Du Pont, Samuel F. 1862
Durand, Elias 1854
Du Simitière, Pierre E. C
Dutton, Clarence E. 1871

E

Earle, Pliney 1866
East, Edward M. 1916
Easton, Morton W. 1886
Eberle, John 1819
Eckert, George N. 1852
Eckfeldt, Jacob B. 1880
Eckfeldt, Jacob R. 1844
Eddy, H. Turner 1877
Edison, Thomas A. 1896
Edmunds, George F. 1895
Edsall, David L. 1906
Edwards, Enoch 1787
Eglin, William C. L. 1926
Eigenmann, Carl H. 1917
Elam, Samuel 1799
Elder, William 1872
Eldridge, Samuel C
Eliot, Charles W. 1871
Ellett, Charles 1843
Ellicott, Andrew 1785
Ellicott, Joseph 1770
Elliot, Andrew C
Elliot, Samuel C
Elliott, A. Marshall 1895
Elliott, Stephen 1819
Elmer, Jonathan 1774
Elwyn, Alfred L. 1844
Ely, Theodore N. 1897
Emerson, Benjamin K. 1897
Emerson, Gouverneur 1833
Emerson, Ralph W. 1867
Emerson, Rollins A. 1922
Emlen, George 1827
Emmet, John P. 1838
Emmet, William LeR. 1898
Emmons, Samuel F. 1883
Engelman, George 1862
Ericsson, John 1877
Erskine, Robert 1780
Espy, James P. 1835
Etting, Frank M. 1876
Evans, Cadwalader .....A
Evans, David C
Evans, Edmund C. 1859
Evans, Rowland C
Eve, Oswell .....A
Everett, Alexander 1831
Everett, Edward 1831
Ewell, Marshall D. 1895
Ewing, John .....B

F

Farabee, William C. 1919
Faries, ——— .....B
Farlow, William G. 1905
Farmer, Ferdinand .....B
Farnum, Joseph W. 1851
Farrand, Livingston 1924
Farrand, Max 1928
Featherstonhaugh, George W. ..1809
Felton, Samuel M. 1854
Ferguson, William 1791
Field, Robert P. 1890
Findley, William 1789
Fine, Henry B. 1897
Finley, Clement A. 1856
Finley, John H. 1919
Fisher, Joshua F. 1833
Fisher, Sidney G. 1860
Fisher, Sidney G. 1897
Fisher, Thomas C
Fisher, William R. 1840

Flexner, Simon 1901
Flint, Austin 1880
Flint, Austin, Jr. 1880
Fluegel, J. G. 1853
Foggo, Edward A. 1878
Fooks, Paul C
Forbes, Stephen A. 1919
Ford, Paul L. 1898
Ford, Worthington C. 1922
Forster, John R. 1793
Foulke, John 1784
Foulke, William P. 1854
Fox, Dixon R. 1935
Fox, George 1784
Fox, Herbert 1932
Fox, Joseph .....B
Foxcroft, John .....A
Foxcroft, Thomas C
Fraley, Frederick 1842
Fraley, Joseph C. 1880
Francis, James B. 1865
Francis, J. W. 1844
Francke, Kuno 1904
Frank, Leonard G. 1875
Frank, Tenney 1927
Franklin, Benjamin .....A
Franklin, Edward C. 1912
Franklin, William .....A
Franklin, William T. 1786
Frazer, John F. 1842
Frazer, John F. 1867
Frazer, Persifor 1872
Frazer, Robert P. 1873
Frazier, Benjamin W. 1896
Frazier, Charles H. 1905
Friebis, George 1889
Frieze, Henry S. 1884
Frost, Edwin B. 1909
Fullerton, George S. 1890
Fulton, John 1873
Fulton, Robert 1809
Furness, Horace H. 1880
Furness, Horace H. 1897
Furness, William H. 1840
Furness, William H. 1897

G

Gabb, William 1869
Gale, Benjamin .....A
Gallatin, Albert 1791
Galloway, Joseph .....A
Gamble, Arch. 1784
Garden, Alexander .....A
Garnett, John 1802
Garrett, Philip C. 1883
Garrison, Joseph F. 1884
Gaston, William 1817
Gates, Merrill E. 1886
Gatschet, Albert S. 1884
Gauld, George 1774
Gay, Edwin F. 1932
Geddings, E. 1848
Genth, Frederick A. 1854
Genth, Frederick A. 1886
George, Sidney C
Gerhard, Benjamin 1854
Gerhard, William W. 1843
Gest, John M. 1921
Gest, William P. 1926
Gibbes, George 1810
Gibbs, Josiah W. 1895
Gibbs, Oliver W. 1854
Gibson, James 1807
Gibson, John .....B
Gibson, John B. 1821
Gibson, William 1820
Gilbert, Cass 1934
Gilbert, Grove K. 1902
Gildersleeve, Basil L. 1903
Gill, Theodore N. 1867
Gilliss, J. Melville 1848
Gilman, Daniel C. 1876
Gilmor, Robert 1803
Gilpin, Henry D. 1832
Gilpin, Joseph 1770
Gilpin, Joshua 1804
Gilpin, Thomas C
Gilpin, Thomas 1814
Girardin, L. H. 1819
Glentworth, George C
Gloxin, Benjamin 1791

Goddard, Kingston 1857
Goddard, Paul B. 1840
Godfrey, Thomas .....B
Godman, John D. 1825
Godon, Silvain 1809
Goethals, George W. 1913
Goldsborough, Robert 1791
Goldsmith, Middleton 1879
Gooch, Frank A. 1907
Goodale, George L. 1893
Goode, George B. 1889
Goodell, William 1877
Goodfellow, Edward 1871
Goodnow, Frank J. 1920
Goodspeed, Arthur W. 1896
Goodwin, Daniel R. 1861
Goodwin, Harold 1892
Goodwin, W. W. 1895
Gordon, George B. 1910
Gorgas, William C. 1913
Gorringe, Henry H. 1881
Gould, A. A. 1849
Gould, Benjamin A. 1851
Gowen, Franklin B. 1877
Graeme, Thomas .....A
Graff, Frederick 1868
Graham, James D. 1840
Grandgent, Charles H. 1929
Grant, Ulysses S. 1868
Grassi, C. F. A. 1796
Gray, Asa 1848
Gray, Elisha 1878
Gray, George 1784
Gray, George 1900
Gray, Isaac 1781
Gray, James 1815
Grayson, William 1780
Greely, Adolphus W. 1904
Green, Ashbel 1789
Green, Traill 1868
Green, Samuel A. 1893
Green, William H. 1863
Greene, William H. 1879
Greene, S. Dana 1898
Greenleaf, Simon 1848
Greenman, Milton J. 1899
Greenway, James 1794
Gregory, Henry D. 1889
Grier, Robert C. 1848
Griffith, J. P. Crozer 1907
Griffith, Robert E. 1828
Griffith, Thomas W. 1838
Griffiths, Samuel P. 1785
Grigsby, Hugh B. 1856
Grinnell, Henry 1853
Griscom, John 1836
Griscom, William W. 1881
Gross, Samuel D. 1854
Gross, Samuel W. 1885
Grote, Augustus R. 1876
Guald, George 1770
Guggenheim, William 1930
Guillon, Constant 1854
Gummere, Francis B. 1903
Gummere, John 1814
Gummere, Samuel J. 1868
Gutekunst, F. 1885
Guyot, Arnold 1867

