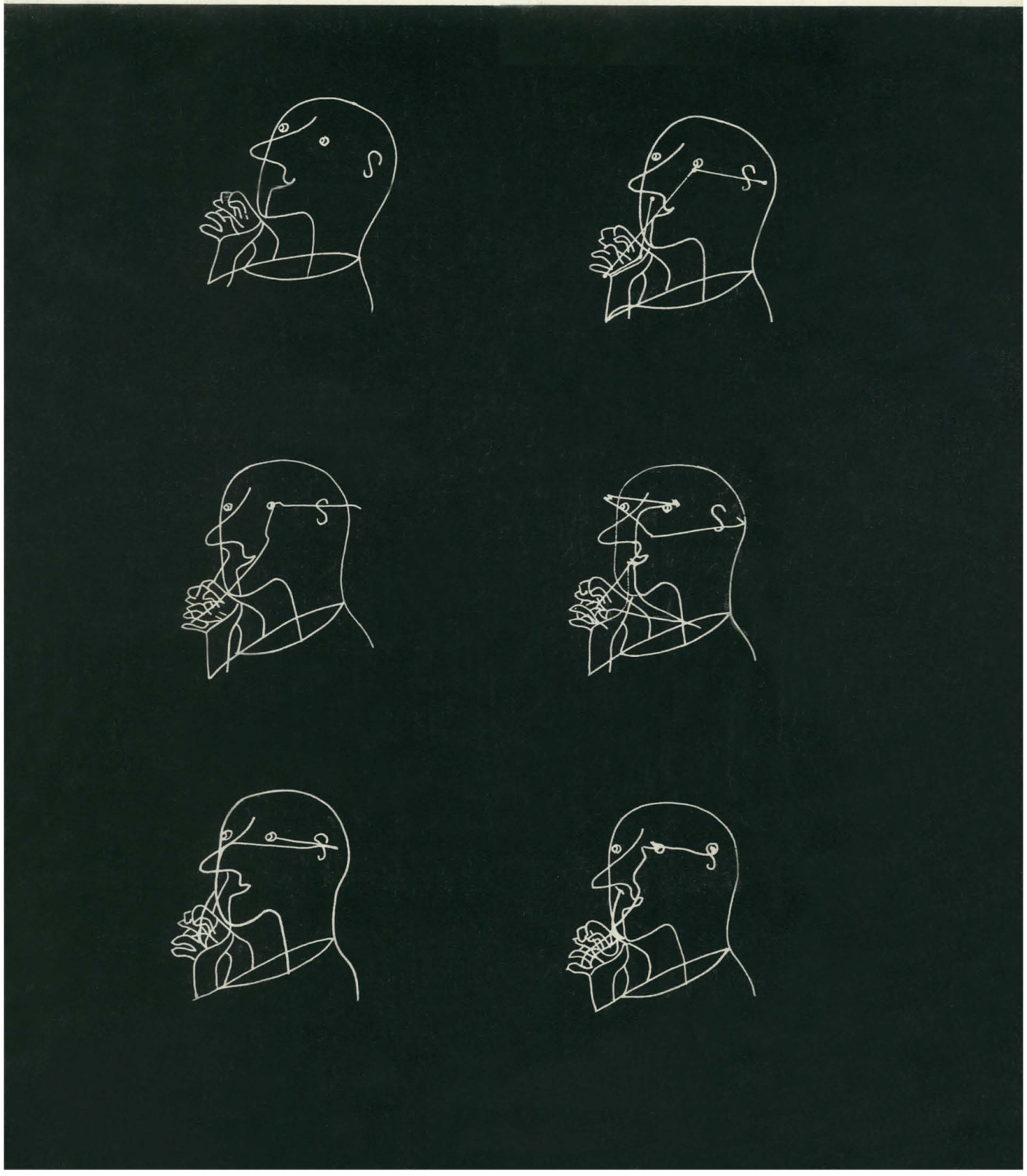
SCIENCE

22 January 1971

Vol. 171, No. 3968

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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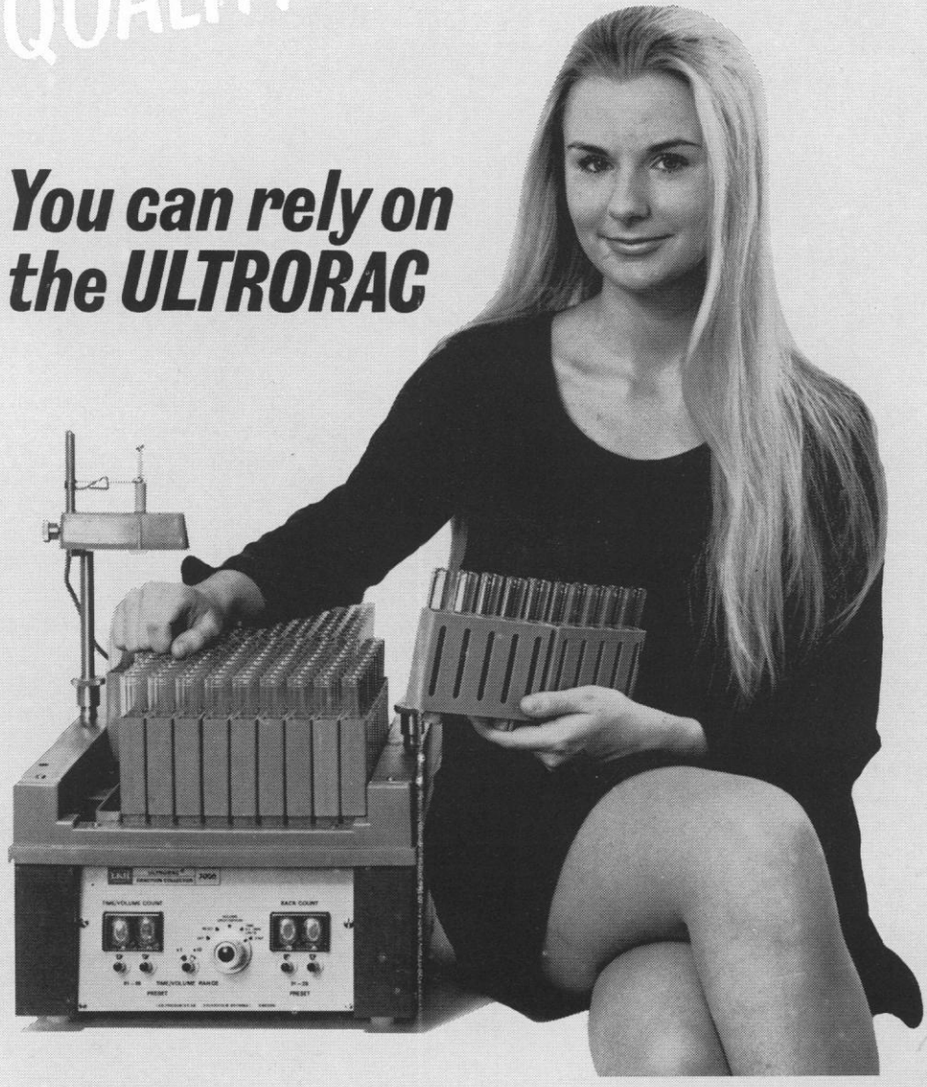

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Eye movements and visual perception. Recordings of eye movements while subjects view and recognize patterns reveal certain regularities, termed "scanpaths," which have implications for theories of visual pattern perception. See page 308. [Drawing derived from etching by Paul Klee]

