NATIONAL ACADEMY OF SCIENCES

EDWIN GRANT CONKLIN

1863—1952

A Biographical Memoir by

E. NEWTON HARVEY

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November 24, 1863—November 21, 1952

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EDWIN GRANT CONKLIN's guiding principle in life was service, a rule of conduct which he expressed in an address at the dedication of the new brick building of the Marine Biological Laboratory at Woods Hole, Massachusetts, in 1925: "Our strongest social instincts are for service; the joy of life is in progress; the desire of all men is for immortality through their work." No better example of this precept can be advanced than his devoted attention to the affairs of the National Academy of Sciences as a member of its council and his labors for many other institutions with which he was associated during a working career of well over sixty years. Most of these were centers of learning, such as Ohio Wesleyan and Northwestern Universities, the University of Pennsylvania, and Princeton University (from 1908); others were learned societies like the American Philosophical Society (from 1897), the Academy of Natural Sciences of Philadelphia (from 1896), The Wistar Institute of Anatomy and Biology (Advisory Board from 1905), or laboratories engaging primarily in research, like the Marine Biological Laboratory of Woods Hole, Massachusetts (Trustee from 1897), and the Bermuda Biological Station for Research (Trustee from 1926). His association with all these institutions extended over many years and is best described as both sympathetic and paternal. In many he served as president or held some other high executive position.

Closely connected with the ideal of service was his interest in education and in human advancement. Professor Conklin's deep concern with instruction is indicated not only by his various academic posi-

tions, but also by the much appreciated addresses he gave at the dedication of buildings and the many requests he received for talks in which science was interpreted for the laymen. His long association with Science Service (President 1937–1945) and the high regard in which he was held, by undergraduate and graduate students alike, testify to his proficiency in this field. The general biology course at Princeton University was a highly popular one for many years. He liked nothing better than to gather around him, in the laboratory or at his home, a group of students for discussion of various subjects. These were times for reminiscence during which his listeners could learn about the history of American biology in the early part of the century from tales related with a keen sense of humor.

One of Professor Conklin's most valuable attributes was a prodigious memory of detail, perhaps fostered by his thesis study of cell lineage. Even during the later years of his life, the date of almost any event was recalled with precision, and those of us who knew him well were entertained by many an amusing anecdote of early life in the middle west and of his later educational period.

Throughout his life, the human interest led to acceptance of executive duties, to willingness to serve on many committees, and to support of various causes, all of which took time from scientific research but became the background for a far wider viewpoint than specific research could have given. He was especially interested in education and in the philosophy of religion. His commencement addresses and published pamphlets present an original approach in this field. Always a liberal in outlook, he was a great believer in freedom and, like most scientists, was vehemently opposed to any sort of regulation and regimentation.

Another of Conklin's characteristics was extreme interest in various subjects, a trait undoubtedly responsible for his love of research, the attempt to get to the bottom of things and to find out first hand the truth of the matter. As will be described more fully later, the cell, as the unit of organized beings, appeared to be the key to the mystery of life, and it was the egg cell with the potentiality of de-

veloping into an adult organism which interested him most. Research in cytology, embryology, and heredity represented the practical expression of his curiosity concerning biological subjects.

Professor Conklin's ethical standards were high. His childhood life was normally but not excessively religious. His parents were leading members of the Methodist church wherever they lived. He went to church with them and attended Sunday school, learning long passages from the Bible by heart, thus gaining a background of intimate knowledge of Biblical lore from which he frequently drew for lectures and addresses. At one time he considered becoming a preacher, but gave up the idea and was never ordained, although he did pass a perfunctory examination on the Bible and received what was known as a "local preacher's license."

The best account of Conklin's views on religion, ethics, and philosophy is to be found in *Thirteen Americans: Their Spiritual Autobiographies,* a series of autobiographical sketches edited by Louis Finkelstein. It is clear from Professor Conklin's account that he never allowed orthodox religious views to influence his thinking. Indeed, on spiritual and moral matters, he expressed his credo as follows: "Throughout my professional life I have been a student of animal development, and, while most of my studies have been directed to the development of the body, I have not failed to observe that the development of physical, mental, and moral qualities in man follow essentially similar patterns. Indeed, a human being is a single person composed of many parts and functions, which are not divisible in real life. Physical, mental, and moral subdivisions of this individual do not represent separate personalities, but only different aspects of one nondivisible unity."

