SCIENCE

17 June 1966

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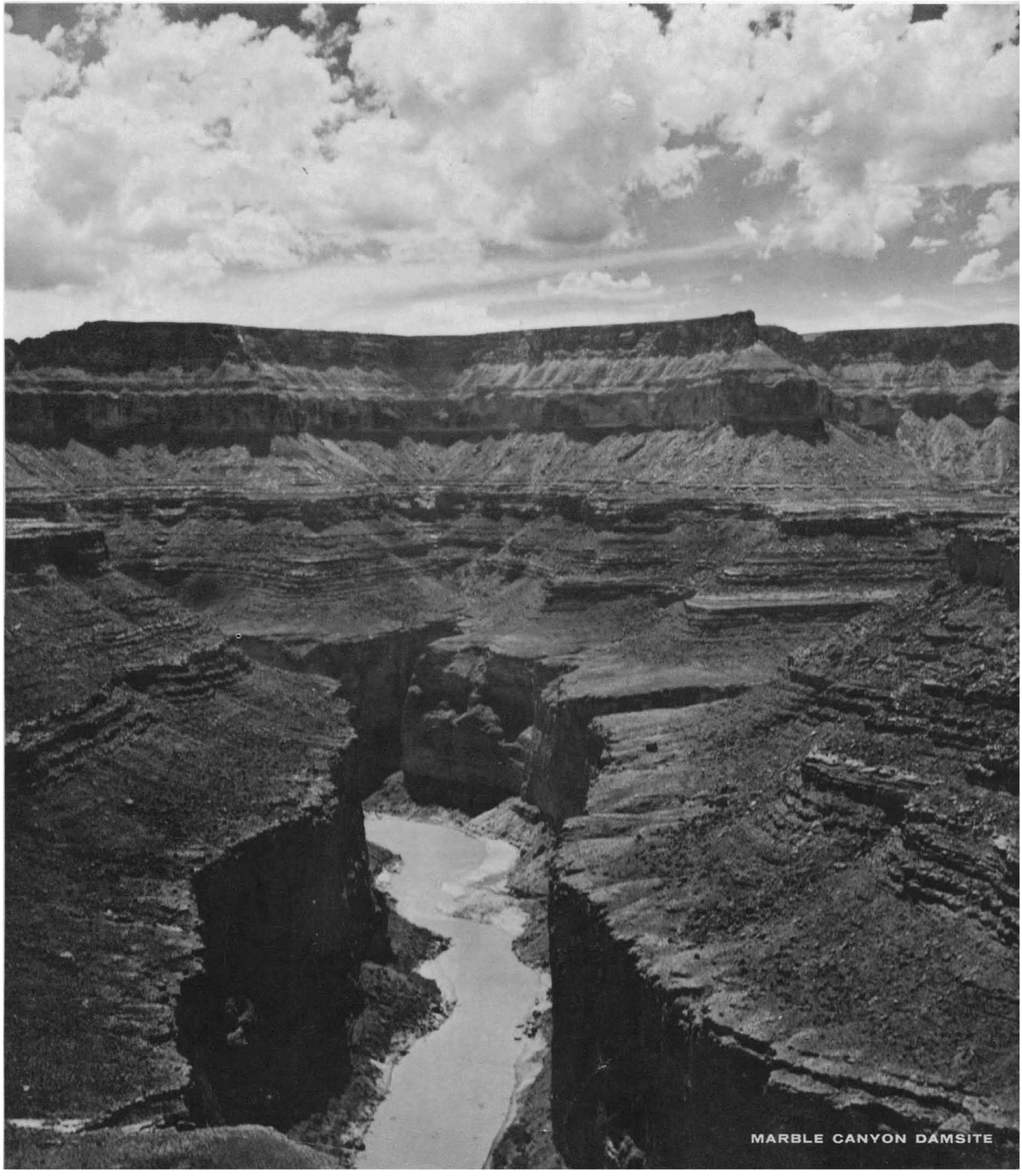
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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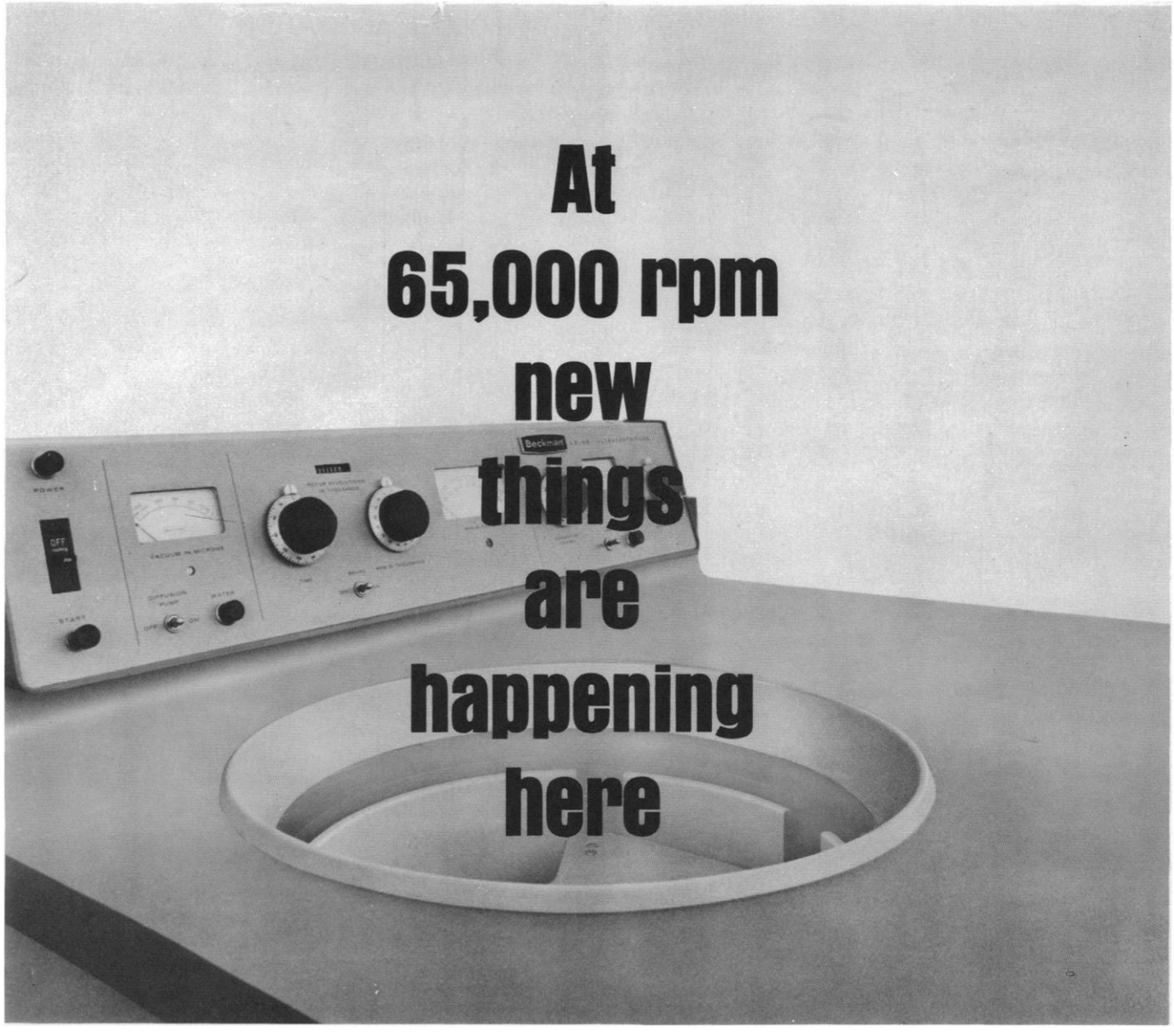

