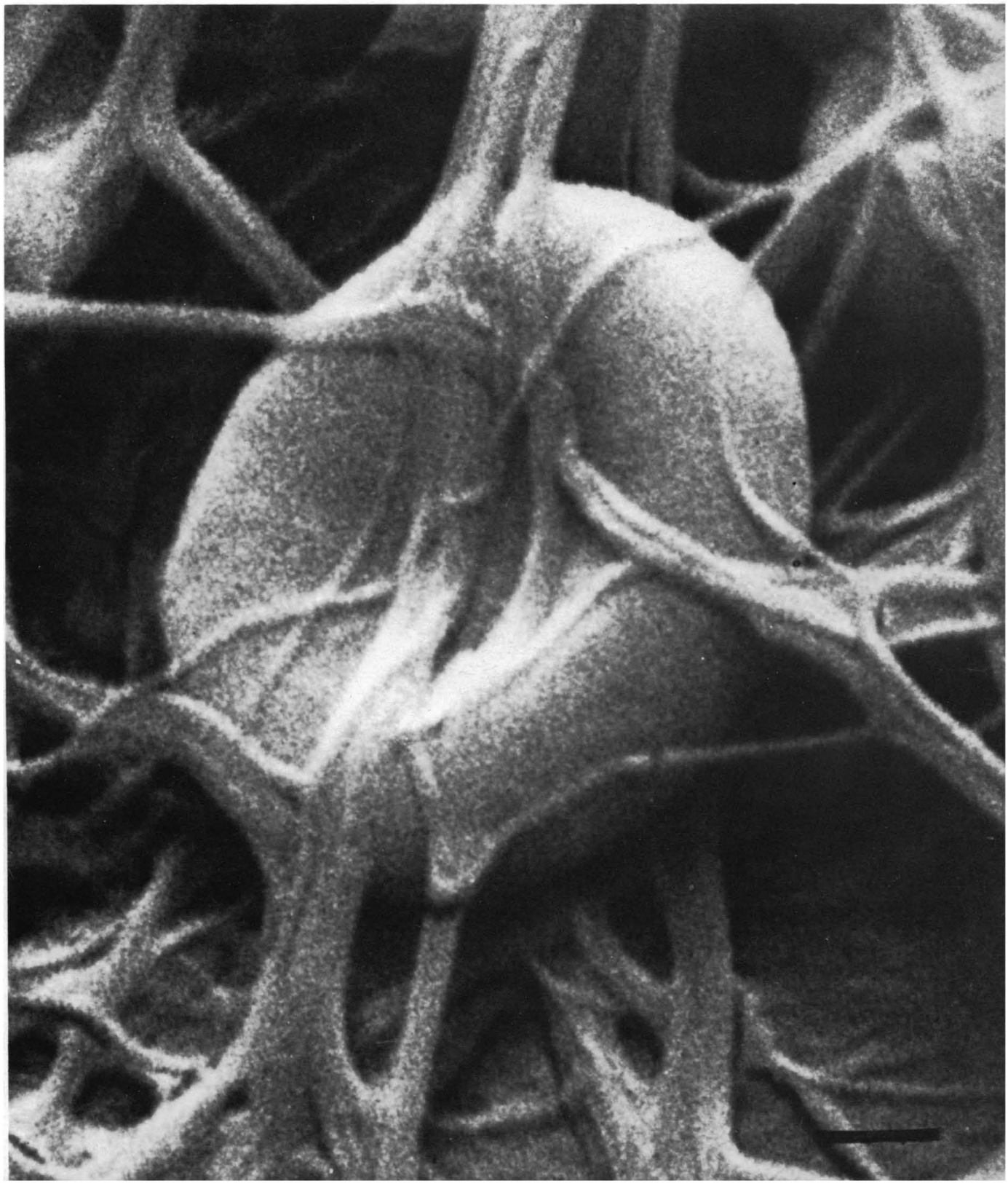
SCIENCE

27 August 1971

Vol. 173, No. 3999

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