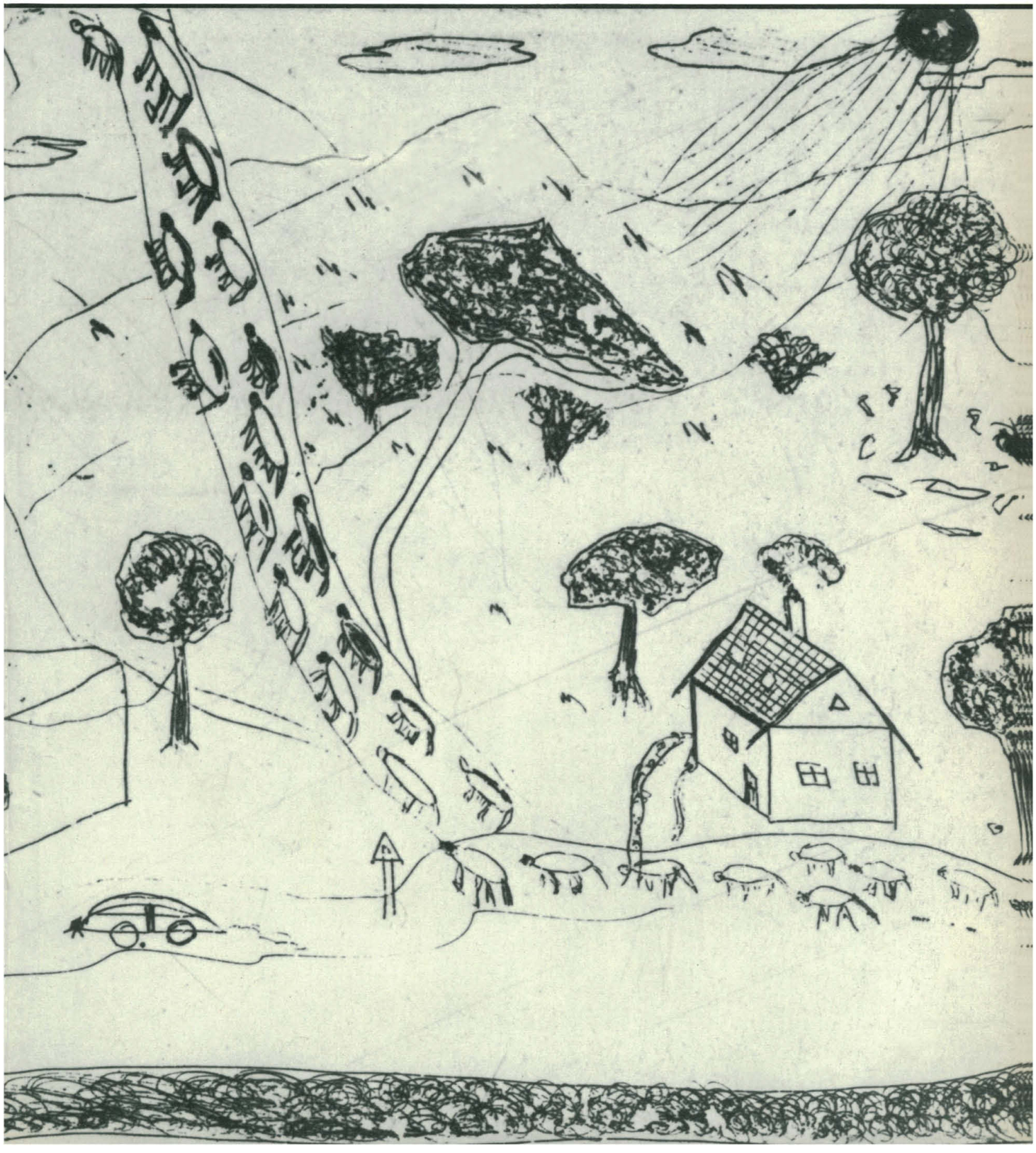
SCIENCE 26 November 1971
Vol. 174, No. 4012
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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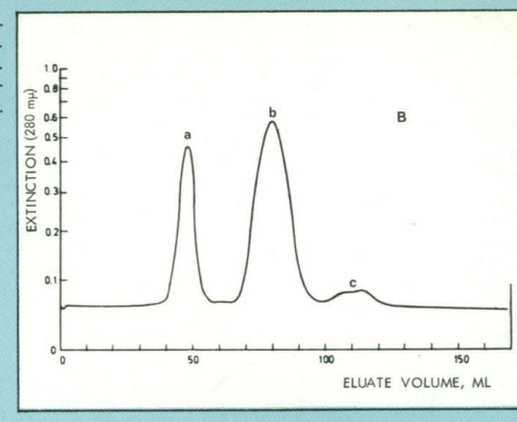