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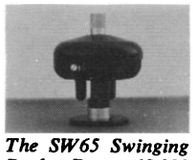

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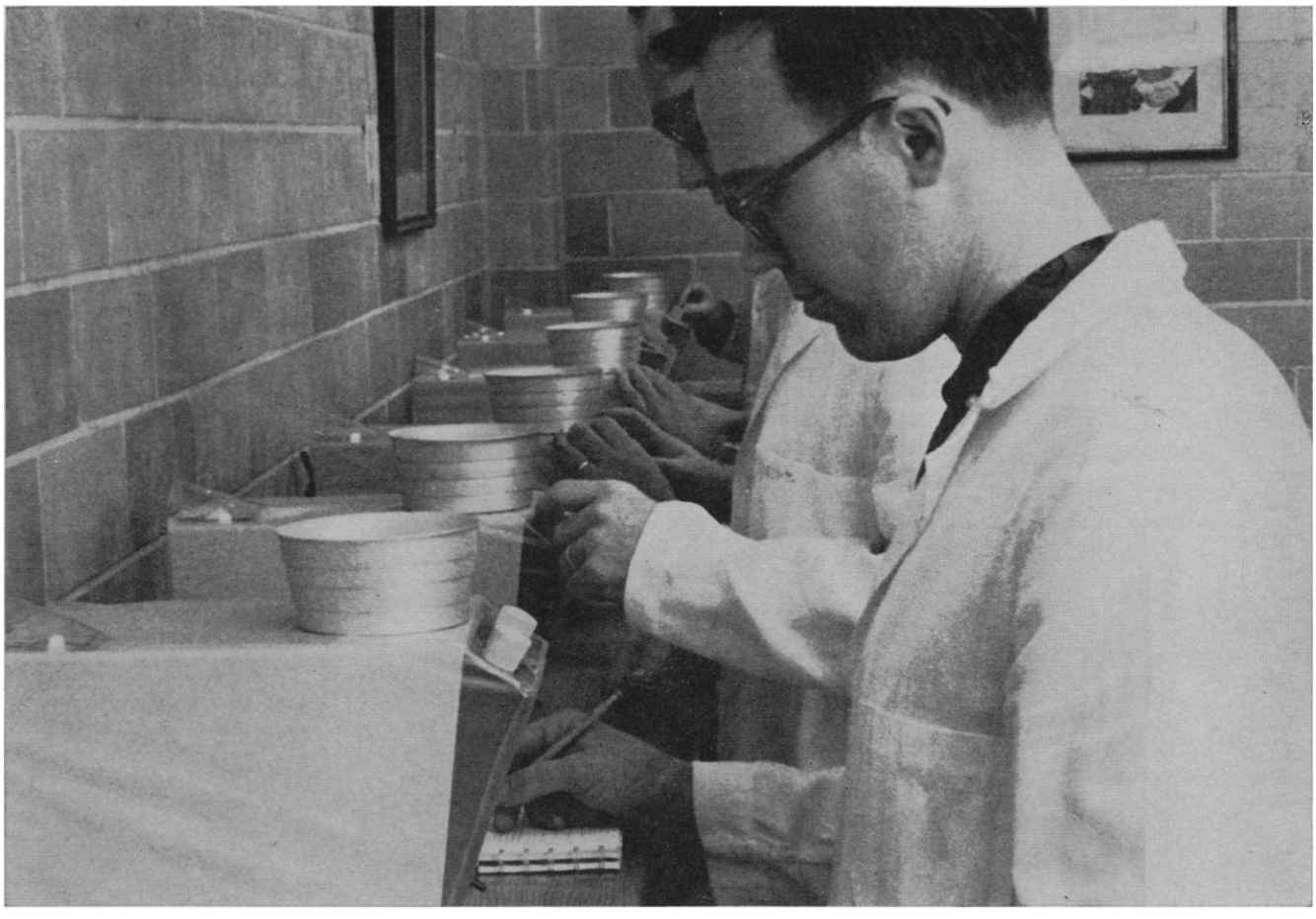

