award should not be bestowed oftener than once in two years. As a part of this condition it was specified that with every award the net accumulated income since the time of the last award should be given to the recipient along with the medal and certificate.

The second and major condition specified by the donors was that the award should be to an individual for noteworthy and distinguished accomplishment in any field of science coming within the scope of the charter of the National Academy of Sciences, and should be either for specific accomplishment or for general service in the advancement of fundamental and applied science; and further, that there should be no limitation placed on the individual sought to be honored by virtue of race, nationality or creed. The method of selecting the candidates was to be voted on by the academy and the method of taking such vote was left entirely to the discretion of the academy.

Under the conditions of this deed of gift the academy is assured at all times of complete and untrammeled freedom to bestow this particular honor periodically on any one anywhere and for any achievement in the field of its present or future interest, whenever in its judgment such bestowal is appropriate.

Thus far since its establishment the medal has been bestowed but once, and that through unanimous vote of the academy on General Carty himself. Fortunately this evidence of esteem was made before General Carty's death and was a source of the deepest gratification to him. Unfortunately, presentation of the medal had to be made posthumously.

On this occasion the action of the academy last spring was on the unanimous recommendation of the Carty Medal Committee. This recommendation was made after long and painstaking consideration. In presenting Dr. Wilson to you I feel I can do no better than to quote from the report of the committee as follows:

> In recent years, Professor Wilson has stood preeminent in the field of zoology, and the influence he has had on two generations of biologists is of a very high order. His individual researches on experimental embryology are classical, and his papers on cytology have been fundamental. His great book, The Cell in Development and Inheritance, has perhaps influenced subsequent biological thought more than any other book produced in this country.
>
> In arriving at its present decision to recommend Professor Wilson, the committee has been guided by the terms of the Deed of Gift, which as they relate to the recipient's qualifications read as follows: "The award may be either for specific accomplishment in some field of science, or for general service in the advancement of fundamental and applied science."
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> In view of his outstanding contributions the committee has no hesitancy in suggesting that Professor Wilson's selection is appropriate both as to specific accomplishment and general service, and we, its members, believe that every consideration points to him as one eminently qualified to receive the Carty Medal.

It is now therefore my very great pleasure to present Professor Wilson for the Carty Medal and Certificate, and its accompanying award, which in this case I understand to have a value of $3,000.

FRANK B. JEWETT

REMARKS BY THE PRESIDENT

IN the absence of Professor Wilson I shall ask Professor Ross G. Harrison, of Yale University, to receive the medal and monetary award which I hereby present, and request him, together with Dr. Jewett, to transmit them to Professor Wilson with the congratulations of the academy on a long life well spent in the service of science, and our best wishes for the fruition of his career and enjoyment of life.

It is customary for recipients of our awards to acknowledge them in a manner always characterized by undue modesty; in this case I shall ask Professor Harrison to speak on behalf of the recipient with the usual cause for such modesty removed.

F. R. LILLIE

RESPONSE ON BEHALF OF THE MEDALLIST

THE rôle in which I am placed this evening is an unusual one in its duality. It is a great pleasure for me to receive the Carty Medal and Award for transmittal to Dr. Wilson, and on his behalf I express to the committee and to the academy his thanks and his high appreciation of the honor they have conferred upon him. At the same time, as a member of the academy, I hasten to add my congratulations to the committee on their admirable choice, and to say, what Dr. Wilson's modesty would preclude him from saying, that no one better qualified to receive this award could possibly have been chosen.

I take it that what you most desire from me is a brief estimate of Dr. Wilson's life work and his place in the science of his time, although in so doing I can not quite separate my own personal relations with him. I first knew Wilson as a tradition. He had preceded me by a decade or so at the Johns Hopkins University, and when I began my biological studies there as an undergraduate in the late eighties, he had some years before received his Ph.D. degree and had already made a substantial reputation as a young professor at Bryn Mawr College. The text-book on biology, written in collaboration with W. T. Sedgwick, was used in our course and its excellence was generally recognized. And so it was with a certain awe that I first looked up to Wilson—a feeling that has long since been tempered by the warmth of friendship. For this I have, perhaps, to thank most the particular circumstances of our association on the editorial board of the *Journal*

of Experimental Zoology now of over thirty years duration. It is to Wilson more than to any one else that we owe the foundation of this enterprise.

