possesses inertia; that when a glowing body cools off, emitting light and heat, it actually loses mass in the process.

This loss is very small, far too small to pick up experimentally on a laboratory scale; but in the case of bodies like our sun it may amount to a large figure. The energy radiated per second by the sun is enormous. Converted into its energy value it gives the rather surprising figure of four million tons per second! But so super-enormous is the sun's total mass to start with that he is good for this expenditure for something like ten million million years!

In this identification of the material concept of matter with the immaterial concept of energy we have taken another long step away from the eighteenth century position. In the light of this correlation of matter and energy it is but natural that the quantum concept should have arisen, for if matter is atomic and only an aspect of energy, then energy should be atomic also.

The quantum theory atomizes energy into indivisible units, and as a consequence explains several discrepancies that had previously existed between theory and experiment. Great as are its successes in this line it can not be regarded as the last word in the matter, for it is in contradiction with a considerable body of experimental fact which is still best explained by the classical theory. Perhaps the ultimate solution will be found in some broader concept of which the two opposing theories are special cases.

The theory of relativity will be treated here only so far as it is concerned with still another important correlation, that of gravitation with other physical phenomena.

At the beginning of the twentieth century gravitation was a great mystery. In spite of much experimenting and more theorizing, the phenomenon of gravitation stood apart, refusing to show any correlation to other phenomena. In the year 1900 our knowledge of gravitation was just where Newton had left it, two centuries before. It was left for Einstein to point out that which when once seen is never forgotten—the correlation of gravitation with inertia.

But great as are the coordinating and correlating properties of the theory of relativity, it can not be regarded as the last word in its line any more than can the quantum concept; for the theory of relativity begins to fail us when applied to rotating bodies. Here, as Eddington says, it stops explaining phenomena and begins explaining them away. It is, however, a great step in advance, and much of it will remain permanently in the theory of physics even when it shall be supplanted, as it must be, by some broader and better concept.

Where, then, has the progress of three centuries in physical science brought us? Of the many distinct concepts of the eighteenth century not one is left. The sole concept of modern physics, energy, was not known in the eighteenth century, and this concept is above all things immaterial. The theoretical structure of our science is left without material means of support. The twentieth century so far is a century of bewilderment. But it is young yet; may we not call it the century of hope? Who knows whither it will lead us?

PAUL R. HEYL

U. S. BUREAU OF STANDARDS

THOMAS LEONARD WATSON

DR. THOMAS LEONARD WATSON, Corcoran professor of geology at the University of Virginia from 1907 to the date of his death, head of the department of geology since 1910, and state geologist and director of the Virginia Geological Survey since 1908, died on November 10, 1924. He was born in Chatham, Pittsylvania County, Virginia, September 5, 1871, and was the descendant of an old and well-known Virginia family. His early education was obtained in the public schools of Pittsylvania County, and in 1890 he was graduated from Virginia Polytechnic Institute, Blacksburg, Virginia, at that time known as the Virginia Agricultural and Mechanical College. Chemistry was his chosen profession and, after a year's residence at the University of Virginia, he served as assistant chemist at the Virginia Experiment Station in Blacksburg, from 1891 to 1895, and at the same time was instructor in geology at his *alma mater*. During this later period of residence in Blacksburg, Dr. Watson became more deeply interested in geology, particularly on the chemical side. He perceived the great opportunity for service to his native state in the study of its natural resources and intricate geology, and accordingly resolved to forsake his allegiance to chemistry and devote his life to geology, with the hope of service to Virginia, a hope that was to be immeasurably fulfilled. Accordingly he entered Cornell University and received the doctorate in June, 1897, his thesis being on glacial geology, a branch of geology that he never afterwards pursued to any extent.

After leaving Cornell, Dr. Watson went to Georgia as assistant state geologist, where he remained until 1901, when he resigned to become professor of geology at Denison University. In 1904, he resigned the professorship at Denison to return to Virginia Polytechnic Institute as professor of geology, where he remained until 1907, when he was appointed professor of geology at the University of Virginia, and in 1908

was made director of the recently organized Virginia Geological Survey, positions which he filled with highest effectiveness until seized by a brief but fatal illness.

