SCIENCE

7 May 1976

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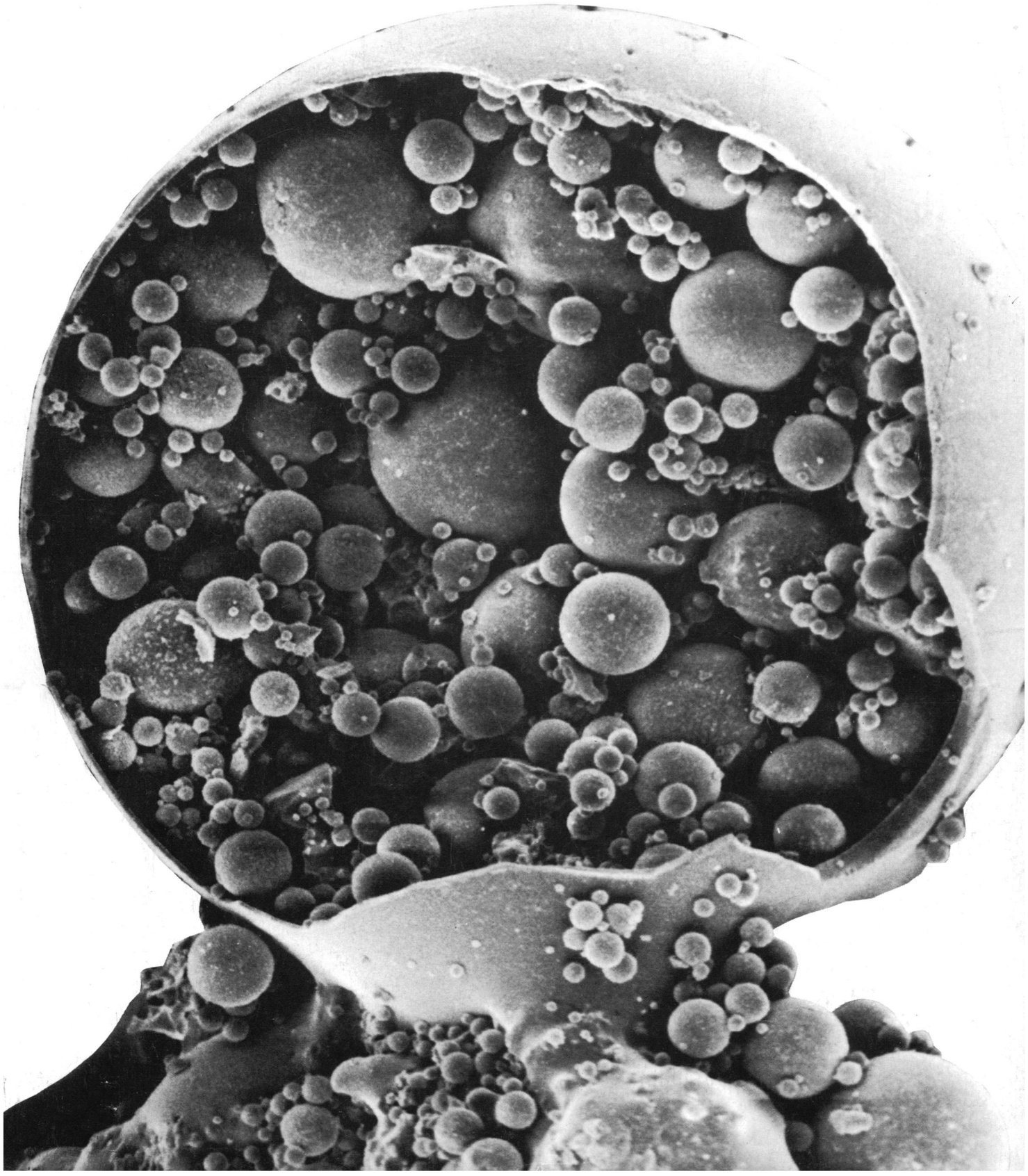
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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The American Association for the Advancement of Science was founded in and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science and human progress. Postmaster: Send Form 3579 to SCIENCE, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005.

COVER

Spheres-within-sphere structure of a fly ash agglomerate collected from the electrostatic precipitator of an operating coal-fired electric plant. The formation of these aluminosilicate plerospheres (hollow spheres packed with smaller spheres) probably results from rapid differential heating of a noncombustible coal fraction and subsequent evolution of gas from thermal decomposition and dehydration (about × 2660). See page 553. [G. L. Fisher, D. P. Y. Chang, and M. Brummer, University of California, Davis]

Last August a biochemist in Philadelphia called us for a radioactive compound we didn't make. We thought it was important so we produced it, stocked it, and added it to our catalog.