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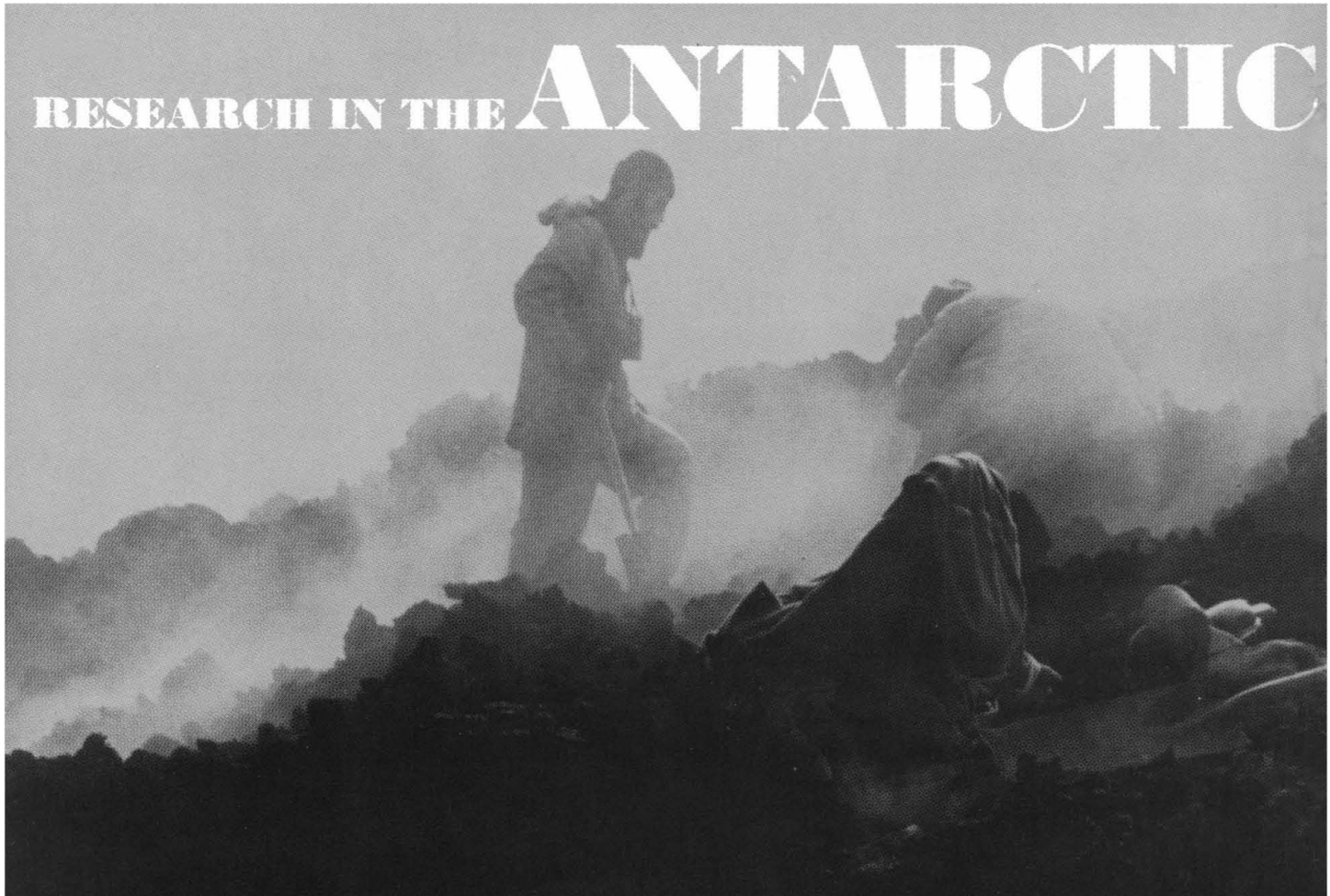

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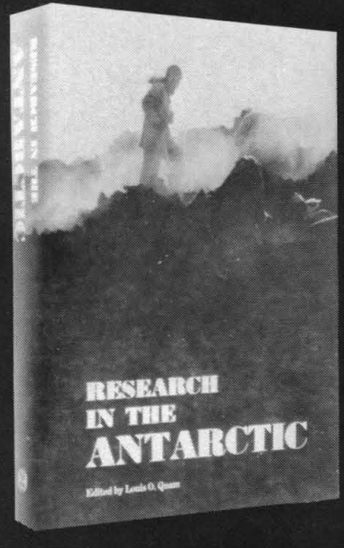