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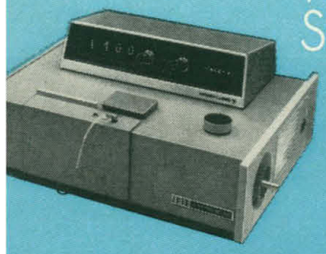

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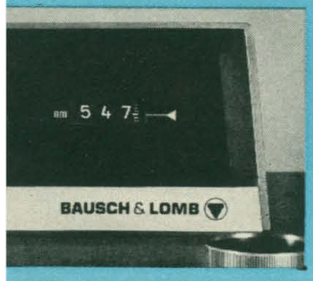

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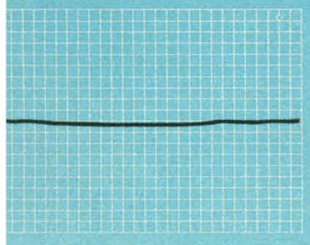

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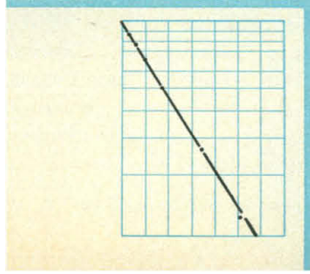

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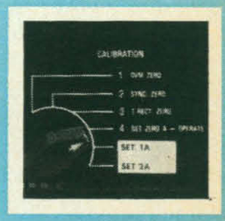

