Letters

Permafrost Research

The 29 Nov. 1957 issue of *Science* [**126**, 1099 (1957)] contains an article titled "Earth Science," prepared by Philip H. Abelson. One paragraph states: "Two problems of immense importance to survival in the Arctic are those of water and permafrost. We have two geologists working on a study of these topics. The Russians have scores." If by "we' is meant the United States, the statement is in error and should be corrected.

The U.S. Army Snow Ice and Permafrost Research Establishment conducts research on these items for the Department of Defense. Currently, 15 engineers, scientists, and technicians are employed by the Frozen Ground Basic and Applied Research Branches. Part-time work is sponsored at a number of universities utilizing about ten professional people as consultants. Contract work is also sponsored in this field, with the work done by a number of universities and private organizations.

The Arctic Construction and Frost Effects Laboratory, U.S. Army Engineer Division, New England, Corps of Engineers, has a staff of about forty engaged in the study of frozen ground and permafrost as related to military construction. They also do much of their research by means of contracts with several universities, notably Massachusetts Institute of Technology, Harvard, and Purdue.

The U.S. Geological Survey maintains a staff at Point Barrow, Alaska, and at Menlo Park, California; both are engaged in a study of the thermal gradients in permafrost under lakes, along the beaches of the Arctic Ocean, and at other locations in Alaska to measure the effect of other variable factors on the temperature regime in permafrost.

The U.S. Army Engineer Research and Development Laboratories, U.S. Army Engineer Waterways Experiment Station, the U.S. Air Force, the U.S. Navy, the Bureau of Public Roads, and the U.S. Department of Public Health all conduct substantial amounts of research in permafrost as a part of the study of particular problems which have Arctic and Antarctic applications.

The total number of technical people devoting time to a study of permafrost problems in the United States must be several score and not two as is stated. I do agree that the amount of effort spent by the Russians is more than that spent by the United States at this time and that our effort should be increased.

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I was aware of the engineering activities being carried out by the U.S. Army Snow Ice and Permafrost Research Establishment when I prepared the material which appeared in *Science* on 29 Nov. 1957.

Some of the "research" projects sponsored by W. K. Boyd's organization (as listed in the *Army Research Annual Task Summary, 1955,* vol. III, *Geophysical and Engineering Sciences*) include: "Development of methods by which troops can rapidly entrench themselves in frozen ground" ($54,000); " Development of an apparatus that will demonstrate the feasibility of applying heat to the frozen soil and progressively removing the thawed surface by a scraper" ($30,000); "Development of drilling and sampling equipment and techniques for all types of frozen ground" ($26,000).

Another "research" sponsored by one of the other organizations mentioned by Boyd: "The work consists of preliminary studies and minor investigations to determine the necessity of specific research or development relative to soil and snow mechanics" ($20,000).

Few scientists—for example, those listed in *American Men of Science*—would agree that the above examples constitute either research or science, which was the topic of our symposium.

The estimate of two geologists was incorrect, though it was provided me by one of the leading hydrologists of this country. The actual number is at least 13—11 engaged in mapping arctic areas, 2 in laboratory and theoretical research studies.

Neither Boyd's remarks nor this altered estimate change the conclusion that Russian scientific activity in the Arctic far exceeds our own.

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Multilingual Reporting of Scientific Data

Science, in principle, is an international undertaking. The results of scientific inquiry are published and thus made a common property of mankind or, more precisely, of those scientists who can read the language in which the work has been written. For a variety of reasons (the large volume of printed matter on almost any subject being the most cogent one), the typical scientist cannot aspire to be a polyglot, mastering all of the European languages, much less all of the Oriental. He has to rely on his helpers—the writers of abstracts, "excerpts," and reviews, on second-hand information.

The usefulness of a scientific paper, written in a language understandable only to a limited audience, is substantially increased by the attachment of an