

now belongs to divisions? Between 4000 and 5000 members—about 20% of our total. This does not count those in the newly forming Division of Nuclear Physics or the potential Division of Fields and Particles. Moreover, it has been estimated that more than twice as many members of the society are actively concerned with solid state physics as have paid the modest fee required to become a member of the Division of Solid State Physics. It is conceivable that similar figures hold for other divisions. Consequently the divisions may well span closer to 80 or 90% than to 20% of the physics interests of our fellow members.

Who will join a division if the proposed amendments are adopted? First, nobody has to join any division; that is clearly spelled out. Second, everyone acquires the right to belong to one division free of annual dues. Third, subject to the payment of a modest annual due for each additional division, one can join as many divisions as he pleases.

What about undue "voting weight" for the member who belongs to a division? First, the extra "weight" won't be very great—one division councillor (per division) as compared to the seven or eight councillors-at-large that everybody gets to vote on. Second, maybe he deserves a little bit more voice in the affairs of the society if he is interested enough to join a division. Finally, it has been estimated that probably 80 or 90% of our members will choose to join at least one division and that it will be an infrequent member who will choose not to interest himself in any division.

Other points. Forgive us for dealing at such length with what we conceive to be your major points. On other points perhaps a word or a phrase will be enough to indicate the kind of considerations which entered into the many months of deliberation of the council and its committees:

1. "Formidable barriers" to the removal of a council-elected executive secretary? Complain to the council! Look at their names on the cover of any *Bulletin*. Our membership elected them. See if you don't think they are both responsive and responsible.

2. "Provision for discussion of issues" concerning the constitution? Announcement of public meeting on organization issues in *Bulletin*. Meeting convened, report given, public discussion held at time of annual business meeting in New York, January 1966. Extensive formal printed report on organizational issues by committee on revision issued to members attending. Updated report published in June 1966 *PHYSICS TODAY*. Proposed amendments themselves published in the June 1966 *Bulletin of the APS*, with request that suggestions for changes be communicated to council through office of secretary. Careful review of suggestions by council. Provision for final consideration of final version of amendments by membership later this fall.

3. How will the proposed changes affect the participation of the membership in policy making? First, they will help ensure election of councillors with a spectrum of interests wider than ever before. Second, the councillors—our elected representatives—will have a bigger share of responsibility than ever before.

4. At what rate will the composition of the council change? Four-year terms expiring in different years—half thus expiring in two years. The provisions of the present constitution, here as elsewhere, have been taken over unchanged except when there was impelling reason for change.

Your letter convinces us that you are deeply interested in the welfare of the society. It makes us believe that our fellow members will also be interested in the important organizational issues that confront us. We are glad that you have given us occasion to discuss these issues. This reply will have met an important test if it convinces you, not to veto the proposed amendments, but to vote them in. Without some such modest changes in organization our society will be in serious difficulty.

Sincerely,

John and Charlie

(John A. Wheeler)

Princeton University

(Charles H. Townes)

Massachusetts Institute of Technology

Dear John and Charlie:

I am disappointed that in your thoughtful and detailed reply no precedent is cited from the annals of American learned or professional societies for so massive a delegation of authority to an executive secretary as is uncompromisingly proposed. I am disappointed, also, to see us directed along a new path of government-by-specialists under pressure of threats of secession, without discussions of consequences and alternatives. Unfortunately, our differences can hardly be resolved in so belated and hurried an exchange as this, nor have we even begun to discuss the arrangements that other societies, confronting problems similar to ours, have found satisfactory. I regret that veto of the proposals, which apparently will be offered as a package, appears to be the indispensable preliminary to fuller discussions of the issues and of ways of resolving them.

