

while others strike me as clumsy and unappealing. Could it be that physics and mathematics are *not* totally cold and emotionless? Or have I simply been a physicist too long?

As an undergraduate, Johnson complains of having to continually prove her academic and intellectual skills to those around her (predominantly males). Developing these selling skills could, however, give her a long-term advantage. It is impossible to overemphasize the value of learning, early in a scientific career, how to promote your contribution. As successful physicists know, attracting funding requires skillful selling of the quality and importance of your work.

Most men and women do not choose careers in physics. Why? The answer to that question is simple: It is because they do not perceive physics to be interesting and lucrative.

How do you attract more men and women into physics? The answer to that question is not simple!

DALE GEDCKE

1/91

Oak Ridge, Tennessee

I spent a few minutes looking at Sidney Harris's cartoon in the April 1990 issue, trying to figure out why it was supposed to be amusing. Finally it occurred to me that the "humor" relies on the concept that women *must* show warmth and feeling even if it means not doing math properly.

And while I was distracted from reading science anyway, I decided to check what other subtle messages you give your women readers. What, for example, is the gender ratio in the ads? In the ads depicting persons whose gender was evident, only 11% of those people were women. Granted, this is better than the status quo, but my vision is that the scientific societies (at least the ones to which I belong) in this country should be encouraging women and minorities. (There were *no* people of color shown at all.) I am frankly disturbed by this. Women models cost no more than men, last I heard, so guidelines requiring 50% women and people of color on new ads wouldn't cost the advertisers money. And if they say, "But that's not realistic!" tell them that the times are changing and you want them still to be in business in ten years.

BETH HUFNAGEL

Lick Observatory

9/90

Santa Cruz, California

APS Aid to Women and Minorities

The news story on APS outreach committees (May 1990, page 93)

amused me at first and then made me angry. The APS has committees on the "status of women in physics" and on "minorities in physics." I was amused at the silliness of these ventures. At first, it seemed to me that APS had merely succumbed to the pop sociology that saddles many American institutions with the useless (at best) counting of women and minorities in all occupations. Setting aside the serious issue of quotas, I could smile at my colleagues whose overstimulated consciences had overcome their common sense.

Then I read about the APS-administered scholarships for minorities. No Asians or white males need apply! Who are the sexists and racists here: the majority who would leave physics an open profession of choice or the conscience-stricken committees who would herd women, African-Americans, Hispanics and Native Americans into the physics corral until even the most sensitive sociologist would smile and say, "Now we are equal?"

N. C. NICHOLAS

5/90

Silver Spring, Maryland

THE 1990 PRESIDENT OF APS REPLIES: APS wants to leave physics an open profession of choice and has no desire to "herd" anyone into the "physics corral." If "choice" is to be more than an empty phrase, the options must not be constrained by obsolete hurdles, of whatever origin, that make our science distinctly less open to large segments of our society. The removal of these hurdles has been a goal proclaimed consistently for decades by the elected council of APS. It represents the consensus of an overwhelming majority of our membership, who see it as an enlightened policy not only rooted in elementary fairness but also contributing to the health of physics.

EUGEN MERZBACHER

University of North Carolina,

10/90

Chapel Hill

The Paradoxical 'Unities' of Physics

The introduction of special sessions on "The Unity of Physics" at meetings of The American Physical Society reflects a widely held concern that physics is being fractured into specialties, with insufficient communication among them.

The situation was highlighted by the following experience. The late Luis Alvarez was one of our most versatile and fruitful colleagues. He was one of the very few to show friendly interest in my own work on

the physics of wood energy and its application to domestic heating. I offered to come to Berkeley to give a seminar on my work, but Luis told me that "if you don't talk about quarks, you won't have an audience." I have been turning that remark over in my mind, and find that it reveals an interesting paradox about the unity of physics.

Interest in quarks, and in particle physics generally, is propelled most particularly by the quest for unity in physics—by the search for grand syntheses at the most fundamental level of knowledge. What Alvarez's remark brings home is that the quest for unity has become a specialty that narrows so intensely the intellectual focus of its devotees that they are unwilling to be interested in anything else in physics. Is that what we want to encourage when we speak of "the unity of physics"? Or does such "unity" condemn one to a snobbish isolation from the mainstream of scientific and human concerns?

I believe the traditionally held conception of the role of the physicist is that he is a generalist who can turn his physics training to use in the most diverse ways—for example, as a "consultant-entrepreneur" (see my Guest Comment in *PHYSICS TODAY*, June 1978, page 9). Or as has happened in many notable instances in the past, he can enrich other branches of science with his physics training and habits of mind. I believe it is just such diversity that is the actual goal being sought by those who talk of "the unity of physics."

Perhaps that goal is better expressed by our speaking of "the diversity of physics," or, reaching for a compromise, let us talk of "the diversity and unity of physics."

LAWRENCE CRANBERG

12/90

Austin, Texas

Pauling Biographer Rebuts Rigden

Although I appreciated John Rigden's kind comments (May 1990, page 81) on my book *Linus Pauling: A Man and His Science*, I must challenge some of his other claims. Particularly bizarre is Rigden's claim that "out of a total of 202 references in the book, only three cite primary literature and they concern vitamin C." This is not only false, but surrealistically false. In fact, there are over 500 references, and almost 200 references to primary sources. Such primary sources include letters, monographs and books, as well as political, philosophical and scientific documents written by Paul-

ing. They range over topics from the nature of the chemical bond and quantum chemistry to solid-state physics, nuclear physics, sickle-cell anemia, morality, politics and many others.