H

Hadley, Arthur T. 1902
Hagan, Hermann A. 1886
Hagert, Henry S. 1875
Hague, Arnold 1903
Haines, John S. 1873
Haines, Reuben 1813
Haldeman, Samuel S. 1844
Hale, Charles 1866
Hale, Edward E. 1870
Hale, George E. 1902
Hall, Asaph 1878
Hall, Charles E. 1875
Hall, Charles M. 1898
Hall, David .....B
Hall, Isaac H. 1893
Hall, James 1854
Hall, John E. 1814
Hall, Lyman B. 1885
Hallock, William 1908
Hallowell, Benjamin 1854
Hallowell, Edward 1851
Hamilton, Alexander 1780

Hamilton, James .....B
Hamilton, William 1797
Hammond, William A. 1859
Harden, John W. 1873
Harding, George 1854
Harding, Robert .....B
Hare, Charles W. 1815
Hare, J. I. Clark(e) 1842
Hare, Robert 1803
Harkness, Edward S. 1934
Harkness, William 1898
Harlan, Richard 1822
Harper, Robert A. 1909
Harris, Joseph S. 1887
Harris, Levett 1821
Harris, Robert C
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Harris, Thomas 1828
Harris, William 1838
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Harrison, Joseph C
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Harrison, Peter C
Harshberger, John W. 1906
Hart, James M. 1877
Hart, John S. 1844
Hartranft, John F. 1876
Hartshorne, Edward 1858
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Hartshorne, Joseph 1815
Haskins, Charles H. 1921
Hassler, Ferd. R. 1807
Hastings, Charles S. 1906
Hatcher, John B. 1897
Haupt, Herman 1871
Haupt, Lewis M. 1878
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Haven, Samuel F. 1865
Hay, John 1898
Hayden, Francis V. 1860
Hayes, Isaac I. 1863
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Hayford, John F. 1915
Hays, I. Minis 1886
Hays, Isaac 1830
Hayward, Nathan 1937
Hazard, Ebenezer 1781
Hazen, Charles D. 1923
Hazlehurst, Henry 1889
Hazlehurst, Isaac 1851
Heckewelder, John 1797
Heilprin, Angelo 1883
Helmuth, J. H. C. 1784
Hembel, William 1813
Henderson, Andrew A. 1862
Henderson, C. Hanford 1896
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Henderson, Yandell 1935
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Herty, Charles H. 1917
Hess, Alfred F. 1931
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Hewson, Thomas T. 1801
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Hiller, Hiram M. 1897
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Hodge, Hugh 1796
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Hubbard, Joseph S. 1852
Huber, Gotthelf C. 1912
Humphrey, H. C. 1877
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Humphreys, Joshua 1789
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Hunt, J. Gibbons 1876
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Huntingdon, Samuel 1783
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Hutchins, Thomas 1772
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Ingersoll, Charles J. 1815
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Irvin, David 1841
Irving, Washington 1829
Ives, Frederick E. 1922
Izard, George 1807
Izard, Ralph C

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Jackson, David 1792
Jackson, Isaac R. 1841
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Jacobs, Benjamin C
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James, Abel C
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Jayne, Henry LaB. 1898
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Jefferson, Thomas 1780
Jenks, John S. 1936
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Kirtland, Jared P. 1875
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Knox, Henry 1791
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Lardner, Lynford .....B
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La Roche, Réné 1827
Latrobe, Benjamin H. 1799
Latrobe, John H. B. 1854
Laurens, Henry 1772
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Law, Edward E. 1853
Law, Philip H. 1879
Lawes, John B. 1883
Lawrence, Jason O'B. 1823
Lea, Arthur H. 1912
Lea, Henry C. 1867
Lea, Isaac 1828
Learned, Marion D. 1899
Le Conte, John 1851
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Lee, Francis L. .....B
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Legare, Hugh S. 1838
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Lehman, Ambrose E. 1883
Leidy, Joseph 1849
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Lenthall, John 1843
Leonard, James B. 1897
Lérébours, Alexander 1796
Lesley, J. Peter 1856
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Leslie, Robert 1795
Lesquereux, Leo 1861
Letchworth, Albert S. 1856
Levene, Phoebus A. 1923
Leverett, Frank 1924
Levis, Richard J. 1872
Lewis, Elisha J. 1855
Lewis, Francis W. 1860
Lewis, G. Albert 1896
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Leyburn, John 1856
Libbey, William 1897
Lindgren, Waldemar 1917
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Loomis, Elias 1839
Lorimer, John 1769
Lovering, Joseph 1881
Low, Seth 1892
Lowell, A. Lawrence 1909
Lowell, James R. 1883
Lowell, John 1787
Lowell, Percival 1897
Lowes, John L. 1934
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Lyman, Benjamin S. 1869
Lynch, W. F. 1853