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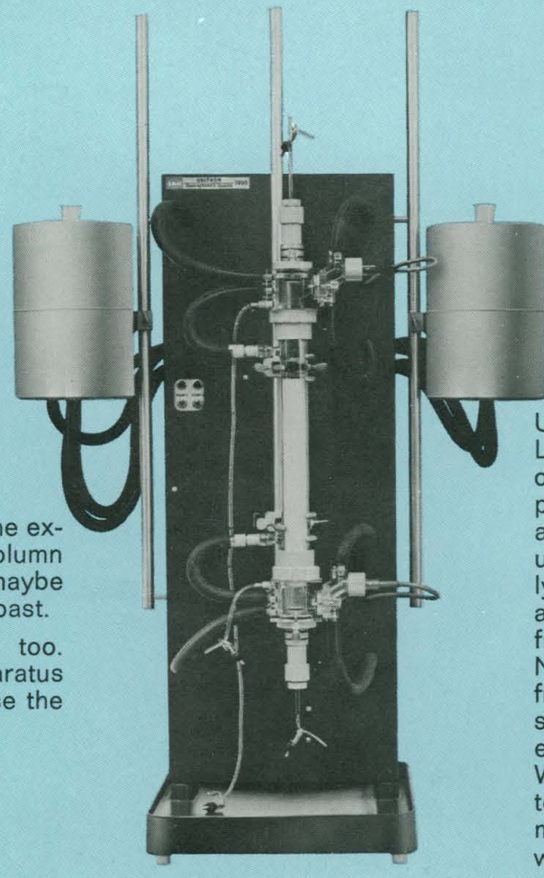

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26 November 1971
Vol. 174, No. 4012

SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Etching, made during an acute schizophrenic episode, demonstrates the contraction of nearby visual space, which results in a raised horizon (original drawing, 130 × 100 millimeters). See page 897. [Photograph courtesy of Leo Navratil, Niederösterreichisches Landeskrankenhaus für Psychiatrie und Neurologie, Klosterneuburg, Austria]