At the end of his autobiographical statement Professor Conklin presented his *confessio fidei:* "When I had felt compelled by increasing knowledge of nature to revise some of my traditional articles of religious faith, I was delighted to find that these changes had not modified in any essential respects my system of ethics. As I expressed it in my presidential address before the American Association for the

Advancement of Science in 1937: 'The ethics of science regards the search for truth as one of the highest duties of man; it regards noble human character as the finest product of evolution; it considers the service of all mankind as the universal good; it teaches that human nature and humane nurture may be improved, that reason may replace unreason, cooperation supplement competition, and the progress of the human race through future ages be promoted by intelligence and goodwill.' "

Professor Conklin was a great reader, not only of science, but of literature in general, especially of poetry, which he recited on many occasions. He loved to read to people and would frequently bring to the laboratory a book which had especially interested him the day before and read long passages to Ethel Browne Harvey, who occupied an adjoining room.

One poem which particularly appealed to him was *John Brown's Body,* by Stephen Vincent Benét, in part because he had nearly won an oratorical contest on John Brown, and in part because of his sympathy with the Abolitionist cause and his great admiration for Lincoln. Professor Conklin was continually referring to the fact that Lincoln's Gettysburg Address was delivered on November 19, 1863, and that he himself was born five days later, on the morning of November 24, 1863, the day of the "Battle above the Clouds," when General U. S. Grant assigned General Joe Hooker the task of taking the Confederate stronghold on the top of Lookout Mountain. This event was to decide Professor Conklin's middle name, for the day after the battle, his father came home and said to his mother, "We have an appropriate name for our son—Grant." His first name, Edwin, came from that of his father's youngest brother.

Professor Conklin loved to tell of the occasion some seventeen years later when he was a freshman at Ohio Wesleyan, and General Grant, who had served two terms as President of the United States, had just returned from a triumphal trip around the world. Grant came back to his native state and was tendered a great reception in the rotunda of the state capitol at Columbus. Conklin journeyed to

Columbus with a group of fellow students, joined the line of persons shaking hands with General Grant, and, passing to the rear, rejoined the line for a second and a third handshake in order to make sure the name of Grant by which he was christened had been duly confirmed.

Professor Conklin liked nothing better than to speak to a large public audience, the larger the better. His training at Ohio Wesleyan was well suited to develop oratorical traits, as he belonged to a literary society known as the Zetagathean Society, and was selected to represent the Society in an oratorical contest in the winter of 1884. He happened to be reading Horace Greeley's *The American Conflict* and decided to present a new interpretation of John Brown's raid on Harper's Ferry—namely, that Brown felt he could accomplish vastly more for the cause of emancipation if he remained and offered himself and his band as martyrs than if he should carry off fifty slaves to Canada. Conklin's oration was published in the *College Transcript* of Ohio Wesleyan, and won second honors, just failing to win the contest because one of the judges, a southerner, as he later confessed to Conklin, "could not possibly vote for anyone who had attempted to make a hero out of an old horse thief and murderer."

If Professor Conklin's guiding principle was service, his most distinctive feature was sociability. He became a member of many societies and a regular attendant at meetings, not because of duty but because of a real interest in the proceedings. At Princeton University he was one of that little band called the "Snuff Club," a group of faculty members who met at various houses to discuss current topics and to have a good time. Later, after retirement, he joined the "Old Guard," a similar group, which met once a month, perhaps more sedately, to listen to a talk on some current subject.

Unless one knew Professor Conklin well, one might consider him a trifle austere and serious. Such an estimate would be far from correct. He had a fine appreciation of humor and a fund of stories, many at his own expense, that most exacting test of true wit. It is

unfortunate that many of his recollections of early days in Ohio, at Johns Hopkins University, and at Woods Hole have not been published, for they were full of delightful anecdotes.

One of his students, Professor Aute Richards (Ph.D. Princeton, 1911) has summed up his character as that of "a man of vigorous, definite, judicial, but amiable personality. It seems almost unnecessary to attempt to put into words a characterization of one so well known to zoologists of this country. He is easy to meet, interested in those with whom he comes in contact, and gifted with a good memory for names and faces. A genuine sense of humor crops out unexpectedly to illuminate many a situation, as in his famous remark that 'wooden legs are not inherited, although wooden heads may be' or his equally well-known observation in regard to the anti-evolutionists, 'Apparently the anti-evolutionist expects to see a monkey or an ass transformed into a man, though he must be familiar enough with the reverse process.' "

Such was the personality of Edwin Grant Conklin. There is no more fascinating study than to trace the characteristics of a man to the background of his early childhood and youth. Conklin was born in Waldo, Ohio, November 24, 1863. His father was Dr. Abram Virgil Conklin, born November 21, 1832 in Westfield, Ohio. His mother was Nancy Marie Hull, born February 2, 1837 in Waldo, Ohio. Both his parents were settlers in the middle west, his paternal grandparents coming from Vermont and Connecticut and his maternal grandparents from Virginia and New York. His forebears on both the Conklin and Hull sides originally migrated from England to America at some time in the seventeenth century and several fought in the American Revolution.

