scientific areas, taken over different periods of time and influenced by different economic and political factors and by advances in scientific theory and practice, with their associated fads and prejudices. In view of this fact, one is tempted to say that any kind of agreement or disagreement is rather fortuitous and perhaps meaningless.

As to whether this analysis of the references in the two sets of continuing critical tables constitutes a sound basis for delineating the quality of basic physicochemical research on an international level, only time will tell. One fairly obvious and not unexpected result of this study is the finding that the principal countries of the world—those in which there is the greatest scientific activity—are the largest contributors of such basic scientific physicochemical data.

Analysis of the references in the continuing critical tables of the American Petroleum Institute Research Project 44 and the Manufacturing Chemists Association Research Project will be made at regular intervals, and appropriate reports will be issued. In particular, it is planned to evaluate the change in percentage of contributions with time for the several countries. This will be important in giving us a projection into the future. It is expected that such an analysis will show a high upward rate of change for the U.S.S.R., as was shown by the figures derived from *Chemical Abstracts*.

References and Notes

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Eugene F. DuBois, Environmental Physiologist

Eugene F. DuBois died 12 February 1959, after distinguished service to science and to his country. He was born in West New Brighton, Staten Island, 4 June 1882. His father died when Eugene was nine. His mother, who attended opera in New York regularly from the age of 8 to 80, spoke French and German fluently and studied Spanish after she was 70. Eugene felt that he got the best part of his education at home during his first 12 years, thanks to his mother, a happy environment, a house full of books, and walks through the woods and fields. In 1897, at 15 he transferred from the Staten Island Academy to Milton Academy, where he learned from one of his teachers, James Hattraik Lee, that study could be good fun. He spent some summers in Europe, but in the summer of 1898 he and his brother Arthur, as volunteer orderlies, helped care for patients with typhoid fever and dysentery at the Army Hospital at Camp Wyckoff, Montauk Point. Eugene then decided to study medicine.

He rated his three years in the humanities at Harvard easy, despite the fact that he graduated *cum laude*. He arranged his courses so that he could row on the Charles River every afternoon. He later regretted having taken only the minimum requirement in chemistry and biology, commenting that he did not get a good education at Harvard but did get the desire and drive to educate himself, a stimulus that lasted throughout his life.

DuBois entered Columbia College of Physicians and Surgeons in 1902. At that time classes were large, standards were low, and instruction was didactic. Students supplemented their medical education by joining private quiz classes and by substituting as interns. Only in this way was it possible to pass the stiff examinations given by the hospitals to select interns. With Charles Lieb, DuBois was fortunate in being selected to serve as "clinical clerk" in the summer of 1905.

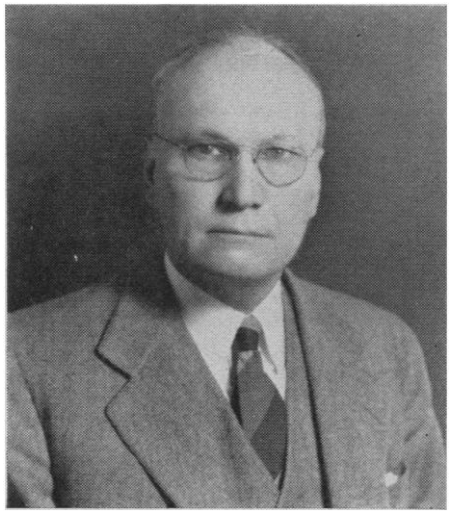
After graduation in 1906, DuBois spent six months with Hanke in Berlin studying pathology. He returned to residency at Presbyterian Hospital. This was in the era of transition, in New York, from the old traditions to the beginning of modern medicine. Leaders in the transition were Graham Lusk, Samuel Meltzer, Theodore Janeway, and Christian Herter. The Rockefeller Institute was making its influence felt, and the Harvey Society was founded. DuBois and several of his fellow interns mapped out careers in scientific medicine. After two years as intern and house officer, DuBois went, on the advice of John Howland, to Berlin to study metabolism for six months under Theodore Brugsch. As happens even today, the young scientist accumulated notebooks of data without adequate information on how to write a scientific paper. Graham Lusk came to his rescue during his stay in Berlin and in typical fashion was generous of his time in helping DuBois recalculate the data and write the paper. The two men became lifelong friends.