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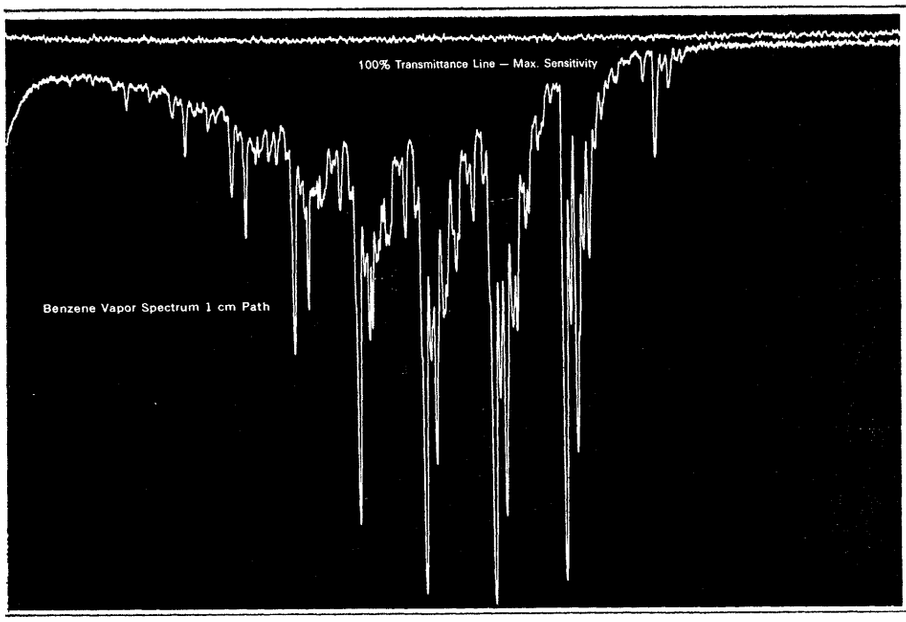
COVER

Marble Canyon damsite, 12½ miles north of Grand Canyon National Park. Although the canyon is about 3000 feet deep here, the dam would rise less than half way up the inner gorge, which is 700 feet deep and 400 feet wide. The dam's upper abutments would be imbedded in Redwall limestone; its middle portions would be in Cambrian dolomite and dolomitic limestone; and its lower part would be in Mauv formation. See page 1600. [John Santa, U.S. Bureau of Reclamation]



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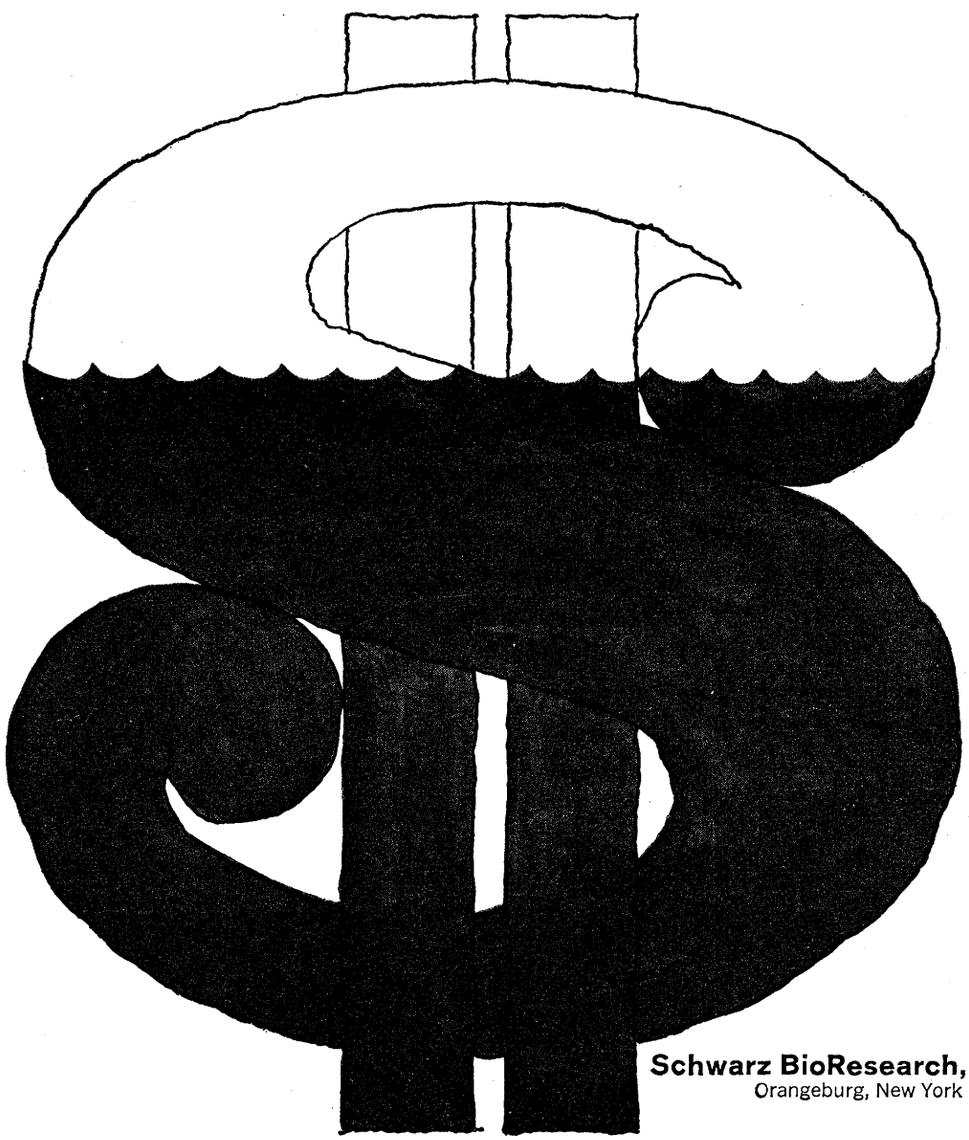

