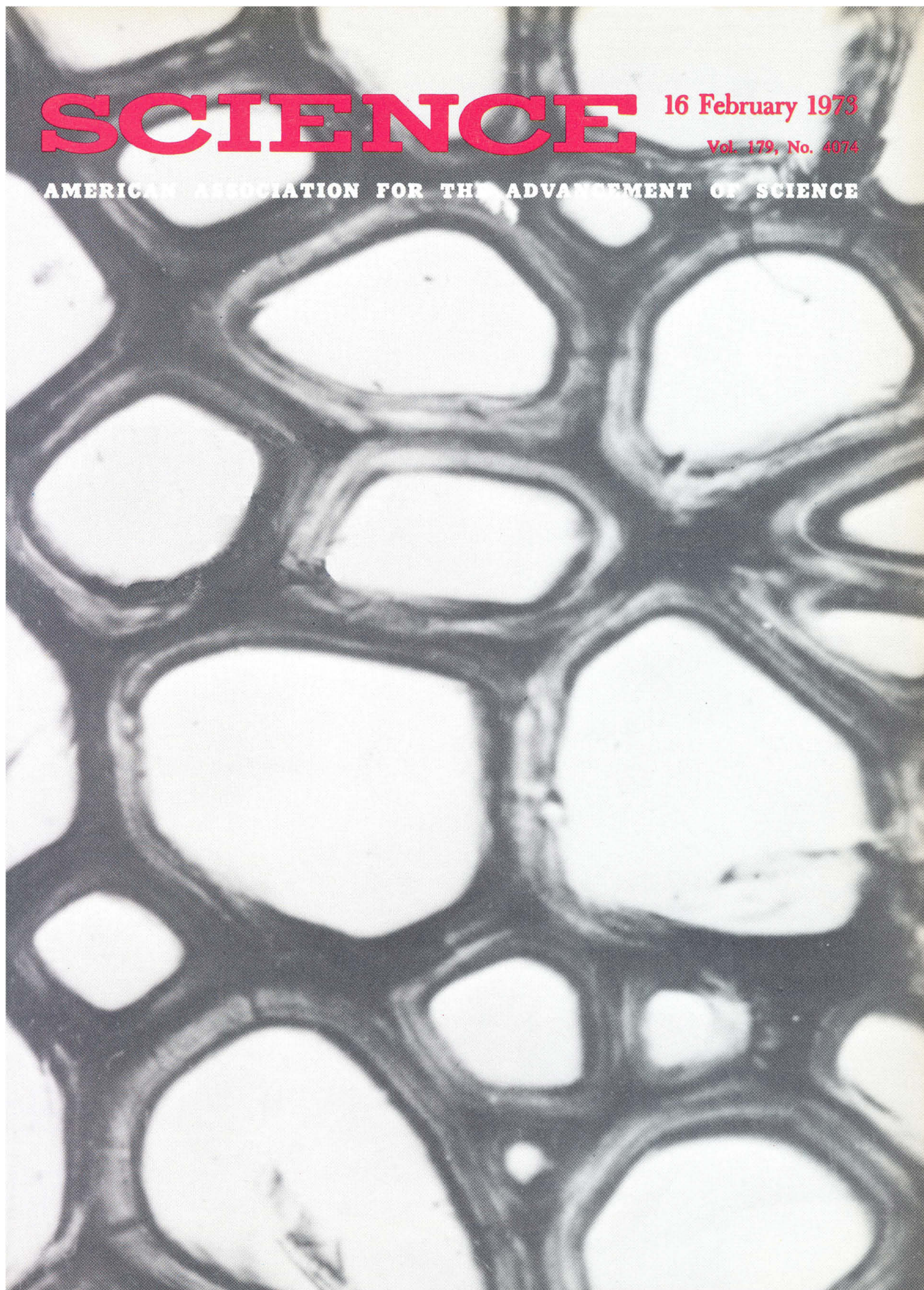


SCIENCE

16 February 1973

Vol. 179, No. 4074

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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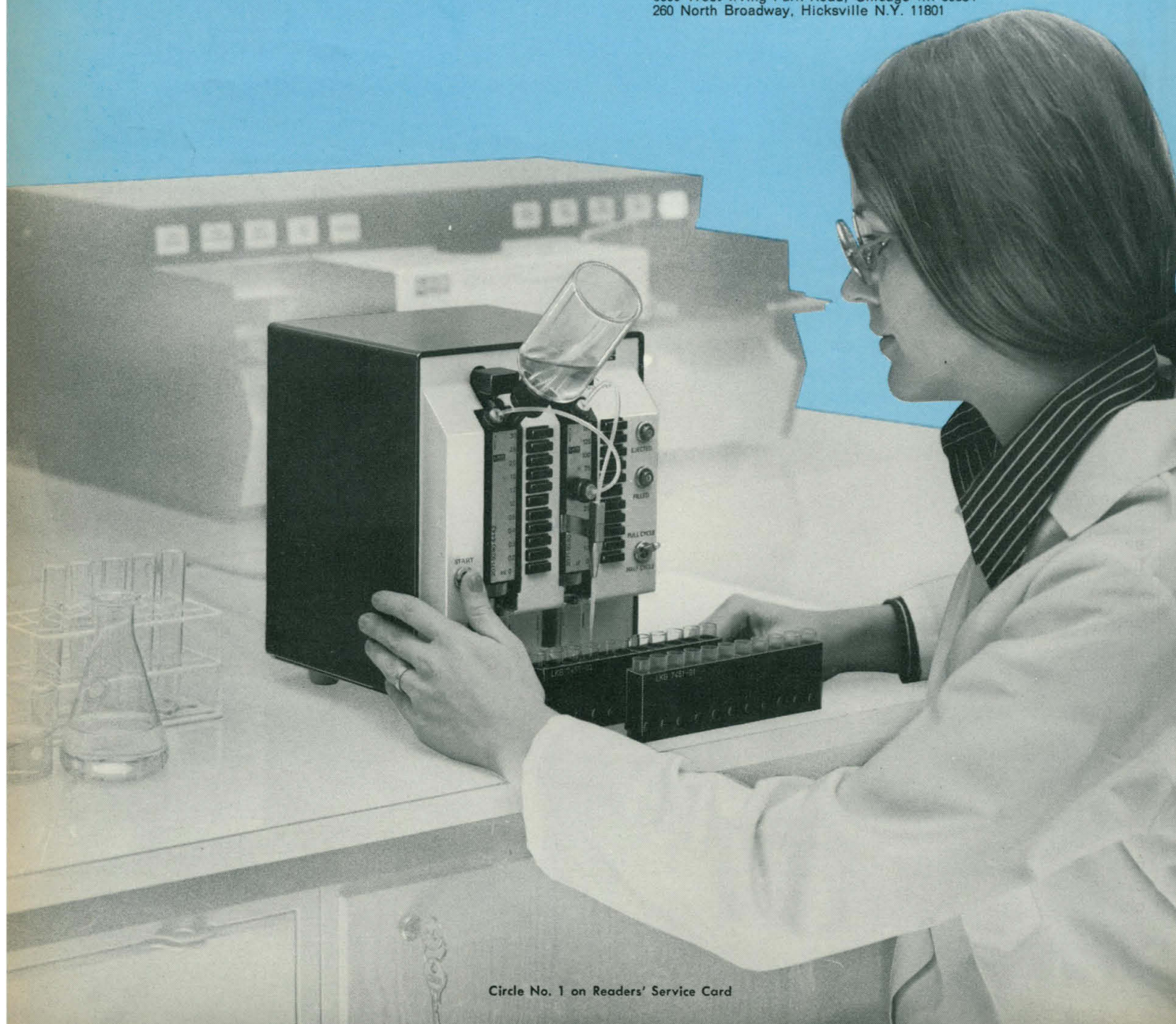
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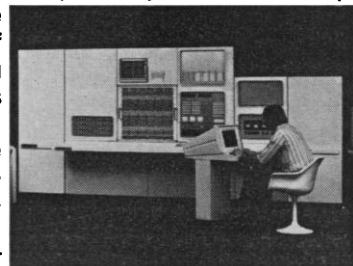
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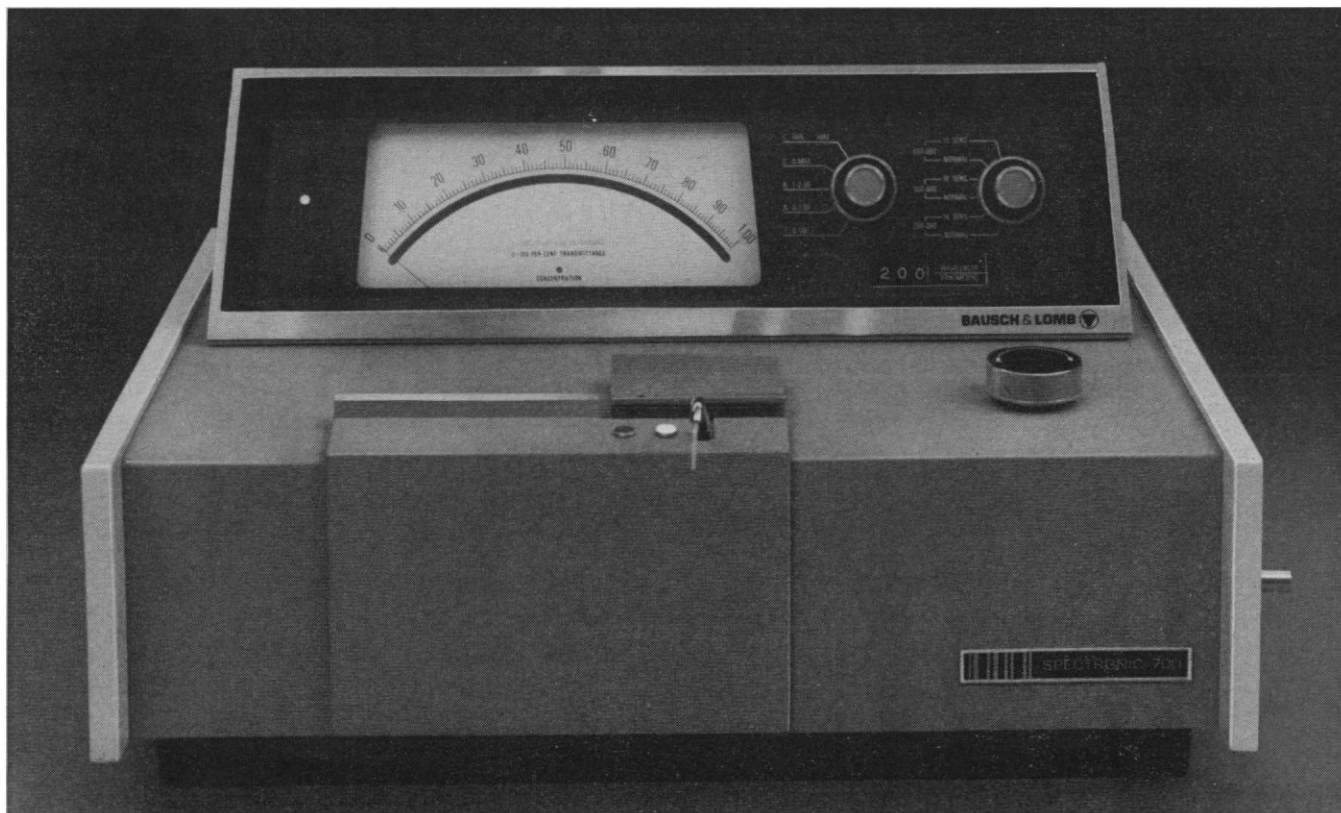
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COVER

