THE NUMBER OF SCIENTIFIC MEN ENGAGED IN WAR WORK

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A NUMBER of statements have appeared attempting to estimate the total number of scientific men employed in the war effort. A request has been received in the office of the National Roster from the editor of SCIENCE requesting a statement on this matter.

In the opinion of the staff of the National Roster, no satisfactory quantitative statement can be made concerning this question because any one numerical answer given will be almost entirely a function of the definition of the term "scientific man" adopted and of some other special assumptions. For example, are all physicians, dentists, veterinarians, pharmacists and osteopaths scientific men? Are social scientists as a group or are only certain social science areas to be included? Are all individuals who are now living who are known to be graduates of accredited institutions with degrees in engineering or science to be considered as scientists no matter when the degrees were received or what the present occupations of the individuals in question may be?

If the medical sciences and the social sciences are eliminated, the best estimate that the Roster has been able to bring together is that there are between 400,000 and 500,000 trained or qualified scientific men and women in the country. If we take certain typical professions, such as segments of the engineering profession and of chemistry, in which we have some satisfactory empirical data, there is reason to believe that over three fourths of this total number may be formally described as engaged directly or indirectly in war work. This estimate, of course, includes those who are in the Army and Navy and who use their scientific training not necessarily in the scientific specialty for which they were prepared but who are using mathematics and other tool subjects in special military tasks. It must be pointed out that of the scientists not actively engaged in war work many are overage, physically incapacitated or for personal reasons not available for scientific work.

A typical example of the difficulty of making an estimate of the number of scientific men in war work may be found in an illustration from the field of physics. Experience of the National Roster indicates that the physicists of the country are as well organized, if not better organized, than any other professional scientific group. It is also probably true that the National Roster has more complete records concerning the members of the profession of physics than in any other field. From the first, however, the physicists themselves have found it difficult to establish a fully satisfactory definition of what constitutes a physicist. A minimum definition of a professional physicist has been presented by the physicists as an individual with at least a master's degree or one possessing equivalent qualifications based on a combination of training and experience. There are somewhat more than 7,000 such men and women in America. In spite of this definition, many students with bachelor's degrees whose major work was done in physics have been employed in war research and as college teachers and as such have been treated by the National Roster as professional physicists. The total of this group, if added to the 7,000 given above, might justify the statement that there are probably 11,000 physicists. On the other hand, if the definition of scientist adopted indicates an ability to do advanced independent research, it is probable that there are not more than 2,000 or, at the most, 3,000 physicists in America. Thus the problem of definition makes it extremely difficult to answer the question, "How many scientists are engaged in war work." It may also be added that the determination of what is and what is not war work is not clearly definable and the determination made concerning this matter in one set of circumstances does not necessarily apply to some other set of circumstances. Added to all this is the further fact that a good number of scientists apportion their working time to different projects. It should also be mentioned that in spite of the fact that the Roster at one time was able to obtain the number of scientists and engineers employed in three fourths of the plants of the country engaged full or part time in the war program, it is still not easy to make any accurate guess concerning the total number of scientists actually employed in the Army, the Navy and in war industry.

Probably the most accurate statement that could be made with respect to the number of scientists engaged in war work is that the scientific and technological mobilization of our nation at war has become so complete that the services of nearly all scientific personnel in some way contribute to or support the war effort. Our colleges and their laboratories, our industries and their laboratories, and our government and its laboratories have become an integrated partnership in the prosecution of a war in which the full might of our scientific and technological capacity is brought to bear

upon the enemy. Thus, when an individual scientist, without complaint and without heroics of any sort, willingly relinquishes a higher paying and more conveniently located job in order to assume a particular wartime task, his decision to transfer more often than not is based on the higher need for his services in the new undertaking rather than because of any lack of contribution to the war effort in the position vacated. To the individual scientist, the question to-day is not "where can he serve" but "where can he serve best." Cold figures can not tell this story, but the enemy has already been made to understand it.

OBITUARY

WILLIAM SHIRLEY BAYLEY

WHEN the late William Shirley Bayley, professor of geology, emeritus, University of Illinois, graduated from the Male High School of the City of Baltimore at the age of seventeen, he was the recipient of a prize given by the Peabody Institute of the City of Baltimore "for fidelity to his studies and attainment therein, for correct moral deportment and personal habits, and for propriety of manners." A more accurate characterization of him could scarcely be written now. Some elaboration of his life, however, is quite appropriate.

He was born in Baltimore, Md., on November 10, 1861, the son of Robert P. and Emma Downing Bayley. On his father's side the family was of old Irish ancestry, and resided at Crossharm, Ireland. On his mother's side the family was English, dating back to Stephen Williams of Great Yarmouth, County Norfolk, in the sixteenth century. In 1637, Robert Williams, of the eighth generation removed, emigrated to Massachusetts, and subsequent members of his lineage filled places of trust and distinction in colonial affairs.

From high school young Bayley entered the Johns Hopkins University with a view to becoming a chemist, but he found increasing interest in the new and growing science of geology which offered opportunities for young men in both the field and the research laboratory. One time he tried to help his father out in his business of importing china, when his father was stricken with paralysis, but business life did not appeal to him and he returned to his studies. Receiving his A.B. in 1883 he continued his postgraduate studies, was awarded a fellowship in 1885–86 and received his Ph.D. degree in 1886.

From 1888 to 1904 he served as professor of geology at Colby College, where his popularity as a teacher and his devotion to research made him an inspiring faculty man. Among his students was the young George Otis Smith, who later became director of the U. S. Geological Survey. In tribute to Professor Bayley's teaching, Dr. Smith relates in the March, 1942, issue of *The Colby Alumnus* that in a Johns Hopkins laboratory in the course of his graduate work, a debate among the graduate students was closed by one of them remarking: "It isn't that 'G. O.' learned more geology in college than we did, but he didn't learn so much that wasn't so."

After teaching two years at Lehigh University, Professor Bayley was invited by President Edmund Janes James to come to the University of Illinois in 1906 where, from assistant professor of mineralogy and economic geology he rose to professor of geology in 1913 and head of the department in 1928, in which capacity he served until his retirement in 1931 with the designation of professor emeritus, thus completing twenty-four years of highly creditable service to the university. As a junior member of the department from 1919 to 1923, the present writer came to recognize his thorough-going teaching and his challenging attitude toward his students in stimulating their devotion to the highest ideals of science. Twenty years more of association with him personally and professionally made indelible these impressions of his critical guardianship of science.

But Professor Bayley was not only a teacher and a critic. He was a research investigator and writer of great merit. For many years he devoted his summers to intensive field work. Establishing an early connection with the U. S. Geological Survey as assistant geologist and later as geologist he did a great deal of work on the pre-Cambrian rocks and iron ores of the Lake Superior region in northeastern Minnesota and in northern Michigan. Many articles came from this work as it progressed, nine of them within six years, besides a continued series of five articles on the basic massive rocks of the Lake Superior region. Then came two extensive reports as junior author with Professor C. R. Van Hise on the Marquette iron-bearing district of Michigan in 1895 and 1897 and a monograph under his own authorship on the Menominee iron-bearing district of Michigan in 1904, besides more papers of increasing significance, including one on the water resources of Maine and two geologic atlases of areas in Michigan and New Jersey, which were in joint authorship with Van Hise and N. H. Darton, respectively. Seven other notable publications punctuated a total of forty-one scientific entries, ninety-seven book reviews and three text-books in his labor-won bibliography. The scope of his work embraced mineralogy, petrography, areal geology, under-