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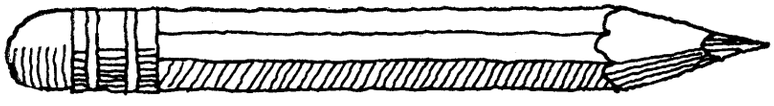

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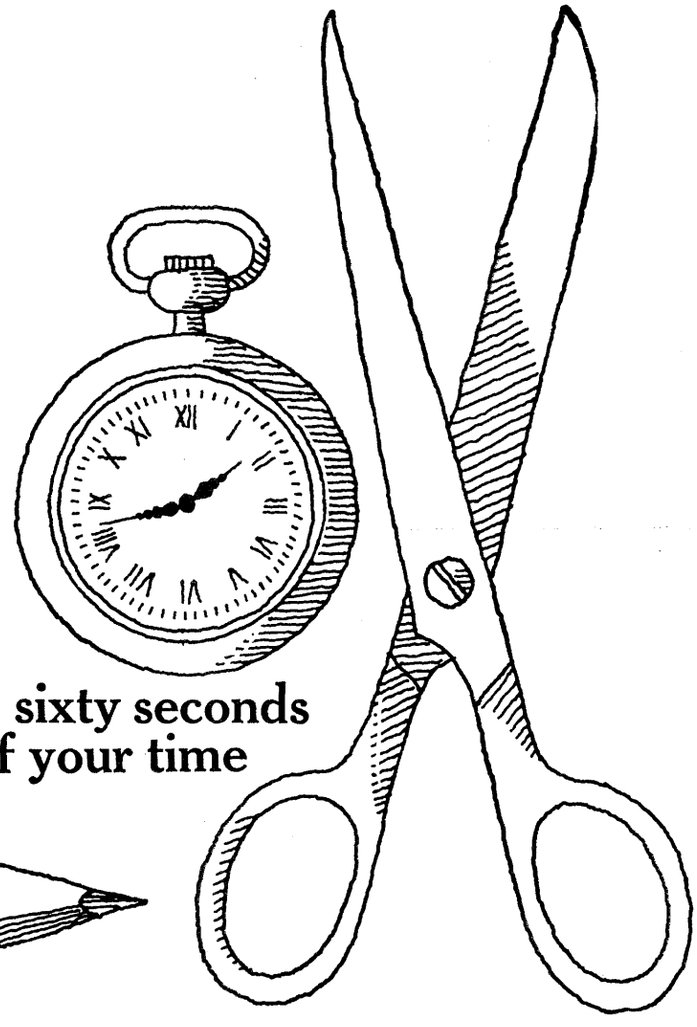

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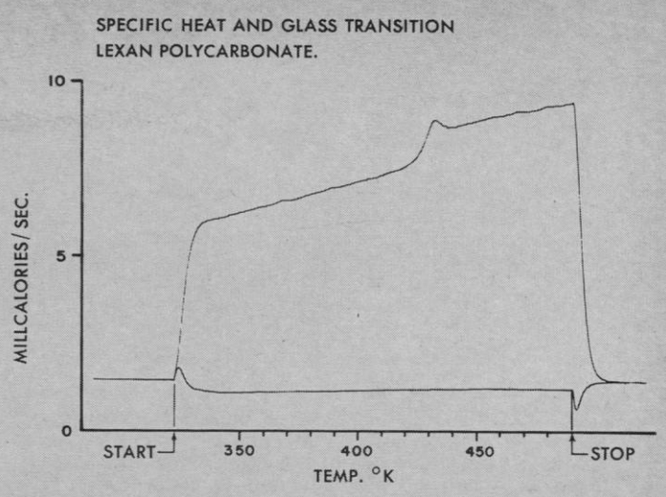

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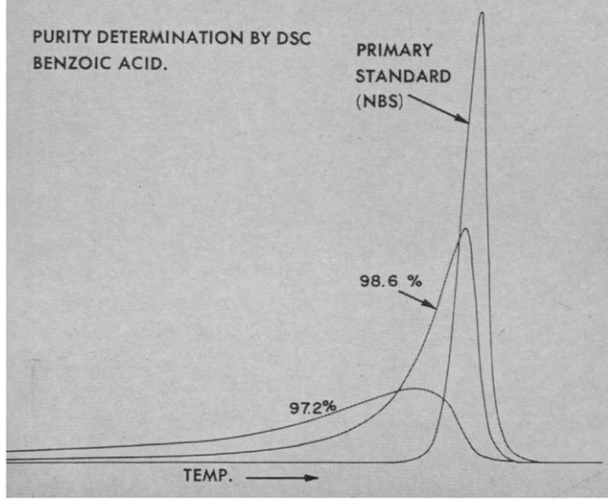