Ultraviolet photomicrograph of reaction wood fibers, *Lagunaria patersonii* ($\times 3240$). See page 647. [G. Scurfield, Forest Products Laboratory, Commonwealth Scientific and Industrial Research Organisation, South Melbourne, Victoria, Australia]

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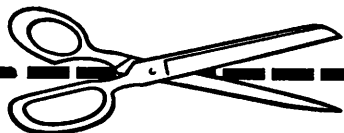
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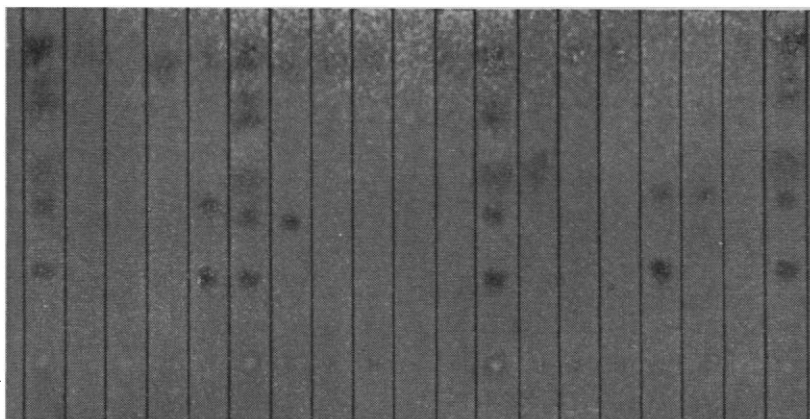
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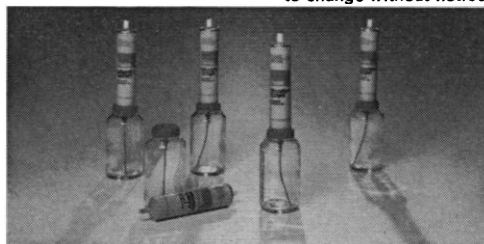
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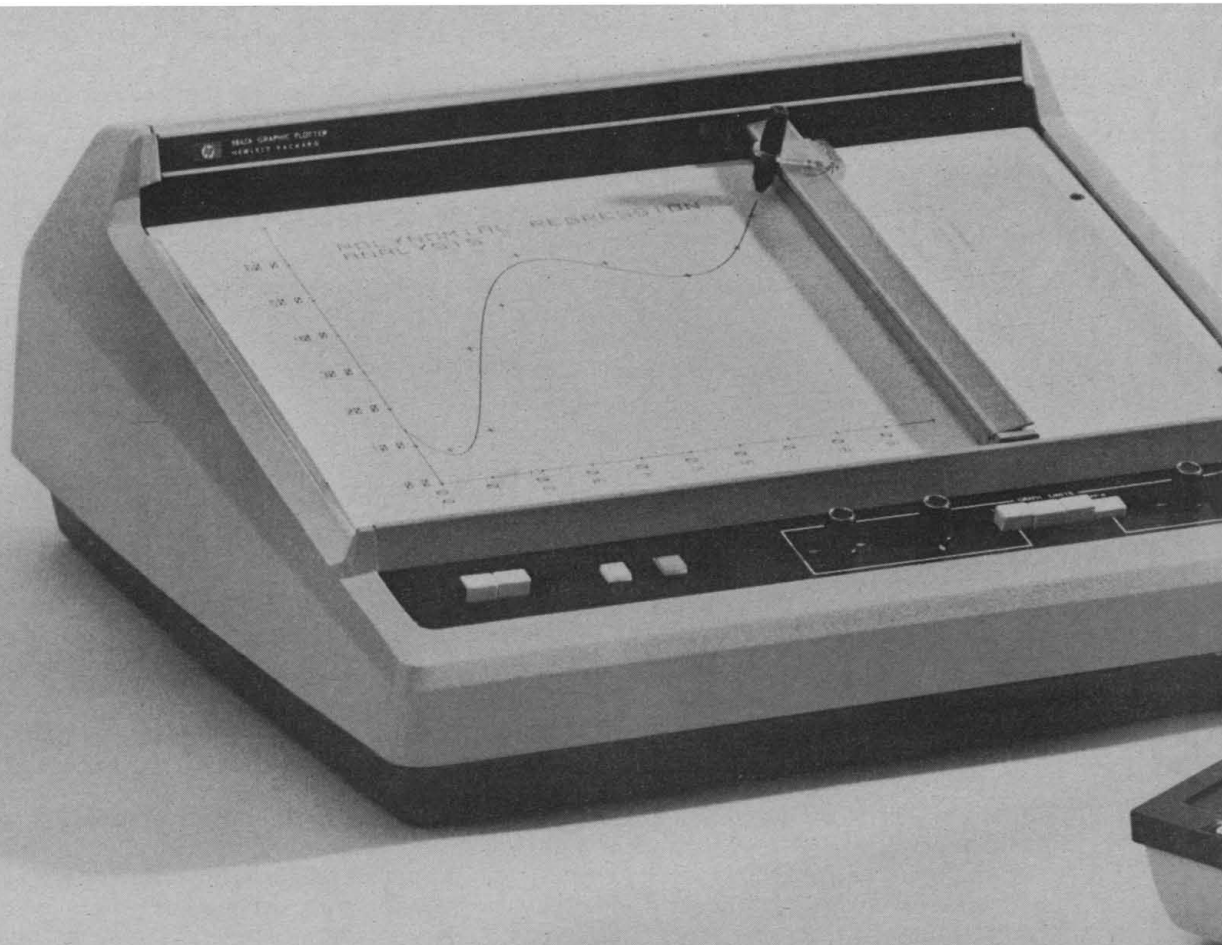
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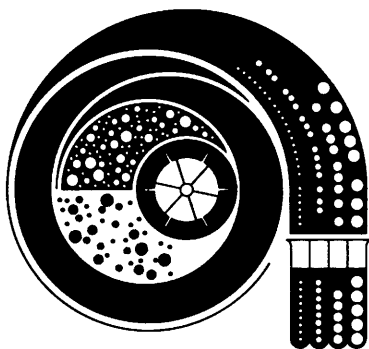
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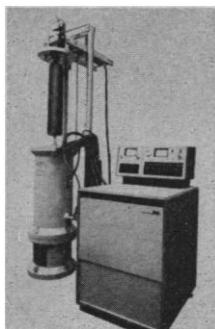
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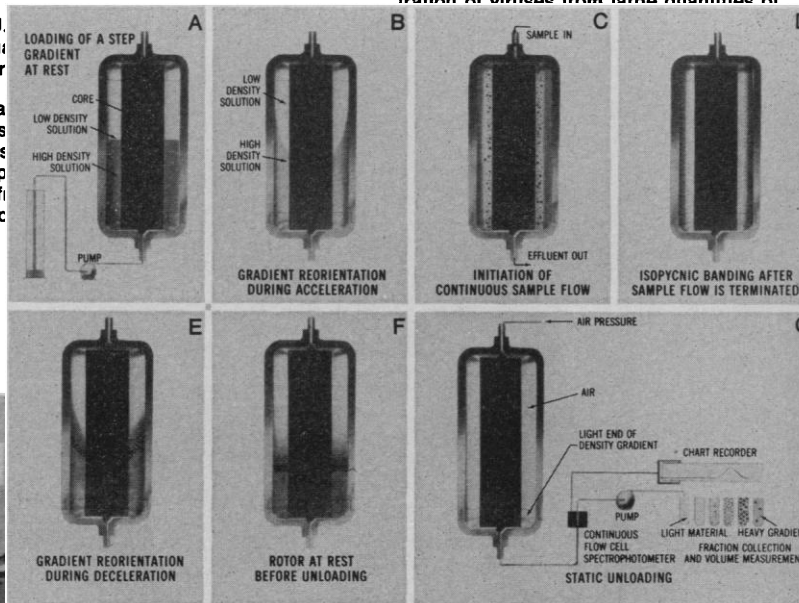
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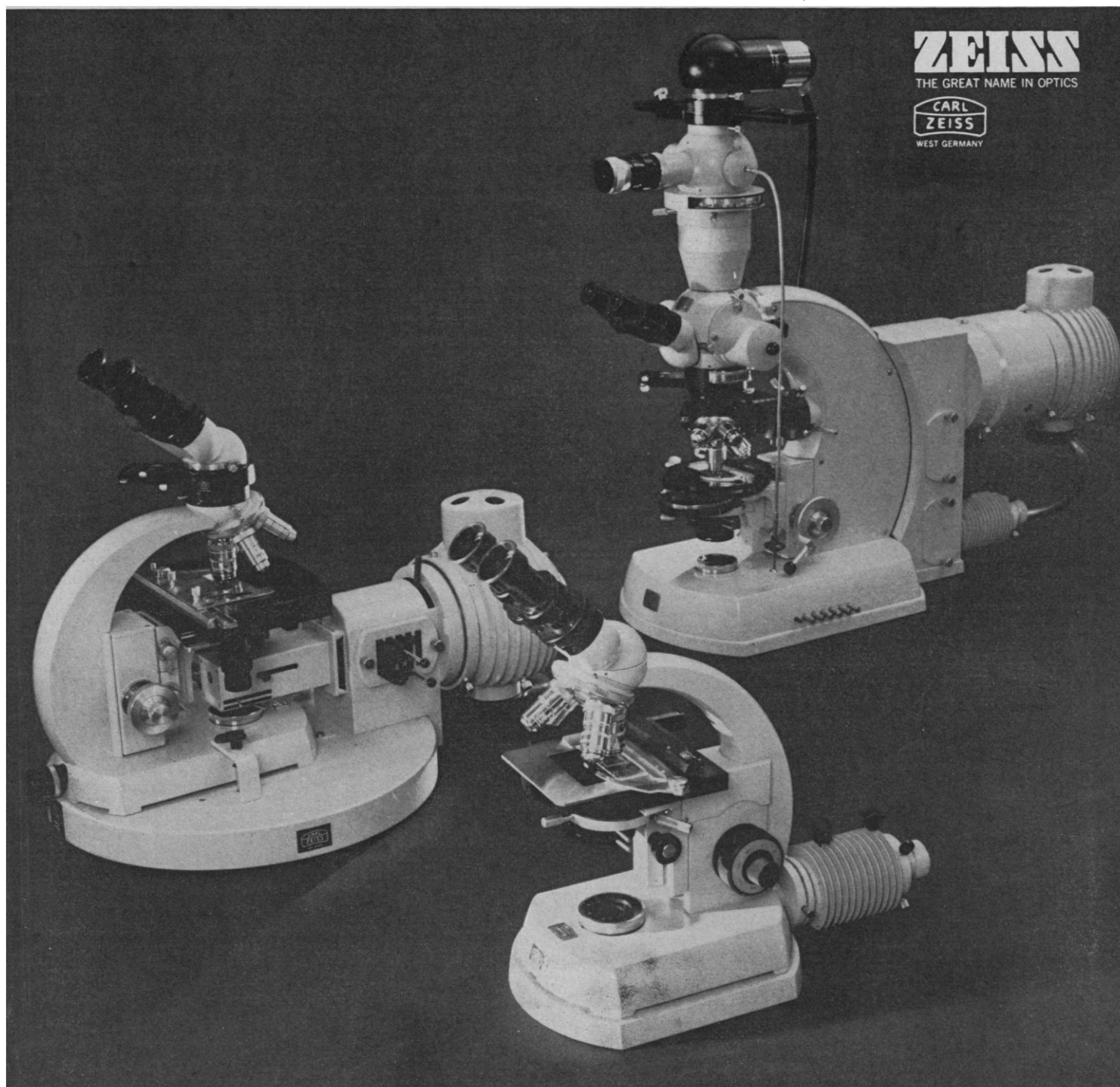
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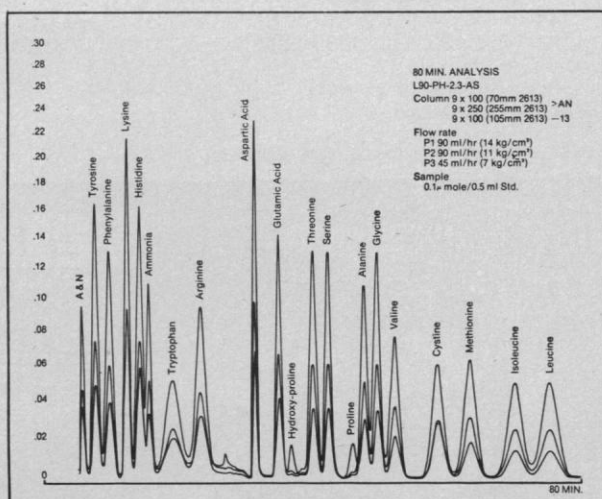
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RUN :	
INST 2 , AA , METHOD 1 , FILE 13 :	
STD CONC ***** :	
TIMES 80.0, .0, 3276.7, 3276.7, 3276.7, 3276.7,	
THRESHOLDS 16, .2,	
UNK/AIR .000, .0,	
TOL .000, .10, 1.0,	
REF PK .000, .0,	
STD NAME :	
TIME AREA RRT RF C NAME	
1.9 .0000 .019, .0000, .0000, 1	