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MacAlister, James 1886
McArthur, John 1875
McCall, Charles A. 1881
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McCauley, Edward Y. 1881
McCay, Leroy W. 1897
McClean, Arch. 1772
McClenahan, Howard 1931
McClune, James 1863
McClung, Clarence E. 1913
McClurg, James 1774
McCook, Henry C. 1896
McCosh, James 1871
McCrae, Thomas 1914
McCrea, James 1910
McCreath, Andrew S. 1879
McCulloh, Richard S. 1846
McDowell, John 1807
McEuen, Charles 1843
McEuen, Thomas 1830
Macfarlane, James 1883
Macfarlane, John M. 1892
McHenry, James 1785
McIlvaine, William 1826
McKean, Joseph B. 1824
McKean, Thomas .....B
McKean, William V. 1877
McLane, Louis 1831
Maclaurin, Richard C. 1910
Maclean, John 1805
Maclure, William 1799
McMaster, John B. 1884
McMichael, Morton 1867
Macneven, William J. 1823
McQuillen, John H. 1877
Madison, James 1780
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Magaw, Samuel 1784
Magee, Christian .....B
Magie, William F. 1896
Mahan, Alfred T. 1897
Maisch, John M. 1884
Mall, Franklin P. 1906
Mallery, Garrick 1882
Mallet, John W. 1885
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Mansfield, Ira F. 1878
Mansfield, Jared 1816
March, Francis A. 1878
Margolis, Max L. 1927
Mark, Edward L. 1907
Marks, William D. 1878
Marsh, Benjamin V. 1864
Marsh, George P. 1849
Marsh, Othniel C. 1868
Marshall, Frederick 1771
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Martin, Alexander 1797
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Martindale, Isaac C. 1880
Martyn [Martin?], David .....B
Marvin, Charles F. 1916
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Mather, Joseph C
Matile, George A. 1856
Matlack, Timothy 1780
Matthew, William D. 1914
Matthews, Albert 1899
Maury, M. F. 1852
May, Addison 1881
May, Joseph 1883
Mayer, Alfred M. 1869
Mayor, Alfred G. 1914
Meade, George G. 1871
Meade, William 1817
Mease, James 1802
Meehan, Thomas 1871
Meek, F. B. 1867
Meem. *See* Mim
Meigs, Arthur V. 1899
Meigs, Charles D. 1826
Meigs, John F. 1852
Meigs, Josiah 1818
Meigs, Montgomery C. 1854
Meigs, William M. 1901

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Meltzer, Samuel J. 1914
Melville, George W. 1897
Mendel, Lafayette B. 1916
Mendenhall, Charles E. 1924
Mendenhall, Thomas C. 1899
Mercer, Charles F. 1817
Mercer, Henry C. 1895
Mercer, Hugh C
Meredith, William 1813
Meredith, William M. 1837
Merriam, C. Hart 1902
Merriam, John C. 1914
Merrick, John V. 1880
Merrick, Samuel V. 1833
Merrill, George P. 1923
Merriman, Mansfield 1881
Messchert, Matthew H. 1873
Michael, Helen Abbott 1887
Michelson, Albert A. 1902
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Miller, E. Spencer 1857
Miller, Edward 1805
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Miller, J. Imbrie 1870
Miller, John A. 1915
Miller, Leslie W. 1899
Miller, Peter C
Miller, Samuel 1800
Milligan, George 1772
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Mim [Meem], John C
Minot, Charles S. 1896
Minto, Walter 1789
Mitchell, Howard H. 1925
Mitchell, James T. 1890
Mitchell, John .....B
Mitchell, John K. 1827
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Moore, Eliakim H. 1905
Moore, George F. 1920
Moore, Gideon E. 1875
Moore, James W. 1885
Moore, Richard B. 1923
Moore, Samuel 1805
Moore, Samuel P. 1771
Moore, Thomas 1809
Mordecai, Alfred 1853
Morehouse, George R. 1877
Morell, John 1770
Morgan, Benjamin 1774
Morgan, Benjamin R. 1813
Morgan, George C
Morgan, John C
Morgan, Thomas H. 1915
Morley, Edward W. 1903
Morley, Frank 1897
Morris, Caspar 1851
Morris, Ellwood 1843
Morris, Israel W. 1899
Morris, J. Cheston 1883
Morris, Jacob G. 1851
Morris, John C
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Morris, John G. 1893
Morris, John T. 1901
Morris, Robert 1786
Morris, Robert H. .....B
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Morrow, Dwight W. 1931
Morse, Edward S. 1895
Morse, Harmon N. 1903
Morse, Samuel F. B. 1848
Morton, Henry 1867
Morton, Henry J. 1857
Morton, Samuel G. 1828
Morton, Thomas G. 1900
Motley, John L. 1861
Mower, T. G. 1844

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Muhlenberg, Henry E. 1785
Munro, Dana C. 1901
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Murgatroyd, John C
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Mütter, Thomas D. 1851

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Nassy, David 1793
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Newberry, J. S. 1867
Newbold, William R. 1909
Newcomb, Simon 1878
Newnan, John 1797
Newton, Hubert A. 1867
Nichols, Edward L. 1904
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Nichols, Francis 1803
Nichols, Starr H. 1872
Nicholson, John 1791
Nicklin, Philip H. 1829
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Nicollet, J. N. 1842
Nipher, Francis E. 1907
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Norris, Joseph P. 1815
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Nulty, Eugenius 1817
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Ochs, Adolph S. 1931
Odell, Jonathan C
Okely, John C
Oliver, Andrew C
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Oliver, Charles A. 1886
Oliver, James E. 1873
Olney, Richard 1897
Ord, George 1817
Ortmann, Arnold E. 1897
Orton, Edward 1897
Osborn, Henry F. 1887
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Osborne, Thomas B. 1921
Osgood, William F. 1915
Otis, George A. 1821
Otolenge, Joseph 1771
Otto, John C. 1817
Otto, John M. 1769
Outerbridge, Alexander E. 1880

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Packard, John H. 1867
Page, Mann 1785
Paine, Robert T. 1838
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Palmer, William R. 1859
Pancoast, Henry S. 1898
Pancoast, Joseph 1851
Pancoast, William H. 1883
Pardee, Ario 1867
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Parke, Thomas 1774
Parr, William 1771
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Patterson, Edward 1900
Patterson, Robert 1783
Patterson, Robert 1851
Patterson, Robert M. 1809
Patterson, Thomas L. 1853
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Patton, Francis L. 1897
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Peale, Charles W. 1786
Peale, Franklin 1833
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Pearce, Richard M. 1914
Pearl, Raymond 1915
Pearse, John B. 1875
Pearson, James C
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Pease, Calvin 1863
Peck, William D. 1796
Peckham, Stephen F. 1897
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Perkins, Jacob 1819
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Pettee, William H. 1898
Peters, Christian H. F. 1878
Peters, Richard .....B
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Pettit, Henry 1895
Phelps, Edward J. 1895
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Phillips, Francis C. 1899
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Physick, Edmund C
Physick, Philip S. 1802
Pickering, Charles 1828
Pickering, Edward C. 1896
Pickering, John 1820
Pickering, Tim. 1795
Picot, Charles 1848
Piersol, George A. 1897
Pilsbry, Henry A. 1895
Pinckney, C. C. 1789
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Pine, Robert E. 1786
Pirsson, Louis V. 1918
Platt, Charles 1898
Platt, Franklin 1874
Plitt, John 1823
Poinsett, Joel R. 1827
Pollock, George 1813
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Pool(e), William C
Porter, Thomas C. 1864
Post, Chr. F. C
Potter, Alonzo 1844
Potts, Jonathan C
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Powel, Samuel C
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Powell, John W. 1889
Prescott, Albert B. 1898

