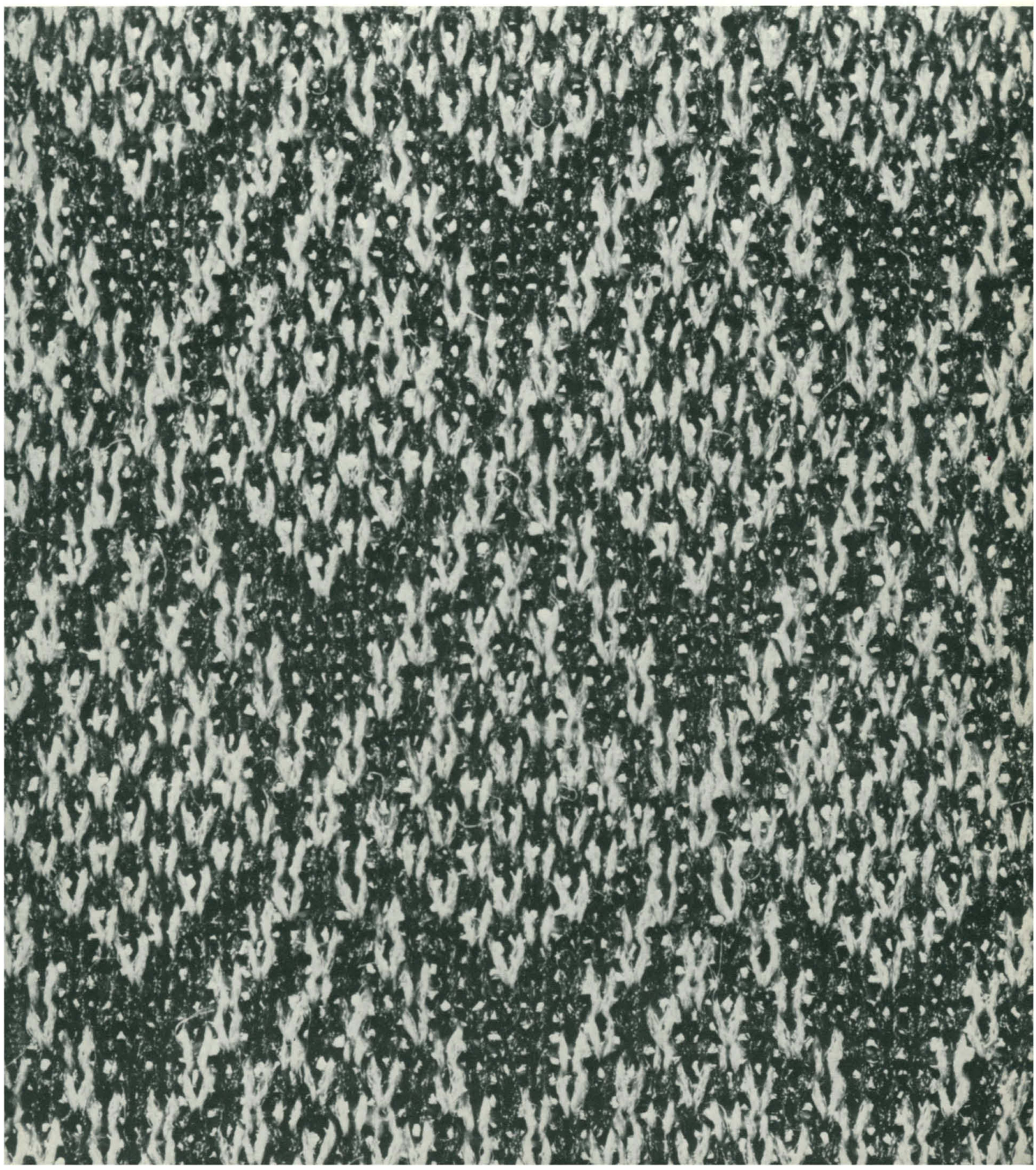
SCIENCE

23 July 1971

Vol. 173, No. 3994

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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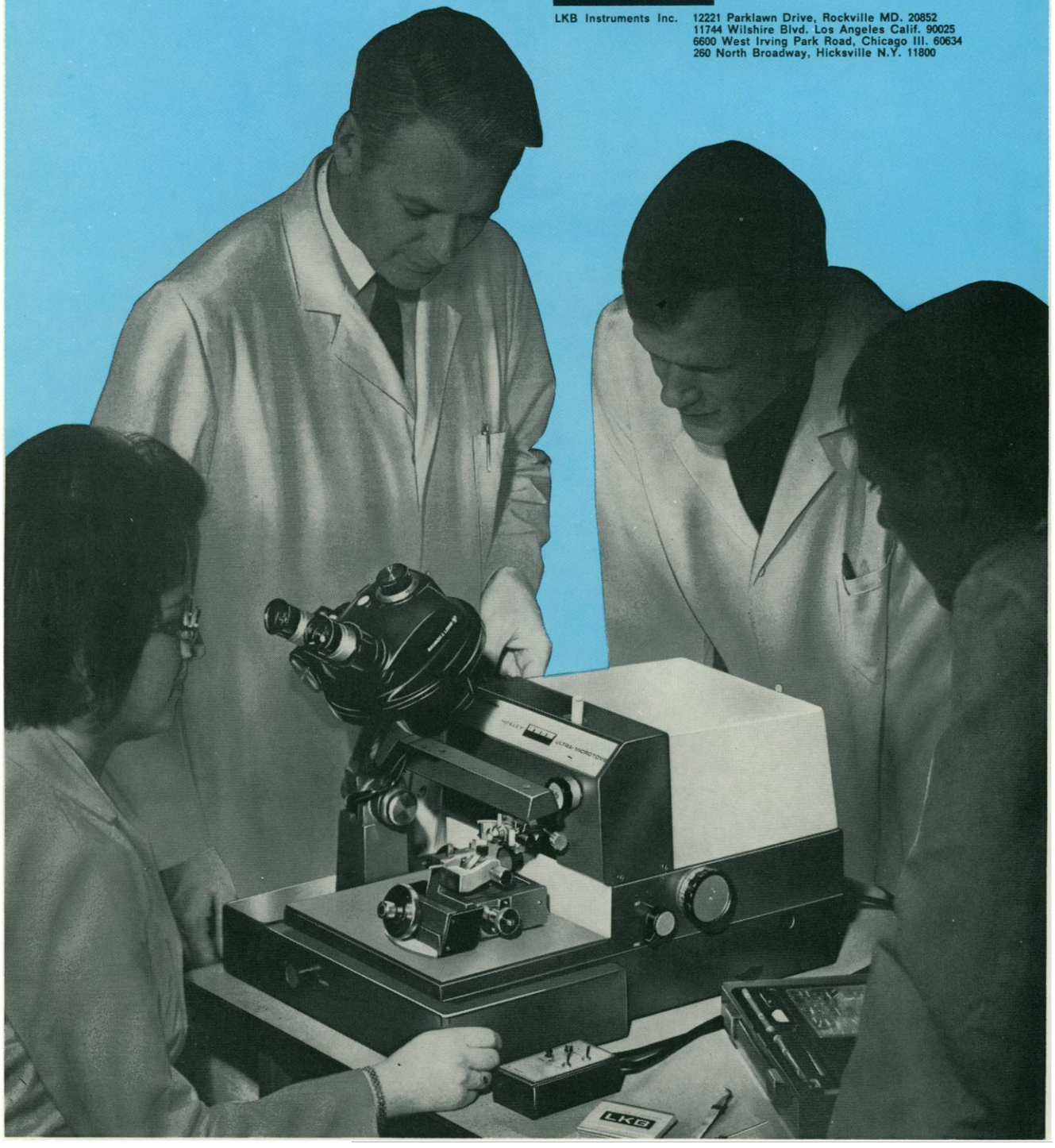

