of an atomic system in itself implies strict determinism. Our amended conclusion therefore would be that events are determined, in the sense of being subject to law, in the ultra-mechanical as well as the mechanical world, but that the conditions of this determination are fundamentally different. The term "physical indeterminism" might by some be regarded as a misnomer. We seem, however, to have reached a stage in scientific development where physical terms are acquiring unexpected meanings; the present contention would simply be that the older physical conceptions of determinism may not prove applicable to the new range of phenomena, and that the experimental facts themselves may oblige us to admit the existence of determining factors indistinguishable in essence from those which formerly we called free. This, however, is not a philosophical but a scientific paper; and my present aim is simply to indicate an objectively valid source of determination for certain fundamental vital phenomena which hitherto have proved refractory to analysis.

RALPH S. LILLIE

MARINE BIOLOGICAL LABORATORY,
JUNE, 1927

HENRY PAUL TALBOT

THE death of Dean Henry Paul Talbot deprives the institute of the services of one of its most cherished alumni, one who devoted his life in a noteworthily unselfish way to the upbuilding of his Alma Mater. For forty years he gave the best of his brain and heart to the development of teaching and administration and to the advancement of the Massachusetts Institute of Technology as a great school of engineering and science.

Dr. Talbot graduated at the institute in 1885 and received the degree of doctor of philosophy from the University of Leipzig in 1890. He returned to the institute as an instructor and was rapidly promoted through the several grades and was finally appointed professor of analytical chemistry in 1898. He showed marked administrative ability and from 1895 was nominally in charge of the department of chemistry, although his official appointment to this post was not made until 1901. He served as chairman of the faculty from 1919 to 1921, as chairman of the administrative committee from 1920 to 1923 and as dean of students from 1921.

Dr. Talbot's training in chemistry was broad: his work as a student equipped him with the point of view of the analytical chemist; his research for his doctorate was in organic chemistry; and he devoted much attention to the study in Germany of the new physical chemistry which was being rapidly developed at that time. He was impressed with the importance of the advance of the science in this direction, and on his return from Germany he introduced at the institute a course in physical chemistry, which he taught successfully. This course was one of the first in this subject given in American universities.

When Dr. Talbot took over the instruction of the first-year students, he felt the advisability of bringing before them the more fundamental concepts of the newer chemistry. He accordingly prepared, with the assistance of Professor Arthur A. Blanchard, a text for this purpose entitled "The Electrolytic Dissociation Theory." Professor Talbot's progressive action in these two cases is typical of his attitude in educational affairs. He was the leader in the development of his department to its present efficient condition and served as chairman of committees on chemical education in the American Chemical Society and the Society for the Promotion of Engineering Education. He showed unusual interest in the teaching of high school science and was helpful in organizations devoted to the improvement of teaching in this field. He served as president of the New England Chemistry Teachers' Association and was for several years chief examiner in chemistry of the College Entrance Examination Board.

Dr. Talbot's record as a member of the American Chemical Society brought to him the honor of election as one of the five directors who determine the more important policies of the society and have full charge of its finances. He has been a member of the council since 1898; he served as associate editor of the *Journal* of the society and as chairman of the division of inorganic and physical chemistry. He also was a member of many important committees.

During the world war Dr. Talbot was appointed a member of a small committee to act in an advisory capacity to the Bureau of Mines in the work it had undertaken in correlating the chemical activities of the country to meet the problems arising from gas warfare. He was particularly helpful in presenting to the Secretary of War directly the needs of this organization, which carried on for over a year, outside of the war department, all the work on war gases.

Dr. Talbot was always interested in research. In the years following his return from Germany he published the results of several investigations in the field of inorganic and analytical chemistry. For a number of years he was chairman of the committee of the American Academy of Arts and Sciences that has charge of the C. M. Warren Fund, the income of which is devoted to aiding chemical research. In recent years the small amount of time available, after he had completed his work as a teacher and administrator, was devoted to editorial work and the writing

of papers on educational, scientific and industrial subjects. He is the author of a widely used text-book on quantitative analysis. Professor Talbot was the consulting editor of the International Chemical Series, which comprises books on a wide range of subjects in the field of chemistry. During the war the *Atlantic Monthly* published a series of papers by him on gas warfare. These were written in the interesting and lucid style which is characteristic of all of his writings. As chairman of the faculty, and of the administrative committee after the death of President Maclaurin, Professor Talbot had much to do with shaping the recent policies of the institute.