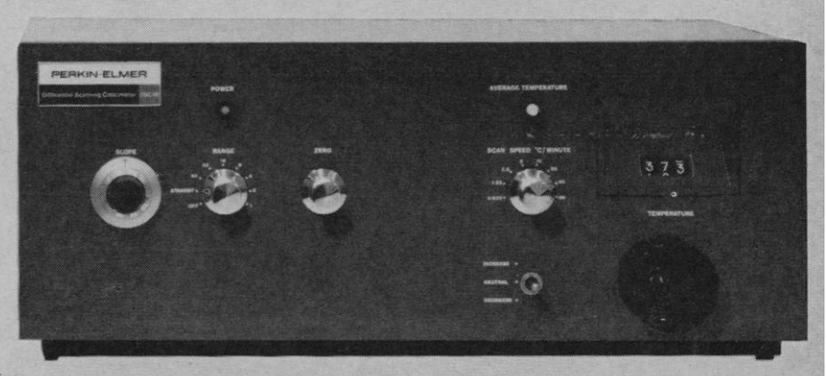

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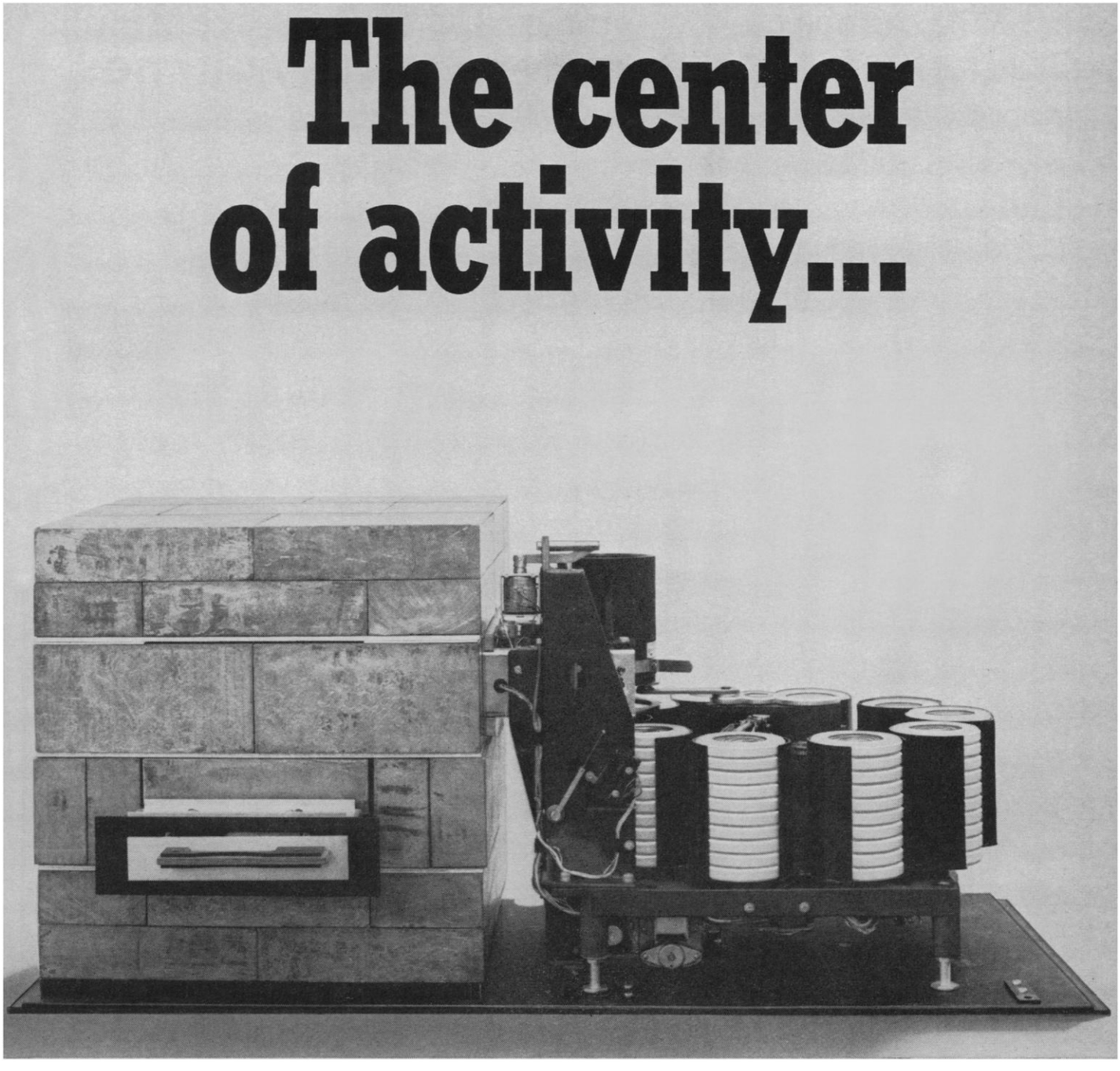