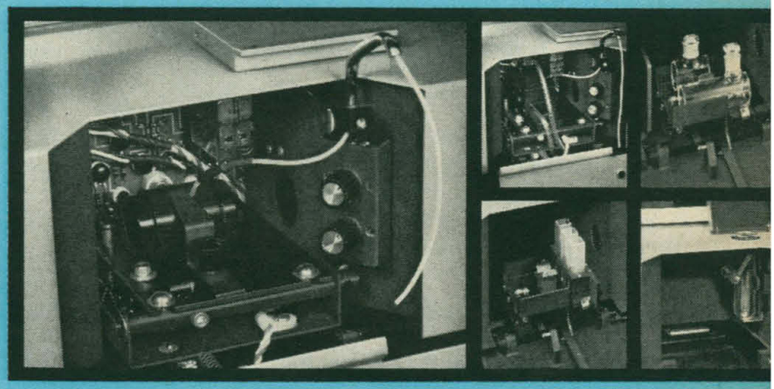

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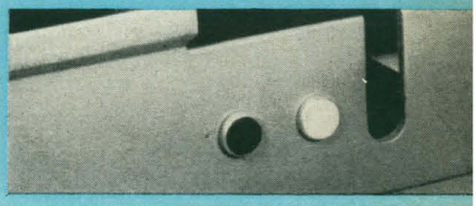

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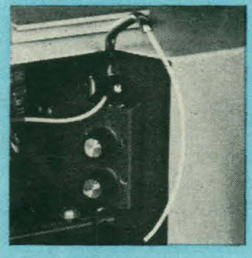

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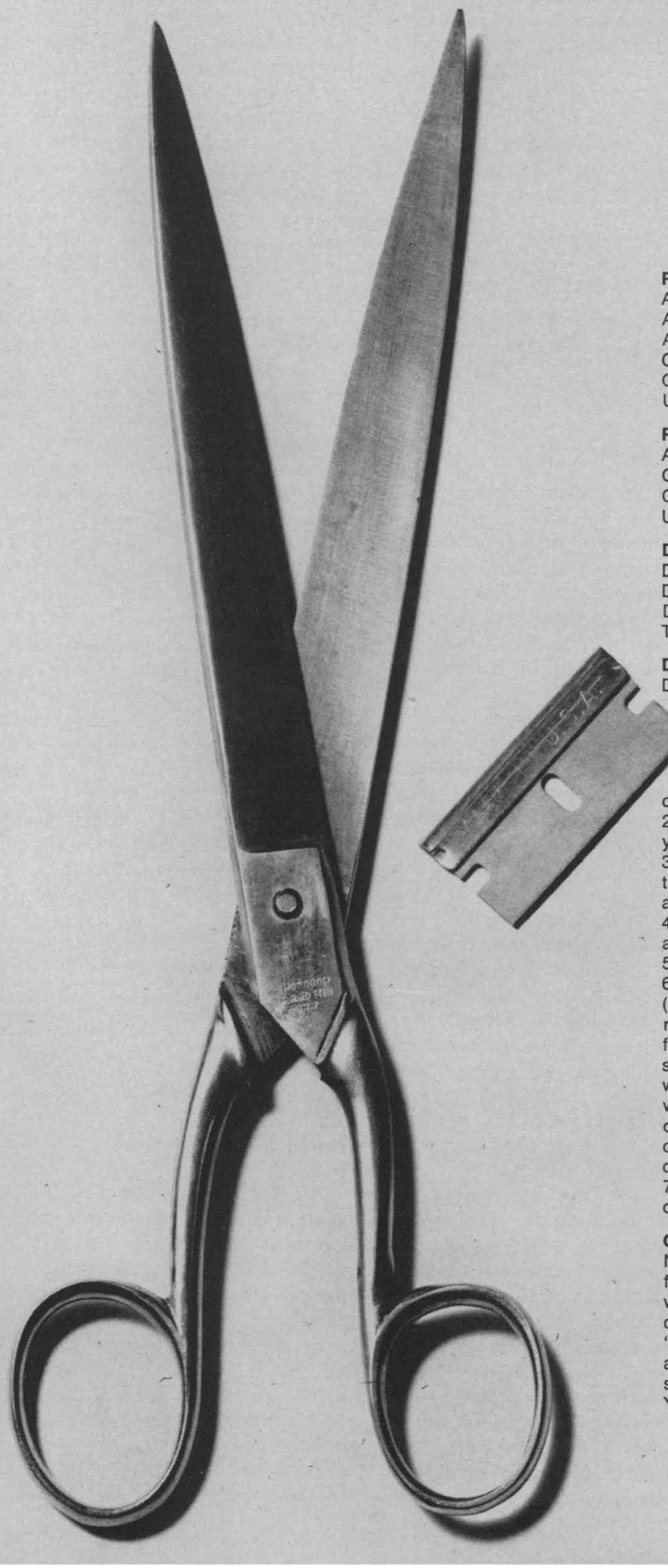

