the mingling of science and militarism. The chief lesson can be put in a single phrase: They do not mix. The War Gas Investigations, which formed the nucleus on which the Chemical Warfare Service finally developed, and the Medical Aviation Investigations, of which I have spoken this evening, were both successful largely because at first they were developed under civilian control, under that splendid scientific arm of the government, the Bureau of Mines and its able director. It is a wise provision of our government by which the Secretary and Assistant Secretaries of War are always civilians. It would also be wise for the general staff in any future war to keep scientific men on a scientific status instead of practically forcing them into uniform.

We all hope that we are done with war, and with soldiers—at least for a generation. We can, however, derive certain broad lessons applicable to the conditions of peace from the experiences and intense activities of war, when almost unlimited funds were obtainable for research and the experiences ordinarily scattered over years were crowded into a few months. One of these lessons is that scientific men need to develop the capacity to become the heads of large enterprises without ceasing to be scientific, without degenerating, as is too often the case, into the super-clerk, who seems to be the American ideal of the high executive official. It is not enough for the scientific man to become the expert adviser to the unscientific administrator. If the latter has the responsibility he will use his power as he, and not as the scientific man, sees fit. To this rule I have known only one splendid exception.

For the most part among us the great prizes go to the man who works up through clerical rather than through expert lines. We must find some way to change this. The path of science must lead to the top, and at the top must still be science. To achieve this ideal, the scientist must show generosity toward colleagues and subordinates, an enthusiastic recognition of their merit and an abnegation of self-aggrandizement, no less than skill in plan and energy in execution. It is essential also that he should develop methods for conserving time and strength by assigning clerical work to clerks instead of becoming a clerk himself, in order that he may keep mind and desk clear for the really important things.

The Chemical Warfare Service was a success largely because the chief of the Research Division followed these principles as the spontaneous promptings of science and patriotism.[10] Medical research in aviation was productive just so long as it pursued a similar course.

He who charts this course, so that others may follow it through the pathless seas of the future, will make a great contribution to science, education, government, and indeed to nearly every phase of trained activity in America.

YANDELL HENDERSON
YALE UNIVERSITY

A NEW DEPOSIT OF URANIUM ORE[1]

HITHERTO the known deposits of radium-uranium ore of commercial importance in the United States have been confined to the carnotite fields of Colorado and Utah, and to a much smaller extent to the pitchblende of Gilpin county, Colorado. In the spring of 1918, a new uranium deposit was discovered at Lusk, Wyo., which is hundreds of miles from any other known fields, and which has proved to be the first isolated deposit of uranium ore to produce commercial quantities. The deposit at Lusk has now proved itself by the

[10] *Cf.* G. A. Burrell, *Journal of Industrial and Engineering Chemistry*, 1918, Vol. II., p. 93.

[1] Published with the permission of the director of the U. S. Bureau of Mines.

production of several carloads of ore containing about 3 per cent. U_3O_8.

The discovery was made quite by accident by Mr. Ross Lambert, of Casper, Wyoming. Having purchased some land near Lusk, without any reference to its mineral value, Mr. Lambert found on the ore dumps of a former silver mine which had been abandoned more than thirty years ago a mineral that attracted his attention by its peculiar yellowish-green color. Mr. Lambert had a complete analysis made of some picked specimens by Mr. W. L. Piers, of Denver, who reported among other things a content of uranium corresponding to more than 20 per cent. of U_3O_8.

In September, 1918, one of the writers had the privilege of visiting the deposit which is situated at Lusk, Wyo., on the Chicago and Northwestern Railway, about twenty miles from the eastern boundary of Wyoming, near the Nebraska-South Dakota intersection. Although considerable prospecting has been done in the region since Mr. Lambert's discovery, the uranium ore so far appears to be confined to a single hill about one quarter of a mile in circumference at its base and tapering up to a sharp conical top about 350 feet above the base. The hill was known by the Indians as Silver Cliff Hill, and still carries this name. It is about one half mile north of Lusk, and lies at the extreme eastern edge of the Hartville uplift. The uranium occurs entirely in quartzite which lies between mica schist and granite. The ore is marked by its extreme variations in appearance. The most typical variety is a greenish-yellow very intimately mixed with quartzite having well rounded grains resembling tapioca in structure and color. However, the predominance of other oxides can completely alter the color and appearance of the ore without the uranium content being affected. For example, a variety containing iron oxide has a rich chocolate-brown color, and yet contains 12 to 15 per cent. U_3O_8 in some cases. Predominance of greenish shades is due to the presence of copper carbonates. Other specimens are black with a glassy lustre, owing to a very intimate mixture of a small quantity of uraninite in the quartzite. In the absence of coloring by these extraneous oxides, the mineral approaches a canary yellow, resembling that of carnotite. In some cases, the colors are found absolutely different in a single piece of quartzite without its chemical composition or the uranium content differing in the various zones. This is due to the high coloring power of a slight predominance of one or the other oxides. A very small proportion of uraninite in the quartzite can color it almost a jet black.