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23 July 1971
Vol. 173, No. 3994

SCIENCE

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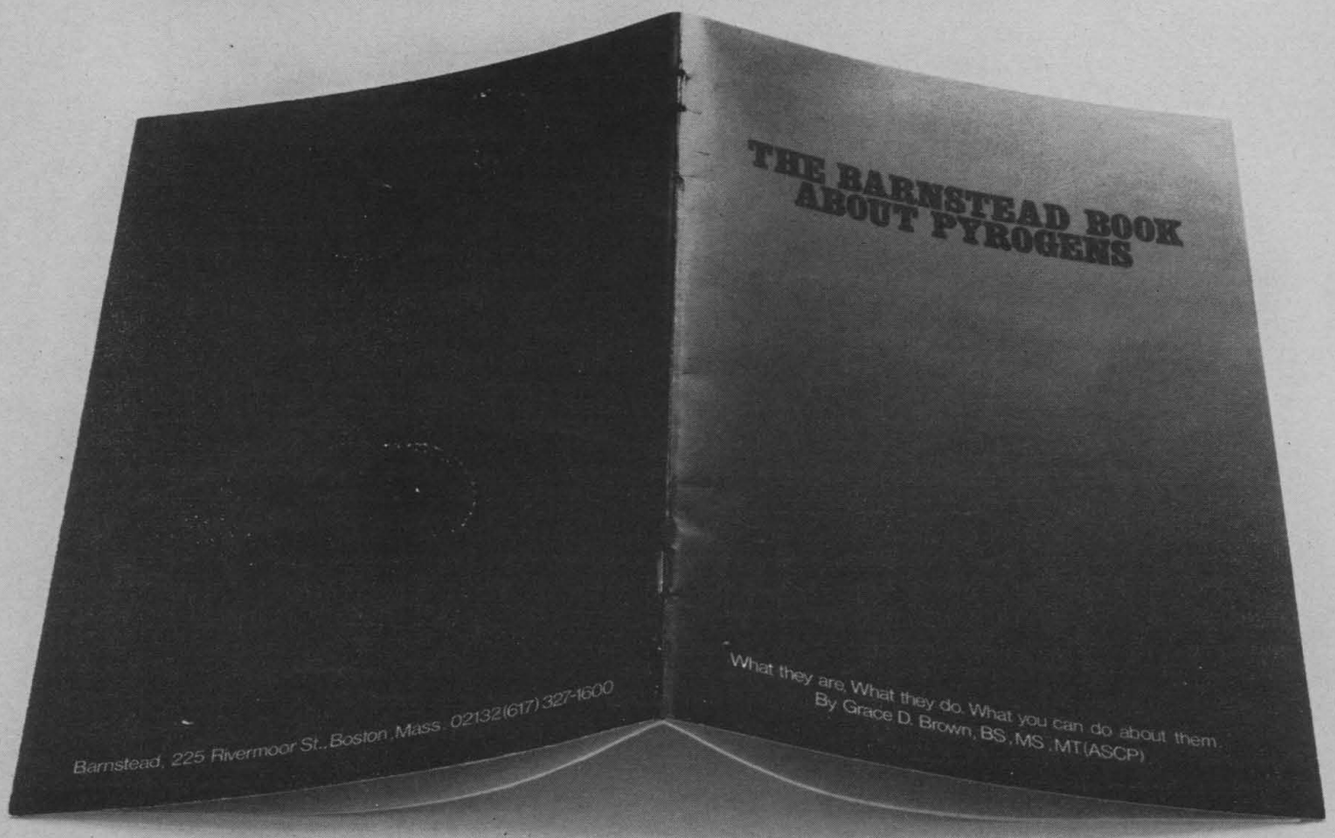