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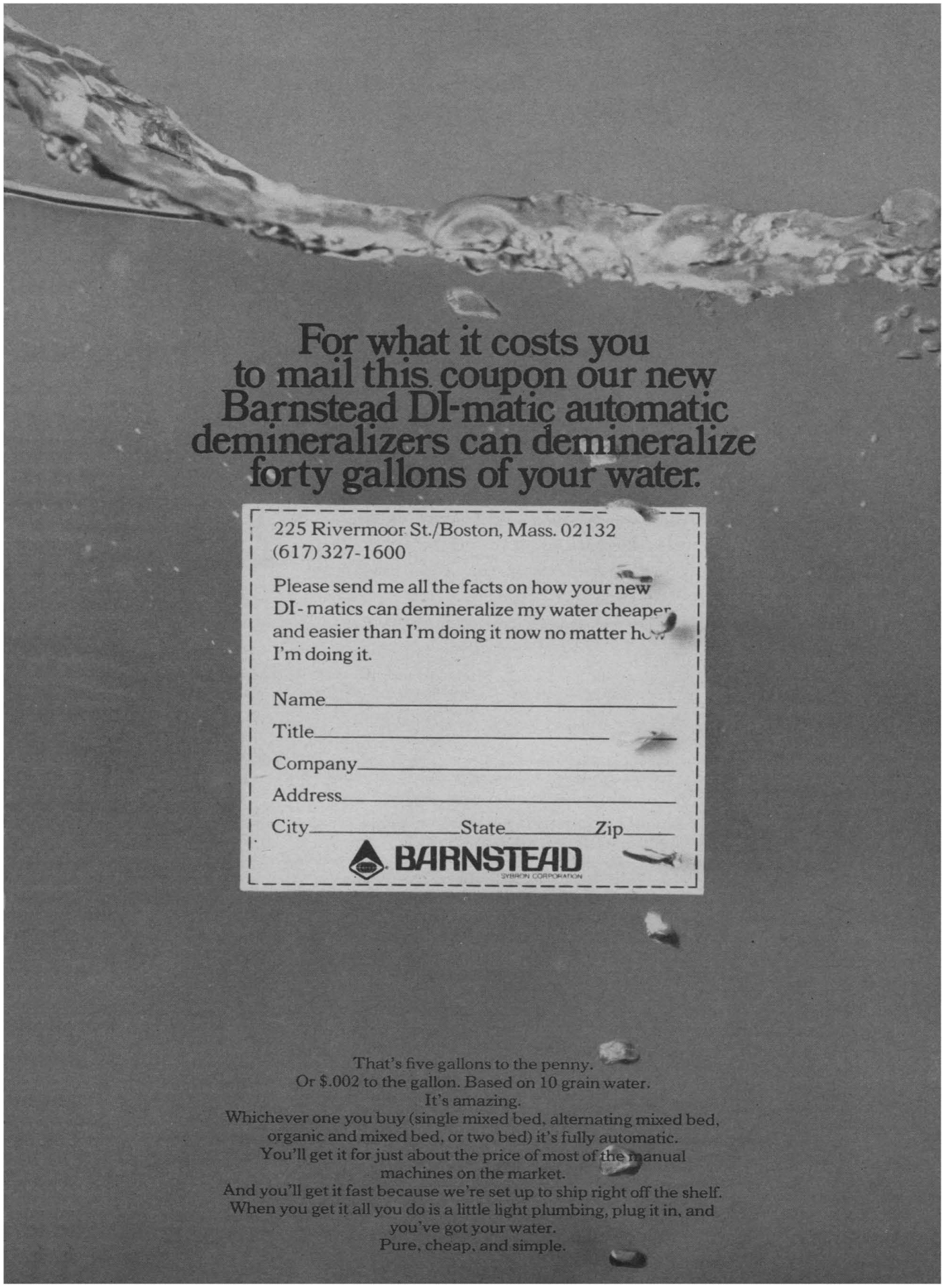

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SCIENCE

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COVER

Scanning electron micrograph of an erythrocyte enmeshed in fibrin. Part of a thrombus found on the inner surface of an intravenous catheter implanted proximal to the heart (about × 20,500). [Emil Bernstein and Eila Kairinen, Gillette Company Research Institute, Rockville, Maryland]

LETTERS

Health Care Crisis

The fashion this season is to talk about the health care crisis (*1*); four years ago, style dictated discussion of the health manpower crisis (*2*). The attempt to solve both of these crises has led to the definition of job roles for new types of health professionals and the development of programs to train them (*3*) as well as the creation of new medical schools and the expansion of enrollments at existing schools [Table 6 in (*4*)]. Recently the development of a new program to train Ph.D.'s in the life sciences as physicians was reported in *Science* (*5*).

