because they have not given up hope. Tyrannies have come and have disappeared, but the consequences of a nuclear war are irreversible for eternity. To even contemplate to "let a new species replace the present one," *that* is showing utter despair! How can anything but the survival of Mankind be more important? In fact, according to Hannes Alfven, "It is intolerable that the politicians do not consider survival to be an important political issue."

Let me also finish with a quotation from Albert Einstein, in his role as chairman of the Emergency Committee of the Atomic Scientists (quoted by Panofsky in The Bulletin of Atomic Scientists, June 1981):

"We *must* continue to live in peace; . . . the alternative is death of our society."

HENK WIND
Founex, Switzerland
2/82

Deep redshift survey

The deep redshift survey of galaxies of Kirshner, *et al*, reported in January by Bertram Schwarzschild (page 17), reveals the existence of galaxy clustering on many scales, rather than the existence of a single large void. Evident in the presented data are at least two "hyperclusters" of radial extent between 100 and 200 megaparsecs. In all three directions observed, these hyperclusters are seen to contain galaxy-depleted regions of 20 to 40 Mpc radial extent, similar in size to the voids observed in surveys of nearby galaxies—and similar in size to galaxy superclusters. Although the data presented are far from statistically conclusive, they suggest that galaxy clusters form superclusters on the 30Mpc scale, which in turn form hyperclusters on the 150 Mpc scale. Voids of these dimensions would arise naturally if the cluster sizes and separation distances were similar in magnitude, which seems to be true on both the "super" and "hyper" scales of observation.

The galaxies shown between 380 and 600 Mpc probably represent different hyperclusters in the three directions of observation, because the three regions of high galaxy-count are separated by distances greater than their individual radial extents. This assumes that hyperclusters are roughly spherical assemblies, and that selection effects are not responsible for the fall-off in galaxy-count beyond 500 Mpc. If these assumptions are correct, then future deep redshift surveys would reveal many more hyperclusters and voids between them. One also might expect the reported Boötes "hyper-void" to be broken up by presently unobserved hyperclusters.

MICHAEL A. PELIZZARI
Greenbelt, Maryland
1/82

Mideast conflict

I feel uneasy about the way PHYSICS TODAY has allowed Yuval Ne'eman in January (page 13) one more chance to display, in two columns, his arrogance and partiality, this time in response to two legitimate complaints about how this journal seems to be drifting toward becoming a one-sided political forum on certain issues.

His opportunistic account of the repression of scientists in Iraq and of the "sins" of the countries hostile to his own, Israel, show that he is talking not as a physicist concerned with human rights but as an Israeli *jusqu'au-bout* defender of Israel, as he has always been. The question is, who wants to hear the view of an Israeli nationalist about the repression in Iraq, the Iraq–Iran war and so on in a physics journal? Clearly the intentions behind any report can turn it into mockery, regardless of the fraction of truth it contains (Who would like to hear a Chinese account of the violations of human rights in USSR, for example?).

In fact, the greatest offense to the integrity of the cause of human rights is when it becomes selective instead of all-inclusive; when some human rights violations are scaled not according to their severity, but according to the friendliness of the country in question. True, human rights violations are less painful to denounce when occuring in an unfriendly country than when in an friendly one. But who said that defending human rights was to be easy?

It could, however, have been easy for Ne'eman to gather information for us about human rights violations in his own country, Israel.

In any case, if Ne'eman is an upholder of justice and not a merely Israeli propagandist, then I am sure he will appreciate knowing about the continuous human-rights violations and attacks to academic freedom in the West Bank: universities closed indefinitely, professors dismissed, exiled or expelled from the country and so on. I have forwarded a report on the human rights saga as witnessed by a delegate from the US National Education Association, detailing those grave violations. This report can be obtained by writing to me at the address below.

