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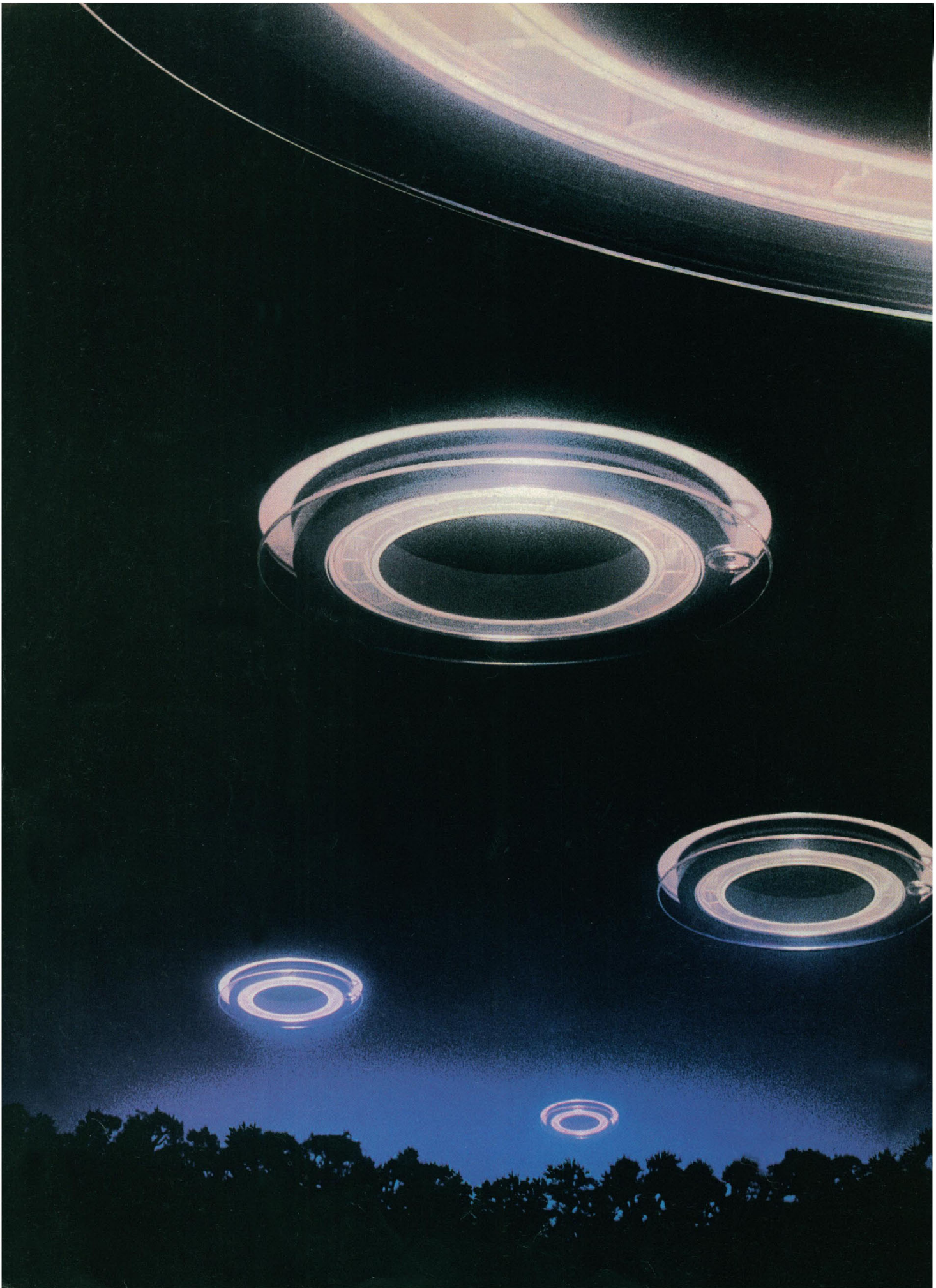
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<b>LETTERS</b>	Least Publishable Unit: <i>R. W. Buddemeier; J. Roth</i> ; Startling Punctuation: <i>N. P. Christy; G. B. Kolata</i> ; Guinea Worm Disease: <i>D. R. Hopkins and W. H. Foege</i> .....	494
<b>EDITORIAL</b>	Affordable Science .....	497
<b>ARTICLES</b>	An Ice-Free Cretaceous? Results from Climate Model Simulations: <i>E. J. Barron, S. L. Thompson, S. H. Schneider</i> .....	501
	Brain, Lung, and Heart Functions During Diving and Recovery: <i>P. W. Hochachka</i> .....	509
	National Science Foundation Budgets: Fiscal Years 1981, 1982, and Beyond: <i>L. M. Branscomb</i> .....	514
<b>NEWS AND COMMENT</b>	Ambitious Energy Project Loses Luster .....	517
	Military Plans for Shuttle Stir Concern .....	520
	Afghanistan: The Politics of a Tragicomedy .....	521
	Attempts to Safeguard Technology Draw Fire .....	523
	<i>Briefing: Meltdown Too Hot for Maryland Science Center; The Perils of Isabelle: Under the Budget Ax; Edwards Hears Criticism from Synfuels Industry; College Students Fail Global Awareness Test</i> .....	524
	The Containment of Research .....	526
<b>RESEARCH NEWS</b>	Micromainframe Is Newest Computer on a Chip .....	527
	<i>Meeting Highlights: Magma Chambers in the Laboratory; More Deep-Sea Hot Springs in the Pacific; Rifts Propagating in the Pacific</i> .....	528
	Tale of the Orphaned Genes .....	530
<b>AAAS NEWS</b>	Questions of Science Literacy Addressed by Rutherford/AAAS: 1982 Exhibit: Energy and Health to Be Discussed in Berkeley; Short Courses at Pacific Division, Annual Meeting .....	532
<b>BOOK REVIEWS</b>	Evolution and Ecology of Zooplankton Communities, <i>reviewed by E. L. Mills</i> ; Ball Lightning and Bead Lightning, <i>R. E. Orville</i> ; The Nature of Thought, <i>K. Outley</i> ; A History of Computing in the Twentieth Century, <i>N. Stern</i> ; Books Received .....	534

