

letters

► Israel had been very active in the field of physics education. Under the leadership of the late Amos de Shalit, a major project was undertaken for reforming and improving physics education in Israel. This project has flourished into the present "Amos de Shalit Science Teaching Center" which, among its other activities, had close relations with many science teaching projects in various developing countries. The recent UNESCO resolution had terminated the UNESCO financial support that the Amos de Shalit Center enjoyed for many years. Israel is the only country in the world in which UNESCO refuses, as a matter of principle, to support the improvement of physics education of school children.

► Just a few days ago *The New York Times* reported that UNESCO has barred Israel from participating in a conference on education in the Mediterranean region. Israel is the only country with a Mediterranean shore excluded from this conference.

There is only one way in which the international scientific community can react to the UNESCO project of educational, scientific and cultural strangulation of Israel. As scientists we must refuse to associate ourselves in any way with UNESCO. We must refuse to accept UNESCO sponsorship, refrain from attending UNESCO conferences, and explain to the UNESCO politicians that freedom of education, science and culture must prevail in its fight with ugly political maneuvers. I call on French and Kelly to reject the UNESCO sponsorship of their conference, and I call on all physicists and educators to refuse to participate in the Edinburgh conference as long as its main sponsor is UNESCO.

I am personally convinced that no Israeli physicist will accept an invitation to the Edinburgh conference. It would be a sad moment for physics and education if physicists from all over the world, *except Israel*, will meet at a conference whose main sponsor is an organization that supports physics education all over the world *except Israel*.

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THE CONFERENCE CHAIRMEN COMMENT: Both local and international bodies are active on educational, scientific and cultural matters and Israel is not excluded from these. The exclusion only applies to regional meetings.

UNESCO is *not* the main sponsor of the Edinburgh Conference. It is organized by IUPAP and supported by the Institute of Physics and the Royal Society. The direct costs of the conference

are to be met by contributions from the sponsoring bodies from industry and from the fees of participants. UNESCO has *not* contributed to the direct costs. It has provided funds that will enable 30 delegates from developing countries to travel to the UK and attend the meeting. UNESCO is also contributing towards costs of preparation and publication of working papers, which will be available throughout the world.

We expect to welcome to Edinburgh some 350 people from over 80 countries including Israeli participants.

A. P. FRENCH
International Chairman
C. A. TAYLOR
National Chairman
W. COCHRAN
Local Chairman
Edinburgh International Conference on
Physics Education

Support for basic physics

I should like to submit to my colleagues in the physics profession what I feel to be an urgently pressing problem, and I should like to propose a possible resolution. First: the problem is that we are so up-tight about the presently accepted ideas of physics, and we are so tightly organized about the business of physics, that many of us have literally lost sight of what sorts of problems are the primary concern of physics scholarship.

Are the problems dealing with social welfare, feeding the hungry masses, ecology, military preparedness, economic recession and inflation, fiscal problems of a university and so on problems of physics? As human beings, members of university faculties and responsible citizens, we must recognize these to be important *bona fide* problems. And to the extent that we are capable of solving these problems, we should get involved in them. But my question is: Are these problems of physics? I don't believe so.

And are the problems dealing with physics experimentation, from the point of view of representing the data, phenomenologically, *as an end in itself*, problems of physics? I don't believe so.

Then what are the real problems of physics? They are the problems that deal purely with a search for further *basic understanding* of the manifestations of the real world—in terms of abstract principles and concepts, from the elementary-particle domain to that of cosmology. This definition is not new! It has been held since ancient times!