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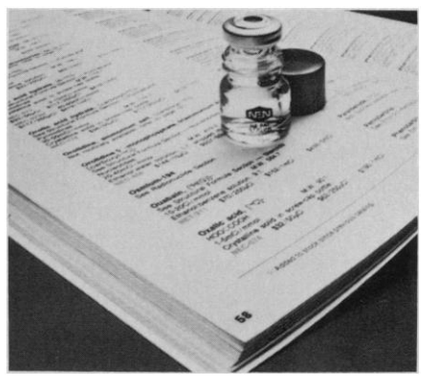

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jected are denied admission solely because of an inadequate number of freshman slots in medical schools. Thus, thousands of college graduates cannot pursue the career of their choice in a profession that is in short supply, and other thousands, who can afford it, seek a medical education abroad. These facts are inimical to our democratic institutions.

The question also arises of why some of the poorest countries in the world should shore up the weak medical manpower foundations of the richest. Of the 7419 FMG's newly licensed to practice in 1973, at least 75 percent, or some 5600, came from the medically underdeveloped countries of Asia, Africa, and Latin America (*2*). These physicians represent the output of 56 of our average-sized medical schools. The capital savings to the United States in bricks, mortar, and chrome alone are more than $6 billion. It easily costs $100,000 to raise and educate an American from childhood through medical school, so the poor countries subsidize us by an additional $560 million yearly. There seems little doubt about who is giving whom the most medical foreign aid.

Nor should we assume that the donor nations are complacent about the physician "brain drain." India has reacted by prohibiting her medical school graduates from taking the Educational Council for Foreign Medical Graduates examination, without which no FMG can apply for U.S. postgraduate training. Iran cries that "One Country's Transfusion Is Another Country's Hemorrhage" (*3*), as one-quarter of her medical school output ends up in the United States (Iran has 26 physicians per 100,000 people; the United States, 156 per 100,000). And Malaysia has appealed to the World Health Assembly to "Stop That Brain Drain" from underdeveloped to developed countries (*4*).

Philosophical issues aside, I disagree with the authors' conclusion that "assumptions relating to FMG's should be regarded as not proven until incontrovertible evidence is available." The evidence is not only available but overwhelming. What is really relevant is the number of FMG's who obtain a license to practice in the United States, for relatively few of them ever return permanently to their native country (*2*). Precise data are available concerning the number of new physician licentiates who are graduates of U.S. (including Canadian) medical schools and those who are FMG's (*2*). The picture is a bit gloomier than the one painted by the authors. The following table indicates the total number of physicians newly licensed to practice in the United States, in three selective years, and the percentages of FMG's (*2*).

New licentiates			
Year	Total	FMG's	
		No.	Percent
1965	9,147	1,528	16.7
1969	9,978	2,307	23.1
1973	16,689	7,419	44.4

Comparing the number of FMG licentiates in 1965 with those in 1973, the increase is 385 percent! If we accept the American Medical Association's estimate of an annual loss of 4,000 physicians due to death or retirement, the net increase of the physician population in 1973 was 12,689—58 percent of whom were FMG's and 42 percent U.S. graduates.

The prospect for the future is more of the same, as both the absolute and relative number of FMG's in training here increases yearly (*5*).

Interns and residents training in the United States			
Year	Total	FMG's	
		No.	Percent
1965	41,357	11,474	27.7
1973	56,244	18,395	32.7

The vast majority of these trainees will become licensed and practice in the United States, as they have in the past. The statistics have become so distorted that there are now more Filipino than black physicians in this country (*6*), despite the fact that 22,580,000 blacks and 343,000 Filipinos were reported in the 1970 U.S. census.

No one would argue with the authors' plea for "the production of accurate data on physician manpower." But there is ample data available on medical education and licensure in the United States to warrant a strong stand for further medical school expansion and a concurrent restriction of FMG immigration.

