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Letters

Science in Israel

The two recent editorials dealing with science in Israel [*Science* 129, 869, 995 (1959)] have special interest to me, since, as a U.N. Technical Assistance consultant in Israel twice, I was involved in certain aspects of the problems described. I offer a personal opinion concerning particularly the second editorial, "Basic research a luxury?" I feel that the editorial exaggerates somewhat the actual differences in viewpoint which exist, and that it states the argument from a rather unrealistic point of view.

Fundamentally, I believe the question is not whether basic research is either a dispensable luxury or a vital necessity in Israel today, or even whether applied research should prevail at the expense of the basic. What is pertinent is the question of balance between the two, taking into account the fact that Israel is a small country of limited natural resources, suffering from stringent economic problems brought on by both heavy immigrant absorption and large but necessary outlays for national defense. Despite rumors to the contrary, Israel simply does not have at this time a sufficient number of adequately trained and seasoned scientists to meet all of the present demands for both basic and applied research. Thus, to some observers in and out of Israel, including myself, the greatest urgency at this particular moment is maximum effort in technological development. While the vital importance of maintaining as much basic and long-range research as the economy can support is not denied, nevertheless the country is limited in its total scientific resources.

Actually, the problem touched on has deeper sociological and emotional roots than the editorials indicate. The source of Israeli science lies in the older European tradition which rewards, with social and intellectual status, individuals identified with basic research. This attitude is rapidly disappearing in Israel, but one continues to meet it there frequently enough to comprehend its major formative influence on the intellectual values and career orientation of students entering scientific fields.

Finally, the editorial discussion of science in Israel might have pointed up a growing problem of major concern not only to Israel but also to a number of European countries as well. I refer to the extent to which these scientifically literate countries are being "raided" for scientific and technical talent by the United States. As a consequence, a serious threat appears to be developing not only to the scientific, academic, and technical welfare of these small countries

themselves but, in the longer range, also to the vital interest which the United States has in the survival and strengthening of these democratic outposts.

It seems to me that the various United States governmental agencies responsible for allocating ever-increasing sums for research within the United States, should show greater concern for the fact that they may be heedlessly, but nevertheless seriously, weakening the scientific fiber of the smaller nations. A leading Israeli scientist made the point to me that the interests of the United States might be better served if a real effort were made to place U.S. Government projects for nonsensitive or nonclassified types of research in countries with capable scientists, such as Israel and several European and Asiatic countries whose survival is vital to our interests. Such a program would not only yield substantial savings in research costs but would also permit these countries to improve and expand their scientific and academic institutions.

A start has already been made in this direction by the U.S. Department of Agriculture, by allocating to research in several countries, including Israel, local currencies accumulating there by purchases of U.S. agricultural surpluses (Public Law 480). It seems to me that this small beginning could be expanded to the mutual advantage of the United States and democratic countries such as Israel whose welfare and survival concern us.

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Mating for "Hybrid Vigor"

In his report "Hetero blood types and breeding performance," Mogens Plum [*Science* 129, 781 (1959)], in discussing his data on the matings between 310 females and 32 males of the Holstein-Friesian breed, states, "The rate of survival increased as the difference in antigens increased. The chi-square of 8.72 is significant at 0.05 level." This chi-square of 8.72 is what might be termed the total chi-square for his data and is based on 3 degrees of freedom.

It is possible, of course, to calculate, from the data Plum gives in Table 1, three values of chi-square, based on a single degree of freedom each, which will add to 8.72. On the basis of the number of antigens in which mates differed, the following independent comparisons or degrees of freedom might be used: 1-5 versus 6-7, 1-5 plus 6-7 versus 8-9, and 1-5 plus 6-7 plus 8-9 versus 10-15. These comparisons and their chi-squares, together with other pertinent information, are given in the following table.