This response seems quite similar to the outpouring of interest, energy, and funds with which this nation met the technology gap and the scientific-engineering manpower crisis of the Sputnik era (*6*). Once again, hearings are held in the nation's capital, programs are proposed, legislation is enacted, projects are funded. A backward glance at the fruits of the response to the earlier crises may prove instructive.

Because science was stressed in the elementary school, improved via new curricula (BSCS biology, PSSC physics, Chem-Study chemistry) in the high school, encouraged by summer stipends at the college level, and supported extensively by grants and fellowships at the graduate and post-doctoral levels, many students who might have entered other fields chose to become scientists (*7*). Colleges and universities, supported by grants from the federal government via the National Science Foundation and the Department of Defense, expanded their science staffs and enrollments, developed teaching and research programs in such fields as high-energy particle physics and molecular genetics, and moved laboratories from the basements of old buildings to the top floors of new science centers. Of course, building faculties and facilities took time.

Now there is an overabundance of Ph.D.'s in all fields, especially the sciences (*8*). While the job outlook for scientists and engineers is the worst in twenty years (*9*), the production of new Ph.D's in these very fields is just reaching its peak. It appears that there has been a tremendous waste of both money and manpower because of an overresponse to what was perceived as a crisis.

Let us turn to the health field. It currently takes 10 years for a first-year medical student to enter the health manpower pool; it takes 5 to 10 years to plan and staff a new medical school before it can accept its first class. The training of other kinds of health professionals is less extensive but may still require 3 to 4 years beyond high school or college. It may be true that more doctors are needed; it is apparent that doctors are useful to people in a very real and personal sense, unlike other highly trained professionals; it is clear that we could always export doctors to countries with health personnel shortages. The time, effort, and expense involved in training doctors and other health professionals, however, compel me, like Cassandra on the threshold, to sound a warning against proceeding too far too fast. The rapid increase in enrollments in the health professions has been documented (*10*); it would be almost criminal to again encourage our youth to enter a lengthy program of specialized training if, when they completed the course, they were to find that the prize they had sought had vanished.

DANIEL J. FINK

Department of Preventive Medicine and Community Health, School of Medicine and Dentistry, University of Rochester, Rochester, New York 14620

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As a member of the AAAS and a physician in active practice in a relatively rural environment, I feel that it

is time to look at the other side of the "health crisis" coin.

Those of us who are serving the public in actual practice are virtually unanimous in criticizing existing government health care programs for their failure to improve our ability to provide better medical care to the recipients.

These government programs are characterized by bureaucratic inefficiency from top to bottom. Although the amount of paper work involved has not increased, there has not been much improvement. The abundance of paper work contributes appreciably to the cost per patient of health care and is disillusioning to even the most altruistically motivated idealists, who would rather spend their efforts ministering to the needs of the sick than rendering reports to Caesar.

At the same time, inadequate funding combined with inflation are reducing the material rewards by which the providers of health care are persuaded to render services to recipients of government aid. Often this results in retroactive refusal by government agencies to pay for services that were apparently authorized.

In addition, more and more people are coming to believe that "medical care is a right." This portion of our population makes increasingly irresponsible demands on our overtaxed system in the form of minor complaints that formerly would not have resulted in a visit to the hospital or to the doctor's office.

Whereas all of us in practice are well aware of deficiencies in the health care that is available to a small segment of our population, certain political leaders have made extravagant claims and promises, which can only be interpreted as having been made for political gain. The inflated expectations brought about by these politicians, together with the defective administration of existing programs and inadequate funding, may actually be reducing the quality of medical care available to some people in the United States.

JOHN D. MACCARTHY
635 Cedar Street, Elko, Nevada 89801

Seeking Employment

In view of the current crisis in employment opportunities for Ph.D. scientists it is interesting to note both the number and profile of those interested

in teaching at liberal arts colleges.

This year our department had a faculty opening for an experimental physical chemist. We placed an advertisement for 2 weeks in a professional magazine. We received a total of 281 applications. On the basis of current or most recent full-time employment, these can be categorized as follows: (i) graduate students (23 percent); (ii) first postdoctoral appointees (28 percent); (iii) second or later postdoctoral appointees (11 percent); (iv) faculty members (22 percent); (v) industrial employees (13 percent); and (vi) government employees (2 percent).

The percentages of currently unemployed, female, and noncitizen applicants were 12, 3, and 27, respectively.