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Adenosine 5'-Triphosphate (8 ^{14}C) Li.	35-50
Adenosine 5'-Triphosphate (8 ^{14}C) Na.	35-50
Cytidine 5'-Triphosphate (2 ^{14}C) Li.	20-35
Guanosine 5'-Triphosphate (8 ^{14}C) Li.	35-50
Uridine 5'-Triphosphate (2 ^{14}C) Li.	20-35
Ribonucleotides (^{3}H)	**c/mM**
Adenosine 5'-Triphosphate (8 ^{3}H) Li.	12-15
Cytidine 5'-Triphosphate (5 ^{3}H) Li.	5-15
Guanosine 5'-Triphosphate (^{3}H) Li.	1-1.5
Uridine 5'-Triphosphate (5 ^{3}H) Li.	10-25
Deoxyribonucleotides (^{14}C)	**mc/mM**
Deoxyadenosine 5'-Triphosphate (8 ^{14}C) Na_2	30-50
Deoxycytidine 5'-Triphosphate (2 ^{14}C) Li.	30-50
Deoxyguanosine 5'-Triphosphate (^{14}C) Li. (U)	200-250
Thymidine 5'-Triphosphate (2 ^{14}C) Li.	40-50
Deoxyribonucleotides (^{3}H)	**c/mM**
Deoxyadenosine 5'-Triphosphate (8 ^{3}H) Li.	5-15
Deoxycytidine 5'-Triphosphate (5 ^{3}H) Li.	15-30
Thymidine 5'-Triphosphate (methyl ^{3}H) Li.	5-15

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tional processes, and use it as feedback to help students self-actualize. I think we should also be aware that poor grades often reflect instructional, as well as student, deficiences. But let us not mislead ourselves and students by stating that college evaluation, even as presently conducted, is worthless when it comes to predicting success in later years.

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San Francisco State College,
San Francisco, California 94132

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Arsenic and Phosphate: Measured by Various Techniques

It was interesting to note (*1*) that the Soap and Detergent Association and the enzyme manufacturers took Angino *et al.* (*2*) to task for what they seemed to regard as an irresponsible discussion of the occurrence of arsenic. . . . Now that the subject has been brought up I would like to add our experiences. We, too, have been finding arsenic in waters—in lake waters to be exact. In ten Minnesota lakes the concentrations of arsenic found in filtered surface waters taken in the fall were 7, 9, 11, 16, 22, 36, 105, 132, 216, and 224 μg/liter, respectively. The last four are well above the Public Health Service's limit for drinking water, but as lakes are not considered drinking water these days I have refrained from calling public attention to these figures. Indeed I have gone out of my way when asked about them to point out that they probably are not harmful. In this way I suspect more has been gained in peace of mind than has been lost in toxicity. (I do not mean to imply that if we close our eyes our problems will go away. On the contrary I believe we should keep our eyes and minds open, but perhaps our mouths shut, until we know what we are saying.) However, these numbers *are* very important for a different reason than health. Most investigators interested in lake pollution are measuring phosphate by some modification of the so-called Harvey method: usually by a molybdate–stannous chloride procedure. This procedure does not distinguish between phosphate and arsenate (the form in which most of the arsenic is present) and so many measurements are undoubtedly wrong in studies where arsenic is present at the concentrations we find. In fact, to give an example, the lake having an arsenic concentration of 224 μg/liter had a concentration of phosphate, by the Harvey procedure, of 104 μg/liter, but a bioassay showed the concentration of phosphate to be less than 1 μg/liter. Clearly if we hope to correlate algal growth with phosphate concentrations or fluxes we must do better. Some investigators who use the so-called Stephens technique may avoid the error somewhat but even this technique is not completely free of arsenate interference. I would recommend that those engaged in measurements of phosphate in lakes be aware of the problem and if it exists try the method we have found that completely eliminates the interference (*3*).

The source of the arsenate is probably from its addition to lakes as sodium arsenite to kill rooted aquatic plants. In Minnesota, records show that from 1956 to 1969 over 900,000 pounds of the chemical were applied. In New York State, from 1961 to 1966, about 85,000 pounds were used and it is likely that even greater quantities have been spread about in other states. The arsenite rapidly oxidizes to arsenate and, because of its relatively low involvement in biological processes, seems to have a long half-life.

JOSEPH SHAPIRO
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University of Minnesota,
Minneapolis 55455

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Doctor of Arts Degree

In his editorial (6 Nov., p. 586) H. Guyford Stever suggests that the rationale behind the Doctor of Arts degree is to fill a gap between the more research-oriented universities and the secondary institutions, the state and junior colleges. It is primarily to these institutions that students would go for training as teachers and it is these institutions that would be expected to absorb the holders of the new degree. I take exception to Stever's contention that new degrees must be created to

meet existing needs. What society, including the academic community, needs is not a new degree but rather stronger Ph.D. and master's degrees which prepare candidates to teach *and* carry on significant original research.