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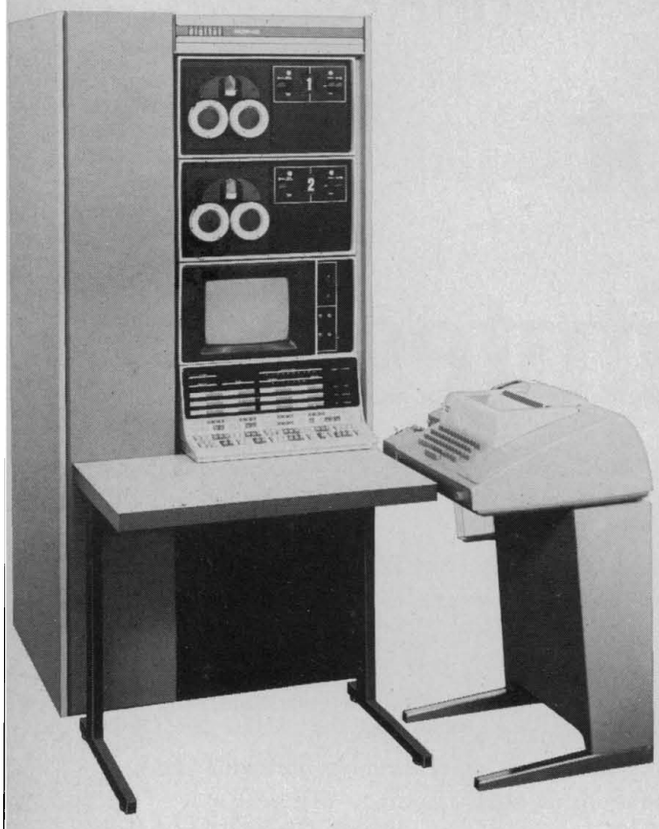
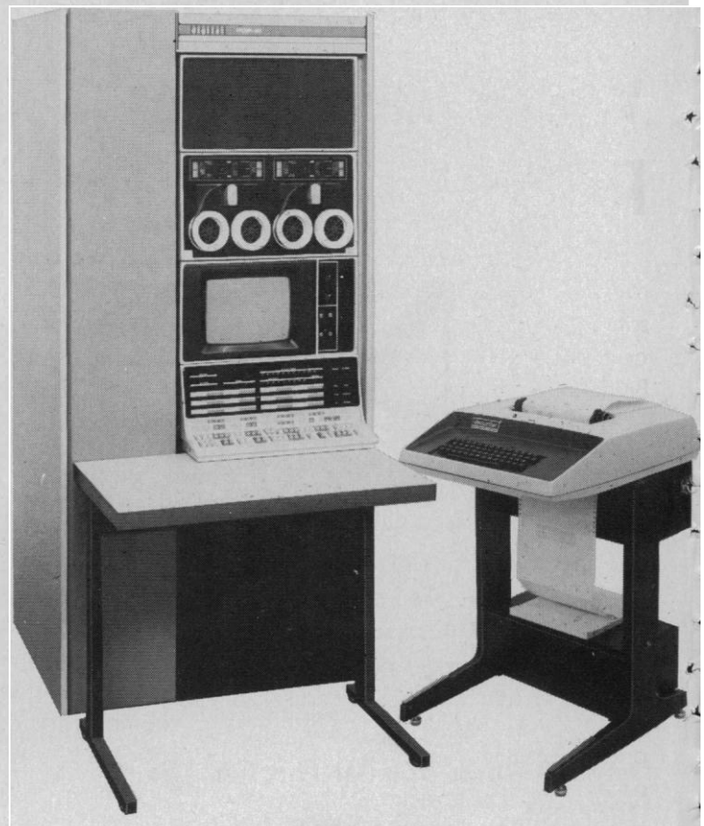


Before



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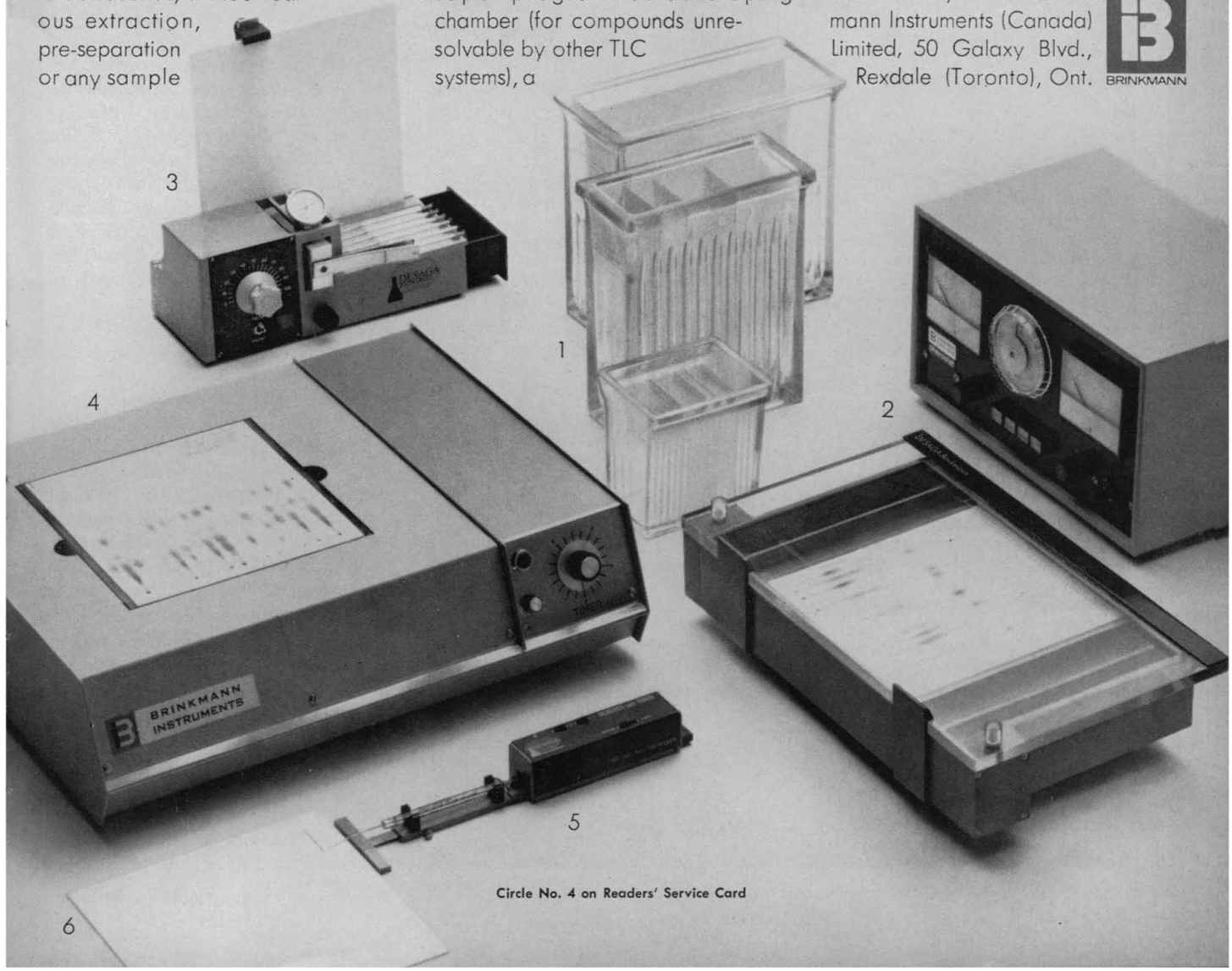