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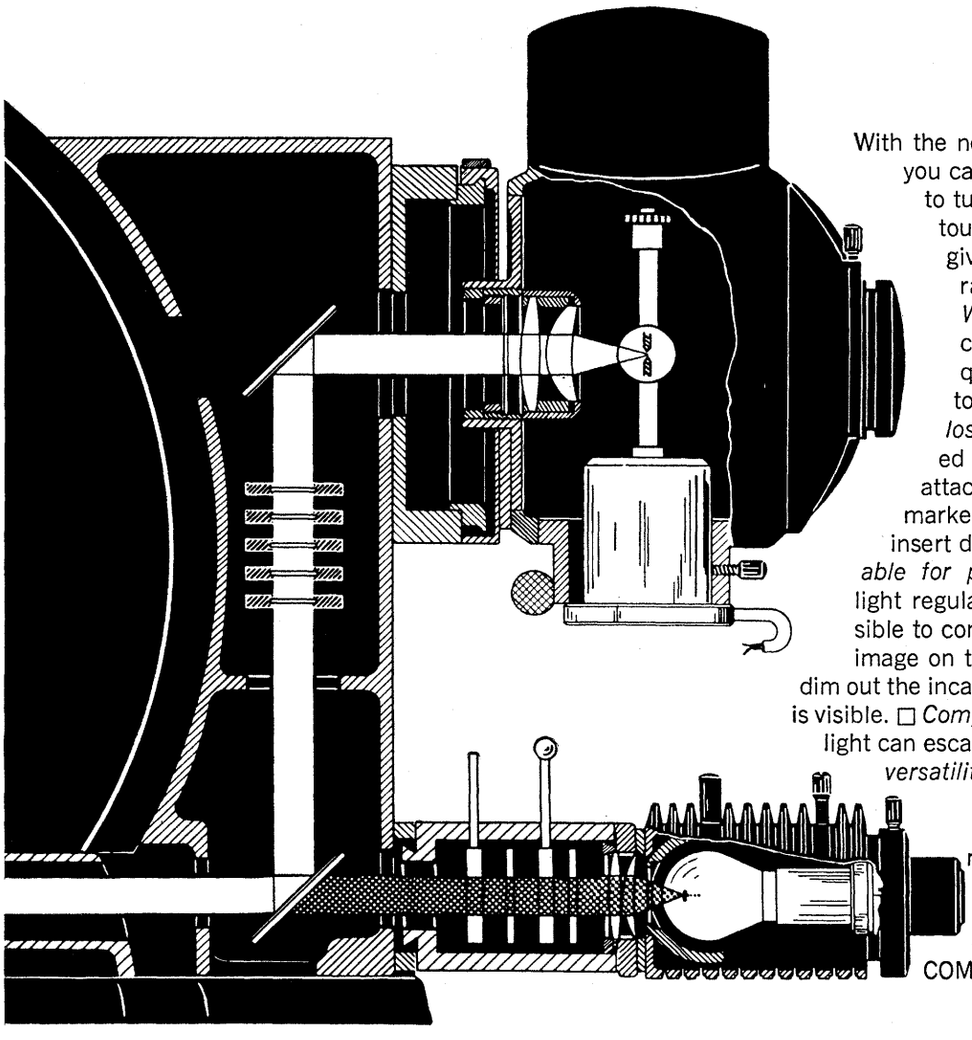

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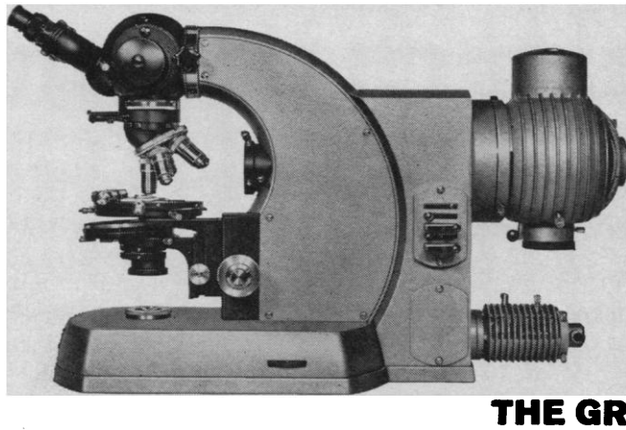

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fluoride intake would be between 1.69 and 3.39 milligrams. The consumption of such high amounts of fluoride during the period of tooth development would undoubtedly influence the prevalence of dental caries and may also produce some mottling of the teeth.

I urge that studies be undertaken regarding the effect of fish-flour ingestion on the prevalence of dental caries and the degree of mottled-enamel development among children. Particular attention should be given to the consumption of fish flour by children in areas where considerable amounts of fluoride are also ingested daily from other sources, such as water and crude sea salt.

D. M. HADJIMARKOS
Department of Public Health, University of Oregon Dental School, Portland

More on Conservation

I write in reply to some of the letters (8 Apr., p. 152) commenting on my article "Geology and the new conservation movement" (28 Jan., p. 409).

H. E. Weaver accuses me of wanting to tear down the Alamo to build a shopping center. I want to go on record here and now as in favor of preserving the Alamo, Lincoln's home, the Acropolis, Mount Vernon, and Independence Hall solely because of their historical value. (I might note, however, that all of Weaver's examples are important economic assets, attracting thousands of tourists yearly.) I believe that, no matter how values are assigned, the cost of preservation must be considered. Perhaps a classic facade might be preserved as an architectural monument if the building can be made to serve a useful purpose. As I said, "The question is—what is the price of preservation and can we afford to pay it? In some cases we can and should pay the price; in others, the price is too high." The price must be set by the community. I do go along with Weaver in giving architects and historians a free hand in selecting the buildings to be preserved. There is more involved than architecture and history. Decisions on preservation should be informed community decisions based on consideration of all the many factors involved. In the case of buildings, I would not ask for a geological opinion, but I certainly would want an economist, an engineer, a planner, and a business representative on the team with the architect and historian. . . . I do not quarrel with Weaver's view that plant ecologists, taxonomists, landscape architects, and park planners can contribute to evaluation of woodland glades; I argue for inclusion of geologists in groups making land-use decisions. There are many woodland glades and, in fact, woodland glades can be planted and nurtured. On the other hand, mineral deposits cannot be planted. They are relatively rare, and they do not grow back.

I must take exception to Chester B. Beaty's limited concept of multiple use. I think the concept offers more value as a guide for land-use policy if it includes sequential multiple use as well as simultaneous or contemporaneous multiple use. Although extraction of minerals from wells or shafts is compatible with other surface uses such as agriculture, strip or open-pit mining is an exclusive surface use for the duration of the extractive process. The whole purpose of reclamation is to permit other uses following the harvesting of minerals. To anyone viewing land use in terms of generations of users, this is multiple use.

R. C. Clement's letter challenged my statement (incompletely quoted in the letter) that "Although conservation is frequently defined as effecting a harmony or balance between man and his environment, such a goal can never be achieved in an industrial society because an industrial society by its very nature consumes and changes its environment." Clement's argument indicates a lack of agreement on what constitutes harmony or balance. More is implied than disfigurement of the landscape. With the powerful tools and immense energy resources of an industrial society, man modifies natural earth processes, reshapes the land, transports vast quantities of earth materials from place to place, and changes the chemical composition of the water and soil. He does this in utilizing earth resources and in constructing and maintaining complex engineering systems. In my opinion, no balance in an ecologic sense can be achieved. There are too many irreversible actions.

