proficiency tests are used to check the technical knowledge of the women in radio repair, automotive mechanics, driver information and other skills.

*Warrant Officer Examinations.* Examinations of technical ability in approximately thirty technical specialties of warrant officers, including auditing and accounting, supply in various arms, engineering, photography and cryptography, have been prepared. These tests are kept up-to-date to take account of changes in methods and duties incident to the development of the Army.

*Army Specialized Training Program Tests.* These tests are to assist in the selection of men from among present enlisted personnel of the Army and young men between the ages of 18 and 22 who will be tested after induction and basic military training. Men selected by these tests are eligible for college training in engineering, medicine, chemistry, physics, psychology and foreign languages as part of their Army service. Further tests will be constructed and used periodically to measure their achievement in these subjects.

The following is a fairly complete list of tests developed up to the present time for Army usage:

*Classification Tests*
- General Classification Test
- Non-Language Test
- Visual Classification Test
- Higher Examination
- Officer Candidate Test
- Women's Classification Test (Mental Alertness Test)
- Army Information Sheet (minimum literacy test)

*Aptitude Tests*
- Mechanical Aptitude Test
- Clerical Aptitude Test
- Radiotelegraph Operator Aptitude Test
- Code Learning Test
- Battery of Tests for Combat Intelligence
  - Identification of Aerial Photographs
  - Map Identification
  - Route Tracing
  - Battle Maps
  - Perception of Detail
  - Map Reading
  - Map Orientation

*Educational Achievement Examinations*
- Algebra
- Arithmetic
- English Grammar and Composition
- French
- General History
- German
- Inorganic Chemistry
- Physics
- Plane and Solid Geometry
- Spanish
- Trigonometry
- United States History
- Combined Algebra, Trigonometry and Geometry

*Trade Knowledge Tests*
- General Automotive Information Test
- General Electricity and Radio Information Test
- General Radio Information Test
- Driver and Automotive Information Test

*Warrant Officer Examinations*
- About 30 technical examinations

*Army Specialized Training Program Tests*
- Army Specialized Training Program Test
  (achievement tests in each subject taught under the program are under construction)

# WAR RÔLE OF A GEOLOGICAL SURVEY[1]

By Dr. ARTHUR BEVAN

STATE GEOLOGIST OF VIRGINIA, CHARLOTTESVILLE

THE chief rôle of a Geological Survey in modern industrial society is to get all the obtainable data about all the earth materials in all the domain served by that Survey. To meet the opportunities and obligations of this rôle, each official Survey ideally must get all these data with sufficient accuracy and in adequate detail to satisfy promptly and completely all the conceivable immediate demands. That Survey must also anticipate—even stimulate—the rational future needs of expanding mineral and related industries and interdependent society.

Those earth materials, which are so indispensable to the smooth functioning, and even the existence, of modern society and its industrial and governmental economies, are the familiar daily grist of the technical mills of each Geological Survey, whether provincial, state or national. They include at the base the "precious metals"—precious not in the technical sense but in the social sense that to modern society they are even more precious than gold and silver or rubies and diamonds. Those metals are obviously the birthstones of the "Age of Metals," as well as the structural framework for most industrial achievements. Included also among the grist of a Geological Survey are the essential nonmetals in great diversity, the priceless mineral fuels and sources of power, and, by no means least, the absolutely vital ground-water supplies. They are the functioning "corpuscles" in the "life blood" of modern industry.

[1] Address at the annual meeting of the Association of American State Geologists, Washington, D. C., February 19, 1943.