ALEX GERBER

Alhambra Medical Clinic,
1237 East Main Street,
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1. *Medical School Admission Requirements, U.S.A. and Canada, 1974-75* (Association of American Medical Colleges, Washington, D.C., 1973), chap. 3; American Medical Association, *Bull. Los Angeles Cty. Med. Assoc.* **105**, 2 (6 November 1975).
2. Council on Medical Education, *Medical Licensure Statistics for 1973* (American Medical Association, Chicago, 1974), p. 18; *ibid.*, p. 9; *ibid.*, p. 5.
3. H. A. Ronaghy, K. Cahill, T. D. Baker, *J. Am. Med. Assoc.* **227**, 538 (1974).
4. *ibid.* **229**, 1814 (1975).
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6. R. Warren, quoted in *Bull. Am. Coll. Surg.* **15**, 18 (4 February 1974).

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The Impact Statement Boondoggle

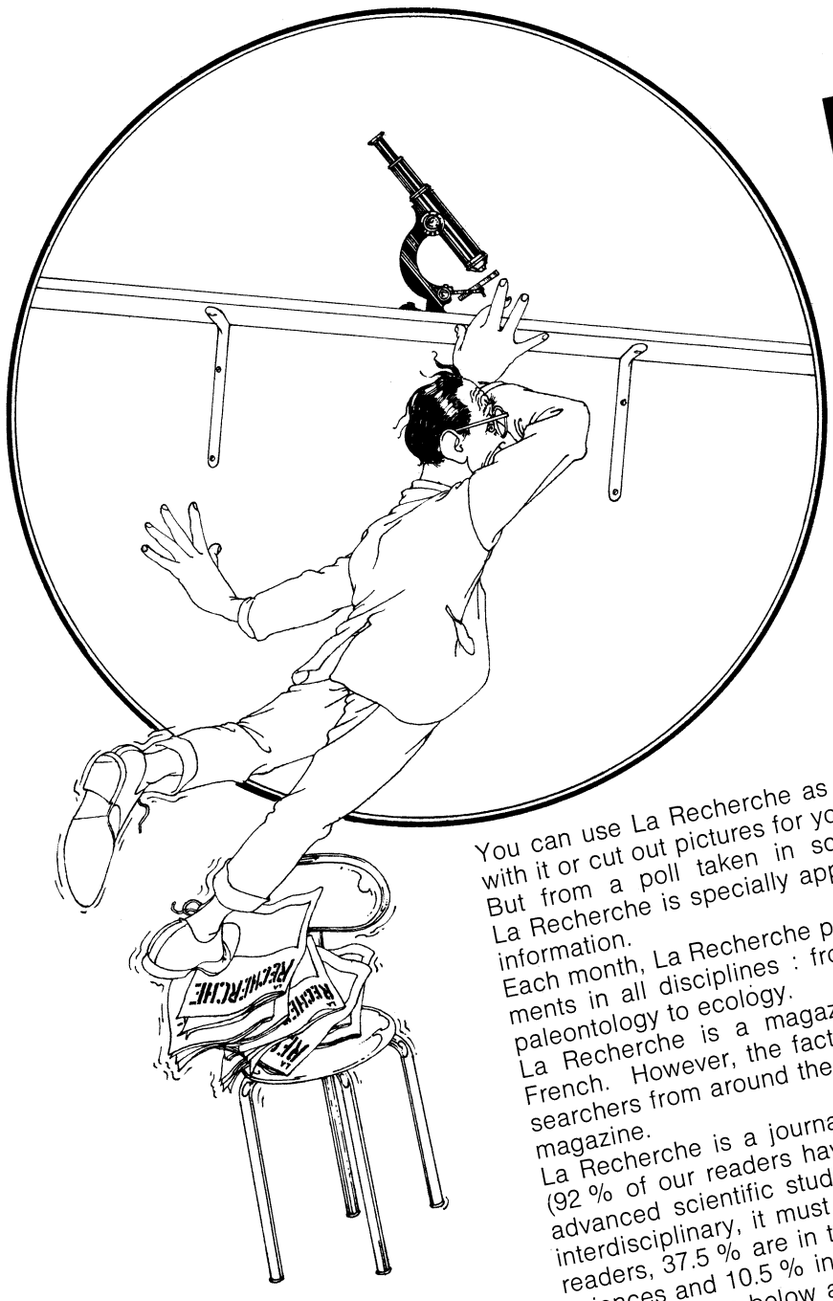
The demand for "impact statements" evaluating the environmental consequences of human activities in natural ecosystems seemed a natural outgrowth of the rise in ecological awareness of the 1960's. This idea, designed to protect our natural resources, has to some extent pacified the demands of ecologically concerned citizens. These citizens should have another look. Having seen the results of many of these impact studies, and evaluated proposals for second-generation studies, I believe that the idea has backfired.