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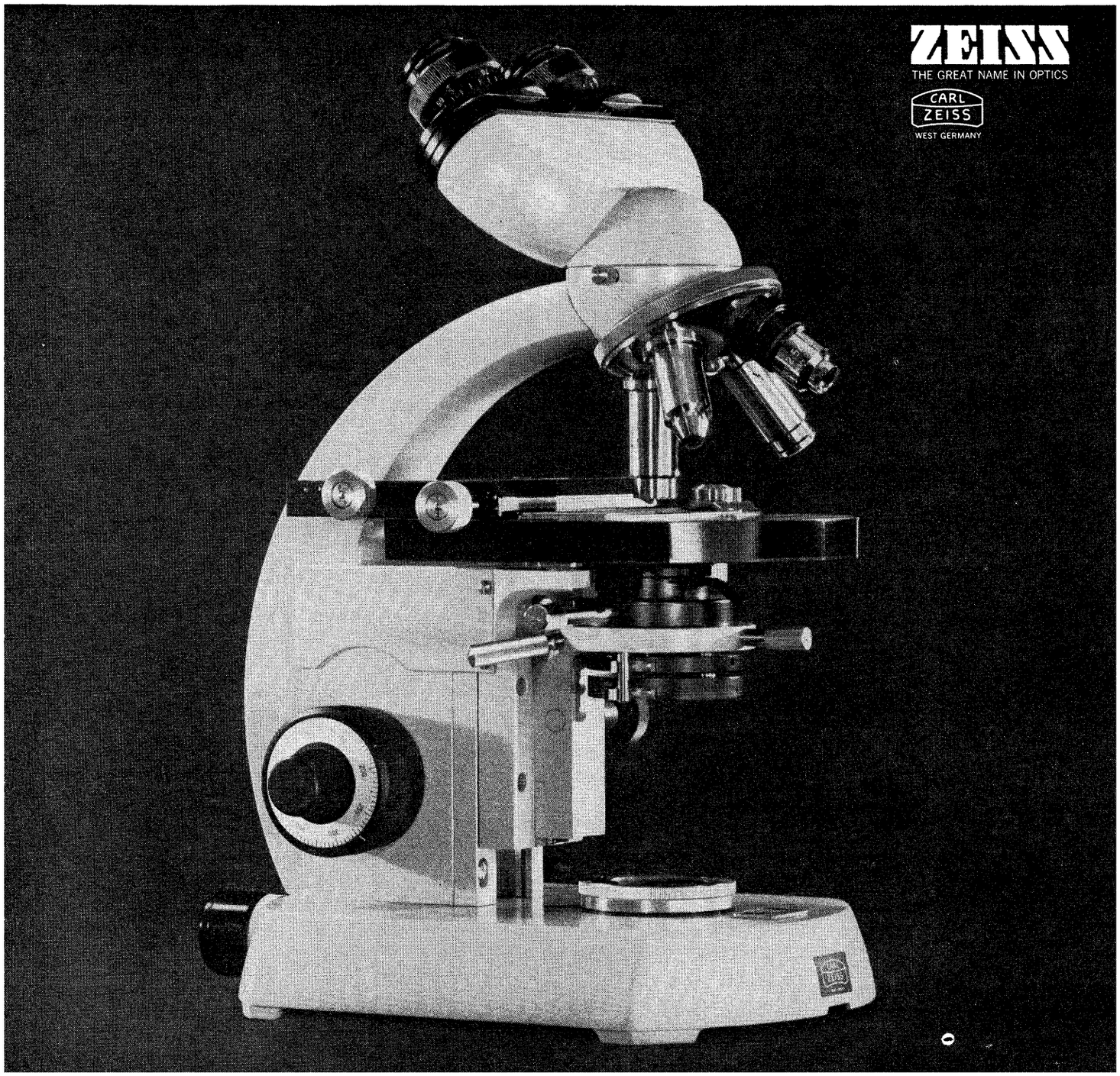