Wilson's first extensive piece of work, "The Development of Renilla," was, in its thoroughness and its clarity of exposition, an augury of what was to follow. It was published in the *Philosophical Transactions* of the Royal Society in 1883 and at once won for him a place among embryologists of the time.

However, it was his great work on "The Cell-Lineage of Nereis," published nine years later, that first gave him a world-wide reputation. In this he traced the cleavage of the egg step by step through to the formation of the germ layers and the principal organs of the embryo. He showed that such widely divergent organisms as flatworms, segmented worms and mollusks have a common cleavage pattern, but that corresponding cells in the dividing egg do not always have exactly the same function or fate. This was of great importance in the then much discussed germ layer theory, and threw light on some of the problems of experimental embryology at that time in its infancy. Wilson was not slow to see this and in the year following there appeared his first contribution to this field, "Amphioxus and the Mosaic Theory of Development." In this paper he clearly set forth the antithesis between the mosaic theory of Roux and the epigenetic theory of Hertwig and Driesch, and showed how the two might be reconciled by the recognition of the fact "that the mosaic-like character of the ontogeny emerges from the indifferent condition of the early stages *at different periods in different animals,* and in many cases appears more or less distinctly from the beginning." The views expressed in this paper are as acceptable to-day as on the day they were written. Later Wilson made further notable contributions to experimental embryology, particularly on the development of nemerteans, mollusks and annelids.

Some years ago Wilhelm Ostwald in his interesting book on great men of science (Grosse Männer) classified them, according to their talents, as romantics and classics. Modern psychology would employ, perhaps, less complimentary terms. To the romantic, ideas come thick and fast; they must find quick expression. His first care is to get a problem off his hands to make room for the next. The classic is more concerned with the perfection of his product, with setting his ideas in the proper relation to each other and to the main body of science. His impulse is to work over his subject so exhaustively and perfectly that no contemporary is able to improve upon it. If one may be permitted a zoological comparison, says Ostwald (translated freely), the attitude of the romantic is that of the cuckoo to its eggs, satisfied with having brought them into the world and willingly entrusting their further care to others. The classic, on the other hand, resembles the legendary she-bear that licks her cub into shape with great patience and solicitude and does not let it go until she has done everything possible for it. Leaving the simile, it is the romantic that revolutionizes, while the classic builds from the ground up.

Wilson is a striking example of a classic, and it is interesting to note that for many years his nearest colleague and closest friend was an equally distinguished romantic.

Wilson's qualities as a classic are shown best in his work in cytology, more particularly that on the sex chromosomes, published in the earlier years of the present century. It was only a year or two after the rediscovery of Mendel's laws that the parallelism between Mendelian inheritance and chromosome behavior was pointed out by one of Wilson's students, W. S. Sutton, and it is certain that Wilson had much to do with the development of this idea. Several years later came the discovery of the sex chromosomes, on which Wilson published a long series of papers. A less careful man would have drawn much more sweeping conclusions than he did from this spectacular discovery and might readily have led into grave error. As it was, Wilson's judicial mind immediately saw the pitfalls, with the result that his discovery has been built into the very foundations of the chromosome theory of heredity and will remain as a lasting monument to his genius.

I have spoken only of Wilson's fundamental research. His great book on the cell was the outcome of his studies in cytology and embryology, and this was fittingly appraised before the academy eight years ago by Professor Conklin when the Elliot Medal was conferred. From time to time Wilson has had occasion to give general addresses, and these show the same finish and philosophic insight that characterize his research. With these qualities there is never a lack of vigor and enthusiasm.