Individuals trained primarily in methodology of instruction are generally poorly prepared to effectively convey the excitement of discovery and creativity unless they have been active participants in original investigations. The best college instructors are those who are engaged in a balanced program of instruction and research. Parenthetically, the ability to critically read literature in a field is greatly enhanced by involvement in original research, and such an ability is an essential part of the educational process.

While the new degree might theoretically solve some of the problems of state and junor colleges, it would do absolutely nothing to solve the problem of the university instructor who must be engaged in original research as well as an effective teaching program. At a time when public support of original research is diminishing and the research-oriented Ph.D. is being placed in a classroom and asked to produce or to seek a position elsewhere, it is even more imperative that Ph.D.'s, who are trained at a great deal of expense, have the preparation and training to be effective instructors as well as effective researchers. One cannot and should not separate teaching from research.

JOHN B. JENKINS
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Swarthmore, Pennsylvania 19081

I trust that physical and biological scientists will not support the Doctor of Arts program proposed by Stever which bypasses the candidate who is discovering new knowledge in his field. Instead the candidate evolves teaching materials and strategies and "develops evaluating instruments, and tests his material in class. The work is carried out in the major-subject department. . . ."

I suggest that the candidates who choose this route are even less likely to be equipped to work in this area of the behavioral sciences. Developing reliable, valid, and unbiased evaluating instruments to assess students' behavior is a challenging technical task. There are standards for data and observations in the behavioral sciences that need to be met. Furthermore, to test instructional processes and curricula in classrooms requires sophisticated behavioral science research designs involving protection against internal and external validity threats atypical to the physical sciences.

There are scientific questions that should be answered, however, concerning the effectiveness of instructional methods and curricula in the "hard" sciences. For instance, why should physical or biological science courses be required of students in the secondary schools, in college, and often included in the lower grades? Is it to learn the elementary facts and principles of a science, or scientific method, thinking habits, and attitudes? Yet even physical and biological research scientists evaluating science curricula often make quite unscientific statements with little regard to the quality of the behavioral science data. Can those who choose not to discover new knowledge in their own fields do research in another?

WILLIAM ASHER
Department of Education, Purdue University, Lafayette, Indiana 47907

It will not be easy to change the pattern of earning advanced degrees in the sciences. As of March 1970, only three institutions, including Carnegie-Mellon, were granting the Doctor of Arts degree and only one of those offered it in the sciences (University of North Dakota). The problem is one of acceptability; the degree is not marketable in science departments for a variety of reasons and especially in the buyer's academic marketplace.

A study last year by the Commission on Undergraduate Education in the Biological Sciences revealed considerable interest in programs aimed toward improving college teaching. Some distinguished, strongly research-oriented biology departments are modifying the Ph.D. program to permit research on curricular innovation in lieu of the traditional thesis. Of more immediate consequence are the expanding programs to improve training for teaching assistants. Nearly 70 percent of all Ph.D.'s in biology become college teachers and only 10 percent publish 90 percent of the research papers. Thus, the time is long overdue for alternatives within the Ph.D. program to prepare scientists for teaching—the job which most of them choose.

EDWARD J. KORMONDY
Commission on Undergraduate Education in the Biological Sciences, 3900 Wisconsin Avenue, NW, Washington, D.C. 20016

Male Bias of NIH

Reporting on HEW's demand that the University of Michigan stop discriminating against women, Bazell (20 Nov., p. 834) asserts: "The women's liberation movement has a new ally: the Department of Health, Education, and Welfare." A most interesting claim, considering the record of NIH, an organization over which HEW is said to exercise some control.

Membership in one of the NIH Public Advisory Groups is a valued form of professional recognition to most scientists, and also provides opportunities for the "challenging interaction with other professionals" that, as Martha White has pointed out ("Psychological and social barriers to women in science," 23 Oct., p. 413), is difficult for many women to achieve. In choosing members for its committees and councils, NIH has a splendid chance to set a good example for its male-oriented client universities.

The *NIH Public Advisory Groups* directory (1 Jan. 1970) lists the members of 96 advisory groups associated with the several institutes: 914 members, of whom 22 are female. Next comes the members of the review committees of the Career Development Branch: 92 men, 1 woman. Following are the members of the 48 study sections that pass on research grant applications: 662 members, including 17 women. The rest of the book, dealing largely with public health and education, includes seven committees concerned with nurses' training; on these women predominate, 55 to 23. The other 35 groups are more orthodox: 375 men, 17 women.

Aside from the nurse-related groups, there are 192 committees, of which one has three women and eight have two. Most have none. Again excepting the nursing committees, there are 2044 extramural advisers, 1987 of whom are male. That's 97.2 percent.

