the BSCS teams of research biologists and teachers. The understanding of the nature of scientific investigation is so different a purpose from the memorization of scientific facts that it is inevitable for the BSCS exams, which emphasize the former, to differ very greatly from most, if not all, standardized biology tests.

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Biological Sciences Curriculum Study, P.O. Box 930, Boulder, Colorado

Grants: Nothing for the Neediest

In a recent editorial ("Forty first-rate universities," 19 June, p. 1413) the writer speaks favorably of the new Science Development Program of the National Science Foundation. Whenever I see such a write-up I feel that, as a faculty member in one of the "have-not" universities, I should attempt to present another side of the story.

A favorable view of the NSF program requires that one accept the assumption that it is of more value to the country for a second-rate institution to pass to a first-rate status than for a third-rate institution to become second-rate. I do not believe that there are sufficient facts available to warrant making such an assumption, attractive though it may be to NSF officials and others. In giving money to those who have it and withholding it from those who do not, we follow an age-old pattern but not necessarily a good one. The situation is very similar to that in our scholarship programs. We give scholarship money to those who least need it and who are most capable of acquiring their own funds—the A and B students. The C students who most need the help cannot get it but must consume badly needed time in earning money. Top students can much better afford working time and furthermore can probably borrow money more easily. So the question arises, is it better to give money to A students or to C students? I do not think that there is an obvious answer to this question, but as long as scholarship funds can be used to attract students I am sure they will continue to go to the top students.

I believe that it can be said with some assurance that it is easier for a top school to get more funds than for a mediocre school. Only those who have worked in the "have-not" institutions can appreciate the monumental tasks involved in bringing about even minor improvements. It is far from obvious to me that the NSF program will place the money where it will do the most good.

C. A. MACKENZIE
Chemistry Department, University of Southwestern Louisiana, Lafayette

"Cultural Divide" in Japan

In L. Campbell's fine article "Science in Japan" (21 Feb., p. 776) appears the statement: "The visitors [17 Japanese scientists attending the AAAS meeting in Cleveland in December] disclaimed any Japanese split into 'two cultures' such as C. P. Snow finds in the West." May I say that I do not share this opinion with the other visitors. I should be extremely happy if I could disclaim such a split, but the real situation in Japan seems to me to be that the separation between scientists and nonscientists is hardly bridgeable.

The situation may be represented by the accompanying figures. The two curves in Fig. 1 are supposed to represent the difference between U.S. and Japanese scientists in intensity and diversification of knowledge. These curves were suggested by Yuzuru Ooshika, Department of Physics, Kanseigakuin University. Ooshika's view is as follows:

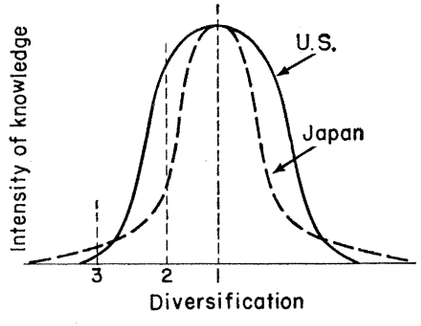

Fig. 1. The curves represent an impression of a characteristic difference between Japanese and American scientists as regards breadth (diversification) and depth (intensity) of knowledge. *1*, the specialty of each man considered; *2* and *3*, subjects outside the specialty.

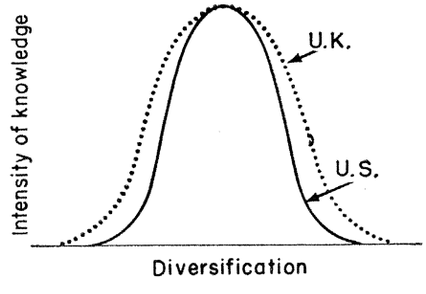

Fig. 2. American scientists and British scientists (particularly Oxford and Cambridge graduates) compared.

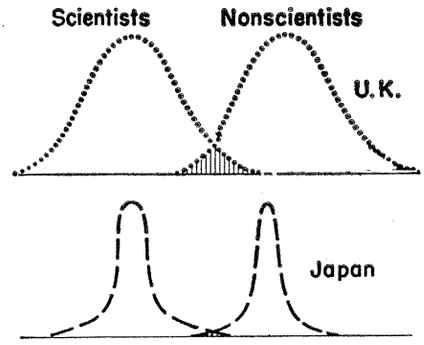

Fig. 3. An impression of the "cultural divide" between scientists and nonscientists as it appears in Britain and in Japan. The coordinates are the same as in Figs. 1 and 2. The areas of overlapping knowledge are shaded.

Compared with U.S. colleagues, Japanese scientists are equally knowledgeable within the very narrow area of their own specialties. But they are ignorant in matters outside this area, even in those closely associated with their special subjects (as represented on the scale of diversification by point 2), although in such minor subjects (point 3) as color-photography our scientists, especially of the younger generation, are less ignorant.

I have been told that Oxford and Cambridge have been able to produce balanced, well-rounded intellectual men. If this is true, one might make a further comparison as in Fig. 2, in which U.S. scientists and British scientists, particularly Cambridge and Oxford graduates, are represented.

If the foregoing comparisons make sense, then comparison of scientists and nonscientists in Japan and the United Kingdom may be represented by Fig. 3. The gap between the two peaks is much greater in Japan and the area of overlap much smaller. I agree with Snow that the "cultural divide is not just an English phenomenon; it exists all over the world." I would add that it seems to be at its sharpest not in England but rather in Japan.

Increasing specialization in Japan is unavoidable because of the isolation of the Japanese language from world languages and is necessary in order for Japan to survive in economic competition with the West.

KENITI HIGASI
Hokkaido University, Sapporo, Japan