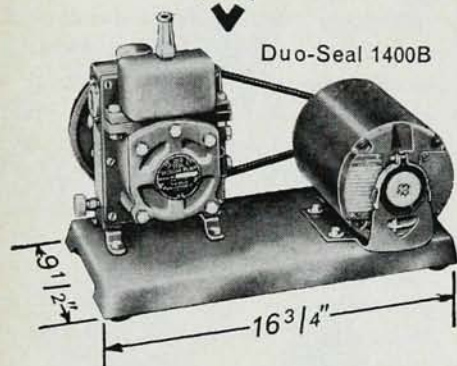
Sincerely,

Larry

An encouraging effort

The recently proposed amendments to the APS constitution and bylaws strike me as a genuine and encouraging effort to improve the business organization of the society, its elective procedures and its communications with the members at large. Although there will doubtless be differences of opinion in some details, the proposals generally seem to deserve the approval and support of the members. During the last 20 years or so criticism of some society procedures and activities have been justified to some extent, but the administrative and procedural inadequacies have scarcely deserved the sense of outrage engendered in some quarters. In keeping with our times the dissidence seems to have been rather widespread. But no member of sound mind has found grounds for suggesting that the affairs of the society have been controlled by a group of sinister archvillains bent on its destruction. Furthermore anyone familiar in the least with administration of such a large and complex organization realizes that it would be utterly impractical, and a completely misguided interpretation of "democratic" principles, to propose (as some

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LETTERS

(Continued)

seem to have felt) that virtually every business detail or proposal be subjected to popular referendum.

As the council has apparently recognized, the time is ripe to bring the constitution and bylaws into line with the increasingly difficult problems that have arisen from the present complexity and explosive growth of the society. The modernization of the society and its future progress will be best served if the dissidents decide to bury the hatchet for a while and join the rest of the members in giving the present proposals unprejudiced consideration and a fair chance to demonstrate their effectiveness.

John Rehner Jr

Esso Research and Engineering Co

Toughness of physics

May I comment on the editorial in the April PHYSICS TODAY on the difficulty of academic physics?

First, must physics be highly mathematical? Surely we can distinguish three aspects: there are qualitative physics, metrical physics and critical physics. Qualitative physics might be called (a part of) "natural history": it is the collection of information about nature. Metrical physics begins when we measure things and thus get numbers among which we seek relations. Critical physics is the examination of the notions involved.

Now the second two must presuppose qualitative physics; without it, without a good qualitative acquaintance with the phenomena, metrical physics is merely mathematics enlivened by quaint little stories, and critical physics is utterly futile. So it would seem reasonable to start with the qualitative aspect. There is another good reason for this: young people are good at collecting information before they are particularly good at mathematics and long before they are good at critical discussion. Moreover, mathematical work done early is done in a laborious way whereas if deferred a little it could be done much more efficiently. (Compare mechanics before and after calculus.) So it would seem reasonable to concen-

trate on the qualitative parts first, and these are, indeed, the only parts of interest to those who are not to become specialists.

From what I have just said, there would be good reason for starting the metrical part at the same time as, or a little after, calculus is begun. This part would be of interest especially to specialists and engineers. Even here things might be improved. The engineer's interest is in design, and the applied physicist at metrical work is acting as an engineer. Now problems in design are not specified very well and have no unique answers; in fact, they are quite different from the problems that students work by the hundreds in introductory courses. We should inquire, in fact, whether the kind of metrical work done in early courses may not be to the disadvantage of students whose ability might be in design but not in the solving of conundrums.

Critical physics is little taught, except some somewhat half-hearted attempts at "philosophy of science," which are rarely useful, because the physical tail always wags the philosophical dog. Anyone wishing to see what might be done in this part of physics might well read—starting without prejudice—Aristotle's *Physics*.

Experiments in the laboratory are needed especially for the metrical aspects—thus are not really necessary for the earlier parts. If done, they should aim at getting premises, such as Newton's laws, from which conclusions can be drawn. But to try by experiments to find a logical conclusion, such as conservation of momentum, is like solemnly measuring the square on the hypotenuse. Nor is it easy to see what students gain especially at the earlier stages, by spending an afternoon measuring something, say g , and then, having a result, falling down and worshipping it because it is good to five significant figures.

As for the attitude of "getting tough with them," the best possible comment on that was made long ago, and can be found in St Luke xi, 46: "Ye lade men with burdens grievous to be borne, and ye yourselves touch not the burden."

H. L. Armstrong

Queen's University, Kingston, Ontario