But it is not enough for a Geological Survey merely to act in the rôle of a general fact-finding agent on the broad stage of modern industrial relations. The interpretive biologist dissects tissues to the nucleus of the cell, or even more minutely, while the exploring physicist literally peers into the structure of the atom to perceive its component parts and its energy mechanisms. Each geologist, worthy of the name "research scientist," on the staff of an alert, aggressive Geological Survey must constantly strive to do likewise. At the same time, the Survey staff in part or as a whole must assemble, coordinate and interpret the results of that research into a body of usable and useful facts. No longer is it sufficient, as it may have been in days of old, to know what earth materials have been stored within the domain of the Geological Survey, and where, and in what probable quantity and of what possible quality. The present uses of those geologic resources must be widely understood and their potential industrial uses, to meet the needs of evolving society, must be envisioned as clearly and as completely as may be possible.

The staff of a modern Geological Survey must examine more or less minutely—take apart, so to speak—many raw mineral resources so as to determine the constituents and their significant geologic and chemical relations. For example, staff technologists must discover the kinds and characteristics of the unit components of coals, clays, even limestones, and of other complex earth materials. More than that, with this precise technical knowledge well in hand, they should experiment to the end that ways and means may be found to separate the constituents and recombine them into products of greater usefulness and hence of more value to society.

In summary, as I see it just now, the rôle of a Geological Survey has advanced rapidly from the qualitative stage of research to the quantitative theater of investigation. Early tendencies, entirely necessary and appropriate in those times, to general reconnaissance research in the field and in the laboratory have given way to precise, particular research in specialized fields through the use of all the available specialized techniques and apparatus. Pure geologic research, for a Geological Survey, has been supplemented to a considerable degree by emphasis upon greater practical usefulness. It should be stressed, however, that the two fields are not mutually exclusive, popular notions to the contrary notwithstanding, but that they are mutually interdependent.

In playing its proper rôle in modern society, a Geological Survey not only has the opportunity and obligation to make available to industry, in the broadest sense, all the useful facts about geologic resources, but it has also an unparalleled opportunity and an inescapable obligation to keep public interest stimulated and public opinion informed in regard to these resources. Some of us call this rôle of a Geological Survey "PEG"—alphabetical jargon for public education in geology. It is a responsibility and an opportunity of tax-supported Surveys even more than it is of educational institutions. The knowledge and attitude of the present and oncoming generations of public-minded citizens, administrative officials and statesmen in regard to the interrelated aspects of geologic resources will be of consequential significance in helping to shape the destinies of the post-war world and in making that world a better and more comfortable place in which to live and to create worthy results. The idea is well expressed in two recent statements: one by State Geologist Smith of Michigan when he said, apropos of PEG, that "geology should come 'down to earth'"; the other by Miss Newlon, of the West Virginia Geological Survey, when she emphasized one of the aims of their Survey to be that "every one in this State is going to know what geology is and what it's good for!"

At the risk of becoming wearisome in the emphasis upon PEG as part of the essential rôle of a Geological Survey, it should still be stressed in these times of rapid tempo that grave social dangers may lurk in the long-continued public lack of understanding, or even worse—misunderstanding, of the rôle of pure and applied geology in modern affairs. Examples ranging from local to national importance no doubt come readily to mind. Too many steps of progress in geological science, industrial development, governmental functioning and social evolution depend upon those influential public attitudes to permit us to dismiss them as of little concern to the research geologist, the teaching geologist and staff members of official Geological Surveys.

Most of you are probably asking by this time, "But what has all this to do with the rôle of a Geological Survey in time of war?" Only this: Wars make rapid and decisive shifts mandatory—not only in the military establishment but in the undergirding and supporting civilian activities. In an all-out, global war, such as the present conflict, many of those civilian shifts are sudden and drastic. In brief, Geological Surveys too have gone to war—in many ways and over a considerable period of time. In the field and laboratory work and in the strengthening of their staffs, most of them have been preparing, though probably without this particular objective in the forefront of their planning, to meet promptly the emergency demands that are now being made upon them by the armed services and by war industries. Some technical staff personnel have gone into the armed services

where their special knowledge and skills will be of the greatest use in the successful prosecution of the war; others remain on the local "home front" where the daily service they render is just as highly important and just as effective in the war efforts.

