

CONGRESSMAN BROWN: NOT ONE TO 'BAD'-MOUTH SCIENCE

In his Reference Frame essay "Thoughts on Being Bad" (August, page 9), Daniel Kleppner discusses recent criticisms of science by John Lukacs, by Bryan Appleyard (in his notorious book *Understanding the Present*, which Kleppner accurately describes as "a useful manual for anyone on the antiscience warpath") and by Vaclav Havel, currently President of the Czech Republic. But then Kleppner refers, astonishingly in my view, to a recent essay¹ in the *American Journal of Physics* (of which I am the editor) by George E. Brown Jr, the chairman of the House Science, Space and Technology Committee, as if it too were a wholehearted attack on what we do. Indeed Congressman Brown was criticizing us for promising more than we can deliver. But whether or not Havel was "turning his back on science," Brown was not. And I cannot accept Kleppner's overall description of Brown's essay: "To summarize his message, Brown wants scientists to stop being bad."

It seems to me that Brown's real message for us was expressed in the final paragraph of his essay, a paragraph that I find inspiring:

Finally, we must recover a spirit which has, for many of us, been lost in the endless debates over funding and priorities and competition. The promise of societal benefit through technology development is often illusory, but the potential of science to empower the human intellect is not. My personal view—subjective in the extreme—is that the ultimate enrichment of the human spirit comes from our ability to expand our realm of experience and knowledge. Scientists must seek to share the privilege of their enrichment with others, not by promising more, faster, stronger machines, but by sharing what they know and how they feel. This demands a renewed commitment to education as the ultimate mechanism for individual empowerment,

and a critical prerequisite for social justice. This is a commitment that all scientists can make, in their own backyards, starting now.

Would that we had more members of Congress who understand our aspirations as well as does George Brown!

Reference

1. G. E. Brown Jr, *Am. J. Phys.* **60**, 779 (1992).

ROBERT H. ROMER

Amherst College

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8/93

KLEPPNER REPLIES: The paragraph that Robert H. Romer cites constitutes a splendid encomium to science. And beyond writing such words, George Brown is actually fighting for science in Congress. At the moment he is defending research and attacking earmarking, for which he deserves our deep gratitude. Nevertheless, the very title of his essay, "The Objectivity Crisis," reveals that Brown has been attracted by the postmodern movement and its distorted view of science. The worldview from the postmodern bandwagon is gloomy, too gloomy to accommodate the optimism of science and, I suspect, the optimism of Congressman Brown.

DANIEL KLEPPNER

Massachusetts Institute of Technology

10/93

Cambridge, Massachusetts

Finding Novel Niches in a Poor Job Market

The lament about the lack of physics jobs continues unabated in your Letters section.

Regrettably, young physicists are loath to consider that their newly minted PhDs do not automatically confer a stress-free life of contemplative research at a fine university. Seldom do they accept that a physics degree (at any level) can provide a very firm foundation for a satisfying

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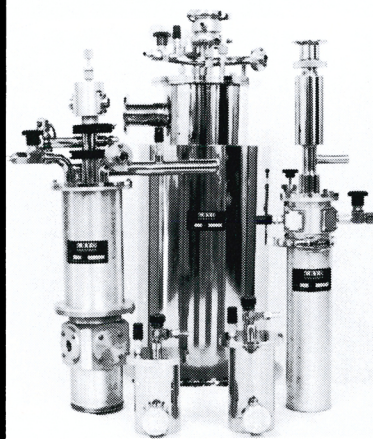
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career outside physics. In fact, studying physics provides a better foundation than most curriculums for many careers for which there simply is no obvious training ground.

The history of physicists (not the history of physics) is full of examples of physicists making powerful and useful contributions to society outside physics. Consider that radar was invented by physicists, not engineers; Francis Crick, codiscoverer of the double-helix structure of DNA, was a physicist; Akio Morita, the famous chairman of Sony Corporation, is a physicist; Paul Stern, a recent former president of Northern Telecom, is a physicist; Michael Schulhof, a current president of Sony's US entertainment subsidiaries, is a physicist. I doubt that any one of them regrets that he is not actively doing physics. But I bet that all of them treasure the analytical education that their physics degrees guaranteed.

