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enumerate all the analogies in the physical and social sciences, but perhaps I have conveyed the idea that the two branches are not so different but what they can borrow from one another. It would be a wonderful thing if groups of researchers could be supported in universities and research institutes just to study and search for the fundamental laws governing social dynamics. It is hoped that such groups would not be restricted to the responsibility of enhancing the profits of any particular corporation or the immediate needs of any territory. Although these ideas are not new, this letter might add impetus to movements already underway.

DAN MCLACHLAN, JR
Ohio State University
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8/18/78

Scientists' public image

In George Abell's review of *Scientists Confront Velikovsky* (August, page 56), he mentions the frustration of scientists because Velikovsky was ever taken seriously, and, I think, correctly assesses the scientific community's reaction as one of bewilderment: "Where have we failed?"

That question has troubled me for some time. After 22 years in industry as physicist, program manager and chairman of an industry standards-writing section, I set up my own consulting business and fell to a serious examination of issues and trends in areas where science, technology, government and the public interact. Recent projects have included electronic mail, wideband communication and the evolution of home terminals.

I have observed that the issue of scientific credibility is often raised. Whether it is mandating flame retardants for infant clothes and having them found carcinogenic, or increasing filtering of grain dust and then facing five granary explosions, the public is ready to associate an element of amateurishness with the technology community that is really not deserved. Nevertheless, lives were lost, and the public, with a marvelous *ad hoc, ipso facto* intuition and a jaundiced eye for academic arrogance, racks up another point for taking any scientific pronunciamento with a grain of salt.

Abell has put his finger on a sore point. While of course doubt and suspicion are healthy challenges to scientific inquiry, the public's healthy doubt about scientific infallibility has rather badly overshot. Why?

It seems to me the root problem involves the professionalism with which scientists speak to the public. It has been said that J. Willard Gibbs never wrote or said anything that isn't still so. While that may be an impossible goal, it ought always to be in the scientist's mind when he or she speaks to the public.

When a scientist speaks to the public, the words are clothed with all the aura of the speaker's scientific credentials. In time, the public comes to judge the scientific credentials themselves by the enduring values it sees in the words. When a J. Willard Gibbs says something about equilibrium or thermodynamics, he knows whereof he speaks, and the scientific aura glows with credibility as time elapses and the words prove still to be true.

The problem, I think, arises when scientists speak as though with *ex cathedra* authority on subjects not within their realm of special expertise. It arises if a famous scientist with high integrity and credibility in his/her field of achievement speaks out on a social problem, on criminal justice (capital punishment), inelastic military collisions (Vietnam), a pet recipe for peace, or fetus morality, and does not make clear that in this exercise of the citizen's right of free speech, he or she is speaking out as an amateur and citizen, and not as an authoritative scientist.

The sophisticated distinctions between the *ex cathedra* scientific statement, and the layman's social pronunciamento, escape and confuse the public. So when a Velikovsky speaks out in a scientific matter which he knows not of, the public must evaluate the scientific community's protestations of absurdity by a yardstick of value judgement drawn against everything that any scientist has said lately that hits the press. If much of the association with famous scientific names has to do with social matters outside the scientist's personal area of recognized competence, and if the public has reservations about the infallibility of these social pronouncements, then these doubts will probably carry over to the *ex cathedra* comments as well, even when they fall cleanly in the area of the individual's expertise.

The erosion of trust in scientists on matters of controversy has probably occurred because there have been so many cases of scientists who have not clearly distinguished between *ex cathedra* and amateur statements. Perhaps a famous scientist should use a nom-de-plume when speaking out on social issues not directly related to his/her field of competence. At least there should be qualifiers and modest disclaimers that amputate the aura of scientific authority when the scientist wishes to remove the halo and speak out at an unprofessional level.

I am not a social scientist. I disclaim special expertise in assessing why the public is suspicious of revealed truth from scientists. It is not a matter of facsimile communications, or wideband, or displays, or electronic mail, so I have no special expertise in what I am saying. As

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just an ordinary citizen who happens to have belonged to The American Physical Society for 33 years, I suspect that promiscuous use of the professional cloak in speaking out on non-physics problems is "where we have failed" in the area of credibility with the public.

GEORGE M. STAMPS
GMS Consulting
8/21/78 *Westport, Connecticut*

On second reading

In my review of *Scientists Confront Velikovsky* (August, page 56), I questioned whether J. Derral Mulholland could have meant to say that the number of days per year could have varied as much as 1 or 2 percent during recorded history. Velikovsky, in fact, had proposed even more drastic changes in the Earth's rotation rate within the past 3000 years, and as I read Mulholland's discussion I assumed he was also speaking to the possibility of such variations during historical times. In fact, however, Mulholland was referring to the possibility of such changes over geological times (say, the past few hundred million years), as is clear from a careful reading of his following paragraph (page 109 of *Scientists Confront Velikovsky*). I had read too quickly and misinterpreted his meaning, and I apologize for the error.