DuBois returned to Presbyterian Hospital in 1909, to begin work in pathology under Eugene Opie. There he was associated with Jonathan Meakins and Russell L. Cecil. He held various appointments at Cornell beginning in 1910. He was professor of medicine from 1930 until he became professor of physiology in 1941. In a sense he asked for the latter post. When Bronk, after a 1-year tenure, resigned as professor of physiology at Cornell to return to the Johnson Foundation, DuBois remarked that "it was a chair any professor of medicine would be glad to accept." Almost immediately he was offered the position and accepted it.

DuBois had hesitated about departing for his second period of European study in 1908 because he had just become engaged. However, his fiancee insisted that his career should come first. After he married Rebeckah Rutter in 1910, his small salary compelled him to open an office in their apartment and practice medicine a few hours a day. While never an athlete, DuBois enjoyed many forms of sport and throughout his life maintained a high degree of

physical fitness. While at Harvard he rowed on the Weld crews; in medical school he exercised in the gymnasium, and from 1924 until at least 1948 he ran about a mile in Central Park almost every morning before breakfast. He had virtually no illness until his stroke a few years before his death.

DuBois' military career began shortly before World War I was declared. It was then that his duties in the Bureau of Medicine and Surgery demonstrated his ability as an environmental physiologist. He became an expert in the toxic environments found in gas warfare, in submarines, and in deep-sea diving, and an expert in aviation medicine. In 1919 he received the Navy Cross. In World War II he was on duty as a captain for three months of each year, chiefly as an adviser in aviation medicine. From 1940 to 1945 he was chairman of the Committee of Aviation Medicine organized by the National Research Council and later brought under the Office of Scientific Research and Development. After the war he was awarded the President's Certificate of Merit. When DuBois last wrote me, in April 1958, he said he was still enrolled in the Naval Reserve and would volunteer his services again in case of a national emergency—this despite the fact that he was nearly 76 years old and was recovering from a stroke. The military services are indebted to him for inspiration, encouragement, and training given to many who hold or have held posts of importance. For example, DuBois was especially



Eugene F. DuBois

proud of James D. Hardy, who has been for several years director of research at the Navy's Aviation Medical Laboratory, Johnsville, Pa. Another of his protégés, Carl M. Herget, is chief of the Biophysics Division, U.S. Army Chemical Warfare Laboratories.

DuBois is best known for his metabolic studies, particularly those related to temperature regulation. His *Basal Metabolism in Health and Disease*, published in 1924 and again in 1927 and 1936, built for him an international reputation. In 1937 Stanford University invited him to give the Lane medical lectures. He chose for his topic, "The Mechanism of Heat Loss and Temperature Regulation"; his book under this title was published by the Stanford University Press in the same year. These five lectures contain the highlights of a quarter-century's research in the fields of clinical investigation and environmental physiology. Among his many associates during those years were several who became leaders in clinical investigation in Boston; these included Howard Means, Frances Peabody, Joe Aub, and Soma Weiss. His patron saint was Graham Lusk.

In recognition of his attainments in science, medicine, and administration, DuBois received many honors. He was elected to membership in the National Academy of Sciences, received an honorary D.Sc. from the University of Rochester in 1948, and was president of several societies.

DuBois is best known to most medical scientists for the metabolic standards he and his engineer cousin, Delafield DuBois, helped establish. Physiologists, including DuBois himself, have rated as of greater interest his studies of metabolism in fever and his research on methods of heat loss and temperature regulation. DuBois, Barr, and Hardy were the first to prove that the body could give off as much heat through a cool skin as through a warm skin. He was a leader in environmental physiology for the last 25 years of his life. I came to know him best after he retired in 1950, and I admired his determination and success in remaining alert and active as a scientist until his death.

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