In Ohio, Professor Conklin's grandparents had settled on farms, but his father suffered from a hip ailment which made his leg stiff and hence was unable to take an active part in farming. The father studied medicine and became an M.D. in 1860, later a busy and successful physician of the general practitioner type, a "horse and buggy

doctor" of the eighteen seventies. Nevertheless he did buy a farm, raised crops, bred cattle, and was an enthusiastic beekeeper and inventor. He perfected and patented the "Diamond Frame Movable Comb Bee Hive" in 1868, and used a centrifugal machine to extract the honey.

It is this background of farm life that no doubt started Professor Conklin along the path of natural history, a path which led to leadership among biologists in this country. He was always proud of the fact that he had traveled in a covered wagon from one part of Ohio to another, attended a country school with one room and one teacher, and worked on a farm. Later he became the teacher in a similar country school, where he was a janitor and disciplinarian as well as instructor, at a salary of $35 a month.

In high school, which he attended at Delaware, Ohio, graduating in 1880, the subjects of study were reading, recitation, speaking, writing, spelling, grammar, mathematics, geography, history, and Latin, but no science. What a training for an orator or writer! Only later in college were such sciences as chemistry, physics, botany, mineralogy, geology, zoology, and physiology taught.

In September, 1880, he entered Ohio Wesleyan University and came under the influence of Edward T. Nelson (Ph.D., Yale, 1869), professor of Natural History, who encouraged him to collect and identify fossils and the shells of river mussels and snails. During Conklin's senior year Nelson appointed him assistant in the Museum. Professor Nelson's thesis was on fossil molluscs and he was fundamentally a collector, but one of the most scholarly men on the faculty. Conklin has written, "I never dissected an animal nor saw a living thing under the microscope while I was a student at Delaware but I had 'museum practice' throughout my sophomore year." Nelson also took his students on collecting trips for shells, and it seems likely that this early experience set Conklin's later interest in molluscan embryology.

On graduation, Conklin needed money and he obtained a position in Rust University, a missionary college for Negroes in Mississippi,

where he taught Latin, Greek, English, elocution, history, and all the sciences for three years (1885–1888). It was while he was teaching at Rust University that he met and became engaged to Belle Adkinson, daughter of the Reverend L. G. Adkinson, D.D., who later became President of a college in New Orleans. They were married in 1889 and Conklin has written that "for more than fifty years she was my constant helpmate and the very personification of faith, hope and love as described by Paul (I Corinthians, 13)." There were three children, Paul, Mary, and Isabel.

The experience in teaching science at Rust University convinced Conklin that he needed further training and that biology should be his life work. Accordingly in 1888 he entered Johns Hopkins University, where his principal subjects of study were morphology, physiology, and geography, and his professors W. K. Brooks, E. A. Andrews, H. Newell Martin, W. H. Howell, George Williams and W. B. Clark. Conklin has written: "I cannot begin to describe adequately the stimulus for scholarly work and research which I received at Johns Hopkins. It was as if I had entered a new world with new outlooks on nature, new respect for exact science, new determination to contribute to the best of my ability to 'the increase and diffusion of knowledge among men.'"

At Hopkins, fellow students who greatly stimulated him were H. V. Wilson, S. Watasé, T. H. Morgan, and R. G. Harrison. In later years Ross Harrison became his most intimate friend, although Professor Conklin had so many friends that it is difficult to pick the closest. In each place that he lived for any length of time, there were intimates in whom he confided and whose companionship he enjoyed.

In Philadelphia his close friends were J. Percy Moore and Philip Calvert, both professors of zoology at the University of Pennsylvania. In Princeton, Edward Capps, professor of Greek, Henry B. Fine, dean of the College, G. A. Hulett, professor of chemistry, and Stewart Paton, a lecturer in biology, should be mentioned. At Woods Hole, T. H. Morgan and G. H. Parker were especially intimate; E. B. Wilson, W. J. V. Osterhout, Jacques Loeb, and G. N. Calkins were also close

friends. In the American Philosophical Society, to which his interest outside university life was truly dedicated, Luther P. Eisenhart, for many years Executive Officer of the Society, was a companion and confidant.