If we learn to classify the data from the accelerating machines, including new and unexpected "tracks," in terms of more novel or economical categories of numbers, or other sorts of phenomenological descriptions, *and if we stop there*, we would not have learned anything new about the dynamical laws

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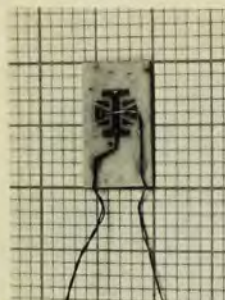
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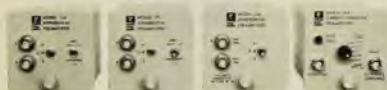
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that underlie such classifications of the data. If we are fortunate enough to learn how to generate nuclear energy from water, as extremely important as this might be for society's present energy-crisis problems, it probably would not help one iota in the quest of physics to *understand* the laws of nature that underlie these processes. While I fully support such activities by physicists, I do not believe it should be advisable that their continuance and growth should be at the expense of sacrificing research effort aimed at the fundamental principles of physics. While many of my colleagues may disagree with me on this, I still maintain that extremely little effort is being expended today on fundamental problems in physics—in spite of the huge outpouring of printed pages in the journals.

I think that the basic reason for this is the state of content that most physicists have reached—at least outwardly—with our present state of *basic knowledge*. There appears to be a consensus today that we have already discovered essentially all of the fundamental principles that are to be discovered, and our only remaining obligation, as physicists, is to apply these principles. There is some agreement (in print) that if all of the presently accepted principles of physics are not mutually compatible, and if their mutual acceptance implies a certain degree of irrationality along with the laws of nature, then indeed we should accept some irrationality as the way the real world is! There are even some who propose a return to the medieval notions of astrology and witchcraft—in the name of science!

In spite of the great amount of activity and sums of money spent on physics research today, the combination of (my view of) what a physics problem is, and the rigidity with which fundamental ideas are being held today, leads me to the belief that at this stage, physics, though not dead, is in a state of suspended animation. Thus it is potentially capable of revivification. To this end, we must re-create a climate in which people recognize physics for its own sake, rather than for the sake of phenomenological descriptions, as ends in themselves, or for the sake of possible applications, whether immediate or in the future. However small the activity of fundamental physics research may become, *it should be allowed to exist—without strings!* My suggestion, then, is that a foundation be established, with a budget, for the purpose of supporting fundamental physics, for its own sake.

I suggest that this should be an *international science foundation*—dedicated to sponsoring "unsafe research" on fundamental problems. That is, re-

search that does not claim the answers to problems before the problems have been investigated, nor necessarily backed by prestigious institutions of people, so long as they are backed by technically sound proposals.

The existence of an ISF could create an international intellectual atmosphere in which physicists might start to believe that they are not being cranks when they think freely and critically about the basic problems of physics, so long as they follow through with technically competent methods. To move in the direction of establishing such a foundation, I suggest that the leading physics organizations of as many nations as possible (the AIP in the US) should jointly approach the United Nations, as the proper seat for such a foundation. I believe that the existence of such a foundation could help to accomplish the job of reviving free thinking in physics, thereby restoring the potential for real progress in fundamental knowledge.

MENDEL SACHS

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Error in lithium

We wish to point out an error in the value of the atomic weight of lithium, as published in some of the scientific community's most widely used reference works.^{1,2} The atomic weight on the chemical scale, based on the C^{12} standard, is given as 6.939 amu. However, when one calculates this figure from the nuclide masses and relative abundances listed in the same works, it is found to be 6.9417 amu. Further, the nuclide mass figures are self-consistent in all the usual reference sources,^{1,2,3,4} as are the relative abundance values.

The error might well be explained by the following scenario in which we derive the incorrect figure:

The contributions to the chemical atomic weight from the two naturally occurring isotopes are as follows:

$$\begin{aligned} \text{Li}^6: (6.015123) (0.0742) \\ &= 0.446322 \text{ amu} \\ \text{Li}^7: (7.016004) (0.9258) \\ &= 6.49544165 \text{ amu} \end{aligned}$$

If at this point we make the mistake of transposing 0.4463 to 0.4436, we get the sum 6.9390 amu for the chemical atomic weight.

It would appear likely that this error originated at the time of the adoption of the C^{12} standard, and has proliferated ever since. It can even be found in Webster's *Third New International Dictionary*.

References

1. *American Institute of Physics Handbook* (Dwight E. Gray, ed.), McGraw-Hill, New York (1974), 3rd ed., page 7—6.
2. *Handbook of Chemistry and Physics*