If science has come to have a determining place in our economic, social and intellectual life, it is because of such discoveries as this. Strictly speaking, one such achievement should not thus be singled out as if it alone had caused these transformations; for the whole body of science is closely interrelated. Roentgen's discovery is rather to be compared with a declaration of war which initiates a whole series of world-shaking events. On this basis, as seen after forty-three years, the discovery of x-rays is thus quite comparable with the starting of the world war.

But here is a vast difference. The scars of the great war are rapidly healing. New alliances are being formed. Future wars are being planned and old ones forgotten. Science's achievements, on the contrary, are of growing significance. Recent discoveries have not yet shown their human worth. Had we used Faraday's discovery of electromagnetic induction instead of the much later one of Roentgen, our comparison with the world war would have been too one-sided. Electrical machinery is vital to the world's existence. Industrially, politically or socially, it is now far more significant than the result of any past war. We have seen the growing value of the discovery of x-rays. A century from now, when the world war means no more than the pages of history describing Napoleon's conquests mean to us now, x-rays and the developments consequent upon it will have become of a significance comparable with that of electricity to-day. Physics and the future! All history demonstrates the growing value of scientific discoveries. Fire, the wheel, handling of iron and steel, the laws of motion and electricity, never have they meant as much to man as to-day. By the same token we can be confident of the permanent value of the scientific achievements of our own age.

In the past there have been alternating periods of rapid scientific advance and relative stagnation. There are now definite signs of a decline of physics research in central Europe; but the increasing interest in both fundamental and applied physics in other parts of the world indicates that this decline is a local rather than a world trend. The Orient has joined the Occident in physics research. India contributes to our knowledge of scattered light and of stellar atmospheres; China interprets atoms by scattered x-rays; Japan develops iron with new magnetic properties. British research is carried on throughout the empire. Mexico joins effectively in the study of cosmic rays. With physics research now truly world-wide, the future advances can hardly be greatly affected by local political disorders. On the other hand, we may continue to expect periods of relative stagnation following the solution of problems that occupy the attention of leaders of the science. This was the situation in physics toward the close of the nineteenth century after classical mechanics and electrodynamics had been developed, and again in 1930 for a brief period, following the development of quantum mechanics. Very probably similar quiescent stages will follow the solution of the major problems of nuclear physics and cosmic rays. As before, however, these quiescent stages should be only temporary, for many physics problems remain to be solved and the rewards for their solution are great.

PHYSICS AND A STABILIZED SOCIETY

The growth of physics is thus intimately bound to the future of civilization. Advances in science and techniques go hand in hand, and both become easier in a well-organized society where specialists can develop highly specialized skills. It is thus impossible to conclude an adequate statement about physics and the future without some consideration of the mutual relation between physics and the organization of society.

It has become clear to all who have their eyes open that the great power given to man by his new knowledge of the world may be used either to his good or to his harm. Without cooperation, we have seen that this knowledge can not be made fully effective. If men divide into antagonistic groups it may become terribly destructive. When it becomes sufficiently evident that the welfare of the more powerful communities depends upon cooperation rather than upon strife with others, we may expect such cooperation to be not far distant. The growth of physics, through its great advances in communication, its highly specialized and interdependent industries, and the great power given to industrially organized communities, is rapidly bringing about just this condition, where strife endangers every one and cooperation gives rich rewards to all. Thus, not only does physics need well-organized civilization for its own development, but it is in itself a powerful factor in stabilizing such a cooperative society.

OBITUARY

FRANK BURSLEY TAYLOR

FRANK BURSLEY TAYLOR was born in Fort Wayne, Ind., on November 23, 1860, the only child of Judge Robert S. and Fannie Wright Taylor. His father was nationally known as a master of law in cases involving electrical sciences and a man of superior talent and broad interests. Taylor was graduated from the Fort Wayne High School in 1881, but because of poor health

he deferred entering Harvard University until 1882. He there took an elective course seeking no degree, and gave especial attention to geology and astronomy for two years, being much interested in their lines of contact.