3.9 1.4600 .039, .0278, .0999, TYROSINE:	
6.1 1.4362 .061, .0275, .1002, PHENYLALANINE:	
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12.6 .9406 .126, .0238, .0998, AMMONIA:	
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28.9 1.5041 .209, .0171, .1010, ARGinine:	
29.7 1.2656 .297, .0268, .1007, ASPARTIC ACID:	
33.3 1.2885 .333, .0201, .0997, GLUTAMIC ACID:	
35.2 .3124 .352, .0388, .1000, HYDROXY-PROLINE:	
38.8 1.3650 .388, .0225, .0998, THREONINE:	
41.2 1.4212 .412, .0245, .1004, SERINE:	
45.3 .4687 .453, .0160, .1009, PROLINE:	
46.9 1.2884 .469, .0265, .1001, ALANINE:	
49.2 1.5465 .492, .0264, .1006, GLYCINE:	
51.9 .3113 .519, .0260, .1007, VALINE:	
58.8 1.5937 .588, .0150, .0989, CYSTINE:	
64.0 1.7785 .640, .0272, .1011, METHIONINE:	
71.4 1.3296 .714, .0290, .1003, ISOLEUCINE:	
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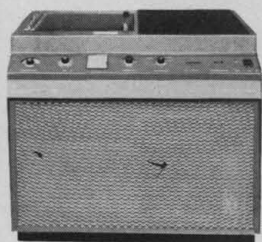
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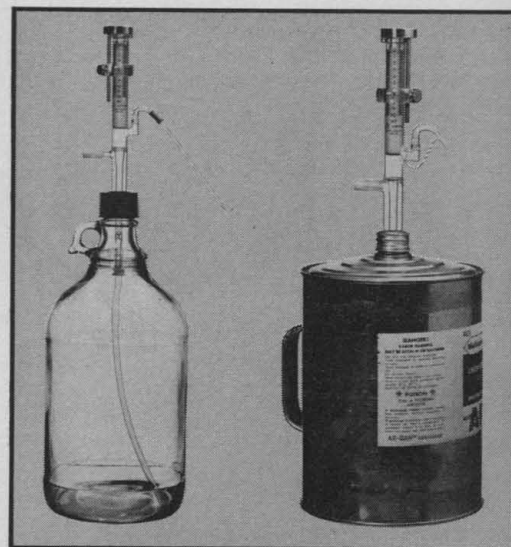
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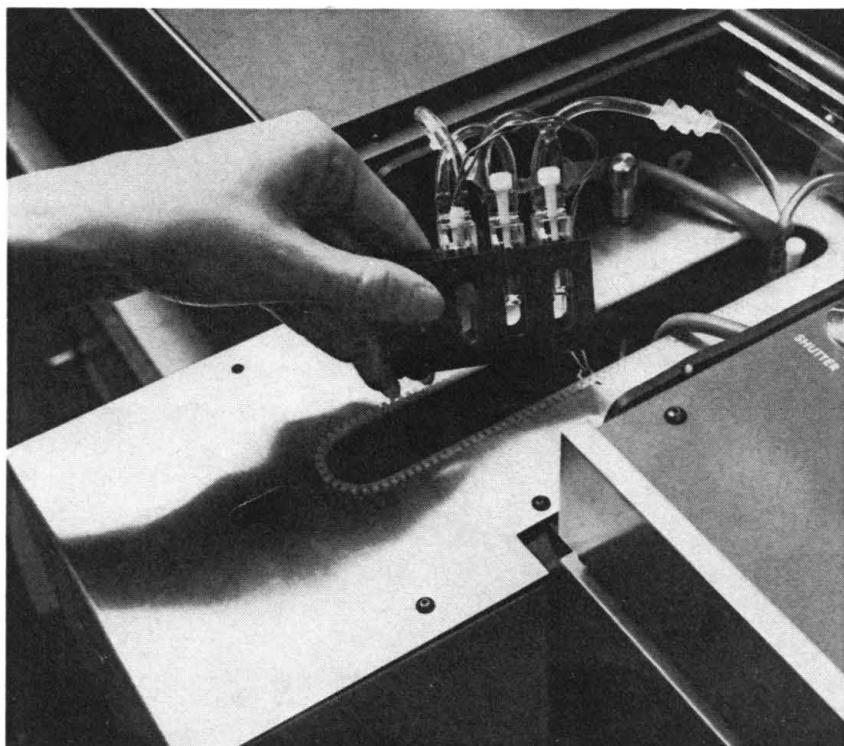
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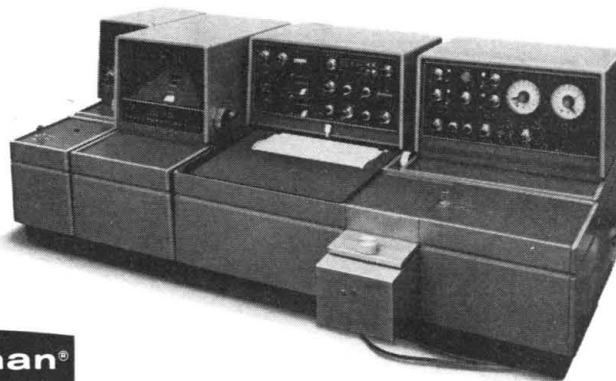
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and maximum absorption alternatives. To describe the "constant quality" projection as "his image of the normal educational condition" is a clear distortion.

