LETTERS

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pendent scientific experts and any professional unit that oversees the work of the panel. It was the judgment of these reviewers that the RDA panel's suggestions for modifying the recommended levels for certain nutrients were not justified by the scientific evidence presented. The panel was apprised of these detailed criticisms—over 130 pages in all. However, the panel's responses satisfied neither its parent unit—the Food and Nutrition Board—nor the officers of the National Research Council.

Regrettably, the flexibility claimed in Kamin's letter was not apparent during lengthy discussions between him and various representatives of the Research Council in intensive efforts to resolve certain differences of scientific opinion. The suggestion that the RDA's for vitamins A and C were the pivotal points for my decision is misleading. At one stage, focus was indeed placed on vitamins A and C on the *assumption* that all other major issues had been resolved. Resolution of the RDA's on vitamins A and C was part of a series of major subjects that needed attention to bring the draft up to the standards considered acceptable for NRC reports. The crux of the matter is not whether the RDA's proposed by the panel were higher or lower than the current ones, but whether these proposals were based on strong scientific evidence and sound logic. It was the latter that gave the Research Council and its reviewers serious cause for concern.

Robert Olson was neither a part of the panel nor party to the review process. His letter contains unverified assertions about the NRC's decision, selective citations, faulty characterization of the review process, and unjustified attacks on members of the Food and Nutrition Board. All Research Council professional units are periodically examined for balance of expertise and viewpoints. The current Food and Nutrition Board is a broadly constituted, well-balanced group of experts from academia and the public and private sectors.

Kamin, Olson, and others who take issue with the Research Council's process of decision-making appear to reject the most basic tenet of American science—the peer review process. Despite months of deliberation and discussion, the panel's draft did not pass the scientific peer review and achieve the standards expected of Research Council reports. Under these circumstances, it is in the best interest of the scientific community and the public for the Research Council to establish a new panel charged with producing a report that can, like all our reports, withstand a rigorous scientific review.

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Understanding Science

Daniel E. Koshland Jr.'s eloquent call for "Scientific literacy" (Editorial, 25 Oct., p. 391) is testimony that the AAAS has not done enough with the old *Scientific Monthly*, the new *Science 85*, the radio broadcasts, the internship program with the media, the congressional fellowships, the museum displays, and so forth. Why not try organizing and financing a cadre of retired scientists and educators to advance the understanding of the scientific enterprise? There are many willing and able to capture attention and motivate and sustain interest. They are ready; working scientists are probably too busy.

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The scientific illiteracy described so cogently by Koshland in his 25 October editorial is really a general and massive failure of our public education system. An adequate understanding of logical thinking and methods of inquiry does not require specialized scientific and mathematical training per se. The concepts of the scientific method, experimental design, nature of risk, and even chance, probability, and statistical inference are essential elements of any reasonable education. They were so regarded (as part of Natural Philosophy) right through the last century. All are best grasped in the early formative years of elementary and secondary school.

The concepts do, however, have to be communicated by committed and dedicated teachers, a "species" in real danger of extinction. In addition to inadequate remuneration (elementary and secondary school salary scales are well below those of clerical, laboring, and service occupations), psychic and status recognition awards from society are also generally at an all-time low. Would any of our modern-day social-hero role models (entrepreneur, financier, engineer, or scientist) advise their children to be public school teachers?

Although some local community and state actions are under way to redress this situation, more than token national leadership is needed. At the very least it should be equivalent to the kind demonstrated in the formation of the U.S. Public Health Corps during that crisis in U.S. history.

Why doesn't the AAAS itself take the lead by sponsoring an adequately prestigious Teaching Corps, with high status and recognition, for exactly this service in our public schools?

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Koshland's editorial describes the problems related to scientific literacy accurately and well. The logic behind randomized, replicated experiments deserves more recognition as a major step in the progress of science. R. A. Fisher (*1*), an architect in the field, wrote that these concepts were ones involving "questions of the right use of human reasoning power, with which all intelligent people, who hope to be intelligible are equally concerned"; scientists obviously need to know about the principles of scientific inference, but also "equally no other thinking man can avoid a like obligation."

The thought that the models we use are approximations could be incorporated into the teaching of science from the start. Not only nonscientists but scientists themselves need to become more aware that we make only successive approximations of the Truth, and we never arrive at it.

The arguments for proper controls and the need for replication seem almost obvious. The principles, however, are not always appreciated. Unfortunately, the example used in Koshland's excellent editorial proves the point. Dividing students into two classes, one to be taught the new math, one the old math, leaves us with two units—classes—one assigned to each treatment—method of instruction. There is no way to estimate experimental error, no replication of units treated alike. The people who denounced this plan because it was a "lottery with students' lives" did the right thing for the wrong reason. It was not good science.

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References

1. R. A. Fisher, *The Design of Experiments* (Hafner, New York, 1960), pp. 1 and 2.