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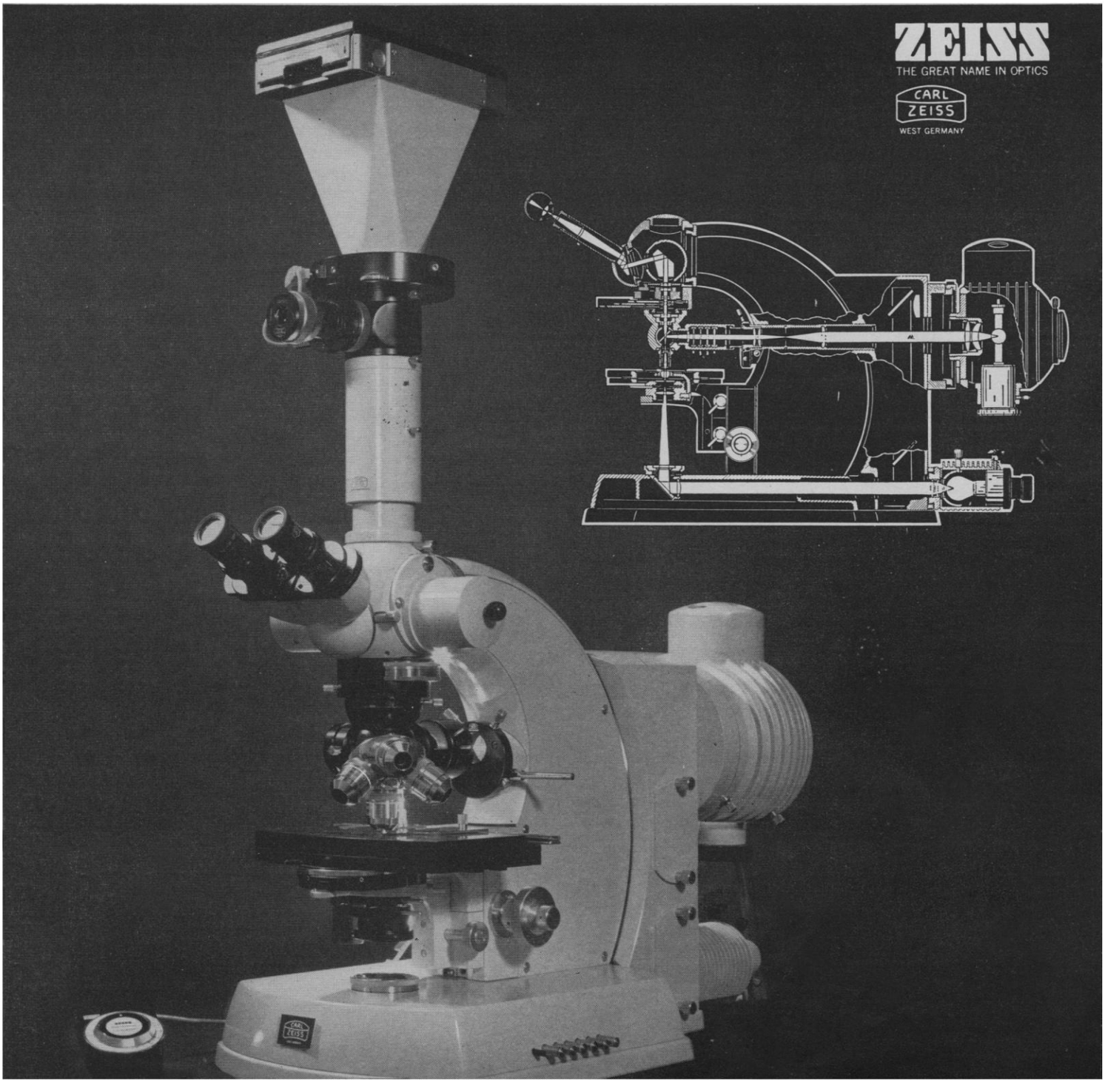

taining a livable environment, and thus would increase the value of $F(P)$ in Ehrlich and Holdren's relation

$$I = P \cdot F(P)$$

$F(P)$ is thus a function of age structure as well as population size. The resulting extra cost subsumes not only fewer human resources to attack environmental problems but also the diversion of income, and ultimately energy, for the increased demands of health and public education that such age structure implies.