Vaughan and Sjöberg attack my use of the word "normal" [for example, "In a normal year, approximately 50 percent of new doctorates take positions as college and university teachers" (1, p. 135)] to describe a steady trend, claiming that I "imply that it is fundamentally good." Surely anticipating the continuation of a customary pattern of growth or market behavior does not have "normative" overtones. They take even greater liberties when they refer to my "assumptions concerning the *ideal* proportion of Ph.D.'s in colleges and an *ideal* student-teacher ratio of 20 to 1 [italics added]." None of the one or two dozen economists and sociologists who have attempted to project trends in the academic labor market have ever assumed that likely events were therefore "ideal." The incremental student-teacher ratio of 20 to 1 happens to be the average for the period from 1958 to 1972, and 44 percent of college faculty members happen to have the doctorate. It surely is not my conception of the ideal world; it is part of the real world that one must contend with.

Finally, in one of the few instances where I *have* stated a personal preference among public policy alternatives, Vaughan and Sjöberg claim that I fail "to recognize the political dysfunctions of . . . [my] rather elitist educational commitment." "Implicit in the policy for restricting graduate programs is the notion that limited funds would be spent most expeditiously on those institutions wherein high quality is already judged to exist. By implication . . . this policy would lead to the support of a relatively small number of low-risk students who are carefully selected by these prestigious institutions." I have argued, and firmly believe, that it is inappropriate federal policy to merely let the market resolve the problem, imposing a kind of Malthusian adjustment upon academic institutions. Instead, I have argued for a positive program of federal support of graduate education that would attempt to provide long-term financial stability for the major graduate schools. I have suggested that "75 to 100 national universities" should receive basic federal support, but I hardly see that as being elitist. These same universities today produce 75 to 80 per-







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cent of all the doctorates, and most of them have enviable records in recent years of enrolling minority students. One could hardly characterize the nearly quarter of a million graduate students enrolled in these universities a "small number of low risk students." Vaughan and Sjöberg create straw-man arguments that mislead the reader.

In summary, it is difficult to know what Vaughan and Sjöberg are positively recommending. They applaud the actions of institutions and government agencies in cutting back on enrollments, yet deplore my proposal for added federal aid to support the major graduate centers. They wax enthusiastic about educators taking "a more active role in defining the future social order" and "creating a more viable and meaningful way of life," but they provide few hints as to what that new order might be. They want graduate education to change markedly in undefined ways to better serve some future undefined society. I wish they would reveal that vision to their readers; many of us might share it.