JON M. VEIGEL
Joint Science Department,
Claremont Colleges,
Claremont, California 91711

Pesticide Labeling

I am collecting case histories of poisonings by combination preparations of pesticides, particularly those composed of various mixtures of phosphate esters, carbamates, or chlorinated hydrocarbons. Those cases in which information about instructions for use printed on labels have been inadequate, confusing, contradictory, or absent are especially pertinent to this study.

While there are many reported instances of poisonings by individual compounds, case reports in which several pesticides in combination were involved are not commonly reported in the literature. Many poisonings from these combinations may go unreported owing to the difficulties in establishing which of the agents is responsible for the patient's symptoms.

I urge scientists and physicians who know of such cases to write to me.

CECIL H. FOX
Box 19367,
Washington, D.C. 20036

Definition of "Good Teaching"

In his letter of 11 June, Dow pleads for a definition of "good teaching."

A good teacher is a person who provides far more than textbooks or lectures; he offers himself as a model for his students' identification; through him they not only know more than they knew before, but also they are more than they were before. A good teacher, regardless of his subject, catalyzes the student's self-discovery, and the joy of the *ding an sich*—the thing-in-itself, the excitement of knowing for itself. The great teacher goes farther; in his unique way, he legitimizes for his gifted students the myriad awe-inspiring experiences from which new creative possibilities and combinations spring forth.

John Ciardi correctly notes that American mass education aims for the development of a universal standard of subliteracy. As the educational edifice weakens, its standards fall farther, its incredible bureaucracy proliferates, and it is no wonder that educators must indulge in pseudoscientific, numerological mumbledepeg to "discover" what it is they think they are supposed to be doing with students. As Dow states, "many of the teaching-versus-research studies . . . simply result in quantifying the obvious." How right he is!

DONALD B. RINSLEY
3212 Eveningside Drive,
Topeka, Kansas 66614

Women in Physics

The American Physical Society has appointed a Committee on Women in Physics which requests the following information for its study.

First, we are compiling a roster of women physicists and would very much like to know the names and present addresses of all women physicists, especially those who are not members of the American Physical Society. The term physicist is meant to include women with B.A.'s, B.Sc.'s, or higher degrees who are actively engaged in work related to physics and also women with advanced degrees in physics working in areas not related to physics or not presently working.

Second, we are soliciting comments and recommendations to the committee from all women physicists, both members of the American Physical Society and nonmembers.

VERA KISTIAKOWSKY
Committee on Women in Physics,
575 Technology Square, Room 408,
Massachusetts Institute of Technology,
Cambridge 02139

27 August 1971, Volume 173, Number 3999 **SCIENCE**

AAAS Council Resolutions

The American Association for the Advancement of Science has had a liberal policy with regard to the introduction of resolutions for endorsement by Council. This has stimulated new thinking and has provided a means for assuring relevance and responsiveness during this period of transition for science and technology. It is important to assure that this responsiveness is accompanied by appropriate responsibility.

The Committee on Council Affairs, of which I am a member, has the responsibility of studying the resolutions and recommending Council action. Many types of resolutions have been sent to this committee. When resolutions are clearly inappropriate, time is lost by the committee in discussing them and time has obviously been spent by the sponsor in preparing them. It seems in order to indicate the nature of resolutions that are appropriate and the nature of those that are not.