JAMAL MIMOUNI
University of Pennsylvania
Philadelphia, Pennsylvania
2/82

THE AUTHOR COMMENTS: I tend to agree with the general principles mentioned in Jamal Mimouni's letter and with some of his points about me. My original letter in July 1981 (page 13, "Threat to free publication") treated a problem relevant to research and publication on physics in the US. PHYSICS TODAY was thus certainly the appropriate forum. I avoided any mention of Middle East divisions. It is unfortunate that the readers who commented on my letter (January, page 11) did not address themselves to the question I raised, choosing instead to bring in the Middle East's unfortunate conflicts (Iraq, and so on) and pointing to my own bias. My answers were thus forced to deal with the issues they raised, especially Iraq. I do, however, agree with Mimouni's feelings—Iraq and our conflicts do not fit in with the contents of PHYSICS TODAY. I assume that the editors of this journal chose to publish those comments (and my reply) because they wanted to avoid being accused of partiality.

As to the other comments of Mimouni—I admit to a partisan position in the Middle East conflicts. I am clearly on one side, and shall be the first to agree that the other side is entitled to its views, perhaps with as much subjective feelings of fighting for a just cause. It is a bitter struggle. It has nothing to do with science, physics and research. I shall again be happy to answer, in detail, any questions in that domain (including those mentioned by Mimouni) but suggest that interested readers write to me directly, or if they prefer a public forum, transfer that part of the discussion to a more appropriate publication.

YUVAL NE'EMAN
Tel Aviv University
Tel Aviv, Israel
2/82

Eddington's greatness

Sir Arthur Stanley Eddington was, beyond doubt, one of the greatest scientists of this century. From meager data, he constructed the first quantitative models of stellar interiors and Cepheid variables. During his lifetime, he was recognized by Schapley and others as the "greatest living astronomer." The *Source Book in Astronomy and Astrophysics 1900–1975* (K. Lang and O. Gingerich, eds.) included more papers by Eddington than by anyone else. Such a man is in little need of a "retrial."

At various times president of the Royal Astronomical Society, Physical Society, and International Astronomical Union, Eddington was noted for his exposure to and facility in all branches of physics and astronomy. Eddington spent seven years as an observational astronomer and thus knew firsthand the experimental as well as the theo-

retical side of the sciences. But as brilliant and convincing as his observations and his astrophysics were, his research into the fundamental laws of physics never carried conviction. Eddington was the first man in England to learn relativity. The experience transformed his outlook, and almost immediately he set about to finish what he perceived Einstein had begun. In 1921, he published his own version of a unified field theory. Other papers followed, slowly, but with increasing rapidity. Toward the end of his life, as he devoted more and more time to the unification of general relativity with Dirac's quantum mechanics, he drifted farther and farther from the mainstream of physics.

There is no real mystery as to why Eddington's ideas met with such ambivalence during his lifetime; but to understand the reactions of contemporary scientists, one must consider briefly what Eddington was trying to do. His goal was simple: He wished to deduce the fundamental laws of physics, as known in his day, from axioms that no one could self-consistently object to. By fundamental laws, he meant laws such as Einstein's field equations and Dirac's equation. The axioms that led to these laws came from a careful examination of the ways in which we viewed the world. Eddington's goal was quite reasonable and falls within a tradition that included Hilbert, von Neumann, and many mathematical physicists of today. What distinguished Eddington was that he believed he had completed such a deduction. Unfortunately, his scheme was obscure and out of step with his times. During the very years in which Eddington was trying to deduce a comprehensive view of the universe, physics was exploding with new facts and new theories that led to still more new facts. Eddington's work was ignored because the vast majority of physicists were uninterested in pursuing ideas that did not lead to *new* physics.

The other reason that Eddington's ideas met with such reluctance is psychological. During the twenties and thirties, Eddington was a premier popularizer of the physical sciences. Not only did his books discuss the recent advances in physics, they also fit them within the framework of his deductive scheme. One can easily understand the resentment some of Eddington's contemporaries must have felt upon seeing unproven assertions delivered in public with an aura of authority befitting England's leading astronomer.