Space does not permit a complete account of Professor Conklin's student days at Hopkins or of his early years at the Marine Biological Laboratory at Woods Hole, where he did his research for the doctor's degree. He matriculated at Hopkins the same year the M. B. L. was founded (1888). Professor Brooks had received much material collected by Alexander Agassiz on his expedition to the Pacific. Conklin has written: "One of the bottles, carefully marked with the latitude and longitude of the place where the specimen had been collected and which contained fragmentary remains of some kind of jelly-fish-like organism, was turned over to me by Professor Brooks with the request that I find out what it was. I did this to such good effect that I discovered that it consisted of fragments of a new siphonophore. I made a careful study of the entire fragments and then embedded them (in paraffin) and made serial sections for study of the histology of the specimens. The result of this study was published toward the end of the academic year of 1889–90 in the Johns Hopkins Circulars under the title 'Structure and development of the gonophores of a certain siphonophore, etc.' " This contribution, written jointly with W. K. Brooks, was Conklin's first scientific publication and the only one published with another name attached.

At the end of the academic year, after Conklin had been again appointed Fellow in Biology at Hopkins and assigned a table at the U. S. Fish Commission laboratory at Woods Hole, he asked Brooks what he should work on for a thesis subject. Brooks replied, "Why don't you continue your study of the siphonophores?" The advice was unfortunate, as the only siphonophore at Woods Hole is an occasional Portuguese man-of-war (Physalia), blown in from the Gulf Stream by a southeast breeze. Such a procedure was characteristic of Brooks, who believed in leaving his students severely alone, allowing them to find out for themselves the right and the wrong procedure.

Fortunately, the lack of siphonophores forced Conklin to search the animal kingdom for material and actually to find his own topic for a doctor's thesis. His chief interest was in embryology; gasteropod material was especially abundant and seemed particularly favorable to him. He finally selected the development of the slipper limpet, Crepidula, and, in his own words, "made very rapid progress in being able to follow the individual cleavages of the egg to a relatively advanced stage, so that I could determine even at the first cleavage of the egg the future axis of the animal that was to develop from it and in the later cleavages could trace the succession of divisions until they gave rise to the larval organs of the veliger larva."

In this way was the study of cell lineage begun, a field in which Professor Conklin became the leader and in which he continued for over forty years, applying his methods to the ascidian egg, also abundant at Woods Hole and then to that of Amphioxus, once regarded as the ancestor of the vertebrates. He later applied various experimental procedures (centrifugal force, electrical currents, treatment with salt solutions) to the eggs in an attempt to analyze the various factors which controlled the successive steps in development.

When Conklin returned to Baltimore at the end of the summer (1890), he consulted Professor Brooks in regard to his thesis subject and work and asked if it would be satisfactory. Brooks replied: "There is no morphological significance in the mere duplication of parts. The cleavage of the egg is a mere duplication of cells and I do not think there is any morphological significance in it." Later, when the thesis was finished and Brooks had looked it over, he came to the general laboratory where all research students were working and handed it back, saying in a loud voice: "Well, Conklin, this University has sometimes given the doctor's degree for counting words; I think maybe it might give one degree for counting cells." There was a roar of laughter and the general statement became prevalent that Conklin was engaged in "cellular bookkeeping."

The next summer Professor Conklin returned to Woods Hole, again occupying the Johns Hopkins table at the Fish Commission. It was there that he met for the first time Professor E. B. Wilson who

had been working on a similar problem in the development of the annelid, Nereis. The two compared notes, and in the words of Professor Conklin: "Then began one of the most interesting and exciting experiences of my life. We compared our drawings, his of Nereis and mine of Crepidula—an annelid and a gasteropod. The fundamental resemblances were amazing. Neither of us had ever dreamed that we would find homologies in the early development of two such distinct forms as gasteropods and annelids. But in both these groups we found that after the first two cleavages, the four cells that were thus formed gave rise to three quartets of smaller cells which formed the entire ectoderm of the future animal and that, most remarkable of all, one of these first four cells gave rise to a cell of the fourth quartet which produced practically all of the mesoderm of the future animal, while the endoderm was derived from the remains of the first four cells after the ectomeres and the mesomere had been formed. We traced the homologies much further than this into the cells which give rise to the homologous organs of the larva and, so far from justifying Brooks' conclusion that there was no morphological significance in the cleavage of the egg, we were certain that in these two forms at least there was fundamental morphological significance in the cleavage."

Professor Conklin's thesis was entitled, "The Embryology of Crepidula." His public oral examination took place at the end of the year 1891, but publication of the thesis was delayed, due to teaching duties at Ohio Wesleyan, where Conklin had accepted a professorship in order to organize a full-fledged laboratory of biology. The thesis had been accepted by C. O. Whitman in 1891 for the newly established *Journal of Morphology,* but extensions and redrawing of figures prevented its appearance until 1897. The paper was actually a book of 226 pages and nine plates, with 105 colored figures

The early work on Crepidula established the direction of all his later research interest. He was actively engaged in development problems from 1890 until increasing attention to the broader implications of biology and added duties in executive positions led him away from

detailed research. Problems of early development are essentially cell-problems, connected with cell division and the whole complicated series of events technically called mitosis or karyokinesis. How is the plane of cell division determined so characteristically during the course of development that certain cells are cut off at just the proper time and position to develop into special tissues of the later embryo? Study of cytology is an integral part of embryology. These two subjects constituted the basic research field of Professor Conklin. It is therefore significant that the next comprehensive paper published after his thesis was entitled: "Karyokinesis and Cytokinesis in the Maturation, Fertilization and Cleavage of Crepidula and other Gasteropoda" (1902).

