more fundamental work. Granted that a sharp line can not be drawn and that economically motivated research may lead into problems of fundamental theoretical significance, nevertheless free research constitutes the greatest long-term asset of society in the field of science.

It is more than a little illogical for society to hold on the one hand that the results of science, developed under a system of freedom of research for which it has been necessary constantly to fight, constitute the greatest economic asset of nations, and on the other hand to maintain that science will do better in the future if its direction is taken over by social agencies. The problem of social agencies is not so much to direct the course of science as to make good use of its results.

Lest I may seem to be deprecating organized research let me say that this is not in the least my intention, nor has it been my past example. Organization of research has increasing importance, illustrated by so many productive examples as to require no defense. It has existed as long as our universities, academies and scientific associations and societies. It has been strengthened more recently by industries, technical schools and governments. Almost every scientific man is as a matter of course a member of one or many such organizations. I am, however, much concerned about the auspices of the organization of research and the freedom of the members of such organizations. Most scientific men work best in an organized program. This, I think, has to be recognized. But there is food for thought in a remark once made to me jokingly by one of the best-known American physicists, now dead: "I propose," he said, "to organize a Committee of One Hundred to write the best American poem." The limitations of organization for creative work are thus suggested.

In some cases the results of science in our own time are not yet put to their full social uses; there is an inevitable social lag or even active social resistance. A good example of retardation due to social resistance, now in the course of breaking down, is the present campaign against syphilis. Ever since the discovery of the causative organism (*Treponema pallidum*) by a zoologist, Schaudinn, in 1905, the way was open to its control, which was realized, through the pioneer work of Ehrlich on the chemo-therapy of arsenic compounds, by a whole host of investigators; but it has remained for the years 1937–38 to inaugurate an effective campaign for the suppression of this destructive disease in our own country.

In other cases groups of people organize to promote applications of biology to the social organism when both biological and sociological opinion is divided. The most striking example is in the field of eugenics, the improvement of the inborn qualities of the population. Biological opinion is divided because our knowledge of human heredity is quite rudimentary as compared, for instance, with our knowledge of heredity in fruit-flies or guinea pigs. Even if we felt sure that our knowledge of the principles of heredity in lower animals is theoretically fully applicable to mankind, we would not know how to apply it energetically except in most general terms, for there are no pure lines in human inheritance for one thing, and for another, we have few animal analogies to the human qualities of character that we most need in the social process. Biological opinion is divided even on the subject of negative eugenics, the elimination of the unfit, not so much on the general desirability of the principle as on the definition of unfitness, the determination of standards and the methods to be employed. Sociological and political opinion is also divided sharply, on the question of the trends of existing social, economic and political selective processes as they affect population, and the desirability of applying such a sharp instrument as radical eugenics to society before the possibilities of social amelioration in other ways are more fully explored. Under these conditions we should have institutes specially devoted to human genetics for the sake of the medical as well as of the social problems involved.

One sometimes feels tempted to despair of the social coordination of scientific knowledge for the increase of the well-being and happiness of mankind. But faith in the progressive evolution of mankind is stronger, in the scientific world at least. I have the conviction that the ethical principles of Christianity are wide-spread among the masses of mankind and that they will prevail. But the processes of evolution are slow, and we may have to wait a long time.

OBITUARY

HENRY HERBERT DONALDSON

HENRY H. DONALDSON was born at Yonkers, New York, on May 12, 1857, and died at his home in Philadelphia on January 23, 1938. He prepared for college at Phillips Academy, Andover, Mass., and graduated from Yale in 1879 with the degree of B.A. The following year he did advanced work at Sheffield Scientific School and conducted research with Professor Russell H. Chittenden "On the Detection and Determination of Arsenic in Organic Compounds"; this was published jointly with Professor Chittenden as his first scientific paper. During the year 1880–81,

he attended the College of Physicians and Surgeons in New York and devoted especial attention to human anatomy. Realizing that his interests were in research rather than in medicine, he entered the Graduate School of Johns Hopkins University in 1881 and was appointed fellow in biology and reappointed the following year. During these years he specialized in physiology under Professor H. Newell Martin and as a result of this work published, between 1882 and 1886, four papers on physiology and pharmacology (two of them jointly with other students).