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<b>REPORTS</b>	Control of Equatorial Ocean Currents by Turbulent Dissipation: <i>W. R. Crawford and T. R. Osborn</i> .....	539
	Regression of Aflatoxin B <sub>1</sub> -Induced Hepatocellular Carcinomas by Reduced Glutathione: <i>A. M. Novi</i> .....	541
	Changes in DNA During Meiosis in a Repair-Deficient Mutant ( <i>rad 52</i> ) of Yeast: <i>M. A. Resnick et al.</i> .....	543
	Mutation Caused by Human Phagocytes: <i>S. A. Weitzman and T. P. Stossel</i> .....	546
	Transformation of Paralytic Shellfish Toxins as Demonstrated in Scallop Homogenates: <i>Y. Shimizu and M. Yoshioka</i> .....	547
	Tritiated Thymidine Incorporation Does Not Measure DNA Synthesis in Ribavirin-Treated Human Cells: <i>J. C. Drach et al.</i> .....	549
	Ctenidial Autotomy in <i>Corbicula fluminea</i> in Response to Massive Granulomas: <i>J. C. Britton et al.</i> .....	551
	Purified Reduced Nicotinamide Adenine Dinucleotide: Responses to Lactate Dehydrogenase Isozymes from Three Cell Sources: <i>A. E. Kaplan et al.</i> .....	553
	Excitation of <i>Limulus</i> Photoreceptors by Vanadate and by a Hydrolysis- Resistant Analog of Guanosine Triphosphate: <i>A. Fein and D. W. Corson</i> .....	555
	Isoguanosine: Isolation from an Animal: <i>F. A. Fuhrman et al.</i> .....	557
	Tyrosine Increases Blood Pressure in Hypotensive Rats: <i>L. A. Conlay, T. J. Maher, R. J. Wurtman</i> .....	559
	Cadmium-113 Nuclear Magnetic Resonance Studies of Bovine Insulin: Two-Zinc Insulin Hexamer Specifically Binds Calcium: <i>J. L. Sudmeier et al.</i> .....	560
	Evidence for Endomycorrhizae in Pennsylvanian Age Plant Fossils: <i>C. A. Wagner and T. N. Taylor</i> .....	562
	Alternative Male Strategies: Genetic Differences in Crickets: <i>W. H. Cade</i> .....	563
	Energetics of Honeybee Swarm Thermoregulation: <i>B. Heinrich</i> .....	565
	Different Proteins Associated with 10-Nanometer Filaments in Cultured Chick Neurons and Nonneuronal Cells: <i>G. S. Bennett et al.</i> .....	567
	Drug Discrimination Learning in Lead-Exposed Rats: <i>H. Zenick and M. Goldsmith</i> .....	569
	Eusociality in a Mammal: Cooperative Breeding in Naked Mole-Rat Colonies: <i>J. U. M. Jarvis</i> .....	571
	Male Vole Urine Changes Luteinizing Hormone-Releasing Hormone and Norepinephrine in Female Olfactory Bulb: <i>D. E. Dhuzen et al.</i> .....	573
	Age Determination for the Shanidar 3 Neanderthal: <i>D. D. Thompson and E. Trinkaus</i> .....	575
	<i>Technical Comments:</i> Terminal Cretaceous Extinctions and the Arctic Spillover Model: <i>D. L. Clark and J. A. Kitchell</i> ; <i>S. Gartner</i> ; Food Colors and Behavior: <i>R. L. Brunner, C. V. Vorhees, R. E. Butcher, B. Weiss</i> .....	577