The third large contribution, "Organization and Cell Lineage of the Ascidian Egg," was published in 1905, as a result of his studies at Woods Hole in 1903 on the egg of Cynthia partita.

As in so many other fields of biological research, selection of the proper material is most important. The unfertilized egg of Cynthia happens to contain naturally pigmented regions which can be followed into various blastomeres of the dividing egg and the fate of the colored parts in the resultant embryo determined. These "organ forming substances" opened up a whole new field of embryological work and led to the concept of "mosaic development" in contrast to other types of development, known as regulative, in which every region of the egg cell can form any part of the future embryo.

As eggs of different species follow one or the other type of development, there was ample opportunity for differences of opinion and controversy concerning interpretation. This led in Professor Conklin's case to what might be called a friendly controversy with the well-known German embryologist and philosopher, Hans Driesch. I say friendly, because Driesch visited Princeton and stayed at Professor Conklin's house, and their differences of opinion were adjusted without recourse to polemical publication, so characteristic of early biological research.

Professor Conklin's work, and that of others, had shown the impor-

tance of the experimental approach to zoological problems. The time was ripe for a new journal, with emphasis on the experimental rather than the morphological aspects of biology. Fortunately, Professor E. B. Wilson had obtained a guarantee of $5,000 for the establishment of such a journal, and he, Conklin and T. H. Morgan met in 1903, and agreed on the name, *Journal of Experimental Zoology,* and the board of editors, including Ross G. Harrison, then Associate Professor of Anatomy in Johns Hopkins University, for managing editor. The choice was a good one, for Harrison, Conklin's best friend, remained officially in charge until a reorganization of the editorial board in 1947, after 104 volumes had been published. Harrison and Conklin both continued as associate editors.

Conklin's first paper in the new journal appeared in 1910, "The Effects of Centrifugal Force upon the Organization and Development of the Eggs of Fresh Water Pulmonates." He was an active associate editor, as I can testify from viewing the manuscripts on his desk, manuscripts sent by Harrison for his opinion on suitability for publication and possible suggestions to the author. Professor Conklin remained a member of the editorial board until his death, and it is safe to say that during all these years he never lost interest in experimental work.

Professor Conklin gradually turned his attention more and more to the application of biological discoveries to subjects of general interest, particularly to man, and particularly as regards heredity and evolution. Such matters were always present in his thoughts, for as early as 1896 he wrote a review for *Science* of John M. Tyler's book, *Whence and Whither of Man.*

The results of his thought on these problems appeared as his first book, *Heredity and Environment in the Development of Man,* published by the Princeton University Press in 1915. The book was based on lectures he had given at Northwestern University in 1914. It went through six editions and was translated into Japanese and (with the omission of certain parts) into Russian. Conklin always held that he could lecture better than he could write, but his clarity of expression

was certainly transferred to the printed page, and his written style was all that could be desired.

The most formative influences of Professor Conklin's early life involved two great questions of the day, one scientific, the theory of evolution, the other political, slavery and human rights. He has written that some of his earliest memories were stories of the escape of slaves to Canada by way of the "Underground Railroad." His father was a loyal Union man but no "Fire-eater," and Conklin himself was always inclined to take the side of the oppressed, although with moderate rather than extreme action.

Evolution was Professor Conklin's special interest. His first contact with evolution came as a result of the bitter denunciation of Darwin and all he stood for by the professor of mental and moral philosophy at Ohio Wesleyan. Conklin has written: "I got a copy of Darwin's 'Origin of Species' from the library, and, while I could not appreciate much of it, I was impressed with the fact that abundant evidence was offered for the general theory of evolution, and that the book ended on a quite idealistic note. The next time the professor indulged in one of his tirades against Darwin I asked him if he had ever read any of his books. He replied with emotion, 'No, I wouldn't touch them with a ten foot pole!' I then asked permission to read to him and to the class the last sentence of the 'Origin of Species': 'There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one, and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved.' When the professor heard this, he said in amazement, 'Did Darwin write that?' "

It was the unreasoning attitude of antievolutionists like Thomas Carlyle, as well as the scientific evidences in its favor, which made Conklin one of the advocates of evolution. The progress of the Scopes trial of July, 1925, absorbed him tremendously. This was a belated aftermath of the extreme views which must have been held in certain regions of the country during the last quarter of the nineteenth cen-

tury. Conklin's old teacher, Professor Brooks, was greatly interested in the philosophical aspects of biology, which in those days meant evolution. As the very foundation of biology, Brooks's views were transferred to the pupil. Professor Conklin studied the subject carefully, buying personal copies of Darwin's books so that he could mark important passages for future use. The evidence convinced him completely; and the whole subject of evolution, with all its ramifications, became his lifelong interest. He always spoke of evolution as "the central theme of biology, the connecting strand on which all details of the science could be strung."

