not be appreciably changed if data for 1938 were used.

At any rate, it seems clear that the number of science doctorates awarded the graduates of these small schools is in line with the total number of students educated in these schools. How can it be that the small high schools of 1946, that presumably possessed all the curricular, instructional, and material deficiencies said to go with smallness, produced their full quota of scientists in 1957 and 1958?

Is the situation different today?

ROGER G. BARKER
University of Kansas, Midwest Psychological Field Station, Oskaloosa

Importance of Chinese for Scientific Communication

During recent years the number of scientific journals and the total volume of scientific literature published by the People's Republic of China appear to have increased considerably. Evidence cited by Wilson (*1*) on the magnitude of the effort in scientific education and research leads one to expect that the increase will continue. According to a sampling of journals received by the Harvard-Yenching Institute, Cambridge, Mass., the vast majority of Chinese scientific publications appear only in the Chinese language and normally are not translated. However, two journals published in Peking, *Scientia Sinica* by the Academia Sinica and *Science Record* by the Science Press, consist of papers in Western languages, principally English. These papers, representing various fields of science, often appear previously in other Chinese-language journals.

In view of the rapidly increasing importance of Chinese scientific literature it is desirable that some scientifically trained persons now begin learning to read scientific Chinese. Only when knowledge of the language is widespread can Chinese scientific progress be evaluated accurately. The task may soon be too great for exclusive reliance on the few American scientists who speak Chinese as their native tongue.

Most of the difficulties associated with learning to read scientific Chinese are not associated with the language itself and seem to reflect a lack of interest on the part of Western scientists. According to a study that I have made the following problems stand out.

1) Because of present world unrest, publications of the People's Republic of China do not circulate freely in the United States.

2) No textbooks and selected read-

ing materials specifically prepared as aids in learning to read scientific literature are yet available.

3) There appear to be no technical Chinese-English dictionaries, such as exist for German, French, and Russian. The existing specialized dictionaries of technical terms, intended mainly for those who speak Chinese, are not easily used by the Western student.

4) Class instruction in Chinese for the scientist is not currently offered by universities in the United States (the Massachusetts Institute of Technology is planning a course in scientific Chinese for September 1960).

Learning Chinese is not as insuperable a problem for the Western scientist as many tend to believe. The grammar of the language is simple; words are not inflected as in Western languages, and number, tense, case, and person are all indicated by the context. Furthermore, an active interest in teaching Chinese to Western students in nonscientific fields already exists, and much of this experience would be of value in the teaching of scientific Chinese. An increase in interest and an organized effort on the part of individuals aware of the growing need for scientists with a reading knowledge of scientific Chinese could overcome most of the problems.

JOHN W. WINCHESTER
Department of Geology and Geophysics, Massachusetts Institute of Technology, Cambridge

References

1. J. T. Wilson, "Red China's hidden capital of science," *Saturday Review of Literature* (8 Nov. 1958); *One Chinese Moon* (Hill and Wang, New York, 1959); "Geophysical institutes of the U.S.S.R. and the People's Republic of China," *Trans. Am. Geophys. Union* **40**, 3 (1959).

The Scientist and Moral Values

The two letters concerning animal research [*Science* **131**, 263 (29 Jan. 1960)] by implication raise issues of fundamental importance to the role of science and to the respect it may claim in the world of tomorrow.

The first is a question one would like to see squarely answered: Are there any moral limits at all to animal experimentation? Or is it the responsible and considered opinion of today's biologists and psychologists that any experiment, no matter how cruel, is permissible as long as it is scientifically worth while?

The second is a scientific problem that has been surprisingly—and significantly—little investigated: that of the psychology of scientists. Who are the people who will choose lines of research leading them to ever more cruel and, to