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LETTERS

Understanding Man's Behavior

Constance Holden reports (News and Comment, 17 Sept., p. 111) that psychologists are beset by feelings of futility and self-doubt. I don't wonder! As a biologically oriented scientist who has raised seven children over the past 40 years, I have also been beset by doubts and sheer disbelief of much of psychology for the last 20 of those years. A parent must finally throw up his hands and decide that grandma and grandpa know best after all. At least they have some unity and consistency in their ideas of family relations.

What a golden opportunity psychologists have had! The public has eagerly sought and read their latest pronouncements. People have tried to put psychology into practice, often with unfortunate results. Theories of child rearing have changed so fast that a whole generation (mostly confined to the educated classes) has been raised without fully consistent and secure parental guidance. What else can be expected from a science that has tended to de-emphasize and even disregard the biological contribution to human behavior and the vast biological diversity of humans? How can a science of "the mind" prosper when it sometimes forgets that the brain is a biochemical and biophysical organ that does not respond to environmental stimuli in the same way in different individuals, and furthermore often forgets that many of these differences are inherent?

It is ironic that Skinner and Clark, the men Holden cites as believing they have some answers, should take such completely different approaches. Skinner "believes that all of man's behavior is determined by his environment." He would condition each and every one of us to be good boys and girls. Clark, on the other hand, assumes some biological basis for behavior when he advocates the use of mind-affecting drugs to make our leaders behave.

These prescriptions sound like nonsense to this nonpsychologist and will plunge psychology even deeper into futility and self-doubt. Psychologists need a "comprehensive theoretical model" that includes the fact that the human brain is a highly diversified biochemical and biophysical organ, developed over a million years of human evolution. Man's behavior will not really be understood until the nature and ramifications

of the biological-spiritual brain (human nature?) are better understood. In the meantime let's keep in mind that all men are *not* created equal. This will save much time and effort and many tears.

LEON S. MINCKLER
State University College of Forestry at Syracuse University, Syracuse, New York 13210

In the account of the annual meetings of the American Psychological Association, Holden states that operant conditioning refers to the stimulus response techniques first developed by Pavlov. It should be pointed out that operant conditioning refers to the stimulus-response-*reinforcement* techniques first described by B. F. Skinner in 1938 (*1*).