It was with this background that he approached his first important teaching position. Concerning the years at Ohio Wesleyan where he very successfully established a modern laboratory, Professor Conklin has written:

"I wish to bear witness to the generous and cordial support which President Bashford and many members of the faculty gave to a young upstart who came in upsetting many cherished traditions, both academic and theologic. Before I accepted President Bashford's invitation to the professorship of biology I told him that I must have freedom to teach the truth as I saw it, and in particular that I could not teach biology without teaching evolution. He assured me that I should have such freedom and that he himself accepted the doctrine of evolution. To proclaim the truth as he saw it, and to make my way easier, his first Sunday lecture after I joined the faculty was on the religious significance of the theory of evolution. Thanks to his vision and courage and to the broadmindedness of his successors there has never since been any serious attempt to interfere with the teaching of evolution at the Ohio Wesleyan University."

After Ohio Wesleyan, Professor Conklin spent two years as Professor of Zoology at Northwestern University (1894–1896) and was then called to a similar position at the University of Pennsylvania, where he stayed for twelve years (1896–1908). It was in Philadelphia that his reputation grew by leaps and bounds and it was in that city with its tradition of freedom and learning, especially as the seat of the Ameri-

can Philosophical Society, that Professor Conklin really flourished. One can hardly think of a more congenial atmosphere than the meetings of this oldest of American learned societies. The broad interests of its illustrious founder, Benjamin Franklin, covering not merely sciences but the humanities and affairs of state, domestic and foreign, have been truly reflected in its membership and in the subjects treated in its proceedings and memoirs.

Professor Conklin was elected a member in February, 1897, but he had been introduced to Vice-President William Pepper and other members by Professor E. D. Cope in March, 1896, in preparation for a coming meeting on evolution. This took place on May 1, 1896, a symposium with E. D. Cope and L. H. Bailey entitled "Factors of Organic Evolution." Conklin presented the embryological aspects of the subject. After election he was almost immediately appointed to the Library Committee (February, 1900), elected a councillor (November, 1900) and a secretary (January, 1901), a position he held until 1908. In the meantime Conklin had read eight papers before the Society up to the Commemoration of the Centenary of Charles Darwin's Birth on February 12, 1809. At the commemoration he spoke on "The World's Debt to Darwin."

It is safe to say that the American Philosophical Society "held at Philadelphia for promoting useful knowledge" particularly appealed to him because of the wide range of subjects discussed. He rarely missed a meeting, and he took a most active part in its affairs, serving on committees for long periods of time and presiding at various symposia. He was the only member serving as president for two different terms.

A second Philadelphia institution, the oldest of its kind in the United States, in which Professor Conklin took a great interest was the Academy of Natural Sciences of Philadelphia, founded in 1812. He was elected a member in 1896 and served as vice-president from 1901 to 1950. Another of his interests was the Wistar Institute of Anatomy and Biology, where Conklin served as a member of the

advisory board from 1905 and was appointed to the Board of Managers in 1945.

Other activities which began during his Philadelphia residence were also connected with societies or scientific institutions. Long associated with the Marine Biological Laboratory at Woods Hole, he was elected a trustee in 1897 and served in this capacity throughout his life. He became a member of the American Society of Zoologists in 1896, the American Society of Naturalists in 1898, the American Society of Anatomists in 1905, a fellow of the American Association for the Advancement of Science in 1901 and was made vice-president in 1906.

In 1908 Professor Conklin was elected to membership in the National Academy of Sciences. In September of the same year he moved to Princeton University, where he had been appointed Professor of Biology and Chairman of the Biology Department, soon to occupy the fine new building, Guyot Hall, a gift of Cleveland H. Dodge, a classmate of Woodrow Wilson. Guyot Hall was to house both the biology and geology departments, and at that time (1910) was one of the largest and most complete laboratories for biology and geology in the country. How fitting that Professor Conklin, with his previous training in biology and geology, should have been selected to head the reorganized biology department, previously scattered in various buildings on different parts of the campus. He introduced the new and highly successful general course in biology, and taught it faithfully for twenty-five years (1908–1933), until his retirement.