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Antarctic Weddell seal (*Leptonychotes weddelli*) initiating a dive under the ice shelf near Ross Island, Antarctica. The length of diving depends on regulated blends of anaerobic and aerobic metabolism in different tissues and organs. See page 509. [R. Davis, Scripps Institution of Oceanography, La Jolla, California]

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## LETTERS

### Least Publishable Unit

Recent comments on the Least Publishable Unit (News and Comment, 13 Mar., p. 1137) in biomedical research were appropriate but I feel the phenomenon is much more widespread and has both effects and causes not touched upon in the original article.

The increase in gratuitous multiple authorship has tended to discredit genuine collaboration. I have served on several academic personnel committees where it has been seriously argued that coauthored papers should be devalued or disregarded in evaluating a candidate's suitability for hiring or promotion. Science by committee is often pedestrian and opportunistic bibliography trading is reprehensible, but research needs more rather than less of the synergism that arises from genuine peer collaboration. A publication ethic that provides further disincentives for such work is dangerous to the health and integrity of scientific research.

Journals with lenient review and editorial policies offer rapid and convenient publication and thus attract so many papers at all levels of quality that the journals themselves are not indicators of research quality. The more demanding, high-quality journals cease to be a forum for discussion of rapidly developing fields.

There are several reasons for the Least Publishable Unit phenomenon in addition to those mentioned in the article. Among them are

1) *"Micromanagement" techniques.* Agencies that fund applied research have increasingly dictated not only the problem to be solved but also the nature and detailed time schedule of the solution. There is a strong incentive to get publication mileage out of both interim and final reports with a minimum of rewriting or interpretation.

2) *Reader accessibility.* As papers and journals proliferate, researchers are able to read a smaller fraction of the total and tend to concentrate on those dealing with their primary disciplines or specialties.

3) *The sociopolitics of funding.* National Science Foundation reviewers are specifically asked to comment on the research record of the principal investigator and on institutional capabilities. An obvious form of insurance is to have as many relevant titles as possible in the investigator's bibliography and as many of the references as possible from the same group, institution, or interinstitutional research clique.