The further augmentation of the dependency load in Puerto Rico which has occurred as a result of the hasty industrialization of the island might serve as an illustration of the authors' theorems 2, 4, and 5 concerning the necessity for joint and thorough consideration of population and the total environment on a global basis. The fact that agriculture and conservation were long stepchildren to industrialization in Puerto Rico helped to induce many people to leave their homes in the deteriorating rural areas. These people, ill-educated for modern urban living, left the island (and thus its work force) in great numbers, settling largely in the urban ghettos of the United States (*2*).

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References and Note

1. *Anuario Demográfico* (United Nations, New York, 1964). Preliminary estimates of these statistics for the 1970 census, from the Bureau of Labor Force Statistics, Puerto Rico Department of Labor, indicate slight changes.
2. J. V. Calzada, *El Desbalance entre Recursos y Población en Puerto Rico* (Sección de Estudios Demográficos, Departamento de Medicina Preventiva y Salud Pública, Escuela de Medicina, Universidad de Puerto Rico, 1966).

Funding the National Research Council

Critics of the National Research Council suggest (News and Comment, 16 Apr., p. 242) that the reports of the council may be biased in favor of the viewpoint of the agencies that request that studies be made. It would seem that the present organization and method of financing practically guarantee such a bias. Well over two-thirds of the professionals involved in these studies are permanent NRC employees; less than one-third are brought in for specific assignments. NRC must therefore do a great deal of selling to obtain funds to support this permanent staff. Salesmen are not noted for their objectivity.

In order to remove this source of bias, the proportion of permanent professional staff should be greatly reduced, or the $25 million that NRC now receives annually from 20 or more separate agencies should come directly from the Executive Office of the President in one chunk, or both.

ROBERT N. ANTHONY
Harvard Business School,
Boston, Massachusetts 02163

Environment and Emotionalism

The editorial "Changing attitudes toward environmental problems" (7 May, p. 517) in general was quite realistic, particularly in emphasizing that all of us are going to have to pay for any improvements. But the statement that "benefits will be weighed against costs" constrains me to ask how "benefits" affecting the conditions in which we are to live, and even whether we are to continue to live, can be given a dollar value to arrive at any comparison with the "costs."

The "benefit-cost ratio" governing governmental spending in various areas of natural resource "development" has been the root of a good deal of evil. It has taken many years for the reality to be accepted that intangible values make benefit-cost comparisons impossible. Some things must be accepted as essential; they defy dollar evaluation.

I would like to comment also on the somewhat disparaging allusions to emotionalism about environmental matters. As a long-time professional observer of the legislative process, I have found that the screamers, who quote out of context and cite only selected facts, make a real contribution. It is their emotionalism which makes legislative bodies welcome the testimony of rational pleaders who follow. It makes the legislators listen, when otherwise they probably (judging by the record) would not. Rachel Carson was a screamer.

RUSSELL G. LYNCH
8121 Stickney Avenue,
Wauwatosa, Wisconsin 53213

I cannot challenge Abelson's remark that "[by 1970] most of the important components of pollution had leveled off" with any scientific instruments other than my memory and my eyes. As a lifelong resident of the Washing-

ton, D.C., area I have vivid memories of swimming in the Potomac River and even drinking it; to do so now would be dangerous, perhaps fatal. For the last decade I have been able to observe our smog blanket; each year it seems to persist longer and get larger.

My particular environmental concern has been solid waste. Transporting trash is commonly the third largest item in municipal budgets, ranking only behind schools and public safety. I have been in four hearings at various levels of government trying to solve a tiny part of this problem, and the net result of my activity has been five lawsuits from various groups who prefer business as usual.

I grant that there has been great emotionalism about pollution and that in the course of it some extreme statements have been made. However, one may question how much progress would have been made in slowing down the degradation of the planet as a habitat for man—if in fact any has been made—had there not been an emotional outburst. Possibly it is not good to be either too sanguine or too strident, but if there is a hell it is populated by people who kept silent when they should have spoken out.

ELLIS L. YOCHELSON
12303 Stafford Lane,
Bowie, Maryland 20715

Self-Defense

Bryce Nelson's report (12 Feb., p. 556) on the Hiroshima symposium at the AAAS meeting describes attitudes that puzzle millions. It is puzzling that an M.I.T. political scientist can state that "the arms race has generally gotten worse in the last 25 years" and not relate this to Soviet expansionism and militarism. Rathjens is disturbed that a bomb 200 times as powerful as the Hiroshima one is targeted for a Soviet city the size of Hiroshima. Others of us are disturbed that bombs 2000 times as powerful are targeted for American cities.

The blindness of the symposium is evidenced by Alperovitz's answer to the spectator's question: "Why haven't scientists been more successful in helping control the arms race?" According to Alperovitz, the lack of success is a product of scientists' keeping "their lives compartmentalized between their work and politics." This misrepresentation of scientists who faced the implications of their work and decided in favor of the defense of their country is repeated by Yale's Lifton, who slanders Edward Teller as a man who "embraced this weapon as a nuclear deity."