Many years have gone by since the controversies Eddington raised in the philosophy of science died away. Now, Paul Nawrocki (March 1981, page 81) and A. J. Coleman (December, page 72) herald Eddington as the unsung progenitor of modern particle physics. Many of Eddington's ideas are remarkably modern. But even where he was right, he was right for the wrong reasons. Eddington was trying to build a deductive system in which every statement was vital. Make one serious mistake and the structure crumbles. Eddington's prediction that the fine structure constant was exactly the reciprocal of 137, his equation of state for a massive white dwarf, and his strong force potential of e^{-r^2/k^2} are well known but hardly the only examples of where Eddington's deductive structure contains serious gaps. If certain ideas look appealing when examined individually, we must remember the context from which they were drawn. The world Eddington thought he had deduced no longer exists; it has been replaced by one that is infinitely richer and more complex. Eddington had a prescient view of physics, but the history of science teems with people who had the right idea at the wrong time and in the wrong place. Out of phase with history, their achievements effectively cancel each other out. It is a reflection of Eddington's true greatness and breadth of interest that he is still so revered despite the neglect of his later work.

Eddington was the first second-year student to win the Cambridge Mathematical Tripos. In her biography of Eddington, A. V. Douglas relates how he paid tribute to his former teacher Sir Horace Lamb by saying that "while he now knew what it was to be treated as something of a lion his ambition was to become something of a Lamb." Quiet, modest, and almost painfully shy, Eddington sought neither the uncritical adulation nor the unwarranted neglect that seem to be his fate. He was born a hundred years ago this December. As we celebrate his centennial, we may do him no greater honor than to recognize and to continue his work on stellar models. We may do him no greater disservice than to turn him into what he was not, thereby casting him like Daniel into a den of lions.

JOHN BECHHOEFER
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1/82

Organic superconductivity

D. Jérome's comment following M. Revzen, A. Ron and J. Zak's letter in September (page 104) might be misread. This comment did not wish in any way to minimize the work of the Jerusalem group in the superconductivity of chain compounds, which we both consider a significant contribution to the field. Moreover, we wish to acknowledge M. Weger's initial impetus and inspired contribution to the development of the research on organic conductors during his fruitful scientific collaboration with the Orsay group.

J. FRIEDEL
D. JÉROME
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2/82

Advice to lecturers

The fact that you have thought it necessary to print Darrow's article "How to address the APS" (December, page 25) three times in thirty years should lead you to question the effectiveness of your approach to improving conference presentations. Can preaching really teach teaching? Your evidence suggests that it cannot. Let me add some further evidence to support this conclusion. The Royal Institution in London—famous for its lectures—has published a little volume 1, the preface of which states that "the only way to learn to give a good lecture is by experience—often bitter at first. But some of the more excruciating moments can be avoided by giving attention to the hard-worn practical wisdom of fine lecturers." And yet, I have experienced such excruciating moments occasionally even at the Royal Institution.

The real problem is that most university lecturers do not lecture well because they lack certain skills and this lack may even be thought to be endearing. This last point is illustrated in the following quotation from an article on Professor Siegbahn, which celebrated his Nobel Prize.[2]

> He was one of the key invited speakers . . . and I well remember his talk. Professor Siegbahn made the mistake *we all make when we get carried away by our subject* (my emphasis). He spoke for almost a full hour about an aspect of his apparatus and, when it became apparent that time was running out, suddenly discovered that there were some 40 slides of data he wanted to show and had not come round to. Much to the Chairman's annoyance, he then spent a good ten minutes whipping through what in effect was the main part of his talk at a rate of some 15 seconds per slide.

The acquisition of competent lecturing skills—like that of any other skill—requires training, and as long as university teachers do not consider such training necessary, inadequate lectures and conference presentations will be the rule rather than the exception. As I am not hopeful that this situation will change soon, I am looking forward to