It has been very difficult to obtain pure crystals of the uranium mineral itself suitable for purposes of identification. However, Drs. F. B. Laney and E. D. Larsen, of the U. S. Geological Survey have been kind enough to examine some specimens collected by one of the writers. Dr. Larsen's measurements of the optical properties indicate very decidedly that the mineral is identical with uranophane, a hydrated calcium silicate containing some barium and lead, to which the formula $CaO(UO_3)_2(SiO_2)_2.6H_2O$ has usually been assigned. It is readily soluble in acids. The chemical evidence of the writers does not show correspondence with this chemical formula, but further work, both chemical and optical, is desirable before more definite statements can be made about the crystal form or chemical composition. Dr. Laney's microphotographs of polished sections indicate that the uraninite in the quartzite was introduced subsequent to the deposition of the sandstone and replaced the cementing material, and to a less extent, the sand grains themselves. Dr. Laney believes the mineral is probably an oxidation product of uraninite (U_3O_8).

The chemical evidence of the writers on material not so pure as could be desired (about 80 per cent. pure) indicates that the soluble bases and acids account for each other without reference to the uranium oxide at all. This was taken to indicate the existence of a free higher oxide, probably UO_3. Since the occurrence of this oxide in nature has not been reported, if confirmed, it would con-

stitute a new mineral which it has been proposed to name "lambertite" for its discoverer. As already stated, the confirmation must await further chemical and optical evidence on pure crystals if obtainable.

The present development work of the property has not been sufficient to show how much uranium ore it can be expected to produce. The fact that it has already produced about 100 tons is very encouraging.

The writers have been much indebted by the courtesies extended by Messrs. Ross Lambert and H. A. Duncan, owners of the property, and by Messrs. E. D. Morimer and E. A. Dufford, who were in charge of the property at the time of the writer's visit. It is also an especially pleasant obligation to acknowledge the kind interest and valuable assistance of Drs. Laney and Larsen in the examination of this material.

S. C. LIND,
C. W. DAVIS

GOLDEN, COLO.,
March, 1919

SCIENTIFIC EVENTS

CONFERENCE ON HIGH SCHOOL BIOLOGY

AN educational conference on biology in New York City high schools was held under the auspices of the Brooklyn Botanic Garden, laboratory building, on Friday evening, April 4, 1919, Dr. C. Stuart Gager, director of the Botanic Garden, presiding. The meeting was the outcome of a symposium and conference on botanical education in secondary schools on March 11, under the auspices of the Torrey Botanical Club at the American Museum of Natural History. The conference was composed of members of the faculties of Columbia University, Barnard College, Brooklyn Training School, The Lincoln School of Teachers College, and the scientific staffs of New York Botanical Garden and Brooklyn Botanic Garden. The speakers of the evening included: Dr. R. A. Rexford, representing Dr. John L. Tildsley, associate superintendent of schools, in charge of high schools in New York City; Principals Bogart, of Morris High School (Bronx); Janes, of Boy's High School (Brooklyn); Low, of Erasmus Hall High School (Brooklyn), and Zabriskie, of Washington Irving High School (Manhattan), Principal Denbigh, of Packer Collegiate Institute (Brooklyn); Dr. Edgar A. Bedford, professor of biology in Stuyvesant High School (Manhattan), in charge of a class in general science at Hunter College; Dr. George C. Wood, president of the New York Association of Biology Teachers; Dr. James E. Peabody, chairman, Committee on Biology National Educational Association; Professor R. A. Harper, Torrey professor of botany, Columbia University, and Dr. Otis W. Caldwell, director of the Lincoln School of Teachers College.

The purpose of the meeting was to secure an expression of opinion primarily from administrative officials of New York City high schools as to the actual and possible value of elementary biology as a high-school subject—the proposed introduction of courses in general science and community civics in first year of New York City high schools created the possibility of the elimination or serious curtailment of biology.

It was the unanimous opinion of every speaker that biology, both in content and in educational discipline, contributes something essential in the preparation of young men and young women for citizenship, which is not afforded by any other subject and it was the expressed opinion of all the principals that the elimination or curtailment of general biology from the high-school course of study would be an educational mistake. All of the speakers emphasized the necessity of planning a content of the course so as to make a very intimate and obvious correlation with the everyday life of the individual.

The conference is considered by many as the most important meeting for the consideration of this question that has ever been held in New York City and the result was especially significant in view of a commonly expressed opinion—shown by this conference to be wholly erroneous—that many if not all of the high-school principals were opposed to the subject of elementary biology.