Professor Talbot's work has always been appreciated by chemists. Dartmouth College gave him the honorary degree of doctor of science in 1921. In bestowing the distinction his record was summed up as follows: "Henry Paul Talbot—administrator and scholar, faithful and versatile contributor to the welfare of a distinguished sister institution of high learning; scientist whose interest in the discovery of new truths is matched by instinct for the application of those truths, of whose knowledge you have possessed yourself; by virtue of the authority vested in me I welcome you to the fellowship of Dartmouth men and I confer upon you the honorary degree of doctor of science."

In the midst of all his scientific, educational and administrative activities Dr. Talbot consented to accept the important appointment of dean.

Dr. Talbot always showed a keen personal interest in the students as individuals. One of my colleagues, in pointing out the cordial relationship that existed between Professor Talbot and the students who knew him well, noted the fact, evident to us all, that he retained the spirit of youth. To the younger members of the department which Dr. Talbot directed for so many years, his life was always an example of loyal devotion to an ideal; every official act was the result of a conscientious and unselfish desire to do what was best for the Massachusetts Institute of Technology. His will, filed for probate just before this was written, expressed in a concrete way his interest in these younger men and in the institute. He names the institute as a residuary legatee and suggests, but does not require, that a part of the whole of the bequest be used to assist junior members of the institute's staff to attend meetings of the societies of their professions.

JAMES F. NORRIS

SCIENTIFIC EVENTS

TOPOGRAPHIC MAPS OF WESTERN NATIONAL PARKS

Two topographic maps of western national parks have been published by the Geological Survey of the Department of the Interior; one is a map of an area including the Sequoia and General Grant National Parks, California, and the other a map of the east half of the Grand Canyon National Park, Arizona.

The maps are printed in three colors—black showing the works of man, blue showing the rivers and other water features and brown showing the contour lines of altitude that are the distinguishing features of a topographic map. Both maps appear almost like relief models of the areas they portray.

The Grand Canyon map includes the part of the Grand Canyon extending from its head southward and westward to Crystal Rapids and bounded on the north by the Kaibab Plateau, on the east by the Painted Desert, and on the south by the Coconino Plateau. The great contrasts in topography between the canyon slopes and the surrounding plateaus and those between the walls of the main canyon and of the Granite Gorge are clearly shown. The sculptural details of the canyon walls, as well as the buttes and the temples that stand out from the main slopes, are faithfully represented on the map, and the fact that the surface of the Coconino Plateau descends southward away from the canyon rim is well shown along the southern margin of the map. The numerous rapids along the Colorado River are indicated by symbols, and the location of the trails, camps and springs are shown. The Grand Canyon map measures 41 by 65 inches and is sold by the Geological Survey at 25 cents a copy.

The map of the Sequoia and General Grant National Parks embraces an area in eastern California, situated mainly in the Sierra Nevada, and includes these two parks, the Sequoia National Game Reserve, and considerable portions of the Sequoia, Sierra and Inyo National Forests. The northeast corner of the area lies in the Inyo Mountains, and the east side is crossed by Owens Valley, whose floor is shown to lie some 3,700 feet above sea-level. West of Owens Valley the great eastern wall of the Sierra rises abruptly 5,000 to 7,000 feet and is topped by many summits that stand 12,000 to 14,000 feet above the sea. Among them is Mount Whitney, 14,501 feet, the highest point in the United States. The western slopes of the Sierra, which occupy the greater part of the area shown on the map, are seen to be deeply trenched by the rugged canyons of Kings, Keweah and Kern Rivers—the Kings River canyon one of the deepest in the world. This part of the area abounds in gorges, domes, alpine meadows, glacial cirques and cirque lakes, there being several hundred small lakes among the higher summits and divides. The area also contains a dozen groves of the "Big Trees." This map measures 32 by 29 inches and may be obtained from the U. S. Geological Survey, Washington, D. C.