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Preston, Thomas 1771
Price, Eli K. 1854
Price, Eli K. 1916
Price, J. Sergeant 1867
Prime, Ebenezer 1769
Prime, Frederick 1875
Prince, John 1805
Prince, John D. 1913
Pritchett, Henry S. 1899
Proctor, William 1847
Proud, Robert .....B
Pryor, Thomas .....A
Pugh, Evan 1862
Pumpelly, Raphael 1874
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Rand, Edward K. 1925
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Rand, Theodore D. 1873
Randall, F. A. 1878
Randall, Samuel J. 1885
Randolph, Edmund 1791
Randolph, Jacob 1833
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Randolph, Thomas M. 1794
Ransome, Frederick L. 1935
Rau, Charles 1882
Ravenel, Mazÿck P. 1901
Rawle, Francis C
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Rawle, William 1786
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Raymond, Rossiter W. 1875
Raynolds, William F. 1867
Rea, Samuel 1913
Read, John M. 1863
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Redick, David 1789
Redman, John .....A
Reed, Henry 1838
Reed, Henry 1886
Reed, John 1848
Reed, Joseph 1816
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Reed, William B. 1856
Reese, Charles L. 1922
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Reeves, Jesse S. 1934
Reeves, Samuel J. 1869
Reid, Harry F. 1910
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Remington, Joseph P. 1899
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Rennert, Hugo A. 1899
Renwick, James 1828
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Rhoads, Samuel .....B
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Rhoads, Samuel N. 1897
Rhodes, James F. 1910
Rice, Edwin W. 1928
Richards, Benjamin W. 1839
Richards, Horace C. 1907
Richards, Theodore W. 1902
Richardson, Joseph .....B
Riché, George I. 1885
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Riley, Charles V. 1876
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Rittenhouse, David .....A
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Roberts, Hugh .....B
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Roberts, Solomon W. 1843
Roberts, W. Milnor 1876
Robins, James W. 1882
Robinson, Moncure 1833
Robinson, Samuel C
Rodgers, John R. B. 1787
Roepper, W. T. 1871
Rogers, Ebenezer P. 1855
Rogers, Fairman 1857
Rogers, Henry D. 1835
Rogers, James B. 1846
Rogers, Robert E. 1855
Rogers, Robert W. 1890
Rogers, William B. 1835
Rogers, William B. 1880
Röhrig, F. L. Otto 1862
Rolfe, John C. 1907
Romans, Bernard 1774
Rood, Ogden N. 1880
Roosevelt, Theodore 1904
Root, Elihu 1906
Rosa, Edward B. 1912
Rosengarten, Adolph G. 1940
Rosengarten, George D. 1919
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Ross, Andrew 1791
Ross, James 1791
Ross, John .....B
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Rothermel, Peter F. 1873
Rothrock, Joseph T. 1877
Rouelle, John 1792
Rowe, Leo S. 1911
Rowland, Henry A. 1896
Royce, Josiah 1908
Rudder, William 1878
Rumsey, James 1789
Rumsey, William .....B
Ruschenberger, W. S. W. 1849
Rush, Benjamin C
Rush, James 1827
Rush, Richard 1817
Rushton, Thomas 1787
Ryder, John A. 1886

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Sadtler, Samuel P. 1874
St. Clair, Arthur 1780
St. John, Charles E. 1928
Sajous, Charles E. 1888
Sampson, Alden 1897
Sanders, Richard H. 1897
Sanderson, John 1840
Sansom, Joseph 1806
Sapir, Edward 1937
Sargent, Charles S. 1882
Sargent, Winthrop 1789
Sartain, John 1897
Sauveur, Albert 1919
Saxton, Joseph 1837
Say, Thomas 1817
Schaeffer, Fred. C. 1819
Schäffer, Charles 1893
Schelling, Felix E. 1902
Schlesinger, Frank 1912
Schott, Charles A. 1863
Schoolcraft, Henry R. 1833
Schuchert, Charles 1913
Schurman, Jacob G. 1908
Schurz, Carl 1878
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Schweinitz, Lewis 1817
Scott, Charles F. 1898
Scott, James B. 1930
Scott, John M. .....B
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Scott, Lewis A. 1880
Scudder, Samuel H. 1878
Scull, William C
Sedgwick, William T. 1911

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Seiler, Emma 1870
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Sellers, Coleman 1872
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Sergeant, John 1813
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Sergeant, Thomas 1832
Setchell, William A. 1919
Seybert, Adam 1797
Seybert, Henry 1824
Seymour, Thomas D. 1906
Shaeffer, George C. 1865
Shäffer, Charles 1893
Shäffer, Charles 1893
Shaler, William 1826
Shapleigh, Waldron 1899
Sharp, Benjamin 1886
Sharples, Philip P. 1881
Sharples, Stephen P. 1882
Sharpless, Isaac 1884
Sharswood, George 1851
Sheafer, Peter W. 1863
Shear, Theodore L. 1939
Sheppard, Furman 1875
Sherwood, Andrew 1875
Shields, Charles W. 1877
Shiell, Hugh 1781
Shippen, Edward .....B
Shippen, Edward, Jr. .....B
Shippen, Edward 1868
Shippen, Joseph .....B
Shippen, Thomas L. 1793
Shippen, William .....B
Shippen, William, Jr. .....B
Shoemaker, Samuel 1769
Shorey, Paul 1920
Short, Charles W. 1835
Short, William 1804
Shumard, Benjamin F. 1867
Shurtleff, Nathaniel B. 1857
Sigsbee, Charles D. 1899
Silliman, Ben. 1805
Sinclair, William J. 1923
Sinkler, Wharton 1900
Skinner, Henry 1922
Smibert, Williams C
Smilie, John 1791
Smith, A. Donaldson 1897
Smith, Albert H. 1878
Smith, Allen J. 1907
Smith, Aubrey H. 1860
Smith, Charles 1805
Smith, Charles E. 1858
Smith, Daniel B. 1829
Smith, Edgar F. 1887
Smith, Erwin F. 1916
Smith, Francis G. 1852
Smith, George 1863
Smith, George W. 1840
Smith, Isaac C
Smith, J. Lawrence 1857
Smith, James P. 1922
Smith, John .....A
Smith, John R. 1800
Smith, Jonathan B. .....B
Smith, Lloyd P. 1873
Smith, Preserved 1937
Smith, Rich. P. 1796
Smith, Richard S. 1864
Smith, Robert .....B
Smith, Samuel .....B
Smith, Samuel H. 1797
Smith, Samuel S 1785
Smith, Stephen 1875
Smith, Theobald 1915
Smith, Thomas .....B
Smith, Thomas P. 1799
Smith, William .....B
Smith, William .....B
Smith, William, Jr. .....B
Smith, William 1792
Smith, William P. .....B
Smith, William W. 1787
Smock, John C. 1897
Smyth, Albert H. 1887
Smyth, Charles H. 1908
Smyth, Herbert W. 1908
Snowden, A. Loudon 1873
Snyder, Monroe B. 1884
Sonmans, Peter C
Southard, Samuel L. 1831
Spangler, Henry W. 1891
Sparks, Jared 1837