The distinction between Pavlovian (respondent) conditioning and Skinner's operant conditioning is an important one. Skinner contends, and his contentions are supported by a wealth of experimental data from the field of behavior analysis, that behavior is controlled by the consequences it produces in the environment. Pavlov was the first to demonstrate that certain behaviors (primarily reflexes) are elicited by specific antecedent stimuli. Skinner, on the other hand, was the first to explain systematically how most behaviors (primarily social and verbal) are controlled by their consequences.

GEORGE SEMB
Department of Human Development, University of Kansas, Lawrence 66044

Reference

B. F. Skinner, *The Behavior of Organisms* (Appleton-Century-Crofts, New York, 1938).

Pavlov's stimulus-response techniques involve the pairing of a neutral stimulus with a stimulus that regularly elicits a response, such as food (which elicits salivation) or shock (which elicits diffuse "emotional" responses). The food or shock is presented without regard for the organism's behavior.

Operant conditioning procedures differ from Pavlov's in that the organism's behavior determines whether a stimulus such as food or shock will be presented. In a standard operant conditioning experiment, the rate at which a rat will press a bar depends on whether bar-pressing is followed by food or shock, and, conversely, the occurrence of food or shock depends on bar-pressing. Thus, the organism affects its environment, as well as being affected by it. This aspect

of operant conditioning is especially important when the environment includes other organisms—each affects the other and is affected by the other, so that they enter into the reciprocal controlling relations which are the essence of social interaction. Operant conditioning provides a way of understanding these interactions; Pavlovian conditioning, although important in the analysis of behavior, cannot incorporate reciprocal organism-environment interactions.

JOHN A. NEVIN
Department of Psychology,
Columbia University,
New York 10027

Research Grant Evaluation at NIH

Gross (Letters, 9 July, p. 106) expresses sincere but misguided concern for the viability of the National Institutes of Health (NIH) system of research grant evaluation. He considers that "the growth of NIH center grants and contracts . . . not now reviewed by study sections" (but by special committees instead) is an effort to bypass the present system of quality control and provide safe, easy cover for individual investigators. Others, on the contrary, have privately voiced fears that worthy center and program-project grant applications may not be approved if they include less meritorious projects. Both views underestimate the strength and wisdom of the peer review system. Indeed experience with one special committee, the Pharmacology-Toxicology Program Committee, has been reassuring.

Each institution applying for program-project, center, or contract funds is first rigorously inspected by a site-visit team of experts from the committee, suitably reinforced as needed by outside ad hoc consultants to ensure coverage in depth of all aspects of the proposal. The question recurs, "Is this truly a program (or a center), or is it merely an umbrella to cover the research of the department?" The component research projects are minutely scrutinized for both scientific merit and relevance to the aims of the program or center; projects lacking in either criterion are pruned from both the application and the budget in a consensus report prepared by the site visitors.

The committee members on the site-visit team then bring their report to

the full committee, which proceeds to challenge it mercilessly, point by point. Unless adequately defended by the site visitors, the proposal may be further modified or even rejected altogether. If accepted, with or without change, it is assigned a priority and forwarded to the (appropriate) National Advisory Council for implementation. (In today's climate of budgetary austerity, alas, only those proposals approved with sufficiently high priority can be funded.)

I have found all colleagues on this committee to be a group of hard-working, hard-nosed, penny-pinching scientists, adept at winnowing wheat from chaff. Thanks to such zeal and dedication, the peer review system continues to flourish.

