ventional standards, these demonstrations are acceptable (except for the second Bitterman, Wodinsky, and Candland experiment, in which conventional use of the *t*-distribution reveals a probability significantly higher than matching), but if Behrend and Bitterman wish to establish new standards, they should adhere to them.

8. I will take this opportunity to correct an error of transcription which appeared in my report. The Kendall *W* had 2 degrees of freedom, not 18.

Tobacco and Health

The report on the formation of the Tobacco Advisory Committee [*Science* **136**, 972 (1962)] raises some questions concerning the role of this committee.

As stated by the Surgeon General, the mission of the committee is to "make whatever recommendations may be appropriate" regarding the tobacco-health problem. The practical effect of such vague and general instructions may be to insure a long period of delay before the committee can tackle its main job. The unofficial goal, as reported in *Science*, is "to move the government off center on the tobacco issue without delivering too severe a jolt to the tobacco industry." While this implies an interest in protecting the American public against the health hazards of tobacco, it suggests as great or even greater concern for the welfare of the tobacco industry.

What useful purpose can be served by another committee to "study" the tobacco and health issue? The subject has already been studied by at least ten official and voluntary research and health agencies. Studies have been made in the United States, Canada, Great Britain, and the Netherlands, and by the World Health Organization. In 1959 the U.S. Public Health Service reviewed the matter. All these studies came to similar conclusions: tobacco (particularly cigarettes) constitutes a serious health hazard for its users. In addition to its role in lung cancer, tobacco plays a role in cardiovascular and other diseases. It is doubtful if a Tobacco Advisory Committee review could add much to the excellent summaries already available—particularly the most recent one by the Royal College of Physicians of London [*Smoking and Health* (Pitman, New York, 1962)].

Since the evidence concerning smoking as a health hazard has been assembled, summarized, and presented so often in the past, there is little excuse for a long delay in answering the question: Is there sufficient health hazard from smoking to justify doing some-

thing about it? Allowing at most a month or two for preparation, if this committee means business it should be able to reach a decision on this question in a 3-day meeting. But *Science* reports that at his news conference President Kennedy stated that the study would "take some months or go into 1963."

The new committee was set up in response to the pressures generated by public health action abroad—especially in England—and by newspapers and magazine articles at home. The reawakened public interest in the tobacco and health problem will diminish and die down if the committee stalls for 6 months or a year. The composition of the committee seems ideal for such delay. The Surgeon General has announced that "previously uncommitted scientists" would be appointed to the committee. This "sounds good," but its practical effect is to eliminate the scientists who have had first-hand experience with the major surveys and studies on tobacco and health. Indeed, the controversy has dragged on so long and the evidence presented has been so voluminous that there are very few experts in this area who have been unable to make up their minds about the matter. But while the scientists are supposed to be "uncommitted," the tobacco industry, according to the *Science* report, is to be directly represented on this committee.

Although the first major papers on cigarette smoking and lung cancer appeared in 1950, little public action to control the health hazards of tobacco has been taken in the United States. A conservative estimate of the price of this delay is a quarter of a million unnecessary deaths (and the accompanying suffering and economic loss). This delay is *not* happenstance. The tobacco industry has mounted a well-organized and well-financed public relations campaign. The industry experts have developed obfuscation and special pleading into a fine art. A good example of the use of irrelevant and incompetent material to confuse the issues can be found in the industry publication, *Tobacco and Health*. This propaganda bulletin is a very clever imitation of a scientific publication. If given an opportunity, the industry public relations experts could stall the Tobacco Advisory Committee "into 1963" or indefinitely.

In view of the ambiguities and questions concerning the role of the committee, the scientists serving on the committee will bear a double burden. Apart from their official responsibilities they must see to it that the committee is not used merely as a device to cushion the industry against "too severe a jolt." If the committee is unwilling or unable to reach a prompt decision on the health hazards of tobacco—a decision that can lead to effective public health action on this issue—then those scientists who put the public welfare before political or personal considerations should either vote to dissolve the committee or resign from it.

There is an important role that the Tobacco Advisory Committee *could* play—one which would not merely duplicate the activities of the previous committees and commissions. The new committee could move on to the crucial question: What measures are likely to be effective and feasible for reducing the harmful effects of smoking (of cigarettes, in particular) on our population? The question of preventive measures broadens the area of inquiry. In addition to the material relevant to hazard, it brings in the viewpoints and findings of various medical and behav-

ioral disciplines related to public health (for example, epidemiology, sociology, psychology, and public health education). We hope the committee will include in its membership persons competent to advise in these areas, and that the committee will devote its major efforts to considering what can be done to meet the complex problem of minimizing the health hazards of tobacco.

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Martian Antifreeze

Reading Frank R. Salisbury's highly stimulating "Martian biology" [*Science* **136**, 17 (6 Apr. 1962)] made me feel again the importance of interdisciplinary communication. Although Salisbury did not mention it, glycerol may well be an extremely important element in the metabolism of living things on Mars, where the temperature alternates between freezing and thawing each night and day. Glycerol is a product of glucose metabolism and is formed in large amounts by certain microorganisms and even by some insects. Its ability to protect cells, tissues, and protozoa against damage from freezing to low temperatures is well known, and indeed it is used routinely in the preservation of spermatozoa and red blood cells [see, for instance, A. U. Smith, in *Biological Applications of Freezing and Drying*, R. J. C. Harris, Ed. (Academic Press, New York, 1954), pp. 1–62]. It is tempting to speculate that glycerol, ethylene glycol, or some similarly acting compound may protect the Martian organisms during their nightly freeze to —100°C and leave them free to metabolize when they warm up in the daytime.

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The interesting suggestion by Levine that glycerol might provide the necessary protoplasmic antifreeze for survival during the Martian night is certainly a good one. I have often thought in terms of such protoplasmic antifreezes but lacked the specific information cited by Levine. Because of this it had seemed more likely to me that Martian "plants" might simply freeze and survive the freezing, but at this