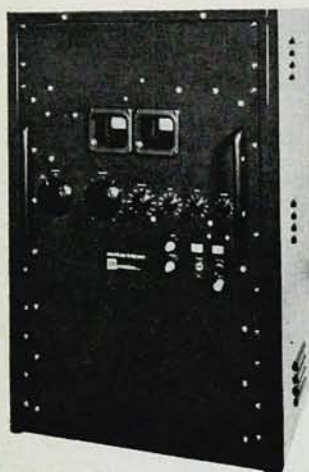


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LETTERS

The individualist in science

In a letter published in the January 1965 issue of *PHYSICS TODAY* (page 134) I discussed what I felt to be a dangerous by-product of the nouveau riche status of the physics community—a by-product that has led to the present tendency toward *team research* and the accompanying establishment of "the path" toward scientific truth. I argued that these developments have been at the expense of risking the individuality and freedom of inquiry that have been so essential to scientific progress throughout the history of science.

The reaction to that letter (through private correspondence and conversation) has been divided into two disparate camps. One camp argues that the most efficient way to solve hard problems in science is to let the paths of inquiry be specified by a small number of leaders (who have previously shown themselves to be brilliant) and followed by the bulk of the scientific community. This camp argues that to let anyone strike off in any other direction to solve the important problems in physics would lead to chaos. The second camp, defending the individualist in research, argues that the history of science substantiates, in a great number of discoveries that have led to bona fide progress in science, that such advances were indeed due to the *free thinking* of individuals whose research did not conform to the established norms of their contemporaries.

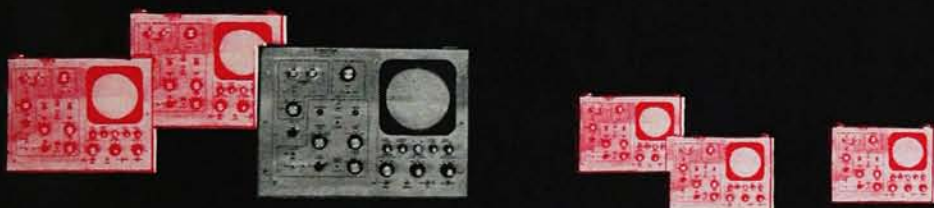
If the scientific community is in full agreement with the contention of the former camp there is nothing more to say, since such a methodology is currently in practice. On the other hand, if the contention of the latter camp (which refutes the former through the experience of centuries of scientific research) is to be taken seriously, then the question remains: What can be done, within the structure of the present-day scientific community, to aid and encourage the individualist in science? Should the scientific community at least partially

agree with the defense of the individualist in research, then the question is a most important one and should be given a great deal of serious thought.

As a first step in answering the question, it appears to me that we should examine one of the most important aspects of scientific research: the means of communicating its results. Since such communication is one of the chief roles of the American Physical Society and the other affiliates of the American Institute of Physics, I should like to make two proposals that I feel could induce a relaxation of the rigidity in present-day research and thereby aid the individualist.

My first proposal is based on the premise that the rigidity in present-day thinking could be relaxed if the journals would encourage publication of short communications relating to technical criticism and elaboration on research articles that have already been published in their own pages. I should like to propose that revival of the "Letters-to-the-Editor" column in *The Physical Review* and the introduction of such a column in the other AIP journals could be most conducive to progress in physics. In my opinion it is indeed unfortunate that a number of years ago the letters column was removed from *The Physical Review*. The subsequent establishment of *Physical Review Letters*—a most needed journal for the quick publication of short articles—did not replace the "Letters-to-the-Editor" column. *Physical Review Letters* is dedicated to new research, whereas the eliminated letters column was for criticism of and elaboration on articles that had appeared in *The Physical Review*.

