the issue is more complicated. Consider, for example, advertisements for books. There are books that are above reproach, that would be enthusiastically praised by any reviewer—serious, well-written scholarly works, or carefully thought out, inspiring textbooks. Other books are clearly "bad books" that any informed scientist would label as "pseudoscientific."

Not every book, however, falls conveniently into one of these two groups. It would clearly take a multidimensional graph to plot the quality of books, but there is surely a continuum between good books and bad books. What does one say about an ad for a book that contains a few wildly speculative and irresponsible claims combined with a large number of new and apparently valid insights? What about the badly written, confusing textbook that encourages rote memorization and number-plugging, but contains no demonstrable errors of fact? Is the electromagnetic theory text that makes this beautiful subject into an undifferentiated boring collection of formulas any less dangerous to the minds of our students than one that is unambiguously pseudoscientific?

There is also, of course, a continuum in the quality of submitted manuscripts, but at the *American Journal of Physics* we make an attempt to provide a careful description of what our policy is, and we have an elaborate and time-consuming refereeing system to provide advice to the editor. Unless we are to set up a refereeing system for ads, so that every advertised book is in some sense vouched for by the editor, I do not see how I could refuse an ad for a book that is at least tangentially related to physics. Similar considerations apply to ads for other products; does the editor of *Science* guarantee the specifications of every measuring instrument advertised in its pages? This is not quite a "free speech" issue, but I would feel extremely uncomfortable if I were to reject an ad simply on the basis of my own reaction to the advertising copy.

There appears on our masthead page every month the following notice.

> It is the policy of the American Association of Physics Teachers that the Editor of the *American Journal of Physics* has responsibility for its content. The Editor has the right to refuse an announcement, advertisement, or other material he or she deems inappropriate. Acceptance of an advertisement, announcement, or other material does not imply endorsement by either the American Association of Physics Teachers or the *American Journal of Physics*.

Although I helped write those words, I intend rarely if ever to exercise that right. [Perhaps it is fortunate for my readers that I had in hand the manuscript for Martin Gardner's stimulating essay on realism—*Am. J. Phys.* **57**, 203 (1989)—before he learned of my stance on this issue.] I can imagine ads I *would* refuse, for instance ads containing language or photographs that I considered blatantly sexist or racist; but it is my present intention not to refuse advertisements, even for books that I know should never have been written and ought never to be read. (I must confess that in the current issue of *Discover* I found ads that would severely test that intention!) Nor do I have any intention of setting up a refereeing system so that we could fairly discriminate between one proffered ad and another; my reviewers and I have quite enough to do trying to make sure that fair and correct decisions are made with regard to submitted manuscripts.

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Grand Canyon Haze

Mark Crawford (News & Comment, 23 Feb., p. 911) does a creditable job of succinctly describing the complex issues surrounding the Environmental Protection Agency's (EPA's) attempts to force scrubbers on the Navajo Generating Station (NGS). It may be of further interest to explain why these issues are so complex. The basic reason is that EPA is in effect looking for a "needle in a haystack" by virtue of trying to implicate a source that at worst, may have an impact on visibility in the Grand Canyon that is so small as to be imperceptible by humans.

Simple but impressive tests have not been able to show any significant link between visibility in the Grand Canyon and power plant operations. In one such case (*1*), shutdown of a large, coal-fired power plant (the Mohave Generating Station) for over 6 months (in 1985) did not produce a detectable effect. The Mohave plant is located approximately 70 miles southwest of the Grand Canyon. At the NGS, observation of the fluctuating emissions over a continuous 4-year period (1984–1988) has also shown no correlation with visibility variations, as measured in a cooperative research program with the government (*2*).

While the massive experiments required to detect and quantify the small impact of the NGS may be grist for statisticians' mills for many years to come, we are in danger of losing sight of the real issue—haze in the Grand Canyon. Haze has always been present at times in the Canyon, but in the post–World War II years it increased, particularly in the summer months. Research clearly demonstrates the dominant impact of urban

haze wending its way eastward and northward passing across the Colorado Plateau (*3*). This phenomenon has not changed noticeably during the past two decades.

Some environmentalists would like to think that resolution of urban air pollution and national park visibility problems can be handled independently of one another. This would require a greater power than that of the legendary King Canute—perhaps even greater than that of EPA. Obviously, no ordinary power on Earth can successfully legislate or regulate the prevention of atmospheric transfer over large distances. Lack of understanding of this principle and its corollaries has been foisted on legislators and regulators who pass and attempt to implement laws prohibiting "any" degradation, or "any" impact upon precious environments. This results in the government's wasting its attention (and the public funds) on turning insignificant impacts into pyrrhic environmental victories while the real problems remain.

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REFERENCES AND NOTES

1. L. C. Murray, R. J. Farber, M. Zeldin, W. H. White, in *Visability and Fine Particles*, C. V. Matha, Ed. (Air and Water Management Association, Pittsburgh, PA, in press).
2. Data collected under the SCENES program. These data may be obtained by anyone interested, by writing to me, c/o The Salt River Project, Post Office Box 52025, Phoenix, AZ 85072.
3. C. Shaver, *Air Quality in the National Parks* (*Natural Resources Report 88-1*, Department of the Interior, Washington, DC, 1988).

In the matter of determining the sources of Grand Canyon air pollution, simply tracing the pollution plume by light plane is effective and unequivocal in many meteorological conditions. I made considerable use of the technique in my study of the air pollution in the Four Corners states caused by a coal-fired power plant (the Four Corners Plant) near Farmington, New Mexico (*1*). From the air the plume appeared as a dirty brown river easily followed for hundreds of miles.

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REFERENCES

1. J. J. Devaney, *Phys. Teach.* (September 1978), p. 358.

Crawford's article about the Grand Canyon visibility pollution controversy describes only the tip of the iceberg. I have been an interested observer of the whole fiasco for several years as a member of the SCENES subcommittee on meteorology.

The deuterated methane data are probably suspect because large releases of this material have been made in the Four Corners area, and it has not been shown that this heavy hydrogen form of methane is not involved in the local biological cycle.

Further, it remains to be explained why the sulfate concentrations increase northward, with the highest concentrations tending to be in the Canyonlands area. But the principles in the ownership, the Navajo Generating Plant, the EPA, and the National Park Service, concentrate their observing networks around the Four Corners area and the periphery of the Grand Canyon.

It is a continuing source of amazement that all of the conclusions have been reached despite the almost complete lack of measurements inside the Grand Canyon and Canyonlands national parks. Heavy reliance is placed on computer models that have not to date included the topography of the Grand Canyon, Canyonlands, or the general Colorado River canyon.

The principles on both sides of this controversy have been in an aggressor-defender posture for many years. As a consequence, the studies have been directed toward an attack-defense of the power plant rather than on the real problems. The public has been ill-served by both sides.

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