LETTERS

The editors take no responsibility for the content of the letters published in this section. Anonymous letters will not be considered. Letters intended for publication should be typewritten double-spaced and submitted in duplicate. A letter writer should indicate clearly whether or not his letter is submitted for publication. For additional information, see Science **124,** *249 (1956) and* **125,** *16 (4 Jan. 1957).*

Image of the Scientist

The article by Margaret Mead and Rhoda Métraux, "The Image of the Scientist among High-School Students" [*Science* **126**, 384 (1957)], should not, I feel, go unchallenged. While I am extremely dubious about the wisdom of certain of their recommendations, I will confine my comments to the relevance of the conclusions to the data.

Their major conclusion is summed up in the following quotation: "In general, the study shows that, while an official image of the scientist—that is, an image that is the correct answer to give when the student is asked to speak without personal career involvement—has been built up which is very positive, that is not so when the student's personal choices are involved. Science in general is represented as a good thing. . . . However, when the question becomes one of personal contact with science, as a career choice or one involving the choice of a husband, the image is overwhelmingly negative."

How is this conclusion established? Great emphasis is placed on the fact that forms II and III of those cited in the article ask a question in personal terms, whereas form I asks a question in impersonal terms. No evidence is presented, however, to show that the difference in responses to the forms is a function of the personal element. The fact is, form I is deliberately phrased with neutral emotional content, form II calls for a listing of sympathetic responses, and form III evokes antipathetic responses. This circumstance alone might be sufficient to account for the differences in the responses.

As a matter of fact, the statement is made, "The 'official' image of the scientist . . . which was evoked primarily in form I, but which recurs in the answers to *all three forms,* is a positive one" (italics mine). The basis for the conclusion that "the image is overwhelmingly negative" comes from unauthenticated data originating wholly outside the scope of the investigation. The key paragraph is: "But this image . . . is one which is likely to invoke a negative attitude as far as personal career or marriage choice is concerned. While the rejection of the negative image is, of course, immediately clear, the positive image of very hard, only occasionally rewarding, very responsible work is also one which, while it is respected, has very little attraction for young Americans today. They do not wish to commit themselves to long-time perspectives, to dedication, to single absorbing purposes, to an abnormal relationship to money, or to the risks of great responsibility. These requirements are seen as far too exacting."

Appended to the foregoing passage is the following remarkable footnote: "In this statement, we draw not only on the attitudes in this study but on a wide variety of other materials on the attitudes of contemporary young Americans." No references, no citations of authorities or of previous studies, just a flat statement that contemporary youth is unsympathetic to its image of the scientist. Even if this assertion be accepted as true, why the condescension toward contemporary American youth? In how many societies, in how many ages, would a broad cross section of the population (let alone youth) display devotion to long-term perspectives and single absorbing purposes?

This study, however, fails to establish

that there is in fact a dichotomy between youth's images and aspirations. It fails to show that the image is substantially inaccurate (say, more inaccurate than the image held of other professions and trades). Nor is there anything in the data that would lead one logically to adopt the recommendations, some of which are simple good sense and others of which I regard as potentially disastrous for the position of science in our society.

The basic approach of the study to the problem of attracting youth to science is framed in terms of "how can we make science appear appealing to youth?" The proper questions, I submit, are, "How can we get across to youth an accurate image of science?" and "How can we evoke in a sufficient number of youths a personal identification with the admittedly prevalent positive image of science?" If it comes to changing science or changing youth, I'm for changing youth. Mead and Métraux do not appear to have considered the latter possibility.

SANDER RUBIN
International Business Machines Corporation, Poughkeepsie, New York

In his letter discussing "The Image of the Scientist among High-School Students" [*Science* **126**, 384 (1957)], Sander Rubin raises a question about "a dichotomy between youth's images and aspirations," and also expresses doubt about the relevance of the conclusion that "when the question becomes one of personal contact with science as a career choice or one involving the choice of a husband, the image is overwhelmingly negative." It is his suggestion that the circumstance that the three questions asked of the high-school students were differently phrased—so as to elicit different kinds of response—"might be sufficient to account for differences in the responses."

It is the congruence in the answers to the questions, whether neutrally, positively, or negatively phrased, that supports the conclusion as stated. In his question about "images" and "aspirations"—if in this Rubin is referring to the students' image of the scientist and their image of their own desired futures—he has hit upon one of the major issues —namely, the divergence between the high-school students' picture of what a scientist's life must be and their picture of what they would like their own futures to be. This divergence was also clearly documented in the responses of the students. In our discussion, the focus was upon the image of the scientist rather than upon the students' aspirations.

An illustration based on one general point in the answers may serve to clarify the question.

The scientist, in answers to any one

of the three questions, is described as someone who works for very long hours in his laboratory and/or as someone who may have to travel to distant places. In describing the kind of scientist they would like to be or to marry (question II), students then describe one who "keeps regular hours" and who "has time for his family," and so on. In describing the kind of scientist they would *not* like to be or to marry (question III), the students write about the kind who is "always in his laboratory," who "has to travel," or who "has no time for his family." Thus, the "positive" and "negative" questions elicit responses which are congruent with each other and refer to a characteristic of the life of the scientist (as visualized by the students) which occurs in all phrasings of the question, but both responses indicate divergence from the picture they have of their own future, for only if, for example, the scientist—who works long hours—could work "regular hours" would science be a desirable career. Thus, however the question is phrased, the response is negative from the point of view of career choice.

MARGARET MEAD
American Museum of Natural History, New York, New York
RHODA MÉTRAUX
Cornell Medical College New York, New York

Soviet Support of Science

For a considerable period of time now the comings and goings of Sputnik have dominated the news. Their implications were discussed in a recent editorial in *Science* [**126**, 803 (1957)]. Although the Russian achievement has caused great surprise all over the world, American scientists and officials have properly noted that the U.S. satellite program will shortly be in a position to close this gap in scientific accomplishment. However, there is a much more serious implication to the Russian satellite which has received little attention. And that is the question of how Russian science has been able to produce, in quick succession, hydrogen bombs and atomic plants, jet transports and super jet bombers, as well as the intercontinental ballistic missile and the satellite.

It is perhaps obvious to say that these accomplishments are not mere coincidence but instead reflect the support given science and science education in the U.S.S.R. It is this program of support which is the important reality behind the spectacular break-through of Sputnik, for since its inception the Soviet government has regarded the training of scientific and technological personnel as its *key problem*. The Russian solution