The new emphasis on science at Princeton was started by Woodrow Wilson, President of the University from 1902 until 1910. Conklin was a great admirer of Wilson, who had inaugurated the preceptorial system, designed to bring about real personal contacts between student and preceptor. This relationship in biology has been accomplished by the laboratory periods, adopted earlier in the teaching of science. It was a real blow to Professor Conklin when Wilson left to become Governor of New Jersey, but I am sure he never regretted his own decision to remain at Princeton. The ideals of education which

Princeton represents, continued by President Hibben and President Dodds, particularly appealed to him. His many friends, the smooth functioning of the renovated department, and the charm of a small university town all combined to make him a very loyal Princetonian, much respected and admired by the many students he introduced to the structure and functioning of living organisms.

It was during Conklin's Princeton residence that his attention was directed more and more to man and biology. This is indicated in the subjects of his addresses and in the titles of his various books. *Heredity and Environment in the Development of Man* (1915) has already been mentioned. In succession there appeared such books as *Direction of Human Evolution* (1920, 1922), *General Morphology of Animals* (1927), *Freedom and Responsibility* (1935), *What is Man?* (1941), and *Man: Real and Ideal* (1943).

In addition, many addresses and contributions to books edited by others were written. They bore titles such as "Science and Ethics," "The Religion of a Biologist," "The Biological Basis of Democracy," or "The Purposive Improvement of the Human Race." Besides the books, Professor Conklin wrote over two hundred papers on embryology, cytology, evolution, and education, as well as biographies of scientists, histories of societies or institutions, and reviews of books. Truly his output was enormous (see bibliography), all of it well and carefully written.

At Princeton also, many honors were to be conferred on him. His presidency of the American Society of Zoologists in 1899 and his vice-presidency of the American Association for the Advancement of Science in 1906 have already been mentioned, as well as his long term as vice-president of the Philadelphia Academy of Natural Sciences (1901–1950). He was elected President of the American Society of Naturalists in 1912, President of the A.A.A.S. in 1936, President of the Bermuda Biological Station (1926–1936), and President of Science Service (1937–1945).

Undoubtedly election to the presidency of the American Philosophical Society pleased him most. This signal honor came twice in his

life, first in 1942–1945, after he had served as councillor, vice-president (1932–1942), and executive officer (1936–1942). The second presidency was from 1948 to 1952. Others had served the Society longer as president, Benjamin Franklin for twenty-one years, but no one but Conklin had been recalled for a second term, and that at the age of eighty-five.

He received the John J. Carty Gold Medal of the National Academy of Sciences in 1942–1943, and the Gold Medal of the National Institute of Social Sciences in 1943.

In addition to membership in many American societies, Conklin was a foreign member of the Königlich Böhmische Gesellschaft der Wissenschaften, the Royal Society of Edinburgh, the Zoological Society of London, the Societé Belge de Biologie, the Societé Royal de Science, Medecin et d'Historie Naturelle de Bruxelles, the Academie Royal de Belgique, the Accademia Nazionale dei Lincei, Roma, and the Instituto Lombardo, Milano. He was in charge of the Biology Section of the Panamerican Scientific Congress, held in Washington, D. C., in 1939.

His literary ability and keen scientific insight led to appointment as associate editor of such journals as the *Biological Bulletin, Journal of Morphology, Journal of Experimental Zoology, Genetics,* and the *Quarterly Review of Biology.*

It must not be inferred that Professor Conklin, although fundamentally American in upbringing and thought, restricted his interest to the soil of the United States. He did travel widely in his native land to give lectures, and he crossed the continent with his family by auto, visiting the various national parks en route, but his consuming interest in many subjects made him an enthusiastic traveller abroad. He attended the International Zoological Congress at Graz in 1910, and spent some time traveling in Europe. He worked at the Stazione Zoologica at Naples in 1910, then under the direction of Reinhardt Dohrn, son of the founder, Anton Dohrn, who died in 1909.

Previously (1907) he had studied the embryology of the jellyfish, Linerges, at Nassau, in the Bahamas, under the auspices of the De-

partment of Marine Biology of the Carnegie Institution of Washington. The main laboratory of this department was located at the Dry Tortugas, Florida, under the directorship of Alfred G. Mayor, one of the most colorful and enthusiastic biologists of the early twentieth century. Later, Conklin spent much time at Bermuda, reorganizing the Bermuda Biological Station for Research, founded by E. L. Mark of Harvard University. Conklin served as president of the Board of Trustees of this Laboratory from 1926 to 1936. He remained a trustee until his death.