I am well aware that the number of women qualified to serve on the advisory panels of NIH is limited, and this situation is due in part to the reluctance of most universities to give women a chance to develop their careers. Since HEW is demanding that universities "achieve a ratio of female employment in academic positions at least equivalent to availability," may I suggest that the ratio of females available to serve on NIH committees is better than 2.8 percent. For myself, I am happy to admit my indebtedness to NIH for generous support of my research and for the training of my students (as well as for the privilege of serving on a study section). But NIH as a women's lib "ally"? Give us girls some good reliable enemies!

FLORENCE MOOG
Department of Biology, Washington University, St. Louis, Missouri 63130

Origin of Nitrogen

The report by Dalgarno and McElroy ("Mars: Is nitrogen present?," 9 Oct., p. 167) makes some interesting points about nitrogen in the atmospheres of Mars and Earth. However, papers of this sort seem consistently to ignore biological phenomena; the nitrogen now in Earth's atmosphere is mostly, if not entirely, of biological origin. Shouldn't one consider the possibility that on Mars electrical phenomena and ultraviolet light might purge the atmosphere of any nitrogen present and that it would not be restored if Mars lacks any counterpart of our denitrifying bacteria?

LAMONT C. COLE
Division of Biological Sciences, Cornell University, Ithaca, New York 14850

Esoteric Fish

A clonal colony of the naturally gynogenetic teleost, *Poecilia formosa* (*1*), has been established in Florida and small numbers are now available for interested investigators. The genetic homogeneity of the colony suggests a usefulness for various biochemical, behavioral (*2*), and immunological (*3*) studies.

BERNARD W. AGRANOFF
R. E. DAVIS
Mental Health Research Institute, University of Michigan, Ann Arbor 48104

R. E. GOSSINGTON
Post Office Box 208, Delray Beach, Florida 33444

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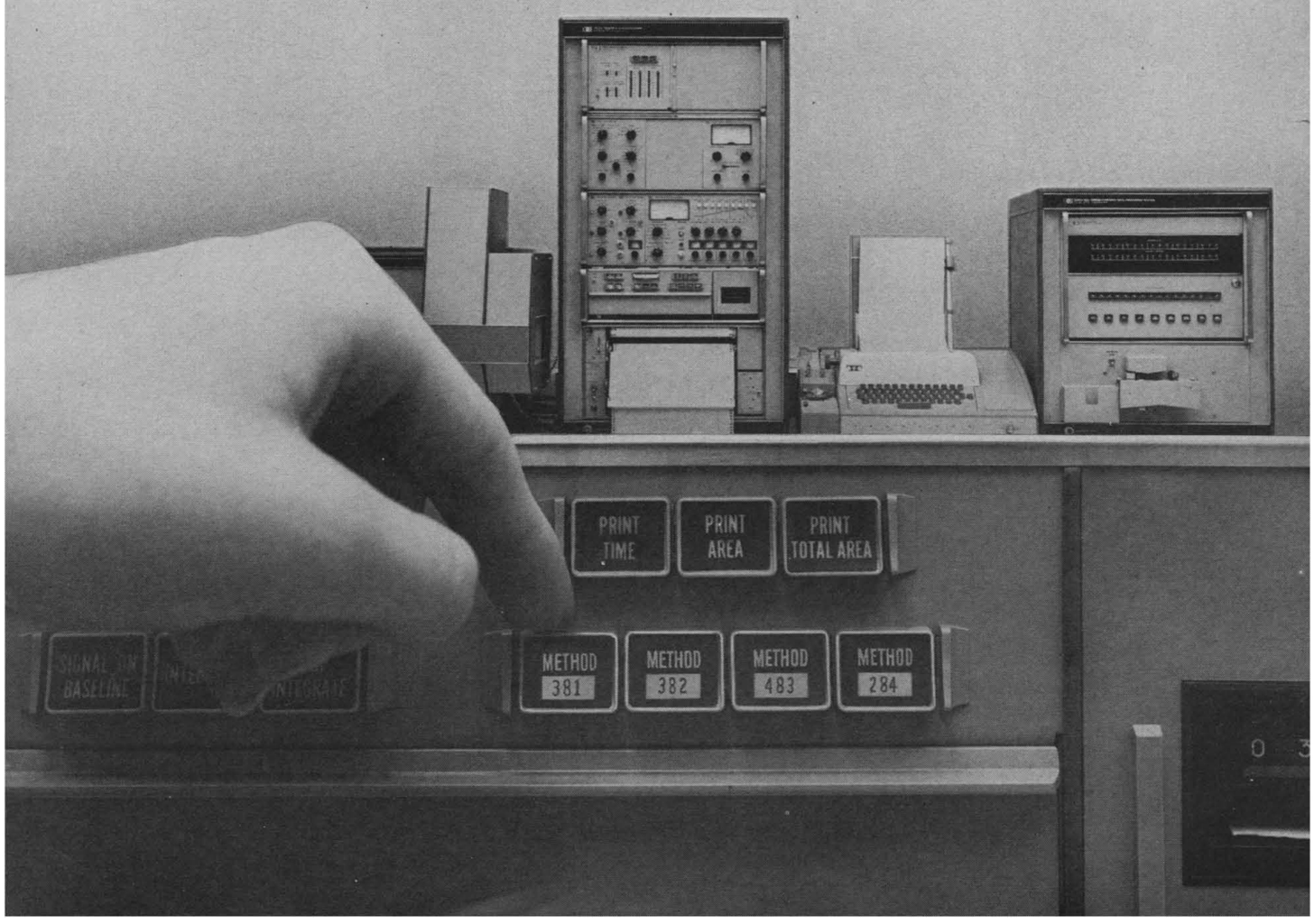