ALLAN M. CARTTER

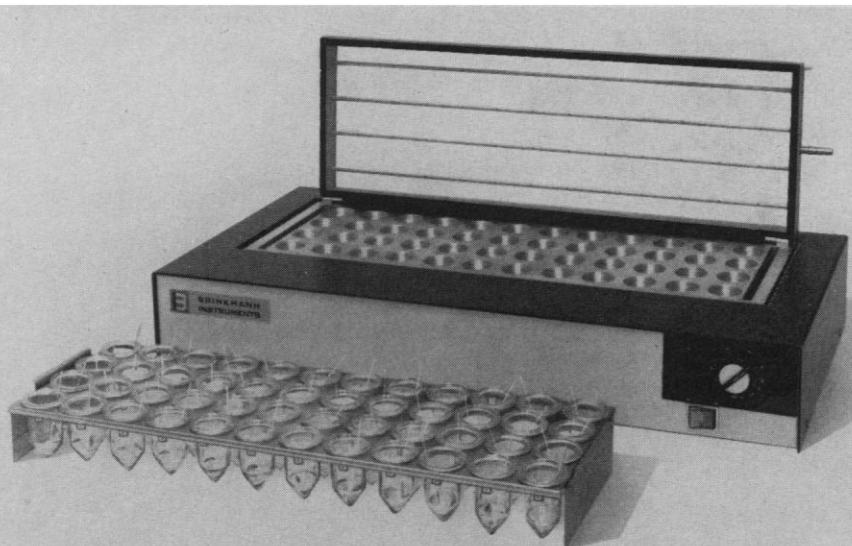
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Although many of Cartter's comments reflect the pique of one personally offended, his response nevertheless is instructive: it more fully exposes his basic orientation to public scrutiny. We shall consider the more obvious areas of intellectual friction and, at Cartter's behest, outline our vision of the future.

1) A fundamental source of disagreement between Cartter and ourselves arises from our differing conceptions of the nature of the market. Cartter's central argument regarding the academic labor market rests on the premise that market outcomes necessarily result from invariant, impersonal forces. In our view, market operations are less determinate; outcomes emerge from choices among a range of alternatives partially defined by noneconomic fac-



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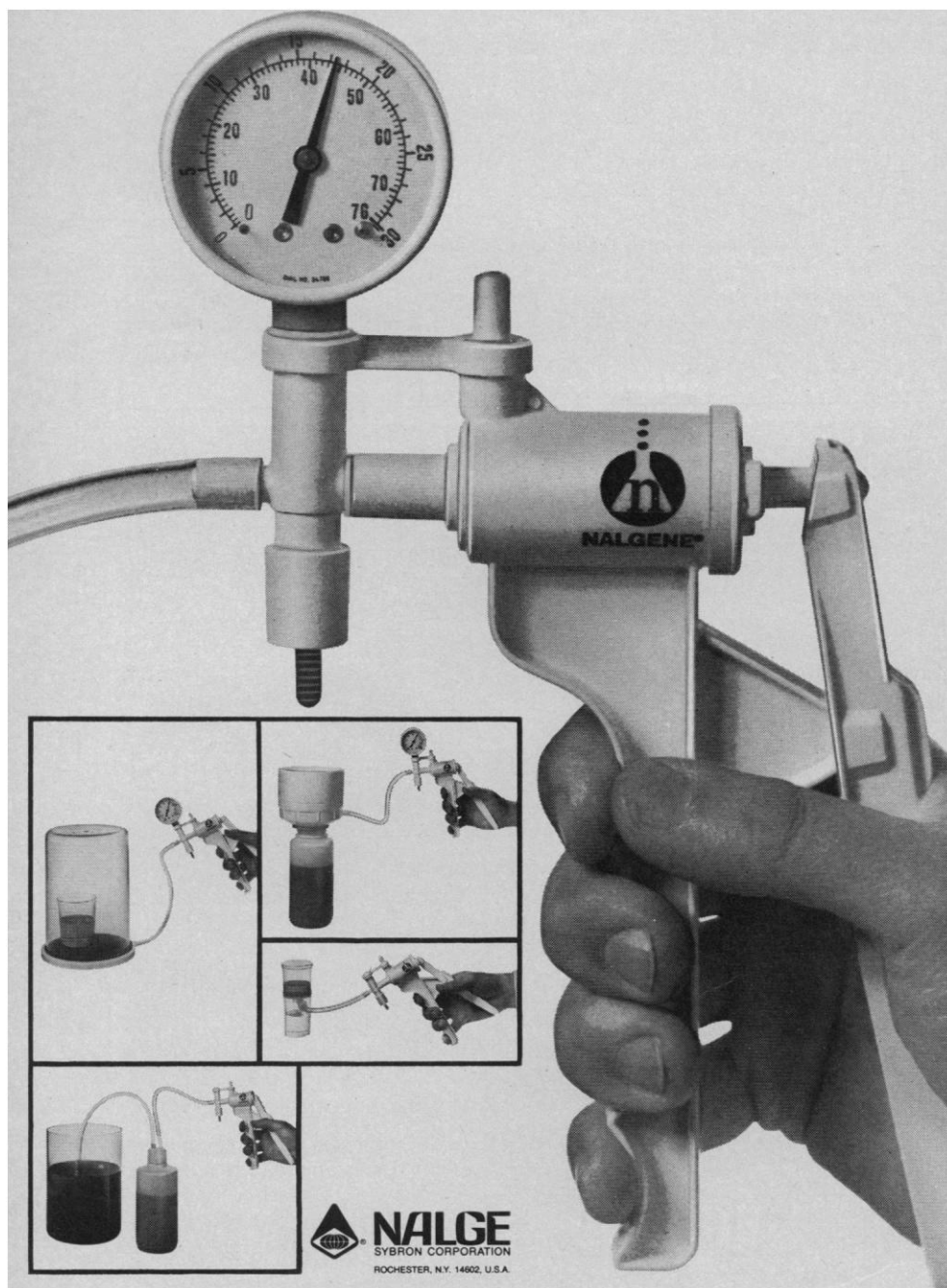
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tors. For one thing, the market has a political component.

Only by taking the existing power structure as a given can Cartter argue that educational needs are reflected in market demands. What is required by the broader society and what some persons in positions of power are willing to pay for are not necessarily the same. To equate social needs with effective market demand is to cling to a 19th-century definition of the market. To speak of a surplus of highly educated talent in a highly affluent society, where about 12 percent of the population over 25 has completed four or more years of college, is to denigrate the value and importance of higher education (1).

2) Cartter's conception of market operations leads him to accept long-or moderate-range social projections uncritically even though most social scientists have expressed major reservations about them. He resists the suggestion that some projections are realized because they are a case of self-fulfilling prophecy.

By asserting that "Galileo may or may not have preferred the earth to be round, but the protestations of the bishops did not alter the facts," Cartter would have us believe he studies invariant market forces much as a natural scientist would investigate his subject matter. But Cartter's reasoning is as faulty as his example. Galileo was persecuted not for arguing that the earth was round but for actively supporting the Copernican heliocentric theory. Nor are Cartter's projections and analysis of the market comparable with Galileo's experiments or his telescopic observations. Then too, Cartter, by his own admission, acted as adviser to the New York State Commissioner of Education and thereby influenced the nature of the academic labor market. Church leaders who censured Galileo did not exert a similar influence over the laws of nature. Cartter often seems to don the robes of a "cleric" who attempts to keep the academic labor market in line with a particular political orientation.

Does Cartter seriously believe that the reputed Ph.D. surplus and the operation of narrow economic forces are alone responsible for the precipitous decline in the number of federally supported graduate students "from 51,446 during fiscal year 1969 to 22,121 estimated for fiscal 1972" (2)? Surely political decisions on the part of the Nixon Administration have affected these developments.

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More generally Cartter fails to recognize that the social researcher is a variable in the research process, and he seems unaware of Robert K. Merton's analysis of the self-fulfilling prophecy. By acting in terms of his own projections, and encouraging others to do likewise, Cartter is then better able to claim that his projections are being fulfilled.

Cartter to the contrary, we do not applaud the cutbacks in graduate programs or in graduate students. We discussed the present cutbacks in order to illustrate Cartter's contribution to a self-fulfilling prophecy. Our position is that major readjustments in the training, and hence in the kinds, of Ph.D.'s are required, and if some constraints on the market are overcome by purposive action and future possibilities realized, then higher education would expand rather than contract.