Professor Conklin's first extensive journey was to New Zealand and Australia in 1914, to attend the British Association for the Advancement of Science meeting in Sydney. Coming back across the Pacific by boat he met Sir Harry Lauder, then at the height of his popularity, and was much impressed with the kindly personality of this great singer.

The next important trip was around the world, with Mr. Embree of the Rockefeller Foundation, to inspect and report on the Foundation's interests in the Far East. Professor and Mrs. Conklin visited Japan, China, Malaya, and India, returning through the Suez Canal and then touring various Mediterranean countries. At all the principal cities the party was entertained by representative scientists, thus affording a real insight into the future scientific potentialities of the country visited. At the same time Professor Conklin learned much of the economy and customs of the people. He acquired many friends and a large number of new and fascinating stories of his experiences.

In 1936, Professor Conklin attended the British Association for the Advancement of Science meeting at Blackpool, and took the opportunity to travel in Scandinavian countries. These experiences served to intensify and broaden his interest in man and man's future.

Professor Conklin died at Princeton, N. J., on November 21, 1952, and is buried in the Princeton cemetery.

In looking back over his life, one is particularly struck not only by his research ability in science but also by the breadth of his point of view, his seriousness of purpose, and the interest he took in his fellow

men. No words can sum up his character better than the inscription on a bronze tablet placed by the side of similar memorials to his friends in the main hallway of the Marine Biological Laboratory at Woods Hole, Massachusetts. This was the place where he spent his happiest hours and where he built his summer home. Woods Hole was the scene of his most important research and the place of intimate discussion with those whose memorial placards remind us of the founders of a truly great marine laboratory—Charles O. Whitman, Edward G. Gardiner, Frank R. Lillie, Edmund B. Wilson, Thomas H. Morgan, Jacques Loeb, and Gary N. Calkins.

Professor Conklin's tablet reads:

EDWIN GRANT CONKLIN
1863–1952
BIOLOGIST—TEACHER
EMBRYOLOGY—CYTOLOGY—EVOLUTION
DISTINGUISHED LEADER IN SCIENCE
MAN OF LETTERS
INVESTIGATOR AT WOODS HOLE
FOR 63 YEARS
TRUSTEE MARINE BIOLOGICAL LABORATORY 1897–1952

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KEY TO ABBREVIATIONS

Am. Assn. Adv. Sci. = American Association for the Advancement of Science
Am. Biol. Teach. = The American Biology Teacher
Am. Jour. Insan. = American Journal of Insanity
Am. Mus. Jour. = American Museum Journal
Am. Nat. = American Naturalist
Anat. Anz. = Anatomischer Anzeiger
Anat. Rec. = Anatomical Record
Ann. N. Y. Acad. Sci. = Annals of the New York Academy of Sciences
Arch. Ent. Mech. = Archiv für Entwicklungsmechanik
Biogr. Mem. Nat. Acad. Sci. = Biographical Memoirs of the National Academy of Sciences
Biol. Bull. = Biological Bulletin
Bull. Wagner Free Inst. Sci. Phila. = Bulletin of the Wagner Free Institute of Science, Philadelphia
J. H. U. Alumni Mag. = Johns Hopkins University Alumni Magazine
J. H. U. Cir. = Johns Hopkins University Circulars
Jour. Acad. Nat. Sci. Phila. = Journal of the Academy of Natural Sciences, Philadelphia
Jour. Appl. Micros. = Journal of Applied Microscopy
Jour. Exp. Zool. = Journal of Experimental Zoology
Jour. Hered. = Journal of Heredity
Jour. Morph. = Journal of Morphology
Jour. Nat. Educ. Assn. = Journal of the National Educational Association
Nat. Hist. = Natural History
Phila. Med. Jour. = Philadelphia Medical Journal

Pop. Sci. Mo.=Popular Science Monthly
Proc. Acad. Nat. Sci. Phila.=Proceedings of the Academy of Natural Sciences, Philadelphia
Proc. Am. Med. Psych. Assn.=Proceedings of the American Medico-Psychological Association
Proc. Am. Phil. Soc.=Proceedings of the American Philosophical Society
Proc. Nat. Acad. Sci.=Proceedings of the National Academy of Sciences
Psychol. Rev.=Psychological Review
Sci. Educ.=Science Education
Sci. Am.=Scientific American
Sci. Mo.=Scientific Monthly
Trans. N. Y. Acad. Sci.=Transactions of the New York Academy of Science
Univ. Med. Mag.=University Medical Magazine
Univ. Pa. Alumni Reg.=University of Pennsylvania Alumni Register
Univ. Pa. Bull.=University of Pennsylvania Bulletin
Zentr. Physiol.=Zentralblatt für Physiologie
Zool. Anz.=Zoologischer Anzeiger

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