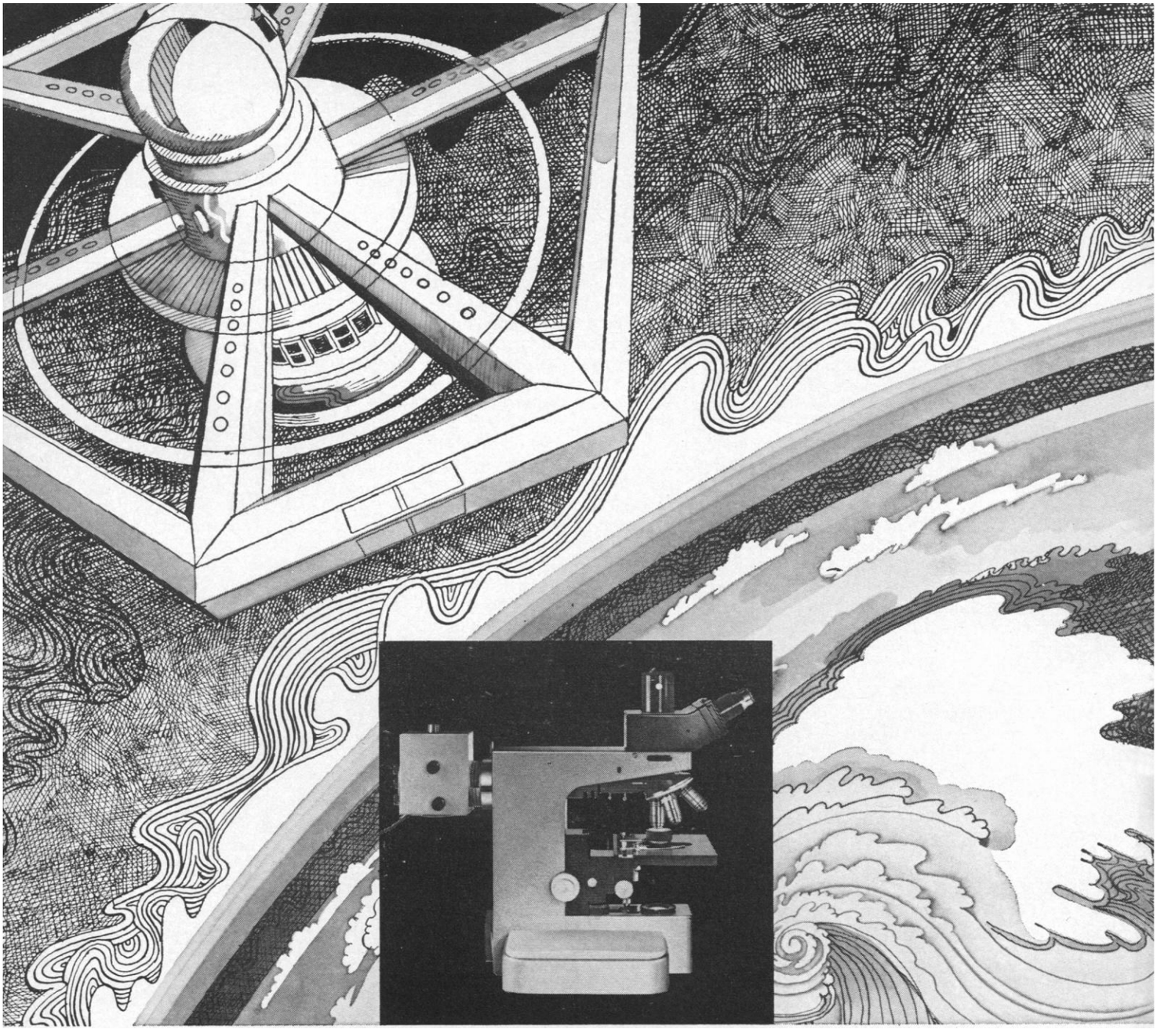

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22 January 1971, Volume 171, Number 3968