3) Cartter's rebuttal confirms our assertion that he fails to recognize the necessity for placing his projections of academic manpower within the context of broader sociocultural trends. He suggests, for instance, that the notion of a "postindustrial society" is a cliché. Cartter thereby ridicules the concerns of many eminent social scientists, such as Daniel Bell (3), as dealing with trivial nonissues. Although Bell, like Cartter, is locked into the categories of the present in projecting or predicting future events, Bell's discussion of the postindustrial order has highlighted fundamental *structural* changes, especially in the labor force, that have been occurring in American society. According to Cartter the trend toward a service economy has been underway since the turn of the century and therefore is not new. The implicit hypothesis that the growth of the service economy during the past two decades is similar to that during the first few decades of the 20th century, when America was moving from a rural- to an urban-manufacturing base, is demonstrably false.

Cartter reasons that examining sociocultural trends "does not really advance the argument" over the future need for Ph.D.'s. By implication, only the more readily quantifiable aspects of society—for example, selected demographic and economic phenomena—are worthy of special attention. This reasoning leads Cartter to accept only variables defined in official statistics as affecting the academic marketplace. Yet official statistics are constructed in terms of past and present social definitions, and officials generally ignore

countervailing trends which, though often qualitative in nature, can readily, when viewed in their cumulative effects, undermine such projections as Cartter's.

4) The future is not a fact; it must be created by taking into account not only the constraints Cartter stresses but the possibilities he ignores. Our vision of higher education in the future, calling for its expansion, seeks to contend with complementary and contradictory forces. First, it is necessary to provide ever-expanding technical knowledge and skills for many sectors of the populace. The use of higher education to upgrade the knowledge and skills of such occupational groups as secretaries and policemen is illustrative of what can be done in such sectors. We also called attention to the possible upgrading of the skills of many college instructors. And new occupations, based upon increased scientific knowledge, must be created to cope with, for example, environmental concerns.

Moreover, Cartter should recognize the need as well as the potential for far more highly trained personnel in, say, the health services, and to be more specific, in the field of geriatrics. But educators must participate in redefining the social and economic rewards of such activities so that people will find greater satisfaction in service to humanity.

Second, we are far more concerned with the issue of the quality of life than is Cartter. He fails to acknowledge the equality movement in American society. He seems unaware of the grave difficulties that the lower-middle class, ethnic minorities, and women will experience if educators and politicians act according to his projections. Cartter persists in slighting the potential contributions of women to higher education and the broader society.

Equality can be approached only if we restructure higher education and if some income redistribution is achieved. Even so, expansion of higher education is essential. To attain relative equality through "compensatory justice," which favors the underprivileged at the expense of those immediately above, that is, the lower-middle class, can only intensify the current backlash against higher education.

We must also recognize that higher education can become leisure, leisure in Aristotelian terms as contemplative thought. Americans expend huge sums on entertainment and leisure-time activities. But higher education has come

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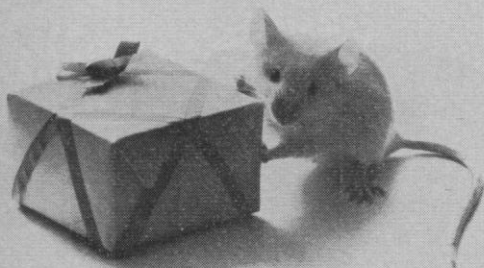


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to be viewed by many persons, whether members of the alternative society or other adults, as a laborious set of requirements that have to be met in order to acquire a job. A redefinition of education as leisure cannot be attained through commitment to present-day bureaucratized educational structures and the concomitant "efficiency model."

An elaboration of our image of the future of education must await another essay. However, our discussion has emphasized Cartter's call for a retrenchment in higher education, whereas we, though cognizant of constraining forces, deem its expansion essential if American society is to cope with accelerated social change. We must broaden the social and economic base of the college population and aggressively create multifaceted programs in higher education for use by persons throughout their adult years.

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References and Notes

1. *Chron. Higher Educ.* 7, 1 (1972).
2. *Graduate Education: Purposes, Problems, and Potential*, No. 1 (National Board on Graduate Education, Washington, D.C., 1972).
3. Bell has written extensively on this topic. See, for example, D. Bell, *Dissent* 19, 163 (1972); *Survey* 16, 1 (1971).

Medical School Admissions

Samuel Z. Goldhaber's report "Medical school admissions: A raw deal for applicants" (News and Comment, 28 July 1972, p. 332) is a classic in its field and hopefully will prompt the needed reforms. However, I must caution that Goldhaber's suggested improvement in the admissions process of reducing or eliminating state preference regrettably will never be changed. The money which the federal government provides to most state medical schools is small in comparison to the state funds provided. Consequently, as long as the legislators control the purse strings, a majority of the entering class will be state residents. It would be interesting to compare statistics on the number of state residents educated in a state medical school who eventually practice medicine in that state versus the number of out-of-state students educated in the same school who set up practice in that "foreign" state. Legisla-

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tors would be amazed at the results. The influence of specific state politics within the medical educational system is too deep to be uprooted now.

RICHARD D. PEPPLER
Departments of Anatomy and Obstetrics and Gynecology, Louisiana State University Medical Center, New Orleans 70112

Goldhaber did a very good job of summarizing the very real problems that face those applying to medical school today. The data speak for themselves, and certainly explain the anxieties and stresses which face those who would pursue a course in medicine.

Having spent a good many years in medical school administration, a number of those as chairman of the admissions committee at a so-called competitive medical school, I am fully aware

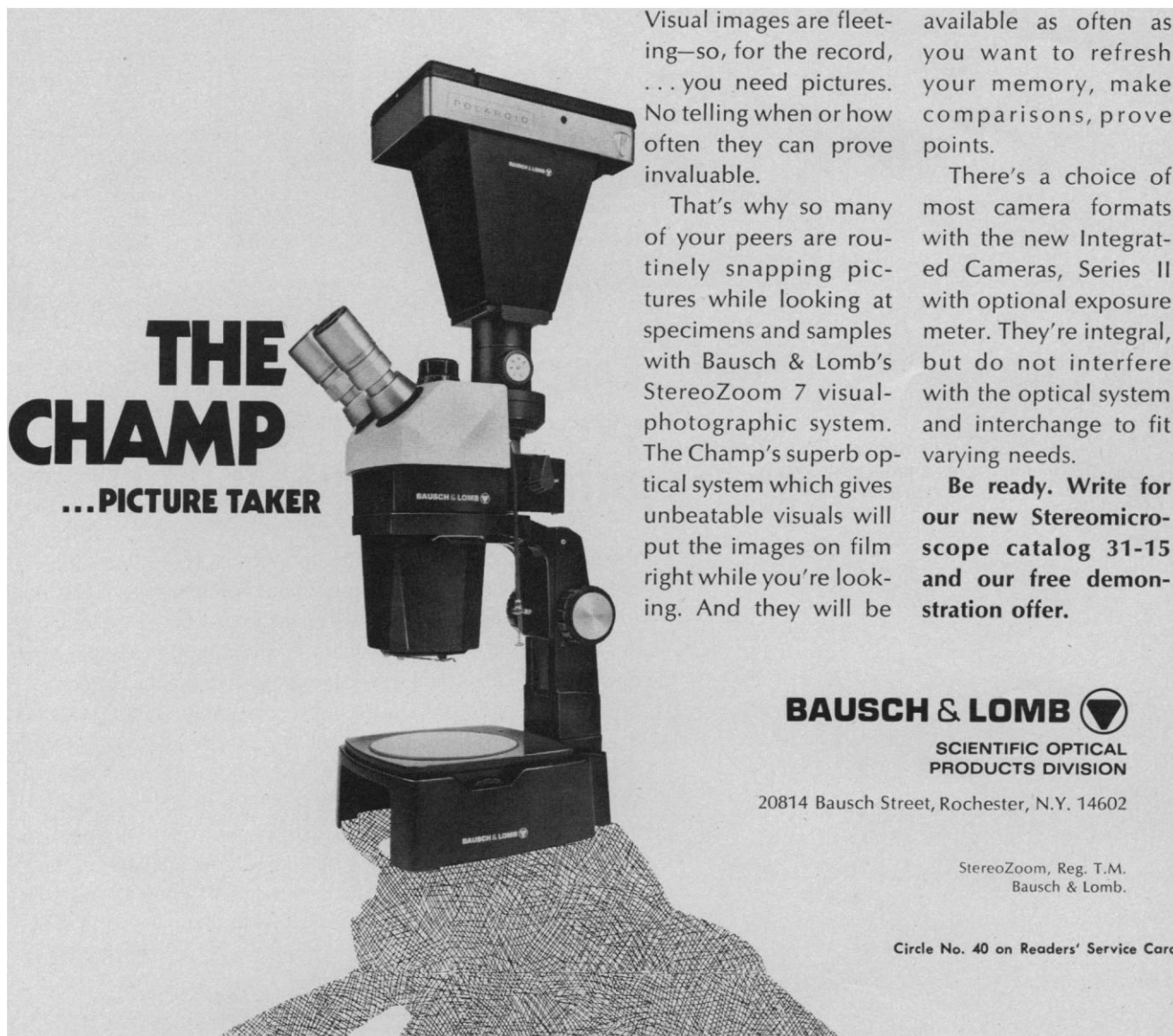
that a situation that has been relatively difficult since the end of World War II has become progressively so in recent years.