What is disregarded by these polemicists is the fact that nuclear weapons exist independently of American politics and scientists. Even the never-stated implication of their attitude—American surrender—would not protect against the use of nuclear weapons. Whereas we might protect ourselves from a Soviet nuclear attack by surrendering to the Soviet Union, we cannot simultaneously surrender to China (to say nothing of countries that may develop nuclear weapons in the future). Therefore, we cannot be assured that we would not be victims in a Russian-Chinese war or even that the Soviets would not decide that such a large and populous country as the United States would be more easily controlled if part were destroyed. Attitudes expressed at the symposium imply that we can trust the Russian and Chinese governments better than our own.

As long as there is a single expansionist or aggressive force, the choice is between surrender and defense. To pretend, as do the Hiroshima symposiasts, that "the arms race" is a product of American politics and scientists is to obscure the choice.

The West has long lost the will and self-belief that are necessary to any expansionist or aggressive power. It is rapidly losing the will necessary for self-defense. Let us really be hard-boiled scientists and stop fooling ourselves. If we choose surrender, let it be a rational product of a recognition of a lack of will to resist and not the product of a self-denunciatory emotionalism or utopian hopes.

CRAIG ROBERTS, MICHA GISSER
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Departments of Economics, History and Mechanical Engineering, University of New Mexico, Albuquerque

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Many Indian research workers find that requests for reprints—particularly when made after the journals are received in this country—bring only regret cards. *Current Contents* has helped to overcome this handicap to some ex-

tent, but we still find that requests for reprints draw negative replies. Many of the foreign journals are not within the reach of all Indian workers, and the cost of Xerox service, even when it is available, is prohibitive. May I therefore ask, through your columns, that requests for reprints from developing countries be given priority by investigators working in more affluent circumstances.

SHANTA S. RAO
Institute for Research in Reproduction, Parel, Bombay-12, India

Brazen Rule

In his most informative review of *Environment, Power, and Society* by H. T. Odum (14 May, p. 664), Leigh refers to a variant of the Golden Rule, the "silver rule": do not unto others as you would not have them do unto you. A much greater departure from the Golden Rule is, unfortunately, all too well known to us. It can operate, or threaten to operate, whenever there are two or more opposing individuals, groups, or societies. This type of behavior deserves a proper metallic label. This might be the "brazen rule": do unto others before they do unto you.

T. EDWARD REED
Departments of Zoology and Anthropology, University of Toronto, Toronto 5, Ontario, Canada

Chin Up

If John W. Gardner believes that "talented young people should not . . . be led to assume that there is always a market for talent . . ." (News and Comment, 21 May, p. 823) then I hope that the gods will forgive him and that nobody else listens.

Hear, hear, young people with talent: Don't let the soothsayers shout you down. Talent was, is, and always will be the rarest and most valuable thing in this world, sought for and fought over by everyone who needs someone to help him accomplish anything. Let the prophets of doom droop with their "projections." If you have talent, young man, if you really have talent, then the world is yours and you don't even need me to tell you that.

HENRY FAUL
Department of Geology, University of Pennsylvania, Philadelphia 19104

Modern AAAS Responsibilities

Key words in the "AAAS Bible" (the Arden House conference statement of 1951) quoted in Philip Boffey's article on the AAAS mission (30 Apr., p. 453) are "relations of science to government, and indeed the relations of science to our society as a whole." These two "relations" tend to merge, since all branches and agencies of the government are managed by people, and are properly influenced by popular opinion.

The AAAS has access to competent men in all scientific disciplines, and would serve the public well by providing expert advice on government support of science, and by initiating special studies in this connection. Many of the presently neglected problems of science are interdisciplinary, and require active investigation by small working groups in order to get started toward a solution.

I think the AAAS should seize the initiative and set up such working groups, each one charged with producing a brief report within a year or less, with a review session at the next annual meeting. The most difficult requirement is the selection of topics and members for these groups. I suggest that a small action committee with rotating membership be appointed by the Board of Directors with the responsibility of reviewing suggestions from AAAS members or from such government agencies as the President's Science Advisory Committee, the departments of Interior, Commerce, Transportation, Health, Education, and Welfare, and so forth. The committee would organize three or four working groups each year, and evaluate their reports in the light of critiques in special sessions at the annual meeting. Emphasis should be on brevity and specific recommendations for government action. Where there was general agreement, the recommendations should be publicized and formally transmitted to the government agency best able to act upon them.

The general level of AAAS recommendations should be somewhat more on science objectives than on the consumer benefits emphasized by Ralph Nader's "raiders." Examples of topics that could be studied include: cancer research relative to other public-health programs (for a working group of two or three medical specialists, a psychologist, a sociologist, and an economist); national potential for power production (two nuclear physicists, two geologists,

a meteorologist, and an economist); continuation of the space effort (two astronomers, a geologist, a physicist, a chemist, and an economist); the needs for atmospheric research (two aerologists, a meteorologist, a geographer, an agriculturist, a forester, and an economist).