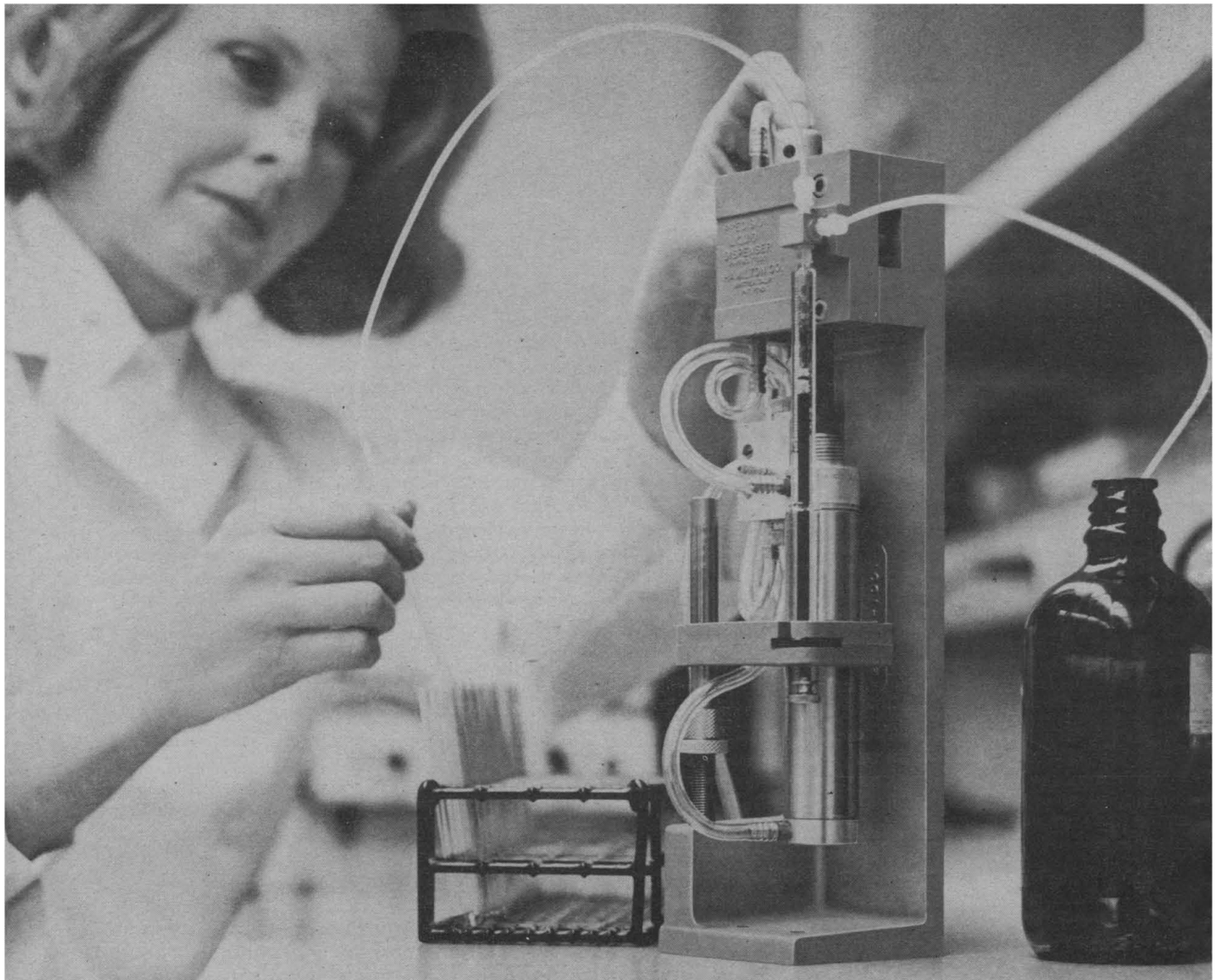
One of the objects of the Association stated in its constitution is "to improve the effectiveness of science in the promotion of human welfare." All too often the words "human welfare" have been taken as the sole basis for a resolution; the "effectiveness of science" or, indeed, any relationship to science has either been ignored or been introduced under very weak rationalization.

Frequently, these resolutions have strongly suggested an attempt to use the name of the Association to support political convictions held by the sponsor. The Committee on Council Affairs does not consider that the Association's purposes include publicizing the political views of its members.

On many occasions, the forms of the resolutions have also been inappropriate for support by a body of scientists supposedly acting on scientific evidence. This has been particularly noticeable in the "whereases" preceding the resolution, which have sometimes been inaccurate in content and ridiculous in length. For example, one resolution submitted in 1970 stated: "Whereas this opinion is shared by leading scientists throughout the world. . . ." Under questioning, the author was unable to name any "leading scientists" who shared the opinion and finally said he "thought" that "some" foreign scientists would agree. This sort of loose and careless language does not impress the committee and raises doubts as to the intellectual honesty of the sponsor of the resolution.

The use of words such as "conclusive proof," without any evidence as to the nature of the proof or where it is to be found, does not help the committee to gauge the soundness of a resolution. Whenever resolutions require specialized knowledge for their consideration, their movers should make it their responsibility to provide such knowledge, so that the committee and the Council can act appropriately. Motions for action requiring financial backing by the Association should include realistic budget estimates. Explicit instructions for submission of resolutions will be published annually in the September issue of the *AAAS Bulletin*.