Goldhaber's call for "... a more equitable system of medical school admissions ..." is all to the good. He is, however, rather naive in asking medical schools to "... weigh more heavily applicants' motivation for applying to medical school and their personal attributes, such as compassion and general intelligence ..." It would be wonderful if we knew how to do these things, but to date I am rather unaware of any satisfactory way of measuring motivation. I have discussed this problem with knowledgeable colleagues in the field of psychology, and have never found any of them who believed that motivation could be measured accurately. Further, I don't remember ever in-

terviewing a medical school applicant—and I interviewed hundreds—who ever seemed anything but well motivated. Similarly, no one would deny that compassion and general intelligence are very important qualifications for a would-be physician. I am afraid, however, that finding a way to determine objectively whether an individual is compassionate or not, particularly during the relatively brief time that medical schools have for evaluating candidates, poses an almost insuperable task.

I don't suggest we shouldn't keep trying to do a better job in our evaluation. Goldhaber is right in saying we need a better system, but how to get it is something else again.

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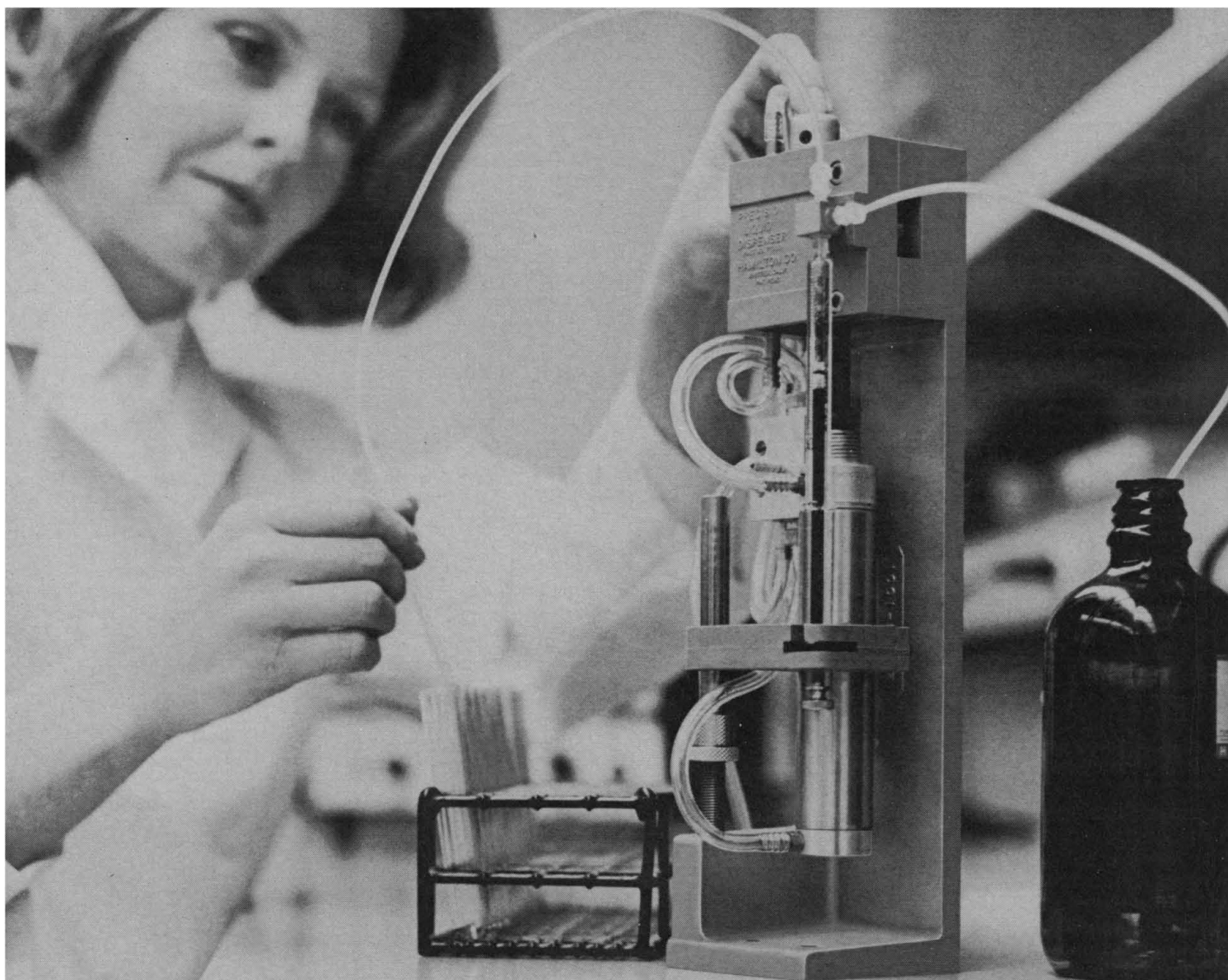
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Casualties of Governmental Reorganization

During his first term, Richard Nixon surprised friends and foes by his performance as President. He took long-overdue initiatives in foreign affairs and responded to domestic needs in ways unexpected of a conservative Republican. He showed ability to plan thoroughly and to execute well. He was able to recruit excellent people to fill government posts, notably at the subcabinet and bureau chief levels. This was especially true in areas involving science and technology. On a few occasions, he found it necessary to force the resignation of an official, but these firings were conducted one at a time and usually with dignity.

Since winning reelection, Nixon has departed from patterns that were successful. His Administration has taken dramatic actions, seemingly without adequate planning or consultation. It has fired or lost through resignation most of the government's best administrators of science and technology. It has downgraded the status of science in the government. It has adopted a new administrative organization that will make it more difficult for the President to obtain well-judged advice.

There are those who say that the abolition of the post of President's Science Adviser and of the Office of Science and Technology were small matters and that the functions of these offices can be carried out elsewhere. Perhaps so. But the way the deed was done was not worthy of a great nation. The office was first abolished. Then someone woke up to the fact that it served important functions. After scrambling around, someone had the inspiration to transfer the functions of the office to the National Science Foundation (NSF) and appoint Guyford Stever (head of the NSF) as science adviser. The solution has merit. However, if it is to represent more than a gesture, Stever and the NSF will be overloaded with conflicting responsibilities.

Another questionable action has been taken in the important matter of energy. Earl Butz, Secretary of Agriculture, has been designated key man reporting to Nixon on energy and natural resources. Butz's experience in these matters is limited, and his staff at the Department of Agriculture is not equipped to deal with energy problems. Latest indications are that authority in energy matters may be divided, with George B. Shultz assuming an important role.

A further example of the downgrading of science can be seen at the Department of the Interior. This department has a proud history of accomplishment and includes many science-oriented agencies, such as those dealing with fuels and natural resources. Are these agencies to be transferred to Agriculture? If not, is another—or several—administrative layers to be imposed between them and the President?

