Letters

Science and Human Welfare

The statement of the AAAS Committee on Science in the Promotion of Human Welfare [*Science* **132**, 68 (8 July 1960)] is an admirable delineation of the crisis facing the scientific community in its relation with the general public. Mutual misunderstanding and lack of trust detrimental to both science and the people has evidently reached a level which makes remedial action rather urgent. Undoubtedly, both parties were at fault in creating this situation. Yet, subjected to severe pressure from the immense power generated by the scientist's discoveries, the public could hardly be blamed for considering irresponsible his disclaimer of any special competence for making decisions on the use of this power. Nor could the scientist help judging the public immature when its decisions on complex scientific matters were often based on partial or unproved information.

To remedy this schism the AAAS committee urges scientists and scientific organizations, as producers and custodians of scientific knowledge, to assume the obligation of imparting such knowledge to the public. Unquestionably, the committee understands that such a policy may involve these organizations in rather violent controversy, when some powerful political leaders with vested interests in particular governmental agencies are especially desirous of keeping certain facts from the public. Such politicians do not always conduct these controversies in accordance with the scientific principles of intellectual honesty, scrupulous integrity, objective and free speculation, and open communication. On the contrary, the usual process involves manipulation of public opinion by innuendo, half-truth and outright distortion of fact. Confronted by these conditions, the large scientific societies, in the past, found it safer to avoid entering public discussion on controversial matters. Fortunately, it is now recognized that this avoidance reaction was an abdication of social responsibility.

The AAAS could advance the objectives of its own committee by taking a vigorous position on such a scientific issue now before the public: Senator Dodd's demand, under threat of a contempt citation, that Linus Pauling hand over the names of all scientists who helped gather petitions against atom-bomb tests. The senator may be acting on behalf of men in the United States Congress who were annoyed by Pauling's success in disseminating widely the dangers of continued testing and by his effectiveness in raising the question of banning such tests to a public issue of widespread concern. Furthermore, these legislators seem determined to make any future action of this type as difficult as possible by generating the fear, particularly among young scientists, that participation on the wrong side of these controversial issues may place one's career and livelihood in jeopardy.

Since unhampered speculation and open communication are at the very foundation of the scientific tradition, the AAAS—as spokesman for the scientific community—should protest vigorously against the harassment of Linus Pauling by the committee of the Senate and the hunting down of dissident opinion by committees from both houses of Congress. For it is becoming more and more apparent that the atmosphere generated in this country by the activities of these committees has not only hampered the nation's scientific advances but has also sapped its democratic vitality.

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Small High Schools

In a letter to the editor [*Science* **131**, 1560 (1960)] Barker makes the point that small high schools "produced their full quota of scientists in 1957 and 1958." If all other variables are controlled, which is unlikely, the implied argument is that since it turns out its quota of scientists, the small high school is an adequate educational institution. This argument defends the small high school on the basis of the record of a small proportion of its graduates, potential scientists. It is quite possible that it does not make too much difference whether a high school is small or large as far as disciplines heavily dependent on the traditional academic curriculum and on high intellectual ability are concerned. Bright youngsters may learn mathematics, science, English, and the like in a high school of any size, provided instruction and facilities are fairly adequate.

But Barker's implied argument ignores the large mass of children who are of average and less than average intelligence. It is these children (as well as, perhaps, the more gifted children) that the small high school may not be serving adequately. The modern high school needs a variety of courses and activities —courses in languages, typing, home economics, citizenship, and elementary probability and statistics, extracurricular activities, and the like—which a small high school usually cannot offer. To a relatively gifted youth who is going to

specialize in science, the lack of such educational and social experiences, while regrettable, may not be very serious. But to a less gifted youth, and especially to a youth for whom high school is the limit of his formal education, the poverty of curriculum of the small high school is probably serious.

Like Barker, I would like data on how students from small and large high schools turn out. But I suspect that adequate data will be very hard to come by, due to the great difficulty of controlling independent variables in educational research of this kind. (An example of one of the most serious difficulties is the factor of individual selection: the bright child may be selecting the small high school, the private school, and the small college.) At any rate, of all citizens, scientists should be circumspect in their judgments and pronouncements on the relative merits of different types of education and educational institutions.

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Ancient Tobacco Smokers

The persistence of alkaloids in plant tissue 1300 years old has been reported by Raffauf and Morris [*Science* **131**, 1047 (1960)]. They reported a test for alkaloids but did not identify the substance present in tobacco samples. These samples were obtained from Indian caves in northern Arizona.

We have examined samples from the same archeological excavations (*1*). Microscopic and chemical investigations have shown that tobacco, presumably *Nicotiana attenuata,* was smoked by the Indians in pipes. Chromatographic and spectrophotometric analyses have established that nicotine was present in both loose tobacco and pipe dottel. The persistence of an alkaloid over such a period of time is remarkable, as Raffauf and Morris stated.

We believe our data are the oldest documented evidence for the smoking of tobacco (approximately A.D. 650) (*2*).

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References and Notes

1. The samples were kindly submitted by Dr. Morris.
2. V. Johnson, J. C. Holmes, F. L. Gager, Jr., "A study of the history of the use of tobacco," paper presented at the 13th Tobacco Chemists' Research Conference, Lexington, Ky., 30 Oct. 1959.