I agree that one of the best ways to deal with the problem is to pay more careful attention to the review process, but preparing a good review is a demanding and time-consuming process and is often more difficult for a short, fragmented paper than for a complete and integrated account. Perhaps the most readily implemented suggestion would be to abandon the total bibliography as an evaluation tool and require applicants to list some specific number of their most significant publications and provide a brief narrative outlining the importance of the work and the nature of the applicant's contribution. This approach would emphasize quality rather than quantity.

ROBERT W. BUDDEMEIER  
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It is surprising if *Science* (and the *New England Journal of Medicine*) place the blame for multiple short papers on the authors. Both journals typically impose very harsh space limitations as a condition for publication, which is often independent of the true size of the scholarly work. Journal editors demand that we cut the baby in half and then lament the fragments that are produced!

JESSE ROTH  
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Metabolism and Digestive Diseases,  
Bethesda, Maryland 20205*

### Startling !Punctuation

Gina Bari Kolata (Research News, 6 Feb., p. 562) writes of the anthropologists' quandary over whether or not to protect the !Kung Bushmen of the Kalahari Desert in southern Africa. From the title on ("!Kung Bushmen join South African Army"), the article is peppered with startling punctuation: "Botswana !Kung," "Namibian !Kung," "!Kung" or "!Kung's" about 30 times, "Chum !Kwe," a place name, six times. Plainly, the ! is no misprint.

The nonanthropologist reader, wishing to understand, asks, what does ! mean? Why not write "Masai" or "Kikuyu"? Is the ! equivalent to the ! of English? Are we English speakers missing a chance to express partisanship, enmity, favor, disapproval, love, or hate when we fail to use our ! in analogous ways, as in "Republican," "Philadelphia !Philies," "Des!Moines," "Dayton !Ohio," "bacteriophage," or "nonpuerperal !galactorrhea"?

In order to communicate scientific information clearly (1), could the editor persuade the author to tell what ! means so those not schooled in exotic languages may see the light?!

NICHOLAS P. CHRISTY  
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Veterans Administration Medical  
Center, Brooklyn, New York 11209

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The exclamation points refer to alveolar-palatal clicks, which are characteristic of the !Kung language. Such a click is made by pressing the tip of the tongue against the roof of the mouth and then drawing it sharply away, producing a hollow, popping sound.

—GINA BARI KOLATA

### Guinea Worm Disease

As the International Drinking Water Supply and Sanitation Decade begins, estimated expenditures of \$20 billion to \$30 billion per year will be necessary to achieve the target of providing clean water for all by 1990 (1). It is therefore important to seize every opportunity to maximize the benefits of that effort. By giving priority to areas where guinea worm disease is endemic for development of a fraction of the new, safe water supplies needed during the Decade, substantial additional benefits could be achieved at virtually no additional cost.

Guinea worm disease (dracunculiasis) is still a serious impediment to development in some rural areas of Africa, India, and the Middle East (2). Sporadic in distribution, it is transmitted by drinking water contaminated with a small crustacean (*Cyclops*) which serves as intermediate host for the parasite *Dracunculus medinensis*. Emergence of the worm through the skin (usually on the lower leg) after a 1-year incubation period causes severe local pain, and sometimes arthritis. This disease has been shown to incapacitate from 30 to 40 percent or more of farmers and other villagers for periods averaging from 1 to 3 months during the annual planting or harvest season (3). About 0.5 percent of infected persons are permanently disabled. In Upper Volta, one study found that almost 7 percent of villagers with guinea worm disease died of secondary tetanus (4). An estimated 10 million to 48 million persons are affected annually (5).

Guinea worm is the only disease which is entirely eliminated by substitution of safe drinking water for bad (6), since no other mode of transmission exists. Within a year after introduction of safe drinking water, recurrent seasonal infections disappear (7). Other strategies for preventing or treating guinea worm disease are unsuitable for mass application (2).