Another aspect of the situation at the Department of the Interior exemplifies the Administration's current personnel policies. Before the election, there were in the department six assistant secretaries and a solicitor general. All were competent, hard-working Republicans, loyal to the President. Today only one remains. Five of the assistant secretaries and the solicitor general have been fired. Their fate and that of many others is not likely to make government service more attractive, as the Administration will learn in attempting to recruit replacements for the large number of posts now vacant.

Nixon's efforts to make his Administration more efficient may ultimately be successful, but insofar as science is concerned, the moves thus far have damaged rather than enhanced the cause of good government.

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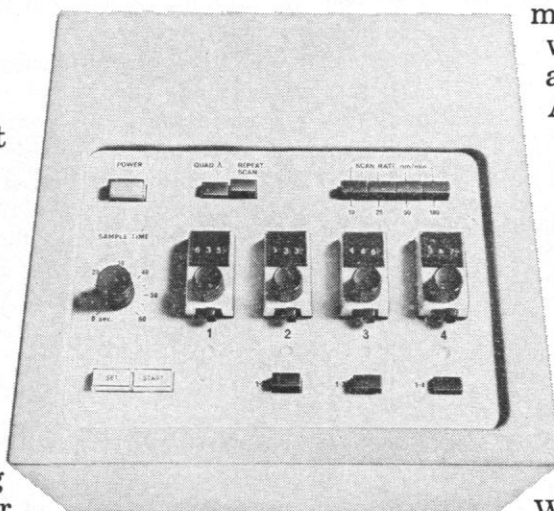
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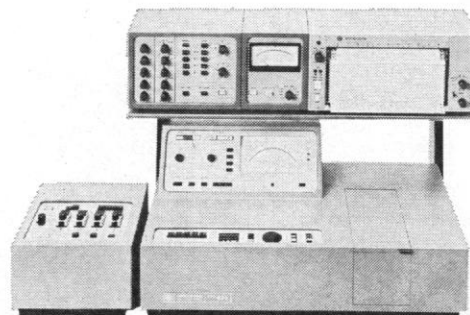
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As They See It. Changing Values of College Youth. Mary Lystad. Schenkman, Cambridge, Mass., 1973 (distributor, General Learning Press, Morristown, N.J.). xiv, 158 pp., illus. Cloth, \$6.95; paper, \$3.50.

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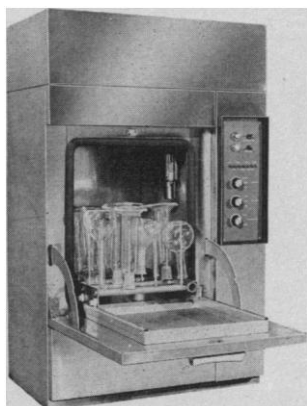
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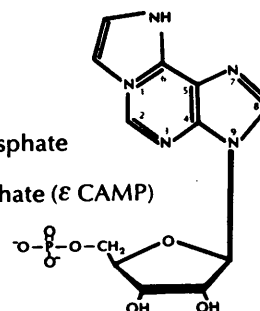
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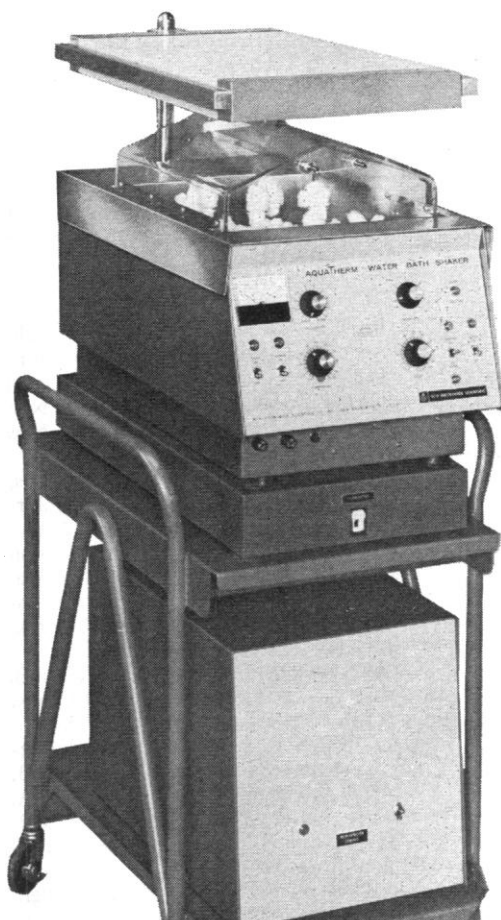
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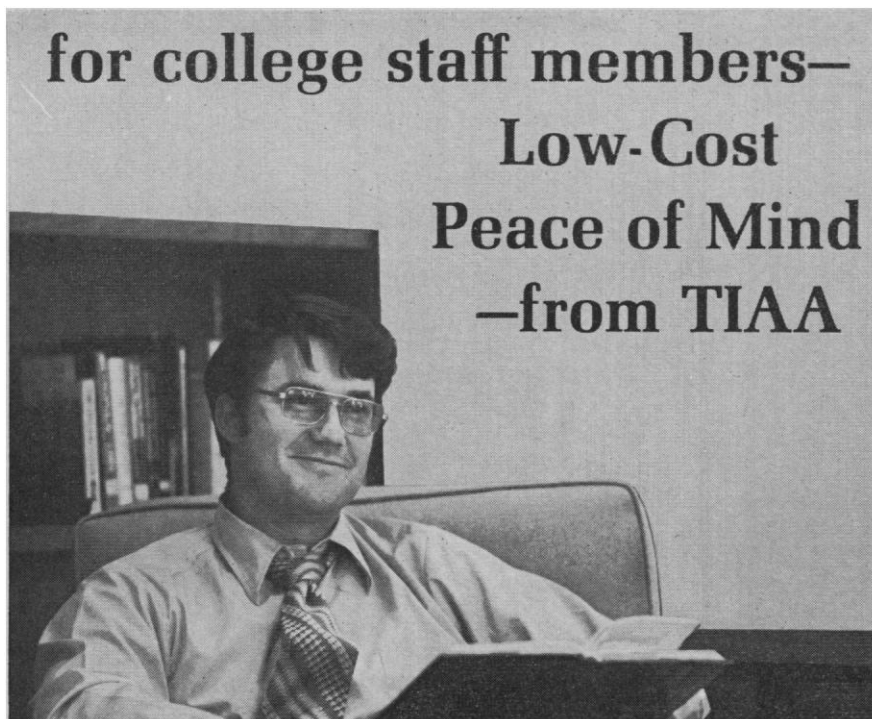


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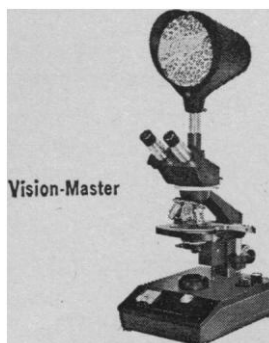
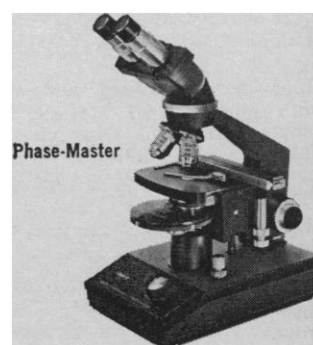
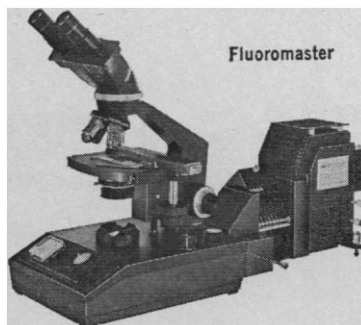
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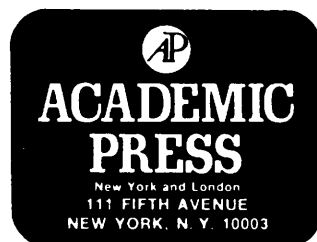
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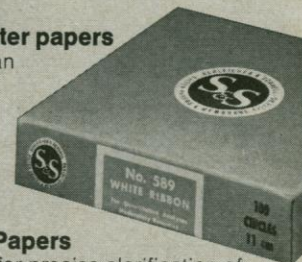


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