Robert R. Curry argues that "Conservationists are rightly protesting the very recent forms of exploitation based on the use of large, modern, earth-moving equipment." To me this

is a most unworldly view. If wastes are disposed of in safe systems and surface-mined lands are reclaimed for subsequent uses, surface mining is the most economic and efficient method of extracting solid mineral matter. I use "economic" to include social values as well as production costs. Any rational approach to the problem must include consideration of what, for example, about 152 million tons of coal at $3.50 per ton means to our society. I recommend to Curry, David B. Brooks's excellent article, "Strip mine reclamation and economic analysis," in the *Natural Resources Journal*, January 1966. I admit land abuse and poor mining practice exist today. They are being stopped both voluntarily and by legislation. My point is that it is illogical to indict today's mining industry, which in large part has moved to meet changing standards of land use, for practices which prevailed in the social and economic world of a half century ago. . . .

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. . . H. E. Weaver has a good point regarding the lack of exposure of professional conservationists (broad sense) to the humanities and social sciences. Some professional schools are trying to improve the situation, but the catalog now open before me, from a major university, illustrates the difficulty they face. I would be hard put to select undergraduate courses in the social sciences that give promise of being helpful. And a frustrating 2-year effort to hire a sociologist to do research on a specific conservation problem has convinced me that few social scientists are aware that they have an opportunity for work relative to natural-resource management, and even fewer are disposed to do anything about it. A research committee of the Rural Sociological Society is now taking a look at possibilities for fruitful cooperation between social scientists and foresters.

Without naming names in substantiation, I dispute Weaver's statement that "The conservation movement is severely handicapped by a shortage of men of broad vision. . . ." Today there are many such men. The handicap may stem from the fact that most of them are professionals, hence largely anonymous within their agencies and companies. But they are making broad-

ly based conservation concepts work on millions of acres. Unfortunately, the headlines go to the crusaders who ride one horse hard and who usually claim to be *the* true conservationists. To the extent that Weaver is talking about these people, I agree with him.

Porter's letter lauds "the development of resources by American private enterprise for the use of the American people." He sees the attacks by conservationists on the practices of the extractive industries as simply part of a scheme to promote government control. It is indeed, as Flawn suggested in his article, pointless to beat the dead horse of despoliation that occurred in the past—to blame present operators for the sins of their predecessors. But a trip through almost any mineral extraction or refining area raises doubt that the horse is really dead. The same profit motive that brings successful exploitation of certain resources for the good of mankind also dictates minimizing of costs, with consequent harm to other natural and human values. Apparently the people's concern can be expressed effectively only through government regulation. The extent to which industries regulate themselves should have considerable influence on the degree to which they are regulated.

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Ruchlis's letter hits the crucial problem in conservation, probably the most important problem in our lives. The assumption that economic growth is always desirable is an idea one rarely hears questioned, almost never by political or business leaders. As Flawn says in his article, conservation depends on control of population. The earth's resources cannot supply the wants of an unlimited number of people. If population cannot be stabilized, and in many areas reduced, and if we cannot build a stable economy to supply the desires of a stable population, it seems certain that most of the things in the world which make life worth living will be destroyed, if not the necessities for the very existence of our species. If Flawn is correct that the best an industrial society can do is to minimize damage necessary for the operation of the system, then our industrial system must be modified. . . .

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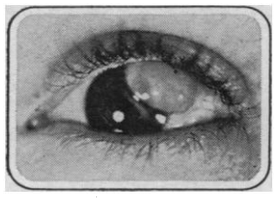
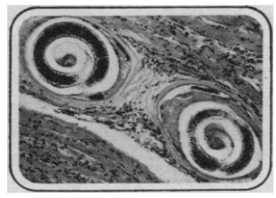
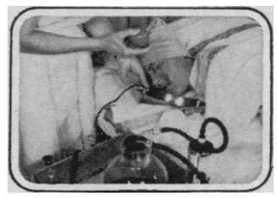
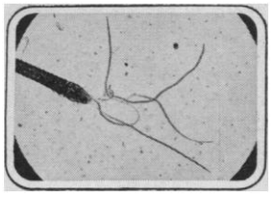

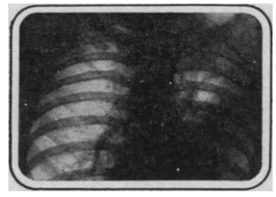
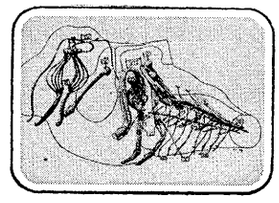