Spitzka, Edward A. 1908
Spofford, Ainsworth R. 1873
Sproul, William C. 1920
Squibb, Edward R. 1897
Squier, George O. 1917
Stallo, John B. 1881
Staughton, William 1808
Stedman, Alexander .....B
Steinhauer, Henry 1817
Steinmetz, Charles P. 1917
Stengel, Alfred 1903
Stephens, Alexander H. 1848
Stephens, Henry M. 1897
Stephens, John L. 1841
Sterrett, John R. S. 1908
Steuben, Frederick W., Baron de .1780
Stevens, John 1789
Stevens, Walter LeC. 1884
Stevens, William B. 1854
Stevenson, John J. 1877
Stevenson, Sara Y. 1895
Stewart, John 1797
Stieglitz, Julius 1919
Stiles, Ezra .....B
Stiles, Joseph C
Stille, Alfred 1852
Stillé Charles J. 1867
Stillman, Samuel C
Stillwell, Lewis B. 1898
Stirling, 6th Earl of. *See* Alexander, William
Stockard, Charles R. 1924
Stockton, Richard .....B
Stokes, William A. 1872
Stone, Frederick D. 1895
Stone, Harlan F. 1939
Stone, Witmer 1913
Storer, D. Humphreys 1842
Storrs, William L. 1848
Story, Joseph 1844
Stratton, Samuel W. 1904
Straus, Oscar S. 1917
Strawbridge, George 1877
Strickland, William 1820
Strong, Theodore 1844
Strong, William 1866
Stuart, George 1877
Stuart, Moses 1824
Sullivan, William 1838
Sullivant, William S. 1862
Sully, Thomas 1835
Sulzberger, Mayer 1895
Summer, Charles 1867
Sumner, Francis B. 1938
Survilliers, Joseph B., Count de..1823
Swain, Joseph 1918
Swasey, Ambrose 1919
Swift, Joseph G. 1814
Syle, E. W. 1884
Sylvester, J. J. 1877
Syng, Peter C
Syng, Philip .....B

T

Taft, William H. 1909
Tait, Charles 1827
Talcott, Andrew 1838
Taney, Roger B. 1844
Tanner, Henry S. 1829
Tatham, William 1897
Tatham, William P. 1875
Taussig, Frank W. 1929
Taylor, Alonzo E. 1917
Taylor, Frederick W. 1912
Taylor, Henry O. 1926
Taylor, Richard C. 1839
Taylor, William B. 1877
Tennent, Gilbert .....B
Tennent, David H. 1938
Tesla, Nikola 1896
Thaxter, Roland 1912
Thayer, Russell 1875
Thayer, M. Russell 1877
Thayer, Sylvanus 1838
Thayer, William R. 1918
Thayer, William S. 1924
Thomas, Allen C. 1884
Thomas, Isaiah 1816
Thomas, Richard 1771
Thompson, Heber S. 1884
Thompson, Oswald 1859
Thompson, Robert E. 1874

Thompson, William 1880
Thomson, Charles C
Thomson, Elihu 1876
Thomson, Frank 1874
Thomson, James G. 1818
Thomson, William 1880
Thurston, Robert H. 1902
Ticknor, George 1828
Tidyman, Philip 1825
Tilghman, Benjamin C. 1871
Tilghman, Benjamin C. 1902
Tilghman, James .....B
Tilghman, Richard A. 1847
Tilghman, William 1805
Tilghman, William M. 1870
Tilney, Frederick 1930
Tilton, James 1773
Titchener, Edward B. 1906
Tittmann, Otto H. 1906
Toppan, Robert N. 1886
Torrey, John 1835
Totten, George M. 1851
Totten, Joseph G. 1836
Tower, Charlemagne 1895
Towne, John H. 1851
Townsend, Joseph B. 1868
Townsende, Washington 1882
Trautwine, John C. 1844
Trautwine, William 1882
Trelease, William 1903
Trego, Charles B. 1843
Trimble, Henry 1897
Troost, Gerhard 1816
Trowbridge, Augustus 1911
Trowbridge, John 1896
Trowbridge, William P. 1872
True, Frederick W. 1899
True, Rodney H. 1923
Trumbull, Henry C. 1884
Trumbull, John 1792
Tucker, George 1837
Tucker, J. Randolph 1895
Turner, George 1790
Tuttle, David K. 1889
Tweedy, John C
Tyler, Lyon G. 1889
Tyndale, Hector 1869
Tyson, James 1887
Tyson, Job R. 1836
Tyson, Philip T. 1869

U

Uhler, William M. 1858

V

Vaillant, George C. 1943
Vanderkemp, F. A. 1805
Vanderkemp, John J. 1840
Van Hise, Charles R. 1909
Vanuxem, Lardner 1822
Vauclain, Samuel M. 1899
Vaughan, John 1784
Vaughan, Samuel 1784
Vaughan, Victor C. 1909
Vaux, George 1897
Vaux, Richard 1884
Vaux, Roberts 1819
Vaux, William S. 1859
Venable, Francis P. 1905
Vere, Scheele de 1885
Vethake, Henry 1831
Vining, John C
Vose, George L. 1870

W

Wagner, Samuel 1885
Wagner, Tobias 1841
Wahl, William H. 1874
Walcott, Charles D. 1897
Walker, John C
Walker, Sears C. 1837
Wall, George 1785
Wallace, Ellerslie 1884