Such reports would have considerable educational value—students might even find them "relevant"—and the studies should become valuable inputs to government from the scientific community. Eventually they might speed up government action to use our advanced technology.

THORNTON PAGE
18639 Point Lookout Drive,
Houston, Texas 77058

Interdisciplinary Science

The general conclusions of Baram's article "Social Control of Science and Technology" (7 May, p. 535) raise in my mind a specter of problems of a greater magnitude than science and society now face. No responsible scientist would disagree that our judicial system has been slow to respond to needed change and that problems relevant to the needs of a complex society are better solved by teams of experts drawn from many fields of endeavor. However, Baram dismisses the current efforts of scientists, and especially biologists, toward these goals, using quotations which are about 180 degrees from most statements I have heard expressed by fellow biologists. Even more surprising is the cursory dismissal of the very real dangers of social control of science and technology as exemplified by Soviet genetics during the Lysenko era.

Baram appears to espouse the oft-heard admonitions of the instant experts of "interdisciplinary" science, who are distrustful of scientific peer groups and perhaps also of man's basically just nature and desire to understand the world he inhabits. I fear that the construction of non-peer, social "do-gooder" agencies specifically given the mission of regulating the range of man's curiosity will do irreparable harm, and may ultimately result in restricting man to the level of the lowest common denominator.

W. S. SILVER
Department of Biology,
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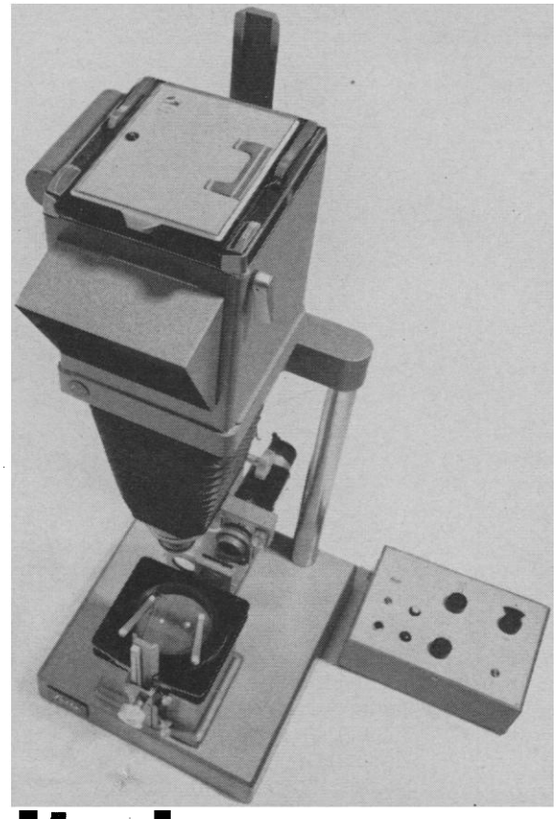

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SCIENCE

Anxiety about Genetic Engineering

Science and technology have provided society with innumerable options and the ability to influence evolution. Optimists see in this a great future, with enhancement of the quality of life and of the dignity of mankind. Pessimists see quite a different picture, and at present they appear to be the more numerous and influential. The average citizen, when he thinks about it, is uncomfortable with the necessity of judging complex issues without adequate facts or background. He also feels relatively powerless to affect the outcome.

In spite of the widespread feeling of ineffectiveness, some people have had very great influence and, collectively, the electorate is having profound effects. Public concern about misuse of technology is leading to measures designed to cope with such present abuses as pollution. Technology can be geared to ameliorate part of the disagreeable conditions, and constructive steps are now being taken.

Some of the difficulties created by science and technology are not so close to solution, particularly in biology and medicine. Advances in these fields have led to great benefits and also to puzzling problems, including some for which our present ethical concepts do not prepare us. More technology alone is hardly likely to provide satisfactory answers to the population explosion. Especially disturbing are aspects of the measures taken to prolong life in the very sick and very old. Death of a loved one was bad enough when it was in the hands of God; now it is often a much more distressing experience. Since every individual must participate in birth and death, he cannot escape some thought about the associated problems that science has created; in general, he is not grateful for the necessity to face such issues.

During the last several years, the public has repeatedly been warned that science is creating additional problems through raising the possibility of test tube babies and "genetic engineering." The response of the public has been negative, with some calling for a halt to research in molecular biology. In truth, the dire predictions of the potentialities of new science have outrun the accomplishments, and the predictors have assumed that society will exercise negatively the options that are provided. Speculation about test tube babies is based on a modest accomplishment—that is, fertilizing a human egg in vitro and keeping it alive for a week or so. For many years, biologists have been fertilizing eggs of countless species in vitro. Talk of genetic engineering received impetus from the isolation of an operon, a specific piece of DNA. This accomplishment is about as meaningful as the isolation of other components of the living system. Biochemists are experts at taking life apart, and they can reassemble some subsystems. The total system, however, is orders of magnitude more complex than anything they have put together. Even if biochemists achieve a capacity for genetic engineering, it is unlikely that their tools will match the tools that are already available. For example, artificial insemination is widely used to improve livestock. If some future ruling clique decided to engage in human genetic improvement, they would be more likely to adopt this technique and to employ their own semen than to use material concocted in the laboratory.