In order to gain more vigor, Taylor then traveled with a physician as companion quite widely in the upper Great Lakes region, giving attention to high shore lines and former lake outlets. His family spent their summers on Mackinac Island, and the first contribution he made to geologic literature was a paper on "The Highest Old Shore Line of Mackinac Island," published in the *American Journal of Science* in April, 1892. This was followed within the next two years by several papers in the *American Geologist,* covering results of his reconnaissance work in the Superior, Michigan and Huron basins. Having traversed what is now known as the Nipissing Outlet from Georgian Bay past North Bay to the Ottawa River, he interpreted it as a strait connecting Georgian Bay with the Gulf of St. Lawrence and published a paper on "The Ancient Strait at Nipissing" in the *Bulletin* of the Geological Society of America, Volume 5, 1893. Between 1895 and 1897 he extended studies southward in the Michigan and Huron basins and gave attention to moraines as well as shore lines.

Up to 1900 Taylor had conducted investigations at private expense. He then became connected with the U. S. Geological Survey, and for several seasons did detailed mapping of moraines and shore lines as an associate with the writer in Michigan and neighboring parts of Indiana and Ohio, the results of which are presented in Monograph 53, U. S. Geological Survey, published under our joint authorship in 1915.

In 1908 and 1909 Taylor worked under the auspices of the Geological Survey of Canada in the southern part of Ontario, making a hurried reconnaissance of a wide area, and giving attention to moraines as well as shore lines. The results appear in the *Transactions* of the Canadian Institute for 1913 under the title "The Moraine Systems of Southwestern Ontario." He later made a special study of Niagara Falls, on which is based "The Niagara Folio,"[1] published in 1913. He also spent one or two seasons under the auspices of the U. S. Geological Survey in field work in Massachusetts and Connecticut in an attempt to work out the method of recession of the Wisconsin icesheet.

About 90 titles of papers and reports by Taylor are listed in the Bibliography of North American Geology between the years 1892 and 1934. Several papers deal with subjects on the border line of astronomy and geology. They discuss the origin and growth of satellites and planetary systems; tidal forces and horizontal sliding of continental crust sheets; the preeminence of Asia in Tertiary diastrophism, etc. Because of these papers, Daly and others have coupled Taylor's name with Alfred Wegener's and made references to "The Taylor-Wegener Hypothesis" as if their views were similar or harmonious. This was a source of regret by Taylor, as he did not subscribe to the Wegener hypothesis of a drifting of continents by flotation.

Aside from his scientific work, Taylor was much interested in artistic and literary subjects, and was a member of the American Academy of Arts and Sciences. He served as president of a Fort Wayne art school, of the Allen County, Indiana, Historical Society and of the Fortnightly Club. He was thus a guiding spirit of the community.

He married Minetta Ketchum, of Mackinac Island, in April, 1899, who survives him. Mrs. Taylor has been a constant participant in all his work. In much of the field work it was she who drove the team, and later the auto, giving him freedom for observation and notes. Thus with her help his delicate health ceased to be much of a handicap, and he was able to cover a large field in a creditable manner. His death occurred on June 12, 1938, after an attack of coronary thrombosis on June 10.

FRANK LEVERETT

[1] Folio No. 190, U. S. Geological Survey.

RECENT DEATHS

DR. CHAS. H. HERTY, research chemist in charge of the Pulp and Paper Laboratory of the Industrial Committee of Savannah, Georgia, died on July 27 in his seventy-first year.

DR. TRUMAN MICHELSON, since 1910 ethnologist of the Bureau of American Ethnology of the Smithsonian Institution, died on July 26 at the age of fifty-eight years.

DR. G. M. JOHNSTONE, MacKay director of research at the Stamford, Conn., laboratories of the American Cyanamid Company, died on July 29 at the age of fifty-five years.

MRS. YNES MEXIA, of Berkeley, Calif., botanical collector, died on July 12 at the age of fifty-eight years.

FRANK M. BAUER, president of Pfaltz and Bauer, Inc., dealers in chemical apparatus, New York City, died on July 20.

Nature reports the death of Dr. A. E. H. Tutton, an authority on chemical and physical crystallography, formerly H. M. inspector of schools, Technological Branch, British Board of Education, on July 14 at the age of seventy-three years; of Sir Colin Mackenzie, formerly director of the Australian Institute of Anatomy, aged sixty-one years, and of H. N. Thompson, lately director of forests, Nigeria, on July 9.