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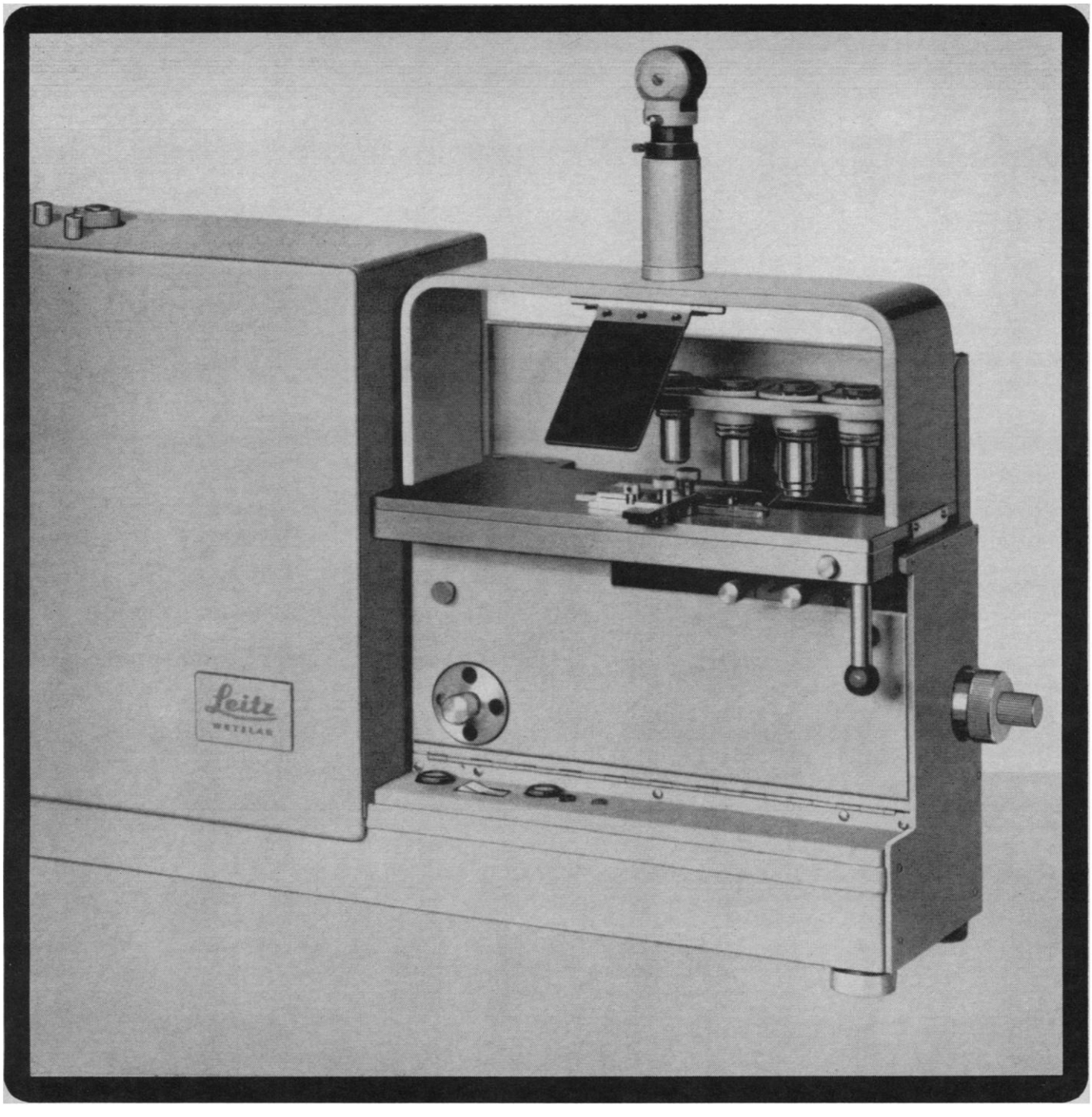

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Changing Human Nature*

In a time like the present, of rapid changes and new demands, an intelligent conservatism that really *conserves* our society may come to demand rapid and intelligent change. When a man is about to be run over by an automobile, or when a world is about to be blown up, real conservatism may demand that he jump out of the way quickly. . . . A radical and ill-considered plunge into Utopianism might destroy our culture, but it is also certain to be destroyed if we go on sticking to our old military belligerence or our old uncontrolled human fertility. Our only safety therefore lies in thinking about what is best to do, in which directions we should change and adapt rapidly and in which directions we should emphasize stability.

Our situation in this problem of social design is somewhat like that of those men who took such a bold step in designing a novel kind of government for the United States. In fact, we might paraphrase *The Federalist* papers by saying, "It seems to have been reserved to the people of this generation to decide the important question, whether societies of men are really capable or not, of establishing good *teaching* to shape a better society from reflection and choice, or whether they are forever destined to depend, for their social training and social structure, on imitation and accident." . . .

There have been many revolutions in our time, but I think that in the long run [the] psychological revolution . . . in the theory and practice of shaping behavior of the young will be the most important revolution of all for the success and happiness of man on this planet. . . .

. . . The ease with which all our mammalian behavior can be shaped or damaged is one of the central features of the experimental psychology of the mid-Twentieth century. The psychologist Hebb and his followers have shown that the sensory deprivation of young animals leads to disorganized perceptions and reactions for the rest of their lives. . . . Skinner at Harvard has shown that dogs and pigeons can be trained in a few minutes, by his "rapid-reinforcement" methods, without any punishment, to do tricks that dogs and pigeons never did . . . before. And that human beings, with these rapid teaching methods and with the "programmed teaching" based on them, can likewise learn many things much faster and easier than was ever possible with older methods. . . .

. . . We have always tried to teach our children what we wanted them to learn and what we wanted them to be. The only difference today is that it looks as though we may soon find out how to be successful at it. It seems to me that these changes in human nature and the possibilities and choices ahead form one of the most interesting subjects in the world for contemplative men. "We know what we are, we know not what we may become," said the Christian philosopher, thinking of heaven. But I would say, if we do not know what we may become, we cannot know what we are. The maturing child only begins to realize who he is when his imagination and his planning begin to turn toward the man he will become. It is the same with a maturing society.

. . . We have a new picture of man's place, his powers, his destiny, and his responsibility. Just as our perception of the external world transcends our internal accidents of construction, so our powers now begin to transcend our biological accidents of origin. It is time to stand up free, with awareness and confidence and choice, to shape, from now on, the further development of what we will become.

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* From *The Step to Man* by John R. Platt (Wiley, New York, 1966). This book contains some unusually imaginative and thoughtful essays. Two of them have appeared in *Science* (16 October 1964 and 6 August 1965).—P.H.A.

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(See 3 June issue for comprehensive list)