In his address as president of the New York Academy of Sciences, delivered in 1904 and entitled "The Problem of Development," which reads, by the way, almost as if written at the present time, he treats of the perennial controversy over vitalism in characteristic manner:

> I am fully in accord with the neo-vitalists in their assertion that the phenomena of development and of life generally have not yet been reduced to a mechanical basis, that they can not at present be fully described in physico-chemical terms. It is certain that living beings exhibit structures more complex than any existing in the inorganic world, and different from them in kind. It is possible, probable I believe, that living bodies may be the arena of specific energies that exist nowhere else in nature. I admit fully that the interpretation of development I have endeavored to outline does not exclude, but

in some ways actually suggests, the existence of such energies. I should, therefore, even admit that the vitalists are wholly right in their contention that the vital processes are not at present explicable as the direct result of such energies as are observed in the non-living world. To prejudge this question would set up a dogmatic barrier to progress, not only in biology, but also in chemistry and physics. If this be vitalism there are probably many of us who must be enrolled as "vitalists," however doubtfully we may regard the honor of bearing such a title. But if the word "vitalism" be used in any other sense than as a convenient phrase, an X by which to designate an unknown quantity, if it be taken in a positive sense to imply in the living organism any negation of the fundamental laws of matter and of motion, the existence of any distinctive entity, or principle that does not fall within the chain of physical causation or that contravenes the general laws of physics, then, I protest, to accept "vitalism" as a principle of interpretation is deliberately to abandon the scientific method in biological study.

Again, in an address entitled "Science and a Liberal Education," he characterizes the place of science in our culture as follows:

> The main service of science to our intellectual life is to help preserve us from a certain disorder of the imagination which I will permit myself to speak of as the malady of Peter Bell. I make no attempt to disguise the fact that Peter Bell and his celebrated primrose have begun to show the ravages of time. Even so, I suspect that science will not with impunity lay her desecrating hand upon Wordsworth's parable. And yet that perennial primrose by a river's brim, which through every changeful year
>
> A yellow primrose was to him
> And it was nothing more—
>
> that weather-beaten botanical specimen, I say, symbolizes a kind of mental myopia with which the man of science feels himself to be as much concerned as the poet. Science has a very definite part to play in the treatment of this insidious ailment. It should adjust our vision to the larger meanings of things in the material world. And by this I mean to say *that science should develop—and it should discipline—the constructive imagination.*

Dr. Jewett has said that Dr. Wilson has qualified under both clauses of the deed of gift, *i.e.,* by his specific accomplishment in a field of science and by his general service in the advancement of science. Let me add a third qualification: by service in the general cause of civilization. When we look over the world to-day, with its nationalistic strife and prejudice, which threatens freedom if not civilization itself, when we view our late political campaign with all its extravagant claims, denunciations and promises, we may well wish that the spirit of Wilson's careful search for truth, his scrupulous weighing of evidence, his moderation and caution in drawing conclusions, in short all those qualities that make up the character of our best men of science, might enter more fully into affairs of politics and government.

ROSS G. HARRISON

OBITUARY

JAMES NEWTON PEARCE

WHILE waiting in the Iowa stadium for the opening of a football game, which was his favorite sport, Professor James Newton Pearce died suddenly of a heart attack on Saturday, November 14, 1936. His passing was a profound shock to his colleagues and friends. For some time past those of us who had been in daily contact with him were fearful that his general health had been impaired by an attack of appendicitis which he suffered a few years ago. But in view of the fact that he had since that time carried a regular schedule of work with his accustomed zeal and energy, no one knew that he was in any immediate danger.

James Newton Pearce was born at Oswego, Illinois, on December 21, 1873, the son of James Titsworth and Mary Catherine (Gannon) Pearce. He received the degree of Ph.B. from Northwestern University in 1896, and that of Ph.M. in 1897. During the ten years following his graduation he was successively chemist for James S. Kirk and Company, soap manufacturers of Chicago, graduate student at the University of Chicago, instructor in chemistry at Northwestern and graduate student at Johns Hopkins University, where he received the degree of Ph.D. in 1907.

Dr. Pearce was a member of Phi Beta Kappa, Sigma Xi, Gamma Alpha, the American Chemical Society and the American Association of University Professors. He was a fellow of the American Association for the Advancement of Science and the Iowa Academy of Science. He had served as chairman and councilor of the Iowa Section of the American Chemical Society. For the past nine years he had been a member of the committee on contact catalysis of the National Research Council and a member of the board of editors of the *Journal of Physical Chemistry* for 1932–33.

Dr. Pearce's interest in chemistry began in his undergraduate days and was emphasized by a short period of industrial work, a few years as a teacher of chemistry, then a period of graduate study. This interest was broadened and intensified by his work in the laboratory of Professor Harry C. Jones at Johns Hopkins, and it may be said that his experience there determined in large measure the direction of his life