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.

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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

for this problem is based on the following:

1) The government subsidizes completely the training and education of scientists. The more capable the student is, the greater the subsidy given him. As a result, scientists are now being trained at a rate four times our own rate, and the U.S.S.R. will shortly have greater resources of technical personnel than the rest of the world combined. [C. E. Simmonds, *Technical Education in the U.S.S.R.* (Society for Cultural Relations with the U.S.S.R., London, 1957)].

2) The salaries for scientists are in the highest income brackets. The discoverers and purveyors of knowledge (such as the knowledge that made Sputnik successful) receive higher pay than the directors of the factories in which this knowledge is applied. For example, the director of a Metallurgical Institute may receive $200 per month more than the directors of the factories served by the institute, while a professor in the same institute can receive a greater salary than the chief engineer at the plant. ["Report of the Delegation of British Engineers," *Publs. Inst. Mech. Engrs.* (London, 1957)].

3) There is no stint on the provision of permanent research facilities free from the threat of curtailment with each new budget. Consequently, established scientists do not need to seek administrative posts in order to guarantee family security, while capable young scientists are not plagued by the uncertainty of temporary positions and curtailed funds.

4) Research institutes seem to be provided with 5-year budgets, improving continuity and freeing creative effort from the drain of yearly renewals and reports. The impact of this increased stability on the fundamental program is, of course, obvious.

5) Research arrangements are directed toward reducing the useless work performed by scientists and increasing the application of brain power to fundamental problems. Technicians and laboratory assistants trained at the B.S. level and specialized in laboratory skills are available in large numbers; it is common for each responsible investigator to have four such assistants.

6) Last but very far from least, scientists and in particular academic personnel are accorded prestige second to none. The president of the U.S.S.R. Academy of Sciences is regarded as a national hero along with the top political leaders and leading artists, with all levels of scientific personnel receiving commensurate recognition.

In the light of these considerations, the Sputnik is hardly to be viewed as a spectacular break-through but rather as an early harvest of unlimited support for science. Needless to say, future harvests of this type can quickly end Western technical supremacy. In the final analysis, however, it is not the relative position as such that matters, but the underlying relation between living standards, technological progress, and the quantity and quality of scientific research. Although no simple equation covers these relations, fundamental advances in science are certainly a *sine qua non* for rapid progress in a technological age. A national policy which fails to recognize this can result only in a population ideologically unprepared for the accelerated impact of technology and, therefore, incapable of developing adequate resources of creative power.

Irrespective of how little one may like the Soviet political system, and without in any way proposing that this country duplicate the Russian approach to the relationship of science and society, the major challenge of bold steps in this direction must be met by purposeful planning, beginning now.

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