The time may well come when scientists will need to speak out together on matters of concern to us all. The authority of our Association will have been greatly weakened if we have passed resolutions on matters unrelated to science or have forced through Council resolutions on which scientists hold widely divergent views.—FRANK BRADSHAW WOOD, *Department of Physics and Astronomy, University of Florida, Gainesville 32601*



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were at that time gathered in a single circumpolar sialic blob, one might visualize such a late pre-Paleozoic glacial episode as being truly "worldwide" as far as records are concerned. Since there is enough evidence to suggest both that this might be so and that it could provide a well-defined operational boundary between Paleozoic and pre-Paleozoic, the possibility deserves intensive, open-minded study. An interesting possibility to be considered here involves the idea that associated lowering of groundwater levels might be reflected by the deep leaching and oxidation of much older BIF protores commonly observed where glacial deposits of younger pre-Paleozoic age are missing.

If Cloud's model of early biospheric-atmospheric-lithospheric evolution is valid, then the onset of red-bed sedimentation should be expected to overlap only slightly in time with the last major episode of banded iron formation, denoting another phase of crustal evolution that seems to have time significance and generally to separate older from younger Proterozoic. Stromatolite zonation, if it can be shown to have consistent interregional applications, would apply on a scale of units hundreds of millions of years long, and primarily to the younger (middle and upper) Proterozoic. Soviet stromatolite students generally have supported this view, recently with the limited concurrence of Martin Glaessner and associates and of Cloud. But at this conference both Hans Hofmann and Paul Hoffman strongly questioned the utility of interbasinal stromatolite correlation on grounds of their experience with the Proterozoic rocks of Canada.

All this interplay made evident both a broad agreement about the main modalities of crustal evolution during pre-Paleozoic time in North America, and much disagreement about details, about the philosophy on which a stratigraphic nomenclature or symbolism should be based, and on how many major divisions should be recognized and what names or symbols should be applied to them. In general this is so the world over at the present time. In broad terms, informed geologists generally recognize (i) a basal granite-greenstone-graywacke-bedded chert-amphibolite facies older than about 2.4 to 2.7 aeons; (ii) an intermediate facies of mainly ensialic clastic prisms or wedges that includes the oldest clean quartzites and generally the youngest banded iron formation above the greenstone-granite facies and older than about 1.8 to 2.1 aeons; and (iii) a younger, more diversified set of rocks which characteristically include the oldest red beds, an abundance of commonly stromatolitic carbonate rocks, and, at many places tillite-containing sediments somewhat older than about 0.6 aeon. The words Archean, Eparchean, Katarchean, lower Proterozoic, and middle and upper Proterozoic are commonly applied to these divisions or parts of them; but, even though the same broad groupings of rocks are recognized, usage of terms is not consistent from one continent and country to another, and there seems to be little prospect of agreement on a uniform global nomenclature at this time.

The consensus at the Medicine Bow conference, insofar as there was one, was that it would be premature to seek nomenclatural agreement. In retrospect it seems not terribly important that we could not agree on names or precise boundaries in view of the fact that we did see the same broad trends and were able to discuss them without much terminological difficulty. This is attributable, above all, to the magnificent labors of the last two generations of geochronologists. But that does not mean that radiometric numbers should define rather than calibrate crustal evolution. The issue will be rejoined—there is no doubt of that. And if it is successfully resolved, the groundwork laid at this conference may take some of the credit.

PRESTON CLOUD

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Notes

1. The terms Archean and Proterozoic here refer to major divisions of the pre-Paleozoic, older and younger, respectively, than about 2.5 to 2.6 aeons, following current practice in Canada where the great bulk of North American pre-Paleozoic rocks are found. Two of the respondents to a draft of this report objected to that usage as not properly reflecting the lack of agreement on nomenclature at the conference. Another felt "that almost everyone agreed that the Precambrian . . . should be divided by arbitrary absolute time boundaries." I did not detect such a consensus, and it is convenient for present purposes, and consistent with much accepted practice, to utilize the terms Archean and Proterozoic in their Canadian sense. The reader should realize, however, both that opinion and practice are unsettled and that there was no agreement among the conferees in favor of this or any other terminology.
2. My research on the primitive earth, my contribution to this conference, and the expenses of attendance and participation by H. L. Allsopp, R. L. McConnell, and myself were supported by NSF grant GB-7851 and NASA Exobiology grant NGR-05-010-035.

13 January 1971

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(*Continued from page 807*)

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