Why, then, does Rigden give the weirdly inaccurate figure of 202 references? Clearly, he merely counted up the footnotes listed at the end of the book, for these *do* total exactly 202. But the other 300-plus references are given in the text of the book itself. This was the publisher's policy, and while it may be unusual, a careful reading of the text could not possibly result in anyone's overlooking 300 references.

Did Rigden read it carefully? Consider also his claim that "Pauling's rejection of the molecular orbital approach needs an explanation that is not found in this book." This question is answered on page 124, by a quote from one of my in-person interviews.

The research for the book was extensive, including trips to California, Oregon, Seattle, Washington, Cambridge, Ithaca, New York, New Haven and other areas of the world for personal interviews with Pauling's contemporaries. I also conducted hundreds of hours of phone interviews with key persons (including phone interviews with an admittedly reluctant Pauling himself), assembled boxloads of Pauling correspondence and spent thousands of hours in libraries across the nation and over five years of my life on the project. Further, my book has been endorsed without qualification by many distinguished scientists and science writers, including Martin Gardner, Isaac Asimov, Robert Olby and many others.

Some of Rigden's other comments are also odd. Consider his remarks regarding John Slater's attack on Pauling's methods. He says, "The primary literature might well have shed some light on serious charges such as these." Note that on page 160 of my book, I quote the text of a personal letter from Slater to Pauling. Slater's letter contains a direct condemnation of Pauling's theory of ferromagnetism and a condemnation of Pauling's entire approach to science. A reviewer should be aware that in a biography a personal letter is universally regarded as a "primary source."

Perhaps there is a deeper problem: Scientists tend to prefer that biographies of scientists cover only the scientist's ideas and actual research. This is understandable, since proceeding in this way tends to hide the human side of science—the jealousies, competitiveness and occasional ran-

cor that are part and parcel of any activity in which live human beings participate. But science is conducted by human beings. Nathan Reingold, in his book *The Sciences in the American Context* (Smithsonian Institution Press, Washington, DC, 1979), sums up one of the most widely held views on how to approach the history of science: "Unlike the older history of science, concepts and data will serve as important elements of human environments, *not as the principal objects of study justifying the endeavor*" (emphasis mine).

ANTHONY SERAFINI

12/90

Hackettstown, New Jersey

Was Sakharov's 'Dark Side' Deleted?

Something essential is missing from the picture of Andrei Sakharov painted in the August 1990 issue of *PHYSICS TODAY*, as if his life was rewritten (in Soviet style). It is one thing to forgive someone's early mistakes because of his good deeds later, and it is something else to miss a significant dark part of his life. Life accounts are supposed to be complete!

Reading about the many Sakharovs, I cannot help but ask myself, Where is the Sakharov who rose to prominence like a meteor in the *Stalin regime*? Everyone who knows the Communist or Nazi systems knows that no one got ahead who did not go along. Indeed, those who did not go along had to consider themselves lucky if they were not smashed—regardless of their talents. So where is the dark side of Sakharov, who was enlisted in classified work on atomic weapons, and who became a member of the Soviet Academy of Sciences at the age of 32? Where are the behind-the-scenes "achievements" that bought him the trust of Stalin and Lavrenti Beria?

LANCELOT I. KETHLEY

8/90

Portland, Oregon

Ernst Ruska's Wartime Generosity

I was quite surprised to read in Ernst Ruska's obituary (July 1990, page 84), written by Peter W. Hawkes, that Ruska "offered shelter in his apartment during the wartime bombing of Berlin to Jews, who were excluded from the public shelters." Were there really any identifiable Jews in wartime Berlin once the serious bombing had started?

J. FUTTERMAN

8/90

Los Angeles, California

HAWKES REPLIES: My information comes from the widow of Ernst Ruska, via Tom Mulvey, who has made many contributions to the history of electron microscopy and translated Ruska's historical volume *The Early Development of Electron Lenses and Electron Microscopy* (Hirzel, Stuttgart, 1980) into English. Ruska was profoundly shocked by the treatment of the Jews and declared, after one anti-Semitic massacre, that this would bring punishment on the German people. No doubt the Jews surviving in wartime Berlin were indeed not readily identifiable except to their friends.

PETER W. HAWKES

Centre National de la

Recherche Scientifique

Toulouse, France

12/90

A Particle for All Reasons

I wish to propose the existence of yet another subatomic particle, the "so-on" [pronounced "sew on," though not to be confused with a jacket patch that proclaims one's unending loyalty to some musical group like Guns n' Roses (*sic*, in more senses of the word than one)].

This is the particle that explains events that cannot be explained otherwise, as in the sentence "This is obviously due to electric fluidity, quantum fluxes and so-on." The lifetime of a so-on will obviously be short—about as short as the conscience span of the speaker who invokes it, or roughly 10^{-50} seconds—and the particle itself will thus be undetectable, though a few attempts will be necessary to prove that its existence can't be proven. All of this at a suitable dollar amount, of course, assessed at more or less the reciprocal of its lifetime.

R. M. KREN

Department of Metachemistry

University of Michigan, Flint

11/90

Corrections

January, page 95—The estimate by Adrian Blaauw mentioned in Wolfgang Kundt's letter implies that all stars more massive than 4, not 14, solar masses would be required as progenitor stars of neutron stars.

December, page 28—The conjecture about the pair distribution function in superfluid helium-4 that was attributed to Roger Penrose and Lars Onsager should have been attributed to Oliver Penrose and Lars Onsager. ■