After his two years as fellow he was appointed assistant in biology for the year 1883–84 and began his thesis for the doctor's degree under G. Stanley Hall, who was at that time professor of psychology at Johns Hopkins. His thesis "On the Temperature Sense" dealt with the mapping of heat-sensitive and cold-sensitive areas of the skin and was published in *Mind* in 1885, in which year he received the degree of Ph.D. The following year he published jointly with Professor Hall in the same journal on "Motor Sensations of the Skin."

This work led him to seek more extensive training in neurology in European centers and in 1886–87 he studied under von Gudden, Forel, Golgi and others. At the close of this year abroad, he was appointed associate in psychology at Johns Hopkins and held that position from 1887 to 1889. In the meantime G. Stanley Hall had become president and professor of psychology in the newly founded Clark University at Worcester, Mass., and in 1889 Dr. Donaldson was called to Clark as assistant professor of neurology.

His proven ability in this field led President Hall to assign to him for study the brain of Laura Bridgman, a blind deaf-mute who had been taught to speak and had attained notable mental development. The results of this study were published in two papers in the *American Journal of Psychology* in 1891 and 1892. In a brief autobiographical note written many years later Dr. Donaldson said: "The chief modifications found in this brain were caused by an arrest of growth due to the destruction of the sense organs. This made it desirable to know the developmental state of the brain at the time of the destructive illness (two years). Such information was not in the literature. With the hope of contributing to fill this gap, I arranged a program for the study of the brain (nervous system) from birth to maturity. In carrying out this plan quantitative methods were used and data on the size and weights of the parts and on the number of cells in them were especially considered."

This led to that long, accurate, quantitative study of growth which was the main theme of his life work. At the beginning of this work, he gathered together all the available records on the growth of the central nervous system and published them in a book entitled "The Growth of the Brain" (Scribner's, 1895).

He remained at Clark University until 1892 when he joined the migration of most of the faculty to the new University of Chicago, where he became professor of neurology. He was very active in the development of the scientific departments, being dean of the Ogden School of Science from 1892 to 1898. A serious illness interrupted his work about this time and left him permanently lame, but he returned to his work with courage and determination and from 1898 until his death there was never a year when he did not publish one or more papers.

In 1905, ten professors of anatomy and zoology in leading universities were invited to serve on the Scientific Advisory Board of the Wistar Institute in Philadelphia; among these was Dr. Donaldson. On the invitation of General Wistar, founder of the institute, the advisory board met in April, 1905, and was asked to propose a plan for the future development of the institute. It was the unanimous opinion of the board that the institute should be devoted primarily to research, and in the beginning to research in neurology. This met the hearty approval of General Wistar, and the board was asked to recommend some one to organize this work. Dr. Donaldson was the unanimous choice of all the other members and after careful consideration he accepted the position of professor of neurology and director of research in the Wistar Institute, and in 1906 transferred his work and his chief associate, Dr. S. Hatai, from Chicago to Philadelphia.

While at Chicago, Dr. Hatai had published fifteen papers based on the white rat and Dr. Donaldson had concluded that it was the best available mammal for laboratory work on problems of growth. However, for accurate, quantitative studies it was necessary to establish a uniform stock, with individual differences reduced as much as possible. Accordingly, he and his associates set about the task of producing a standardized strain of albino rats. How well they succeeded is recognized throughout the world in the use of the Wistar Institute rats in the most accurate scientific work. This work was summarized in a book entitled, "The Rat: Reference Tables and Data," 1915. A revised and enlarged edition was published in 1924.

Much of Donaldson's work was on the growth of the nervous system, but it was extended to include muscles, viscera, skeleton and teeth under normal and experimental conditions. In addition to several papers on the number and size of the nerve cells and fibers, there were others on the effects of exercise, feeding, castration and age on the size and weight of particular organs. The determination of the percentage of water

in the nervous system under all the experimental conditions named constituted a large section of his work.

