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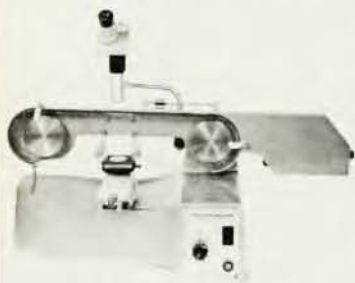


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letters

against the universal constancy of the speed of light in vacuum, how do we explain this modern preoccupation with local "physical frames" sharing a common speed of light which exists *at best* as a theoretical extrapolation?

One wonders whether such abstraction might have been accepted had the original sources been more readily available. All of which reemphasizes the need for the Einstein papers, starting from the premise that the present student body is entitled to a personal comparison between the original sources and their contemporary versions.

Was it not Andrew Carnegie who wanted to do away with all inheritance of personal property over and beyond meeting the immediate and basic needs for the next of kin? How well perceived by old Andrew! It shows the law is too important to be left to lawyers alone. Now that I come to think of it: In physics we have learned to live with a fair measure of outside safeguards against professional inbreeding!

So lawyers, show us your one-upmanship by getting us *the complete collection of all previously published Einstein papers*. Please no unpublished notes or private correspondence, they belong with the executor, and please no retainer, just courtesy service; this litigation has been costly enough for a long time to come.

E. J. Post

7/82

Plaza del Rey, California

Research at small colleges

George Duvall's comments on the role of faculty physicists at small colleges (May, page 118) present a view that is at variance with our experience as a foundation supporting basic academic physics research at both colleges and universities. His view conceives of teaching in the narrow pedagogical sense as the sole proper role of small-college physicists, with serious research being incompatible with the college setting.

In fact many college physicists, with administrative support, opt for a college-based career that includes research for a variety of legitimate personal and professional reasons. They realistically accept that certain areas of modern physics research will be closed to them, but they intend to participate in active research out of at least two motivations. One is the joy and gratification of "doing physics"; the second is the opportunity to integrate undergraduate students into their research as a means of accelerating their maturation as physicists and facilitating their acceptance into the

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(La Jolla Institute, 1980)

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major graduate centers. To those faculty members, the mold into which Duvall's philosophy would force them is completely unacceptable and even pedagogically undesirable.

Our position has consistently been to avoid telling academic physicists what role research should have in their work. For those who aspire to serious physics research as a facet of their careers, however, we offer an avenue of grant support based on an evenhanded peer review of the merit of the research they wish to tackle and its feasibility in a college setting, assuming the added resources of a grant are available.

Our experience is that college-based physicists, given an opportunity to compete for funding, mount very fine basic research ventures which contribute importantly to the growing body of knowledge in physics and provide a steady stream of able young physicists to the graduate schools—students hardened to the special frustrations and demands of research as well as attracted to its rewards.

We think it is critical to the vigor of the basic research community as a whole that all academic physicists have access to support for their research ideas on the basis of the promise of what they propose to do and the likelihood that they can pull it off. We also recognize that many areas of physics research are such that gifted undergraduates can participate in it to their own benefit and to that of physics itself.

That position in no way denigrates the contribution of the teacher who chooses to pour all of his energy into teaching. It is to defend the position that choice ought not to be imposed on every physicist who chooses a small-college career.

KENDALL W. KING
Research Corporation
New York, New York

6/82

THE AUTHOR COMMENTS: It's always uncomfortable to see ones prejudices upset. I've received three letters in response to mine: the one from Kendall King printed above, one from R. E. Stanton, chairman of the chemistry department at Canisius College, New York, and one from S. M. Lea of Livingstone College, North Carolina. The points they make can be summarized as follows:

- Undergraduate teaching is not intellectually challenging of itself. To do it well one must be refreshed by the pleasures of research.
- Research involvement of the teacher improves his teaching; if students are involved, it provides valuable stimulus and expands their understanding.
- Small-scale research does indeed make contributions.
- Research is fun and the college

teacher should not be denied the pleasure of practicing the profession for which he was trained.

I think the problem is more complicated than my letter or any of the above has stated. My specific responses to these points are:

► On the first point: The failure to find intellectual challenge in undergraduate teaching may represent a mismatch between teacher and job. I know, and have known, physics teachers whose professional lives have been devoted to lower-division courses, who were highly skilled in the teaching arts, who were deeply interested in their students, and who have retained the enthusiasm and wonder which they had when they first began. At the upper-division level, the challenge to understand the breadth and depth of modern physics and its sweep through time, and to understand it well enough to synthesize it in a form comprehensible and stimulating to the undergraduate student is greater than, though different from, that which is involved in the average, modest research program. This role, which might be called "scholarship," seems to get lost in debates over research and teaching.

► On the second point: I don't know that research involvement necessarily improves instruction. It certainly takes time from the scholarly pursuits mentioned in the preceding paragraph. Moreover, it is not uncommon for students to enter graduate school with good grades and with enthusiasm generated by undergraduate research experience and to fail for lack of solid understanding of the hard fundamentals.

► No contest on the third and fourth points.

I believe, in addition, that physics students undertaking graduate school today are, on the average, deficient in mathematical skills, physics understanding, and attitude when compared to those of ten or fifteen years ago. It may be only a coincidence that the "depression" in physics which began in the late sixties forced some—perhaps many—graduates into small colleges who would otherwise have had university careers, thereby causing a mismatch between expectations and duties.

The problems faced by the physics profession are too complex for any simple statements to be wholly true or generally applicable. We shall progress only if each of us, whatever his position, realizes that the future of physics depends upon us individually and on the students who pass through our classes and laboratories. Realizing this, we must grasp whether opportunities we see to fulfill our own needs and those of students as we see them. By so proceeding we may hope that the pow-

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letters

er, the strengths and the idiosyncrasies that we have as individuals will be averaged so as to expand the strength of physics, not to weaken it.

GEORGE E. DUVAL

Washington State University

7/82

Pullman, Washington

Grass-roots science education

Every science or news magazine one picks up lately deplores the sad state of science education in this country. I deplore it, too. But in my small way, I am also doing something about it. So are several of my colleagues at Auburn University. Possibly you could, too.

Children are born scientists. If their attitudes toward science are boredom or even hostility in high school, it is because their natural curiosity about the world was killed off by teachers (and parents) who would not or could not help them answer their questions.

If we scientists are concerned about this loss of interest that deprives our field of the talents of bright young people, let us take a hand in its prevention. Here are some concrete suggestions as to what to do, all tried out successfully in Auburn, Alabama.

► If you have a child in elementary school, let his or her teacher know that you can be called on to do a thirty or forty minute "show and tell" in some area of science. I've seen brilliant men quake with fear at the thought of confronting the questions of forty ten-year-olds, but come back from their first classroom visit rarin' to go again because of the enthusiastic reception they got. If you aren't sure you can make yourself understood, find a small group of ordinary kids that age and practice your presentation on them.

► If you don't have an entrance into the schools through a child of your own, call the office of the school you could visit and ask who "coordinates the resource people" for the school. Usually you will be put in touch with a parent volunteer who keeps a list of people who can be called on to share special knowledge or skills with school classes. (If the school you call doesn't have such a person, you will have planted a good idea.)

► Be available as a consultant or judge on science-fair projects. Science fairs are most common at the junior-high and high-school level, and serve to encourage really "doing science" by designing an experiment, taking data, and reaching conclusions. (Poster exhibits don't win fairs.)

► If you are an academic scientist, as I am, you may be able to do something similar to what I do at Auburn University through the Continuing Education

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