If the Decade succeeds in extending drinking water supplies to all who now lack them by 1990, guinea worm disease will disappear by then. Even so, relieving villagers of the burden of guinea worm disease early in the Decade could provide a visible, measurable "health benefit" as an early indicator of progress of the Decade. In addition to eliminating a crippling disease, improving agricultural output in formerly affected areas, and possibly improving nutrition of young children in these poor, rural areas, prevention of guinea worm disease would be a tangible stimulus for villagers to help build and maintain safe water sources.

Since the rural population still unserved by safe drinking water in the relevant World Health Organization regions of Africa, Eastern Mediterranean countries, and Southeast Asia is about 786 million (7), only about 1.3 to 6.2 percent of the unserved rural populations of those regions need to be reached with safe drinking water in order to eliminate guinea worm disease.

To implement the strategy proposed here, countries need to determine which villages are now affected by guinea worm disease (surveillance of this problem is easier than for many other diseases), and those areas affected by guinea worm disease need to be given priority for provision of safe water. At a minimum, guinea worm disease should be an obligatory consideration for funding of water development projects and for evaluating the success of the Decade. "Health for All" cannot be said to exist so long as this eminently preventable scourge persists.

DONALD R. HOPKINS  
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7. *World Health Stat. Rep.* **29**, No. 10 (1976).

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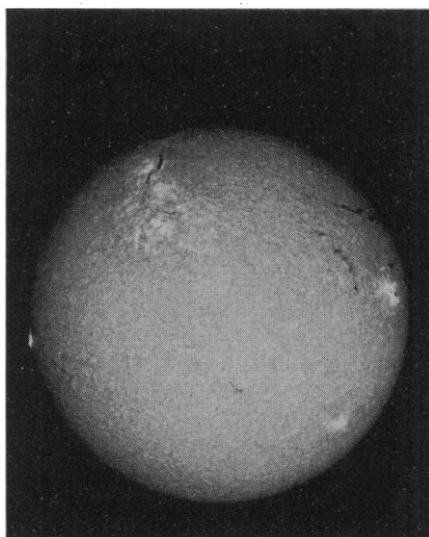
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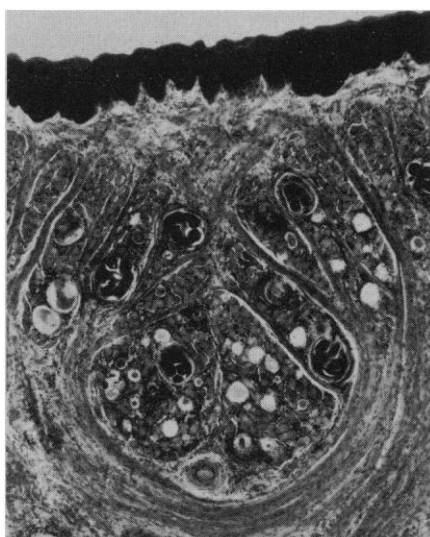
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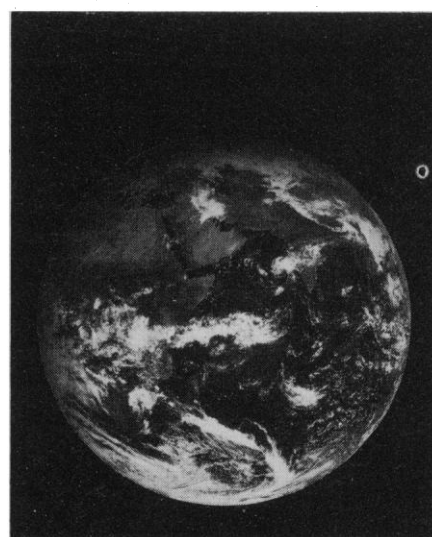
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To the question "What is scientific research," there are several possible answers. One reasonable response is that it constitutes an ordered pursuit of questions that need and are worth studying. Here the trouble begins. Need and worth dance up and down the value scale, depending on where one is coming from and on a satisfactory consensus between investigators and sponsors.