Waln, Lewis 1846
Waln, Nicholas C
Walsh, Robert 1812
Walter, Thomas U. 1839
Ward, Lester F. 1889
Ward, Robert De C. 1922
Warden, David B. 1809
Ware, Lewis S. 1881
Ware, Nathaniel A. 1823
Warfield, Ethelbert D. 1897
Waring, William 1793
Warren, Gouverneur K. 1867
Warren, John C. 1818
Washburne, E. A. 1863
Washington, Bushrod 1805
Washington, George 1780
Washington, Henry S. 1922
Waterhouse, Benjamin 1791
Waters, Nicholas B. 1792
Watson, James F. 1878
Watts, Stephen .....A
Way, Nicholas 1773
Wayland, Francis 1838
Wayland, Herman I. 1890
Wayne, Anthony 1780
Wayne, Henry C. 1858
Wayne, Isaac 1840
Webb, James C
Webber, Sam. 1804
Webster, Arthur G. 1906
Webster, Daniel 1837
Webster, Noah 1827
Weil, Edward H. 1885
Weimer, Albert B. 1927
Welch, William H. 1896
Wells, Richard C
Welsh, Herbert 1884
Welsh, John 1867
West, Francis 1854
West, Samuel .....B
West, William .....B
Wetherill, John P. 1827
Wetherill, John P. 1878
Wetherill, Charles M. 1851
Wharton, Charles H. 1786
Wharton, George M. 1840
Wharton, Henry 1880
Wharton, Isaac C
Wharton, Joseph 1869
Wharton, Samuel C
Wharton, Thomas C
Wharton, Thomas I. 1830
Wheatley, Charles M. 1879
Wheaton, Henry 1829
Wheeler, William M. 1916
Wheeler, Samuel 1795
White, Andrew D. 1869
White, David 1921
White, Israel C. 1878
White, William C
Whitehead, Alfred N. 1926
Whitfield, Robert P. 1898
Whitfield, J. Edward 1905
Whitman, Charles O. 1899
Whitman, William E. 1865
Whitney, George 1880
Whitney, Josiah D. 1863
Whitney, William D. 1863
Whittier, John G. 1870
Whittlesey, Chauncey .....B
Wickham, John 1835
Wilcocks, Alexander .....B
Wilcocks, Alexander 1864
Wilder, Burt G. 1878
Wiley, Harvey W. 1904
Wilkes, Charles 1843
Wilkinson, James 1798
Willard, Joseph 1804
Willcox, Joseph 1895
Williams, Edward H. 1897
Williams, Henry J. 1833
Williams, Jonathan 1787
Williams, Samuel 1772
Williams, Talcott 1888
Williamson, Hugh .....B
Williamson, Robert S. 1870
Willing, Thomas .....B
Willis, Henry 1890
Williston, Samuel W. 1918
Wilson, Alexander 1813
Wilson, Edmund B. 1888
Wilson, Henry V. P. 1932
Wilson, James C
Wilson, James C. 1885
Wilson, James P. 1814
Wilson, Joseph M. 1874

Wilson, Thomas B. 1852
Wilson, William P. 1887
Wilson, Woodrow 1897
Winchell, Alexander 1865
Winsor, Henry 1862
Winsor, Justin 1893
Winthrop, James 1809
Winthrop, John .....B
Winthrop, Robert C. 1880
Winthrop, Thomas L. 1837
Wireman, Henry D. 1887
Wistar, Caspar 1787
Wistar, D. C
Wistar, Isaac J. 1893
Wister, Caspar 1859
Wister, Owen 1897
Wister, Owen J. 1866
Wistler, Charles J. 1811
Witherspoon, John 1769
Wood, George B. 1829
Wood, Horatio C. 1866
Wood, Richard 1879
Wood, Robert W. 1908
Wood, Stuart 1899
Woodhouse, James 1796
Woodward, Henry 1874
Woodward, Robert S. 1902
Woolley, Stephen C
Woolsey, Theodore D. 1871
Wootten, J. E. 1874
Workman, Benjamin 1785
Workman, James 1821
Wormley, Theodore G. 1878
Worral, James C
Worrall, James 1884
Worthen, Andrew H. 1863
Wright, Arthur W. 1896
Wright, James .....A
Wurts, Alexander J. 1899
Wurts, Charles S. 1881
Wyckoff, Ambrose B. 1886
Wylie, Samuel B. 1806
Wyman, Jeffries 1866
Wynkoop, Benjamin C

Y

Yarnall, Ellis 1880
Young, Charles A. 1874

Z

Zane, Isaac C
Zentmayer, Joseph 1873
Zinsser, Hans 1937

FORMER FOREIGN MEMBERS

Following each name there is a notation of the country of the member as per the following table:

A	Austria	H	Hungary
Ar	Argentina	I	Italy
Au	Australia	Ir	Ireland
B	Belgium	J	Japan
Br	Brazil	M	Mexico
C	Canada	N	Netherlands
Co	Colombia	No	Norway
Cz	Czechoslovakia	P	Portugal
D	Denmark	Po	Poland
E	England	R	Russia
Eg	Egypt	S	Sweden
F	France	Sc	Scotland
Fi	Finland	Sp	Spain
G	Germany	Sw	Switzerland
Gr	Greece	W	West Indies
Gu	Guatemala		

As in the case of former resident members, the date of election is given with the exception of members elected before the union of the two Societies in 1769 (see Brief History of the Society, p. 7). In each such case there is an "A," "B," or "C" according as the member has been a member of both Societies before the union, or a member only of the American Philosophical Society or of the American Society.

This list is as accurate as it was possible to determine at this time. There are a number of question marks and blanks for names. Items in doubt are enclosed in brackets. Further study of the list will be made and anyone who can point out any inaccuracies or supply answers to the questions should do so. The same applies to the list of Former Resident Members.