GEORGE O. ABELL
University of California
9/21/78 *Los Angeles*

Image slicers

Nathaniel Carleton and William Hoffmann, in their interesting article on the Multiple-Mirror Telescope (September, page 30), state "However, the practical difficulties of these devices [image slicers] are such that they have seen little actual use." This is perhaps a tongue-in-cheek statement, appearing as it does in an article describing a telescope with "21 electromechanical servos", "51 interacting parameters," and at least 73 optical elements. An image slicer is a simple and practical device. Their rarity is due almost entirely to the conservatism of astronomers, combined with a folklore that leads to statements like the one quoted. Slicers were reviewed[1] a few years ago in a book edited by Carleton himself. Richardson slicers, which can be used in beams of small f-number, are in fairly wide use For slower beams, the elegant Walraven slicer[2] (a solid-state equivalent of the Bowen device) can be highly recommended. I have no doubt that the "telescope slicer"[1,3] proposed for the MMT will also work, but it is more complicated than an image slicer and will have its own practical difficulties. I would not be surprised to see an image slicer on the telescope before long.

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1. D. M. Hunten, in *Methods of Experimental Physics* **12A**, *Astrophysics* (N. P. Carleton, Ed.) Academic Press, New York (1974).
2. Th. and J. H. Walraven, in *Proc. ESO/CERN Conference on Auxiliary Instrumentation for Large Telescopes* (1972), page 1975.
3. W. G. Fastie, Appl. Opt. **6**, 397 (1967).

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University of Arizona
10/19/78 *Tucson, Arizona*

Boycott anti-ERA states?

In a letter published in September (page 13), Robert Rubin asks why The American Physical Society hasn't taken a position on the matter of holding meetings in states (presumably not holding meetings there) that have not ratified the Equal Rights Amendment. And he asks why there has been no discussion on this question in PHYSICS TODAY.

Maybe this is because there are after all still a few level heads in the leadership of the APS. But according to a recent newsletter, the Division of Particles and Fields is now considering such a position; so I can imagine that the political activists, and also those who look to Washington to solve all society's problems, have long been itching for the APS to raise its banner in this knightly effort.

I strongly oppose the APS's taking any position on such a matter as the ERA because I don't think that this issue has anything to do with the purposes for which the APS was organized. If an APS member is discriminated against then it is appropriate for the APS to express itself and to act thereon. But this is quite a different matter.

Granted the desirability of the goal of the ERA, individuals certainly differ on the appropriateness of the ERA as the proper means to achieve that goal. This is a social and political question and as such has no connection with the reasons that I, and I think most others, joined the APS. I do not think that the APS should even be commenting on such issues let alone be acting on them.

In fact I resent the zealotry of those who inject a divisive social and political issue into an organization whose purpose—the pursuit of physics—should cut across all such questions. There are ample forums for those concerned with social and political matters to pursue these concerns.

W. MOELLERING
10/17/78 *Cincinnati, Ohio*

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Robert Rubin asks why the APS has not taken a position on the proposed Equal Rights Amendment, yet he answers his own question when he quotes the APS constitution that the "object of the American Physical Society is the advancement and diffusion of the knowledge of physics."

The APS has neither the obligation, the authority, nor the ability to solve all of society's problems. We should stick to our declared objective, and not dilute our efforts on unrelated issues.

JAMES POTZICK
National Bureau of Standards
9/28/78 *Washington, D.C.*

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With reference to the letter of Robert Rubin, I would like to suggest that the function of The American Physical Society is not and has not been to take such positions as suggested by Rubin on such matters as ERA. I believe that this was clearly expressed by the membership of APS with regard to the "Schwartz Amendment" of a decade ago.

It might be of interest to recall that members of APS reside in the states who by legal process have chosen to not ratify the ERA. It may also be that members throughout our country have varying views on the wisdom of this particular amendment. To suggest that the APS consider boycott of any region of the United States because of political views of its citizens is offensive and absurd. Surely we do not wish the APS to take punitive action against members for exercising their rights as US citizens? To demand that candidates for office in the APS declare their personal political views on such matters as the ERA would raise questions about the purpose of the office.

I support the continued attention of APS to professional matters, to quality publication and dissemination of the advances in physics, and to public education on concerns of the physics profession. Let us tend to physics as a Society and leave the emotional, political issues to the individual.

BENNY J. HILL
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9/28/78 *Weatherford, OK*

Managing research

The series of letters on these pages (February, page 83; September, page 11) discussing management practices for research organizations raises several interesting questions. Management, whether a science or an art, is necessary for the smooth functioning of any organization. Fair and efficient application of the principle of accountability is at the core of any managerial system. This holds true both for the loose application of a traditional academic department as well as for the type of controls necessary in meeting a very specific design requirement.