

LETTERS

▷ It is time limited.

▷ It is the only place in the Constitution where the word "right" occurs. Remarkably enough, this right was overlooked by Alexander Hamilton in his enumeration of Constitutional rights and has therefore perhaps been neglected ever since as a right of profound, general significance.

Article I, section 8(8), is also unique in that it is the only clause in the Constitution or in its amendments that directly encourages any branch of learning. And it represents a precocious appreciation of the importance of science to the useful arts, which today we take for granted.

The role of this trebly unique "right" in encouraging self-expression and as an incentive to economic development can be particularly gauged today in comparisons with contemporary systems that lack this right or have it in varied and often diminished forms. By providing the basis for various forms of intellectual property (patents, copyrights and trademarks), article I, section 8(8), laid the Constitutional basis for the creativity and viability of the American experiment, for its material and scientific progress, and for its military security. The results of its incentives now extend to the entire globe through trade and technology transfer, and in the last 200 years they have produced benefits to health and well-being without parallel in the history of man on this planet.

Nothing appeared in PHYSICS TODAY in the year of the bicentennial of the Constitution about the relationship between science and the Constitution except for one news story (November 1987, page 43) in which it was asserted that "the Constitution doesn't mention" science and technology! During the bicentennial year the distinguished patent attorney Tom Arnold, of Arnold, White and Durkee in Houston, Texas, and I urged the Bicentennial Commission to publicize the impact the Constitution has had on science and invention. The only effect we had was the incorporation in the registry of the commission of an abstract of a 2000-word paper by me titled "Science, Invention and the Constitution." I will be happy to send copies of the paper to interested parties.

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In Science Education, What's Fair is Fairs

I was very interested in your September special issue on pre-college educa-

tion. Though a wide variety of aids, tools and programs for teachers and students were described therein, one activity was not mentioned: the ever growing arena of student science, engineering and invention fairs held each year from grade school levels through to international competitions among high school students. As a product of the science fair system, I can say that it was highly motivating, challenging and rewarding. I chose science as a career based on those extracurricular science activities. The science fair process uses many of the instructional concepts described in the September issue: It offers hands-on experience, is self-paced, is available each year for refinement and advancement of projects, and affords a competitive opportunity for recognition and reward. It allows me, as a scientist today, to contribute to pre-college education without teaching by being a judge, encouraging students with good presentations and serving on science fair committees. Judging by the growth of fairs over the years, I believe they will continue to prosper and expand as scientists, technical corporations, teachers and the media discover the tool and educational outlet they offer.

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10/91

Greenhouse Effect Evidence Debated

I have just read in the July 1991 issue (page 82) Raphael Kazmann's response to readers' letters concerning his earlier letter on global warming (July 1990, page 13). The lack of detailed agreement among global circulation models, the dispute over the effects of different types of cloud, the disagreement among various local temperature indicators and so on are often used as fuel in arguments not to proceed with expensive programs to control the release of greenhouse gases. Kazmann states that "the world's people have already had enough trouble... without embarking on worldwide economic changes based on a hypothetical cause [increasing greenhouse gas concentrations] and effect [rising global temperature]."

While the presence of a correlation cannot be taken as proof of cause and effect, the practically one-to-one relationship between CO₂ concentration and atmospheric temperature during approximately the past 150 000 years¹ cannot be ignored. Whatever

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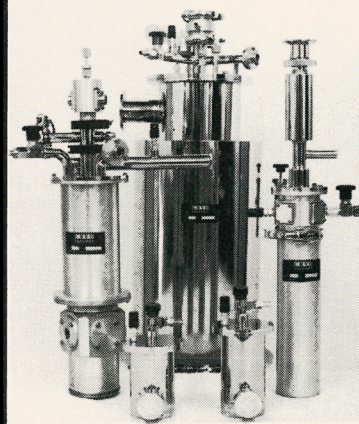
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