A

Abrahamson, Joseph N. B. V..D 1829
Acland, Sir Henry .....E 1873
Adam, Lucien .....F 1886
Adams, Dr. .....W 1775
Adams, Frank D. .....C 1916
Adams, John C. .....E 1848
Adelung, Friedrich von ...G 1818
Adet, Pierre A. .....F 1796
Adye, Stephen .....E 1772
Afzelius, Peter .....S 1821

Agardh, Charles A. .....S 1835
Agassiz, Louis .....Sw 1843
Airy, Sir George B. .....E 1879
Äkerman, Richard .....S 1876
Alaman, Lucas .....M 1851
Albers, Johann A. .....G 1819
Albrecht, Paul .....G 1886
Alcantara, Pedro .....P 1876
Allen, Alfred H. .....E 1898
Anderson, James .....E 1791
Anderson, James .....Sc 1794
Andrada e Silva, Jose B. de Br 1822
Andreani, Paolo, Conte .....I 1792
Angelis, Pedro de .....Ar 1840
Angiviller, Charles C. Labillarderie d' .....F 1784
Anmours, Chev. d' .....F 1783
Archer, Thomas C. .....Sc 1876
Arfwedson, Charles D. .....S 1853
Argyll, Duke of. *See* Campbell, George Douglas
Armstrong, Sir William G. ..E 1874
Arrhenius, Svante A. .....S 1911
Arthaud, Charles .....W 1789
Augustus Frederick, Duke of Sussex .....E 1832
Auwers, George F. J. A. .....G 1912
Avebury, 1st Baron. *See* Lubbock, Sir John

B

Baeyer, Adolf von .....G 1910
Baker, William .....E 1787
Balbo, Prospero, Conte .....I 1831
Balfour, Arthur J. .....E 1917
Ball, Sir Robert S. .....E 1891
Banks, Sir Joseph .....E 1787
Barbé-Marbois, François, Marquis de .....F 1780
Barcena, Mariano .....M 1877
Barbeu-Dubourg, Jacques ...F 1775
Barclay, Robert .....E 1787
Barnes, Thomas .....E 1787
Barrande, Joachim .....A 1862
Bastian, Adolph .....G 1886
Baumhauer, Eduard H. von..N 1877
Beattie, James .....Sc 1786
Beaufort, Francis .....E 1840
Beaulieu, Paul L. .....F 1881
Beaumont, Leonce E. de ....F 1860
Becquerel, Henri .....F 1902
Bedford, Paul .....W C
Bédier, Joseph .....F 1937
Belcher, Jonathan .....C C
Bell, Sir Lowthian .....E 1876
Bennett, John H. .....Sc 1849
Bergius, Peter .....S B
Bergmann, Torbern .....S 1773
Bernard, Claude .....F 1860
Bernhard, Karl, Duke of Saxe-Weimar .....G 1830
Berthelot, Marcelin .....F 1895
Bertholff, Frederick E. F., Baron de Beelen .....B 1785
Bertin, Georges .....F 1895
Berzelius, John J. .....S 1820
Bessel, Friedrich W. .....G 1840
Bessemer, Sir Henry .....E 1894
Bigsby, John J. .....E 1825
Billé, Steen .....D 1832
Birch, Samuel .....E 1869
Bischoff, Theodore L. W. ...G 1860
Blackmore, William .....E 1869
Blackwell, Thomas E. .....C 1863
Blades, William .....E 1882
Blagden, Sir Charles .....E 1789
Blainville. *See* Ducrotay de Blainville
Blanchet, Francis .....C 1801
Blum, J. Reinhardt .....G 1882
Blumenbach, Johann F. ....G 1798
Boekh, C. W. .....N 1870
Bohtlingk, Otto von .....G 1862
Bonaparte, Charles Lucien, Prince of Canino .....I 1824
Bonaparte, Joseph, Comte de Survilliers .....F 1823
Bonaparte, Lucien, Prince of Canino .....I 1823
Bonaparte, Roland, Prince ..F 1895
Bonifacio, Jose de Andrada e Silva. *See* Andrada e Silva
Bopp, Franz .....G 1863

Borgnis, J. A. .....I 1820
Bornet, Jean-Baptiste .....F 1911
Bost, John .....F 1864
Botta, Carlo .....I 1816
Boucher [de Crèvecoeur] de Perthes, Jacques .....F 1863
Bragg, Sir William H. .....E 1940
Brahm, Fred. F. S. de .....? 1784
Braun, Alexander G. .....G 1862
Brayley, Edward W. .....E 1842
Brezina, Aristides .....A 1886
Bring, Ebbe S. .....S 1832
Brissot de Warville, Jean P. .F 1789
Broca, Paul .....F 1872
Broegger, Waldemar C. .....No 1899
Brongniart, Alexandre .....F 1819
Bronn, Henry D. .....G 1860
Brown-Séquard, Charles E. ..F 1854
Brugsh, Henri .....G 1869
Brunet, Ovide .....C 1865
Bryce, James, Viscount .....E 1895
Buchan, Earl of. *See* Erskine, David S.
Budge, E. A. Wallis .....E 1895
Buffon, Georges L. Leclerc, Comte de. .....F B
Bujalsky, ——— .....R 1833
Bunsen, Robert W. .....G 1862
Burmann, Nicolas L. .....N 1791
Burmeister, Hermann .....G 1856
Burrows, Sir George .....E 1873
Bustamante, José M. .....M 1828
Butt, John M. .....W C

C

Cabanis, Pierre J. G. .....F 1786
Cadet-Gassicourt, Louis C. ...F 1787
Cadet de Vaux, Antoine A. F. .....F 1787
Caevallos, Pedro .....Sp 1804
Callisen, Adolph C. P. .....D 1841
Campbell, George D., 8th Duke of Argyll .....E 1886
Camper, Adrien G. .....N 1806
Camper, Pieter .....N 1789
Campomanes, Pedro R., Conte de .....Sp 1784
Cancrin, George, Comte .....R 1843
Candolle, Augustin P. de ..Sw 1841
Cannizzaro, Tommaso .....I 1885
Capellini, Giovanni .....I 1873
Carena, Giacinto .....I 1831
Carleson, Gustaf von .....S 1795
Carlier, Auguste .....F 1869
Carlisle, Nicholas .....E 1836
Carpenter, William B. .....E 1845
Carrillo, Bishop Crescencio..M 1886
Casa-Irujo, C. M. Martinez, Marquis de .....Sp 1802
Castiglioni, Luigi, Conte ....I 1786
Cauchy, B. Augustin .....F 1853
Cavanilles, Antonio J. .....Sp 1804
Ceracchi, Guiseppe .....I 1792
Ceselli, ——— .....I 1869
Chabas, François J. .....F 1869
Charencey, Hyacinthe, Comte de .....F 1886
Chastellux, François J., Marquis de .....F 1781
Chevalier, Michel .....F 1852
Christison, Robert .....Sc 1841
Clark, Sir James .....E 1845
Cochrane, Archibald, 9th Earl of Dundonald .....Sc 1795
Coleridge, Sir John D. Coleridge, 1st Baron .....E 1884
Collins, William H. .....C 1932
Collyer, William B. .....E 1823
Condorcet, M. J. A. N. Caritat, Marquis de .....F 1775
Constant. *See* Estournelles de Constant
Copland, James .....E 1845
Coquebert de Montbret, Charles E., Baron .....F 1823
Cora, Guido .....I 1886
Correa de Serra, José F. ....P 1812
Coupigny, André F. de .....F 1793
Court de Gébelin, Antoine ..F 1783
Crèvecoeur, Michel G. St. J. de .....F 1789