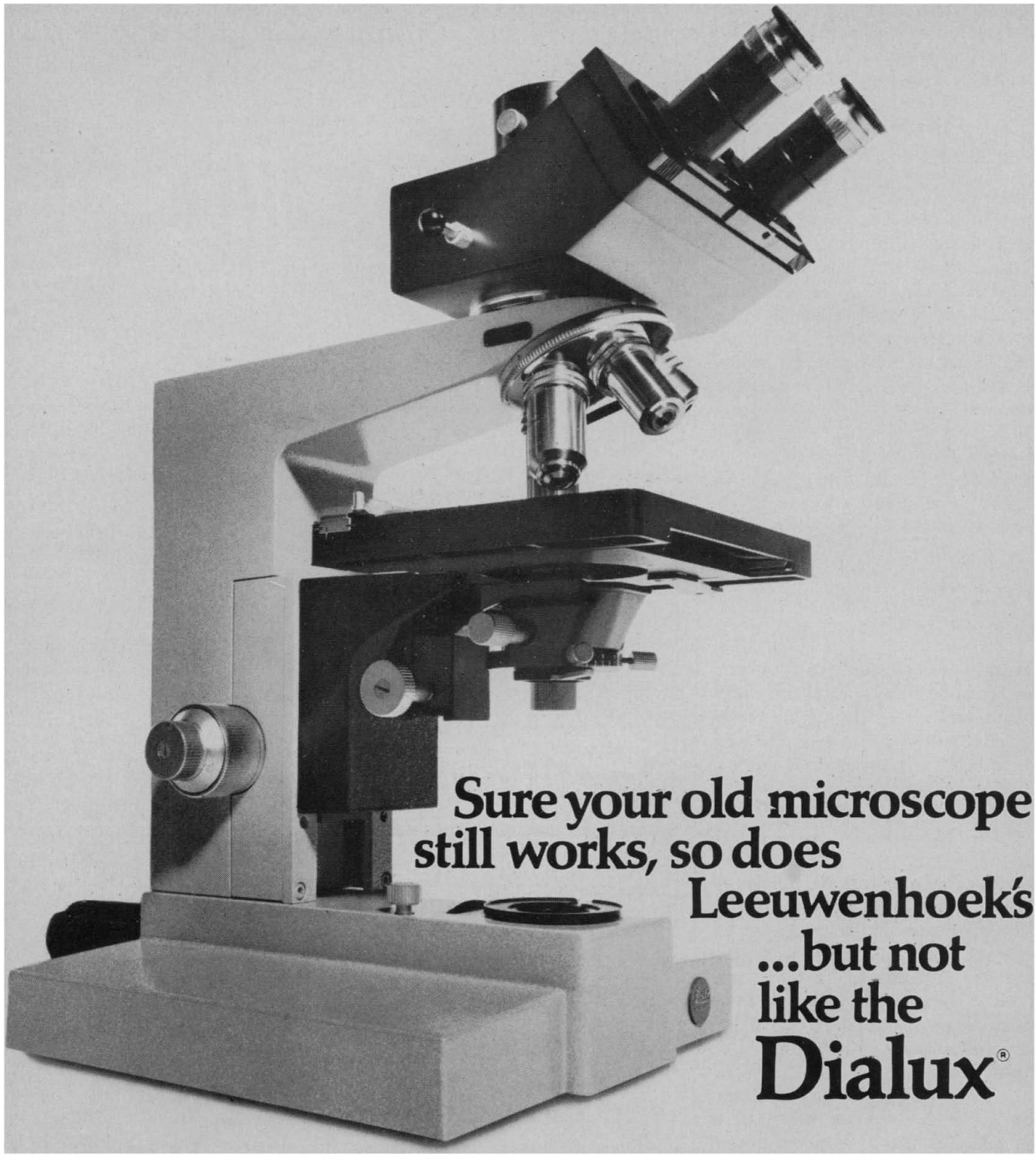
LESTER C. MARK
Department of Anesthesiology, College of Physicians and Surgeons, Columbia University, New York 10032

Spectacular Jaw

It was nice to see the fine old American Museum of Natural History photograph (cover, 8 Oct.) of the reconstructed *Carcharodon megalodon* jaw. It is certainly a spectacular picture, but it should be stated that the jaw is actually much too big. If the teeth in the fossil were like those in the recent species of this genus, they would diminish in size as they approach the corners of the jaw. However, this is not the case in this specimen, probably because the preparators used the largest teeth they could find to make the most spectacular jaw. Most of the teeth that are shown in this jaw come from the second anterior position of the upper jaw. These are the largest teeth that the recent "great white" has, and this must have applied as well to the fossil. It would be a similar faux pas to reconstruct a saber-tooth cat using their canines or sabers for all the teeth. We would end up with a terrifically large-jawed cat.

If the proper lateral and posterior teeth had been used in this shark-jaw reconstruction, it would reduce the size of this *Carcharodon* jaw by at least one-third. The reconstruction would still be large, but not nearly as large as the one in the photograph.