Illustrations multiply daily in the experience of each Geological Survey as to how dependent upon the broad base of geologic science—pure and applied—is the successful conduct of a large-scale modern war. In fact, the turn of the wheel of fortune in great measure is as closely related to geologic science as it is to military science, though the latter is without question the more directly involved and the more directly responsible. It is so obvious now as to be trite that this is a war of machines and instruments, of terrain and topography, of mineral resources and ground-water supplies—all geologic resources of the greatest importance. This is no minimization of man power, or of the value of brains compared with brawn, but under modern conditions they are not the unique force of ancient warfare. The unfortunate fact still remains, however, that the supreme value of geologic resources has not been clearly understood or readily accepted by all who are concerned with all the theaters of preparation, of potential conflicts of interest and of actual combat. "Too little too late" also has its dismaying applications here as well as elsewhere.

The war rôle of an efficient Geological Survey appears, therefore, to be primarily an accelerated continuance of its best peacetime methods. A decisive shift in emphasis upon the type of results to be obtained and their application—both in time and place—rapidly becomes necessary, or even mandatory. Some temporary measures will be desirable, but ultimate peacetime good may come from some of them. The war rôle of an official Geological Survey thus involves a shift in immediate objectives, a new setting of the sights and probably also a realignment of personnel.

In conclusion, we must never forget, or permit others to overlook, the facts that those Surveys are the great repositories of the most useful and diversified geologic and mineral resource data, that they are the users of the most modern field and laboratory techniques in their respective spheres, and that above all they have the technically trained, skilled personnel to make effectively the necessary conversion from peacetime scientific and industrial research to frontal attacks upon very important war problems. Obviously, the closer the cooperation with all other agencies having similar rôles, the more effective will be the contributions of the Geological Surveys toward the prompt and effective winning of this war. Unselfish continuance of such effective cooperation far into the post-war period should help to make another such war virtually impossible.

# OBITUARY

## ISAAC MCKINNEY LEWIS
### 1878–1943

ISAAC MCKINNEY LEWIS, professor of bacteriology in the University of Texas, died of a heart attack on March 12, 1943. He had suffered an attack in the summer of 1941, but, after a long convalescence, he had apparently fully recovered. He is survived by two brothers, Dr. Charles E. Lewis, of Waterville, Maine, and John R. Lewis, of Wolcott, Indiana. He never married.

Dr. Lewis, third son of Isaac R. Lewis and Margaret Jane (McKinney) Lewis, was born on September 21, 1878, on a farm in Jasper County near Rensselaer, Indiana. He had the misfortune never to know his father, who died in the May preceding his birth. He was devoted to his mother, who had been a teacher, throughout her lifetime and he gave her credit for instilling in him the desire to secure an education.

He attended the country school near his home and finished the eighth grade at the age of fourteen. By home study while working on the farm he prepared himself for the teacher's certificate, and at the age of seventeen he began teaching in his home township of Barkley. In 1897 he entered the Indiana State Normal School. His work there was interrupted by trouble with his eyes following measles, and by the necessity of earning his expenses, but he was finally able to finish in 1904. He entered the University of Indiana in the fall of the same year and from this institution he received the B.A. in 1906, the M.A. in 1907 and the Ph.D. in 1909. During the year 1908–09 he was instructor in botany in New Hampshire State College and assistant botanist in the experiment station. In September of 1909 he came to the University of Texas to be instructor in botany and to initiate work in bacteriology. He rose through the successive ranks to professor in 1919. In 1918–19 he was a captain in the Sanitary Corps, U. S. Army, stationed at the Yale Army Laboratory School. He was designated as research professor in 1938–39. For a number of years he taught both botany and bacteriology, but the development under his leadership of the work in bacteriology was such that for the past fifteen years this field occupied his entire time. Throughout his career, however, he retained an intense loyalty to the parent science of botany.

As a man he was unselfish, kindly and modest almost to the point of shyness, with a lively sense of humor