Coste, Jean F. .....F 1783
Crawford, Adair .....E 1785
Crell, Lorenz .....G 1786
Crelle, August L. .....G 1853
Crookes, Sir William .....E 1886
Crosse, John G. .....E 1837
Crum, Walter E. .....E 1944
Cruz, Fernando .....Sp 1889
Cullen, William .....Sc A
Cunat, Joanne B. .....Sp 1796
Curie, Marie Sklodowska....F 1910
Curtius, Ernst .....G 1895
Cuthbert, Ross .....C 1809

D

Dalman, John W. .....S 1827
Dannefeld, C. Juhlin .....S 1876
Dantes Pereira, José M. .... P 1828
Darboux, Gaston .....F 1902
Darwin, Charles .....E 1869
Darwin, Erasmus .....E 1792
Darwin, Francis .....E 1909
Darwin, George H. .....E 1898
Dashkov, Ekaterina R., Princess .....R 1789
Daubenton, [Louis J. M.?]...F 1775
Daubeny, Charles G. B. .....E 1838
Daubrée, Gabriel A. .....G 1863
Davenport, Sir Samuel ....Au 1876
David, Christian G. N.....D 1863
Davidson, Thomas .....E 1866
Davy, Humphry .....E 1810
Dawkins, William B. .....E 1880
Dawson, Sir John W. .....C 1862
Deabbate, Gaspard .....I 1823
Delage, Yves .....F 1903
Delambre, Jean B. J. .....F 1803
Delesse, Achille E. O. J. .....F 1863
Deleuze, Joseph P. F. .....F 1817
Delgada. *See* Rada y Delgada
Delitzsch, Friedrich .....G 1904
Des Cloizeaux, Alfred L. O. L.F 1878
Desmarest, Anselme G. .....F 1819
Desmoulins, Charles .....F 1861
Desor, Edouard .....Sw 1862
Destutt de Tracy, Antoine L. C., Comte .....F 1806
Deveze, Jean .....F 1796
Deville, Henri St. C. .....F 1860
Dewar, James .....E 1899
Dick, Sir Alexander .....Sc C
Diels, Hermann .....G 1909
Dixon, Jeremiah .....E C
Dohrn, Anton .....G 1903
Dohrn, Karl A. .....G 1854
Dolland, Peter ....E 1772
Donner, Otto .....Fi 1886
Dubourg. *See* Barbeu-Dubourg
Ducrotay de Blainville, Henri M. .....F 1819
Duhail, Louis E. .....F 1796
Dumas, Jean-Baptiste .....F 1860
Duméril, Constant ..... F 1813
Dümichen, Johannes .....G 1869
Duncan, Andrew .....Sc 1774
Dundonald, Earl of. *See* Cochrane, Archibald.
Duponceau, Jean G. .....F 1823
duPont, Edouard .....B 1873
du Pont de Nemours, Pierre S., F 1800
Durny, Victor .....F 1886
Dworjak, Charles .....R 1853

E

Ebers, George .....G 1895
Eddington, Sir Arthur S.....E 1931
Edwards, Bryan .....W 1774
Ellis, John .....W 1774
Encke, Johann F. .....G 1839
Endlicher, Stephen .....A 1842
Engler, Adolph .....G 1906
Erskine, David S., 11th Earl of Buchan .....Sc 1794
Eschricht, David [Daniel?] F.D 1863
Estournelles de Constant, Paul H. B. B., Baron d' .....F 1907
Evans, Sir Arthur J. .....E 1913
Evans, Sir John .....E 1881
Eyriès, Jean B. B. .....F 1840

F

Falberg, Samuel .....W 1801
Famitz, Prof. .....I C
Faraday, Michael .....E 1840
Favre, Alphonse .....Sw 1888
Fennell, C. A. M. .....E 1895
Ferguson, James .....E 1770
Ferrer, Joseph J. de .....Sp 1801
Feutry, [Aimé A. J.] .....F 1786
Field, Henry W. .....E 1856
Filsted, Samuel .....W 1771
Fischer, Emil .....G 1909
Fischer von Waldheim, Alexander .....G? 1853
Fischer von Waldheim, Gotthelf .....G? 1818
Flores, Jos. M. de .....Sp 1789
Flourens, Pierre J. M. .....F 1825
Flower, William H. .....E 1869
Fontana, Felice .....I 1783
Forbes, George .....E 1891
Forbes, John .....E 1840
Forchhammer, Johann G. ...D 1862
Foronda, Valentin de .....F 1802
Forstroem, John E. .....W 1807
Foster, George C. .....E 1907
Foster, Sir Michael .....E 1902
Fothergill, Anthony .....E 1792
Fothergill, John .....E 1770
Fox, Robert W. .....E 1840
Frank, Johann P. .....A 1817
Franks, Augustus W. .....E 1895
Frauenfeld, George von ....A 1869
Freiré, Cypriano R. .....P 1796
Frerichs, Friedrich T. .....G 1862
Fronde, James A. .....E 1862
Fuss, Nicholas .....R 1818

G

Gage, Thomas .....E B
Galvez, Mariano .....Gu 1836
Garbier, Thibert .....E 1786
Gardiner, Valentine .....E C
Gardoqui, Diego de .....Sp 1789
Gardoqui, Francis de .....Sp 1789
Garnett, Richard .....E 1901
Gasparin, Alphonse, Comte de .....F 1864
Gastelier, René G. .....F 1786
Gauss, Karl F. .....G 1853
Gayangos, Pascual de .....Sp 1861
Gébelin. *See* Court de Gébelin
Geikie, Sir Archibald .....E 1880
Geikie, James .....Sc 1876
Gérard de Rayneval, Conrad A. .....F 1779
Gérome, J. Léon .....F 1895
Gibbons, Thomas .....E 1775
Giglioli, Enrico H. .....I 1901
Gill, Sir David .....E 1910
Gill, John .....Ir C
Giraldez, Joachim P. C. .....P 1827
Gladstone, William E. .....E 1881
Glaisher, James .....E 1895
Glazebrook, Richard T. ....E 1895
Gloucester, Archibald .....W 1771
Godoy, Manuel, Prince .....Sp 1804
Goeppert, Heinrich R. .....G 1862
Gonzales, Francisco A. .....Sp 1831
Good, John M. .....E 1811
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