Speaking from my experience in the University of California at Berkeley's physics department in the 1960s, followed by physics postdoctoral experience at the University of Warwick (England) and Cornell, I truly believe that the root of the persistent attitude and career problem lies with the physics faculties. Professors, by the very nature of their ingrown self-selection process, have such a restricted view of the working world at large that they convey to their students the attitude that the only true path for a PhD physicist is a university faculty job (a form of self-praise). Most physics departments also manage to convey the notion that applied work is beneath a physicist's dignity, that work in industry (with the possible exceptions of the old Bell Labs and, maybe, IBM) is like being sent to live outdoors in Siberia. The idea of working outside physics, of using physics training as a basis for clear thinking in any endeavor, is usually so remote from professors' imaginations that they do not manage even to disdain it—instead, it simply doesn't exist. And perversely, in a way they are right, because who could have counseled Schulhof that someday he might find himself president of Sony's entertainment subsidiaries? Almost no professor conveys that being a physicist is a state of mind, not an employment slot.

Consequently, after concentrating intently on finishing their degrees and being subtly propagandized for years about the true career path for physicists, most students emerge from their PhD studies totally unpre-

pared for the real, very competitive world where they must sell their abilities—possibly to someone who never expected to meet a physicist, let alone hire one.

I pity the young PhD holders who moan about the difficulty of finding career satisfaction, because they lack the broad self-confidence and imagination to see opportunities all around them.

EDWARD M. DICKSON

Advantage Quest

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5/93

I read with concern the letters from the three members of the Young Scientists' Network (May 1993, page 9). They have demanded honesty from the established scientific community about the true state of the job market. This is a reasonable but largely impractical demand. If professors—in particular the young, untenured ones—went around telling their students about the acute shortage of jobs, they would very likely lose their own. Similar statements can be made about organizations like AIP, APS and NSF. Nine years back, when I (a fresh PhD in physics) was looking for a job, the market was nowhere near as bad as it is now, but there was still a lot of frustration. There was also a need to blame somebody. But every time I thought I had pinned the blame squarely on some person or organization, it turned out that whatever they did was to preserve their own employment.

At least for physics (and maybe for other sciences as well), the major problem seems to lie in the methods of conducting funded (publicly or privately) research and development. Our society needs physicists—but not necessarily the ones that are available. It is tired of physicists who demand public funding for projects like the SSC and promise pies in the sky that are never delivered. If physicists want society to support their projects, they must give honest reasons for doing so. This is difficult, as physicists are very often motivated by the size of the possible research grant rather than the utility of the project. I once heard a particle physicist accusingly mention that another particle physics group was doing its experiments cheap. This problem is not restricted to particle physics. It stems from the fact that funding organizations, in the hope of getting better returns for their dollars, favor large and prominent research groups. To support a large group one needs more funds. So projects need to be big and expensive.

continued on page 67



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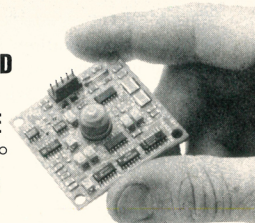
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continued from page 15

In this search for big and preferably expensive projects, we have alienated not only the public at large but also good young physicists. During my own six years in graduate school, I saw some promising graduate students leave physics to do computer science. Their decisions were not based entirely on the job market.

Acknowledging these problems does not solve the problems of unemployed PhDs in physics. Nine years ago, my personal solution was to exit mainstream physics (as many others are doing now), even though at that time it would have been possible for me, with some effort, to stay on. I joined the faculty of a small college, ignoring the opinions of well-wishers who were certain that I was throwing away a promising career. But I have never regretted that decision. Now I do "cheap" research on topics of my own interest. Because of significant teaching responsibilities, my research progresses slowly. This I don't mind, because teaching physics (in particular to nonphysics majors) is exciting. Unlike what one of the YSN members feels, I think it is important to educate youngsters about the excitement and usefulness of physics. Doing so will ensure that we have not only a more practical set of future physicists but also a set of nonphysicists who have a more positive attitude toward physics.