Altogether he personally published nearly one hundred papers and monographs, and his students and associates published more than three hundred and sixty. His method of directing research work was well described in his published report in 1925 to the Scientific Advisory Board of the Wistar Institute: "No investigator is ever asked to do anything which is not for his individual and scientific welfare. . . . In every case the investigators receive full personal credit for their work. This is as it should be for it is the virtue of academic laboratories that the emphasis is put on the individual rather than on the institution." Among those who published work from his laboratory were some thirty Americans, twenty Japanese and a smaller number of other nationalities. Many of these persons are leaders in their professions and all of them revere his memory.

He received the honorary degree of Sc.D. from Yale in 1906 and from Clark in 1937. He was president of the Association of American Anatomists (1916–18), of the American Society of Naturalists (1927) and of the American Neurological Association (1937). He was a councilor of the American Philosophical Society for four terms of three years each between 1911 and 1936, chairman of its Publication Committee from 1932 and vice-president from 1935 until his death. He was a member of the Corporation of the Marine Biological Laboratory from its organization in 1888 and a trustee from 1912 until his death. He was elected to the National Academy of Sciences in 1914 and was a member of its council in 1919. He was also an honored member of ten other American and foreign scientific societies.

On his eightieth birthday (1937), a bronze portrait medallion of him, made by Dr. R. Tait McKenzie, was placed with suitable ceremonies in the Lenape Club at the University of Pennsylvania, of which he had been president for twenty years. A replica of this medallion hangs in the hall of the American Philosophical Society. On the seventy-fifth anniversary of his birth, May 12, 1932, a special anniversary volume of the *Journal of Comparative Neurology* was dedicated to him. It was preceded by an admirable portrait and contained a brief sketch of his distinguished career, followed by twenty scientific contributions from associates and friends and the following affectionate testimonial: "He has won esteem and affection of the Editorial Board by unfailing courtesy, loyal friendship and generous support of all worthy enterprises. For his cordial and invaluable cooperation and wise counsel during nearly thirty-five years the *Journal of Comparative Neurology* owes him much."

Perhaps his most distinctive personal trait was that quality which Sir William Osler celebrates in his essay, *"Equinimitas."* With this were naturally associated orderliness, persistence, serenity. His laboratory and library were always in perfect order, his comings and goings were as timely as the clock, he never seemed hurried and yet he worked *"Ohne Hast, ohne Rast."* His sympathies were broad and deep and even his closest friends never learned from him of his generous contributions and acts of kindness to those who were in need. His students and colleagues knew him as a man of infinite patience, even temper and great nobility of character, and they loved and honored him.

In 1884, he married Julia Desboro Vaux, of New York, who died in 1904. Two children were born to them, John C. Donaldson, now professor of anatomy in the Medical School of the University of Pittsburgh, and Norman V. Donaldson, sales manager of the Yale University Press. In 1907, Dr. Donaldson married Emma Brace, of New York, and their hospitable homes in Philadelphia and Woods Hole are known to a host of loving friends.

After his long illness in the middle nineties of the last century, he was never in robust health but was almost never incapacitated for work. Until a few days before his death he was at work as usual in his laboratory at the institute. His end came as a result of pneumonia and heart failure. With characteristic foresight, he and Mrs. Donaldson had planned the simple and appropriate funeral service which should be held in the event of the death of either. His pallbearers were selected from among his scientific associates and the officers of the institute, the University of Pennsylvania and the American Philosophical Society. His brain was preserved and added to the notable collection of the Wistar Institute and his body was cremated. His work, influence and memory remain to make the world richer for his having lived in it.

EDWIN G. CONKLIN

RECENT DEATHS

DR. RAYMOND L. BARNEY, professor of biology at Middlebury College, Vermont, died on July 9 at the age of forty-six years. Dr. Barney had been a member of the department of biology at the college since 1924. He served as acting dean in 1936.

DR. EDWARD FULLER BIGELOW, president of the Agassiz Association, editor of the monthly magazine *A Guide to Nature* and curator of the Bruce Museum at Greenwich, Conn., died on July 13 at the age of seventy-eight years.