Many politicians have been quick to grasp that the quickest way to silence critical "ecofreaks" is to allocate a small proportion of funds for any engineering project for ecological studies. Someone is inevitably available to receive these funds, conduct the studies regardless of how quickly results are demanded, write large, diffuse reports containing reams of uninterpreted and incomplete descriptive data, and in some cases, construct "predictive" models, irrespective of the quality of the data base. These reports have formed a "gray literature" so diffuse, so voluminous, and so limited in distribution that its conclusions and recommendations are never scrutinized by the scientific community at large. Often the author's only scientific credentials are an impressive title in a government agency, university, or consulting firm. This title, the mass of the report, the author's salary, and his dress and bearing often carry more weight with the commission or study board to whom the statement is presented than either his scientific competence or the validity of his scientific investigation. Indeed, many agencies have found it in their best interests to employ a "traveling circus" of "scientists" with credentials matching these requirements. As a result, impact statements seldom receive the hard scrutiny that follows the publication of scientific findings in a reputable scientific journal.

The advancement of the scientific method is also in jeopardy. First-rate natural scientists are finally learning to set and test hypotheses and to study mechanisms and processes that are important in natural systems, rather than simply to survey and catalog the systems. They are, however, usually not attracted to the undefined scientific problems, complex committee hierarchy, and unrealistic time constraints that are usually attached to impact studies. Instead, such studies are often done by scientists who cannot successfully compete for funding from traditional scientific sources. In general, their methods are ancient, descriptive "textbook" techniques, which do not reflect either the many scientific advances of the past decade or the problems unique to the study undertaken. The same tired old bag of tricks is applied to studies of every type, regardless of the type of impact anticipated. The type of data generated cannot usually be extrapolated from one ecosystem to another, because studies were not planned with that as a major objective. As a result, each new study begins with little or no logical background, and no master plan for studying environmental processes is emerging. How well a particular study is funded is a direct function of the value of the resource to be affected, with no consideration given to the amenability of the system to study or to the quality of science which might result. Enormous sums are therefore spent with little or no scientific return.

The continued application of such studies can have several effects, including increased prices for natural resources; a declining credibility for environmental science and scientists; a reduction in the overall quality of scientific personnel; and the degradation of our natural resources, not as the result of the direct activities of industry and government, but because of the ineffectual groping of environmental scientists.

If we are to protect both our resources and scientific integrity, environmental scientists must seek to put their studies on a scientifically credible basis—to see that problems, terms of reference, funding, time constraints, reports, and conclusions are all within a bona fide scientific framework.—D. W. SCHINDLER, *Leader, Experimental Limnology Project, Freshwater Institute, 501 University Crescent, Winnipeg, Manitoba, Canada*



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AAAS NEWS

(Continued from page 545)

The workshop identified two possible mechanisms for achieving some of these recommendations. The first was to allow the present relationship between AAAS and AAS to evolve in light of the above recommendations. The second was to restructure the relationship of the AAAS and its affiliated academies in accordance with regional AAAS-AAS divisions and regional programming. Two structures were suggested: (i) formal AAAS divisions to which the state academies would relate directly or (ii) regional academy centers with AAAS input and assistance.

In May the executive committee of the AAS will meet with AAAS staff in Washington to sift these ideas and draft a 3-year plan of AAAS-AAS cooperation. Academy members will be called upon to help implement some of these recommendations. Additional ideas, comments, and suggestions are welcome.

—JOSEPH DASBACH, *Science Education*

Notes from the Office of International Science

A Consortium of Affiliates for International Programs has been formed by the AAAS Office of International Science to provide a focal point for the exchange of information on international programs of professional societies and academies of science. Information gathered from all interested affiliates will be periodically distributed to them through a newsletter. In addition to this information exchange function, OIS will sponsor working groups of affiliates ranging from panels at the annual meetings to special conferences or cooperative research requiring outside funding. As a result of several meetings with affiliates with particularly strong international interests, the following working groups will initially be set up: Technology Appropriate to Development, Continuing Professional Education, and Desertification. Membership in the consortium is open to any affiliate who wants to take an active part in this program. Members interested in participating should write directly to Irene Tinker, head, Office of International Science.

* * *

The AAAS Committee on Arid Lands is currently compiling a Directory of Arid Lands Scientists in Canada, the United States, and Mexico. Scientists will be grouped by discipline. Everyone