My second proposal is perhaps more far-reaching, but just as important for obtaining maximal freedom for the individualist in research. I propose the establishment of one more AIP journal. Its aim would be somewhat different from the aims of other scientific journals, and it should not duplicate the kinds of articles that appear in the other AIP journals. The editorial policy of this journal should



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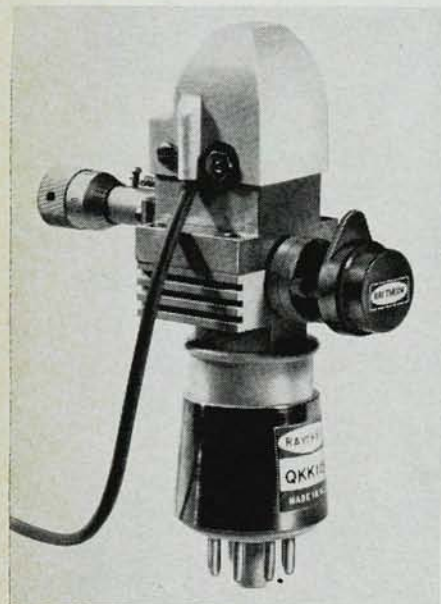
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be to accept only articles that are in accord with some predetermined (and announced) criterion of *completeness* in the development of a definite "thesis" that is *new* and is exploited sufficiently in terms of mathematical development and comparison with experiment to make a bona fide, convincing case for the objective reader. Generally, then, such articles should be based on long, careful investigations, covering as many as possible of the avenues that follow from the central thesis. Because of the nature of such articles, the journal should not be inundated with countless manuscripts.

I hope the existence of such a journal would induce researchers to carry their investigations much further than is customary today before the results are written up. The journal could also relieve some of the burden on other journals that are now flooded with short articles on the initial stages of theoretical and experimental studies.

In addition to the requirement of *completeness*, the only criteria that should be used to judge the acceptability of a manuscript for the proposed journal should be *originality*, *logical consistency* and *mathematical consistency*. I propose that if the reviewing staff of the journal found an article that satisfied those four criteria

—regardless of whether or not its central thesis departed from the thinking of the majority of researchers—the journal would be obliged to accept the article for publication.

I feel that such a journal would indeed aid the individualist by giving him a voice—on condition that he had not only speculated but also followed through with a rigorous mathematical and experimental development and had made sufficient comparison with the properties of nature. In addition to the possible relief that such a journal might provide for other AIP journals, it might also, in the long run, help reduce the tensions of the "publish-or-perish" policy in many institutions by relieving the pressure on scientists to publish results of their studies while the studies are still in the preliminary stages.

I hope that my fellow members of The American Physical Society, and members of the other AIP societies, will consider these proposals to aid the individualist by ensuring and facilitating, as far as possible, his freedom of inquiry in present-day science. I hope that this column might be used for further discussion of these and other suggestions to this end.

Mendel Sachs
Boston University

Is physics too tough? Some comments on our April editorial—

All my experience indicates to me that undergraduate physics as taught in many American colleges and universities is too tough in several ways, and that the responsibility for this situation generally lies in two directions. First, there is the regrettable circumstance that section teaching in the large general course is often delegated to inexperienced graduate students, many of whom regard such an assignment as a menial chore to be completed with as much dispatch as possible so they can get back to matters they consider more important.

More mature staff members, who should know better, frequently harbor the same kind of resentment and unconsciously take it out on the hapless student by expecting him to acquire something of their own degree of seasoned understanding of

the subject in a year's struggle with far too much detailed, strange material. This kind of teacher is likely to give quizzes and examinations consisting exclusively of numerical problems. He is the one who boasts, "We show them that we mean business by flunking about 25 to 30 per cent each year." A mean business, indeed.

Second, if the situation seems disturbing in connection with prospective majors in physics and other sciences, it is even more alarming with respect to students in other fields. These students, it is generally agreed, should gain some real acquaintance with science as part of their general education—the now-famous "two cultures" theme. Here the difficulties are increased by the highly miscellaneous backgrounds and preparation of the prospective learners and by a preva-