SHELTON P. APPLEGATE
Los Angeles County Museum of Natural History, Los Angeles, California 90007



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26 November 1971, Volume 174, Number 4012 **SCIENCE**

New Initiatives in Technology

Recently, Richard M. Nixon has been evincing a considerable interest in winning the 1972 election. He has also been indicating that his tactics for doing so will be daring and imaginative. His proposed visit to China and his actions last August on economic matters were surprising departures from the way a conservative Republican is supposed to act.

For some months Nixon has been seeking to delineate substantial, politically useful initiatives in the field of technology. For this effort he has been utilizing the assistance of many elements of his staff and of the Executive Branch and of numerous outside consultants. No single, large-scale goal has been identified. Rather, the program will consist of a composite of objectives.

Historically the federal government has concentrated its major expenditures for research and development in a few areas. In fiscal 1961, some 91 percent of such expenditures were devoted to atomic energy, space, and defense. In fiscal 1972, despite the various cutbacks that have occurred since 1961, the corresponding figure will be 77 percent. Most citizens would agree that in view of our many domestic needs this proportion is out of line.

To a few citizens, the use of more technology will be abhorrent. However, most people would view favorably the prospect of engaging presently unemployed resources of men and organizations in meeting social needs.

Consideration of means of focusing more attention on the civilian sector is not new. During the Kennedy Administration, Jerome Wiesner often talked of this, but little came of his efforts. Two major factors then and now make the matter politically difficult. First, one cannot identify a single goal that has the kind of dramatic appeal that the moon venture had in the circumstances in which it was announced. Announcement of a lesser single goal would be certain to draw partisan sniping and could prove to be a political liability. Second and more important is the fact that many of the possible initiatives represent a further invasion by the federal government of matters that have previously been considered the domain of private enterprise.

The areas currently under discussion for new initiatives include transportation, urban and suburban affairs, health, natural resources, communications, productivity, the environment, and protection from natural disasters. The final choice of initiatives and the form that new efforts will take will be based on a dual evaluation of technical and political feasibility. The President's science adviser, Edward David, will have considerable say in the determination of technical feasibility. A recent appointee, William A. Magruder, will be influential in political aspects and in ensuring that various bureaus and departments of the federal government loyally implement their share of any new ventures. In an election year, political considerations are likely to have major importance. Already some scientists have expressed fears that the President's science adviser and the Office of Science and Technology will be eclipsed in the new effort. However, David is a resourceful and energetic man, and he has many backers. Moreover, the scope of the new initiatives is so broad that there will be more than enough decisions to keep both David and Magruder very busy in their respective tasks during the next 12 months.

Cynics can and will discount the new initiatives as merely an election-year ploy. However, win or lose, there will remain after the election a residue in the form of a further penetration of government into the management of the nation's life. There could also remain a residue of real progress, for goals once enunciated tend to carry with them a momentum of their own.—PHILIP H. ABELSON

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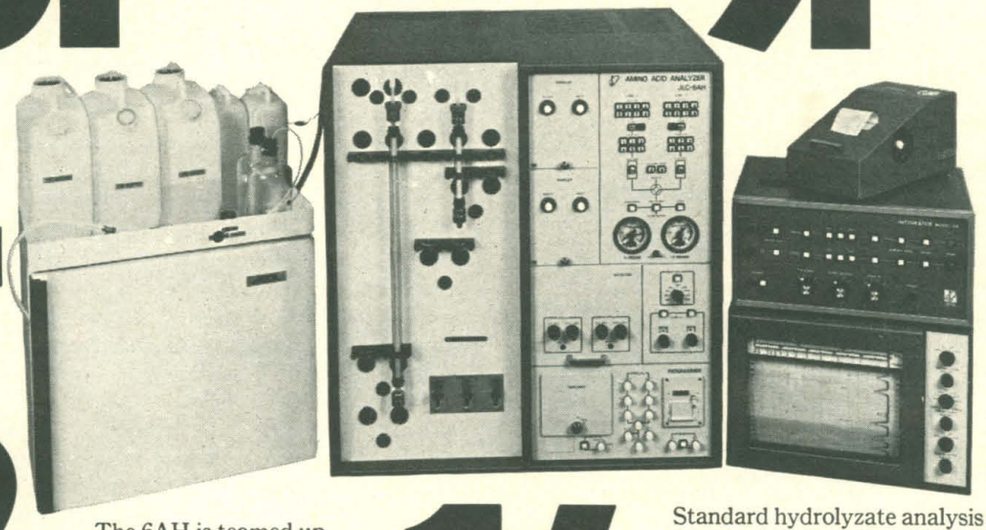

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BOOKS RECEIVED

(Continued from page 939)

citly Scientific Approach. Patty Jo Watson, Steven A. LeBlanc, and Charles L. Redman. Columbia University Press, New York, 1971. xxii, 192 pp., illus. $6.