TARUN BISWAS

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5/93

I have rarely been so saddened as I was when I read Alexander Weissman's letter in the May 1993 issue (page 11). As a preservice high school physics teacher, I am in the process of becoming one of those people who asks young students how lasers work and why the sky is blue. To read of a frustrated PhD in physics blasting the recent awareness of the inadequacy in science education makes my heart ache. Weissman cites the "nation's true attitude toward science." Although I agree that this attitude could definitely use some major improvements, how can we expect to change this attitude if we do not educate our youth about science? They are the future politicians, industry bosses, voters and parents. Without sufficient scientific literacy, competency and curiosity, our society will surely decay. We need the creative and intellectual muscle that science builds to survive in these difficult times as well as to satisfy one of our basic human needs: to explore the unknown and try to

understand it.

Granted, the job market, especially with defense cutbacks, is extremely tough right now. This reality is not limited to PhDs in the sciences. Yet in our rapidly changing global economy, it seems that the only way we are going to succeed is to develop our scientific resources, including our future scientists. I'm investing my life in this endeavor. I also have no guarantees that I will have employment come graduation day, but the prospect of helping to expand young minds and make a difference in the world is enough of an incentive to keep me reaching for the stars.

KATHARINE HAMILTON

Oxford, Ohio

5/93

Does Turbulence Toss the Cosmic Background?

In the July issue of *PHYSICS TODAY* (page 13), complicated answers are given to a simple question. Robert J. Yaes (March, page 13) had asked why the cosmic microwave background, as measured by the Cosmic Background Explorer, does not constitute a privileged reference frame, in contradiction with relativity.

The universe is filled with a gas of photons, much as Earth's atmosphere is filled with a gas of molecules. Does the weather bureau's measurement of wind velocity contradict relativity?

An interesting question is whether the microwave background, like the atmosphere or ocean, is subject to turbulent motion. The 10- or 20-light-year sample available to us exhibits uniform motion. But would observers millions of light-years apart and servoed to be in inertial frames at rest with respect to one another all measure the same velocity with respect to the microwave background?

EUGENE SALAMIN

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7/93

Einstein-Bohr Debate Still Unresolved

Upon reading the letters concerning the "border between quantum and classical" (April 1993, page 13), I was struck by the fact that the debate between Einstein and Bohr is still alive. In that debate, the conservative (Bohr) insisted that the "quantum object" is not observed directly but influences an "apparatus" that

records the data in a "classical" fashion. The revolutionary (Einstein) insisted that when a complete quantum mechanical theory was formulated there would be no need to include a "classical apparatus" limit as an essential ingredient in the theory. Quantum theory would then stand on its own. The notion that Einstein wished to return to a classical view is a myth. However, Einstein was unable to carry out his own theoretical program.

Bohr won the debate in the laboratory, and the notion of a classical apparatus is still put "by hand" into quantum mechanics. It is unlikely that playing with reduced density matrices for the quantum object will resolve the issue, since in averaging over the "classical environment" one is throwing away the experimental data (in the sense of Bohr). It is also unlikely that any issue will be settled by theory.

What is required for progress is an experiment in which the Bohr view fails! Anything else is merely bad philosophy. Such an experiment does not at present seem to exist.

ALLAN WIDOM

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6/93

Don't Alter Courses for Women, Minorities

As a former college physics teacher, I strongly sympathize with the goals of the Introductory University Physics Project and admire the careful and systematic way the group is proceeding. However, I was distressed at the implication, early in the article on the IUPP (April 1993, page 32) that "science courses must meet the needs of new student groups—women, previously underrepresented minorities, new immigrant groups." These students have the same "needs" relative to physics as the traditional white male constituency—understanding, appreciation and skill. To believe otherwise is to set these students up for a self-fulfilling prophecy of second-class citizenship in the scientific community.

Because the article had no further mention of course design based on ethnic group or gender, I hope that the phrase was just decorative boilerplate! Good luck to the IUPP group in its important and difficult task.

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4/93