Notwithstanding his busy life, Dr. Watson found time to spend a part of the summer of 1897 with the Indiana Geological Survey, the summer of 1903 with the North Carolina Geological Survey, and parts of the years 1897 and 1898 in research work in the United States National Museum.

In 1899 Dr. Watson was married to Miss Adelaide Stephenson, of Atlanta, Georgia, a singularly happy union. Out of this union six children were born, all of whom, with Mrs. Watson, survive.

Dr. Watson was a man of high ideals. His life was devoted to public service and, while he was serving his state and his profession with great enthusiasm and tireless energy, he did not neglect the opportunity for public service in his community. He was a director of one of its banks for a considerable time and, for many years, was a member of the Charlottesville School Board. He was also an active member of the First Baptist Church.

Probably the greatest service which Dr. Watson rendered was to his state through the medium of the State Geological Survey. The splendid series of reports published by the Survey during his administration are of the highest usefulness and scientific value. They take first rank among scientific publications in this country and constitute a permanent memorial to the scientific spirit and enthusiastic energy of Dr. Watson as a geologist and administrative officer.

Dr. Watson was successful as a teacher. His scholarship, grace and courtesy easily and quickly won the admiration and devotion of his students. Many of his students have already made a notable record in geology and other phases of science.

His success as an investigator and productive scholar won universal recognition and many honors and placed him in the first rank of American geologists. He was the author of more than 150 publications, including coauthorship of the standard textbook on engineering geology. His writings were particularly in the field of economic geology, mineralogy and petrology, but he took a lively interest also in other phases of earth science and his contributions to those fields were on as high a plane of scientific excellence as in his specialty. Although only fifty-three years of age at the time of his death, he had accomplished a tremendous amount of work.

Dr. Watson was a member of the Sixth Peary Arctic Expedition to North Greenland, Fellow of the American Association for the Advancement of Science, Fellow of the Geological Society of America and the Mineralogical Society of America. He was a member of Sigma Xi, Society of Economic Geologists, American Institute of Mining Engineers, Seismological Society of America, Geological Society of Washington, Washington Academy of Science and the Association of State Geologists. He had served on many committees in connection with his various scientific activities and had held various offices in the scientific societies to which he belonged. During the later years of his life, he had been a member of the council of the Geological Society of America, secretary of the Association of State Geologists, and at the time of his death he was chairman of the committee of the Mineralogical Society of America on nomenclature and classification.

In the death of Dr. Thomas L. Watson, the state of Virginia loses one of its most valuable and effective public servants, the University of Virginia one of its most widely known scholars, and the science of geology one of its foremost exponents in this country.

ALBERT W. GILES

UNIVERSITY OF VIRGINIA

SCIENTIFIC EVENTS

THE PROPOSED INTERNATIONAL CONFERENCE ON FLOWER AND FRUIT STERILITY

THERE have already been held under the auspices of the Horticultural Society of New York two important conferences on matters of vital interest to horticulture. One conference in 1902 was on "Plant breeding and hybridization" and one in 1907 was on "Plant hardiness and acclimatization." The papers presented at these conferences were published by the society as volumes 1 and 2 of its memoirs.

For some time the officers of the society have had in mind the holding of another international conference on some subject of timely significance to the progress of horticulture. After careful consideration the council has decided that the subject of this conference be "Flower and fruit sterility." A conference committee consisting of N. L. Britton, *chairman;* Frederic R. Newbold, *treasurer,* and A. B. Stout, *secretary,* was appointed, the organization of advisory committees was authorized, and a sum of money appropriated for the expenses of the conference and for the publication of its proceedings.

A preliminary statement of the main features of the conference may be made at the present time as follows:

Scope: The conference will consider the phenomena of sterility and fertility in fruit and seed production with special reference to (a) the breeding of floricultural plants, (b) problems of fruit growing and seed production in horticultural and agricultural crops