SCIENCE

The Chicago Meeting

The AAAS has had an important role in efforts to use science and technology for the long-term benefit of mankind. The annual meeting has been especially effective in dealing with many interactions of science and society. National political and administrative actions in such fields as environmental regulation can be traced to ideas presented there. The diversity of speakers and ideas has been a major basis for the effectiveness of the meeting. Instead of attempting to lay down a "party line," AAAS has provided a platform for scientists of all disciplines and political persuasions, including ultraliberals. Although there have been vigorous clashes of personalities and ideas, the proceedings have been conducted in a fair and orderly way.

During the past 2 years and especially at the Chicago meeting, there has been a departure from tolerance which, if permitted to continue, would destroy the value of the convention. Key speakers would refuse to participate; large audiences would not come to listen to a one-sided "discussion"; and the press would go elsewhere.

The disorders at Chicago were instigated by a group of militants that numbered about 50 out of a total of 6000 or more attendees. The group began its preparations many months ago. A handbill distributed in November by an organizing group invited to a planning session "all people interested in planning counter-tours, counter-seminars, or just general agitation." Throughout these premeeting activities, AAAS was referred to as AAA$. Presumably this indicated a belief that AAAS is a wealthy organization, for the militants attempted to discourage payment of registration fees. Actually AAAS had a deficit of more than $100,000 in 1970, and meeting revenues have never come close to covering costs.

During the convention, militants focused on disrupting a few sessions, tormenting selected speakers, and obtaining maximum coverage in the media. Their efforts to bring notoriety to themselves and to tarnish the image of AAAS were to some extent successful. Many scientists and the public at large got the impression that the meeting consisted mainly in a series of riots. In fact, more than 95 percent of the individual sessions were conducted without incident. One of the most notable failures of the militants was their inability to gain support among the hundreds of students in attendance. Indeed many of the students were "turned off," for they had come, sometimes from a distance, to hear certain speakers and were denied that right; to them, confrontation is old stuff.

From the standpoint of the press, the militants did not advance their cause; nor did they advance the cause of science. Comment in the 1 January issue of the *Washington Post* was typical of that across the land: "Shouting appeared to be the chief intellectual resource of the younger scientists who refer to themselves as 'radicals' more or less in the manner of Nazi stormtroopers who used to call themselves 'socialists.' But their radicalism seems to consist of no more than a rejection of reason and an unwillingness to let anyone but themselves be heard. . . . It should not be beyond the power of scientists to restore reason to its normal throne at their conventions. . . . It is a scientific fact, we believe, that only a single speaker can be heard at a particular time in a particular place. Those who want to hear him should be free to do so; those who do not should be free to go away. This is not alone the basis of science; it is also the essence of freedom."—PHILIP H. ABELSON

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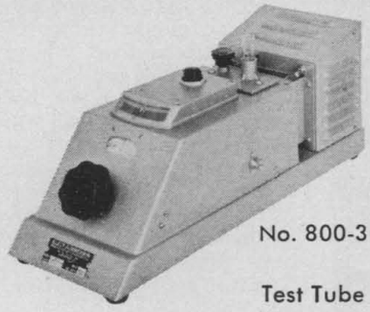

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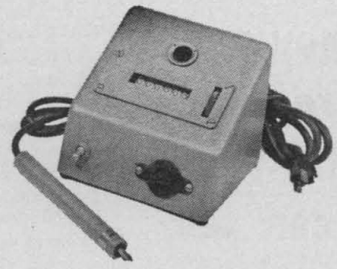

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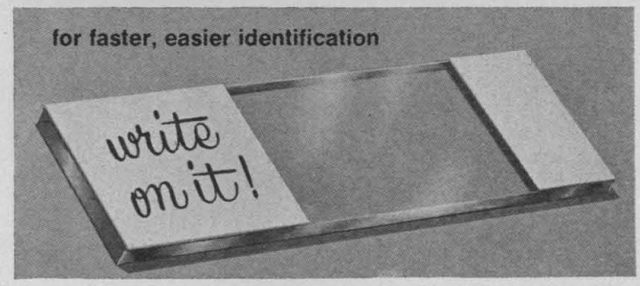

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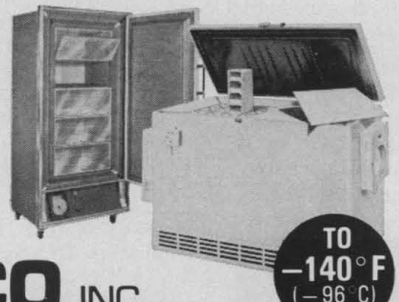

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(*Continued from page 275*)

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