Talk of the dire social implications of laboratory-related genetic engineering is premature and unrealistic. It disturbs the public unnecessarily and could lead to harmful restrictions on all scientific research.

—PHILIP H. ABELSON

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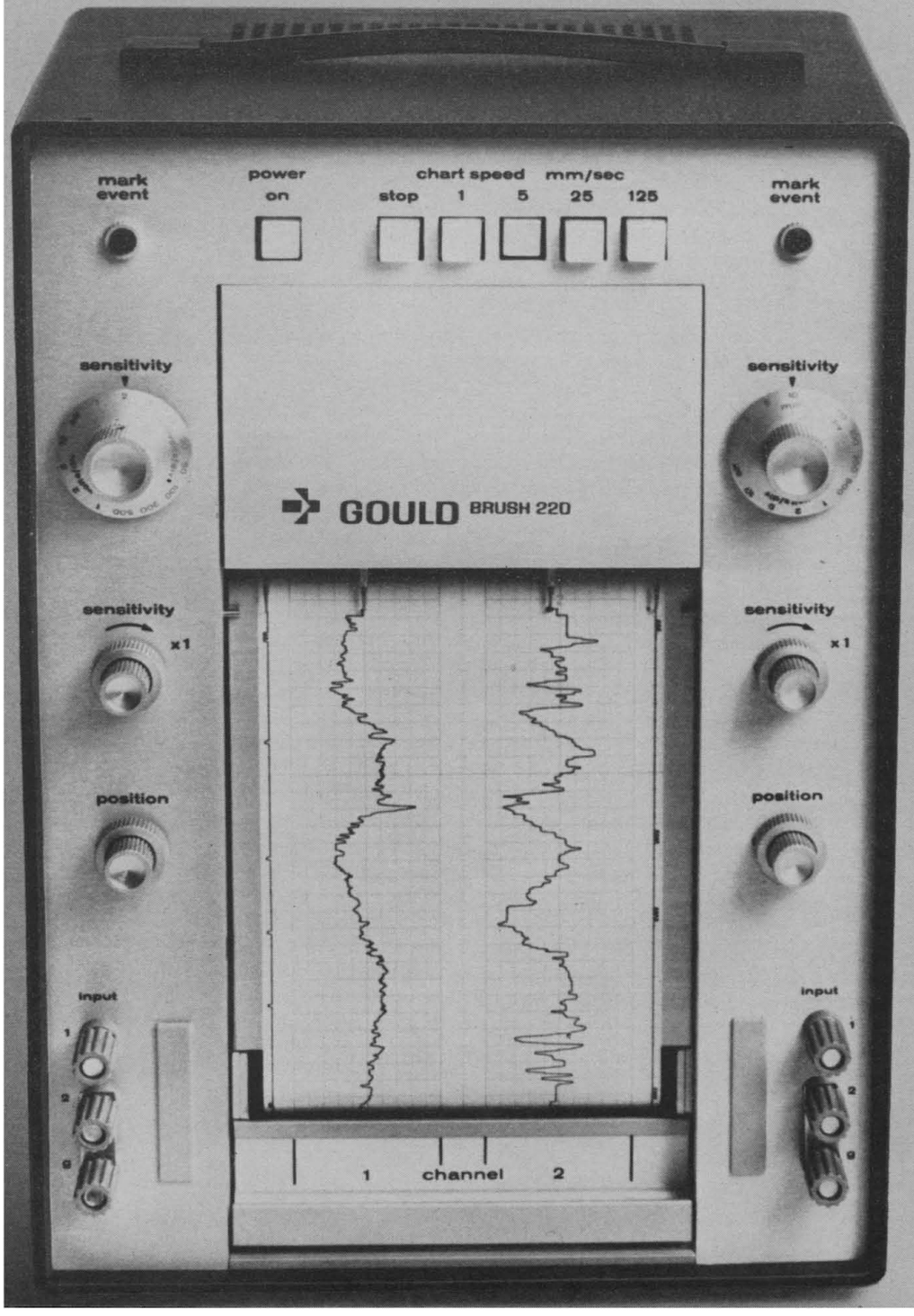

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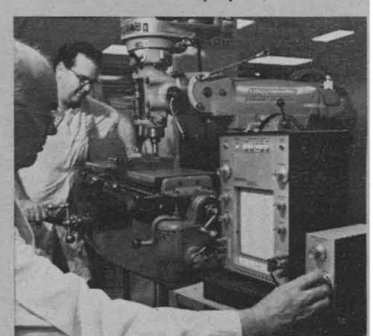

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(*Continued from page 319*)

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Better Medical Writing. Charles Thorne. Grune and Stratton, New York, 1971. 96 pp., illus. $5.

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