The Fight for Quiet. Theodore Berland. Prentice-Hall, Englewood Cliffs, N.J., 1971. xvi, 306 pp. Paper, $2.95. Reprint of the 1970 edition.

Flavins and Flavoproteins. A symposium, Durham, N.C., 1970. Henry Kamin, Ed. University Park Press, Baltimore, Md.; Butterworths, London, 1971. xviii, 712 pp., illus. $29.50. International Union of Biochemistry symposium No. 39.

Freud and the Americans. The Beginnings of Psychoanalysis in the United States, 1876–1917. Nathan G. Hale, Jr. Oxford University Press, New York, 1971. xvi, 574 pp. $15. Freud in America, vol. 1.

From Watt to Clausius. The Rise of Thermodynamics in the Early Industrial Age. D. S. L. Cardwell. Cornell University Press, Ithaca, N.Y., 1971. xvi, 336 pp., illus. $11.50.

Functional Groups in Organic Compounds. Walter S. Trahanovsky. Prentice-Hall, Englewood Cliffs, N.J., 1971. x, 150 pp., illus. Cloth, $8.95; paper, $4.95. Foundations of Modern Organic Chemistry Series.

Génétique Médicale. Maurice Lamy. Masson, Paris, 1971. vi, 264 pp., illus. Paper, 68 F.

Group Theory and Its Applications. Vol. 2. Ernest M. Loebl, Ed. Academic Press, New York, 1971. xiv, 312 pp., illus. $18.50.

Helping People. Karen Horney's Psychoanalytic Approach. Harold Kelman. Science House, New York, 1971. ix, 622 pp., illus. $18.50.

Hoofed Mammals of the World. Ugo Mochi and T. Donald Carter. Scribner, New York, ed. 2, 1971. xx, 268 pp., illus. $9.95.

How to Use the Magic Self-Cybernetics. Ben B. Smith. Fell, New York, 1971. 238 pp., illus. $7.95.

Human Cytogenetics. Clinical Cytogenetics. Vol. 2. John L. Hamerton. Academic Press, New York, 1971. xviii, 546 pp., illus. $27.

Immunological Methods in Endocrinology. A symposium, Ulm, Germany, February 1970. K. Federlin, C. N. Hales, J. Kracht, Eds. Thieme, Stuttgart; Academic Press, New York, 1971. viii, 120 pp., illus. $9. Hormone and Metabolic Research, Supplement Series, No. 3.

In the Name of Life. Essays in Honor of Erich Fromm. Bernard Landis, Edward S. Tauber, and Erica Landis, Eds. Holt, Rinehart and Winston, New York, 1971. xvi, 334 pp., illus. $10.95.

Introduction to Axiomatic Set Theory. G. Takeuti and W. M. Zaring. Springer-Verlag, New York, 1971. viii, 252 pp. Paper, $9.50. Graduate Texts in Mathematics, vol. 1.

Introduction to Materials Science. A. G. Guy with the collaboration of M. E. Bever, L. L. Hench, and A. Peterlin. McGraw-Hill, New York, 1971. xx, 604 pp., illus. $16.50. McGraw-Hill Series in Materials Science and Engineering.

An Introduction to the Study of Man. J. Z. Young. Clarendon (Oxford University Press), New York, 1971. xxvi, 720 pp., illus. $19.25.

The Insect Societies. Edward O. Wilson. Belknap (Harvard University Press), Cambridge, Mass., 1971. xii, 548 pp., illus. $20.

Introduction to Newton's 'Principia.' I. Bernard Cohen. Harvard University Press, Cambridge, Mass., 1971. xxx, 380 pp. + plates. $30.

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