That the federal government is not about to abandon science and technology is clear enough. In the aggregate, the provisions for support of research and development appear robust. Science has been found to be affordable across the spectrum from fundamental research to the stage where commercialization begins, provided it does not tread on the values of the new masters. For the first time in the postwar partnership of science with government, summary judgment has been passed on the legitimacy of particular fields of scientific inquiry without the benefit of due process. The social and economic sciences have been scored as flunking the tests of need and worth on the scale of government's fiscal values.

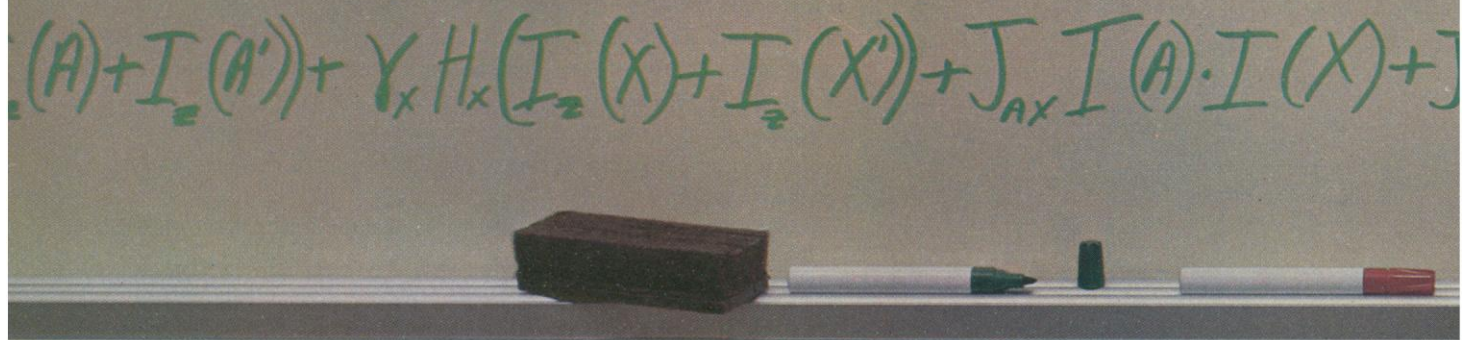
Even more troubling than the star-chamber procedures followed in reaching this choice is the implicit judgment that science has nothing useful to say about contemporary dilemmas and issues. For these matters, it must be presumed, neat answers are to be found in the transition reports. It is even possible that the social and economic sciences have been convicted for luring government into social experiments and programs that are now deemed wasteful and improvident.

But there are some realities that cast a different light on the need and worth of the social and economic sciences. As far ahead as one cares to look, for example, the United States will face close encounters with risks domestic and foreign, including those of surprise and miscalculation. There is little to show that we are well prepared for them. Going further, it would seem that while we set about spending \$1.3 trillion on our defense forces there is a powerful case for honing our skills at conflict resolution. And rather than disposing of terrorism by nailing it as a Soviet conspiracy, it would be profitable to employ science to search into the formation of terrorism and find strategies for their management. As for improving productivity in the nation's economy, it should be clear by now that prayers and good works will not suffice in the absence of much greater understanding of economic behavior than we have at hand.

The charge being leveled against the social and economic sciences is that they are esoteric, meaning that they are practiced by insiders for insiders. If this is nonsense, it is nonetheless plain that the same act of public faith that legitimizes theoretical and applied research in the physical and life sciences has been withheld from the social and economic sciences because the benefits are less amenable to measurement. It is a Catch-22 situation, and it is not likely to improve unless the stronger scientific disciplines come to the relief of their embattled colleagues. Isolating the social and economic sciences means inflicting damage on integrity of all scholarship.

The dilemma that is framed by the exclusionary thrust at the worth of social and economic research raises unsettling questions as to what our national science policy is, and how it is decided. Budgetary dispositions should be consistent with a policy for science, and not presume to reinvent it. It would be a strange species of national science policy that forecloses progress toward understanding and illuminating the tides of human choice and denies that it is affordable science.—WILLIAM D. CAREY

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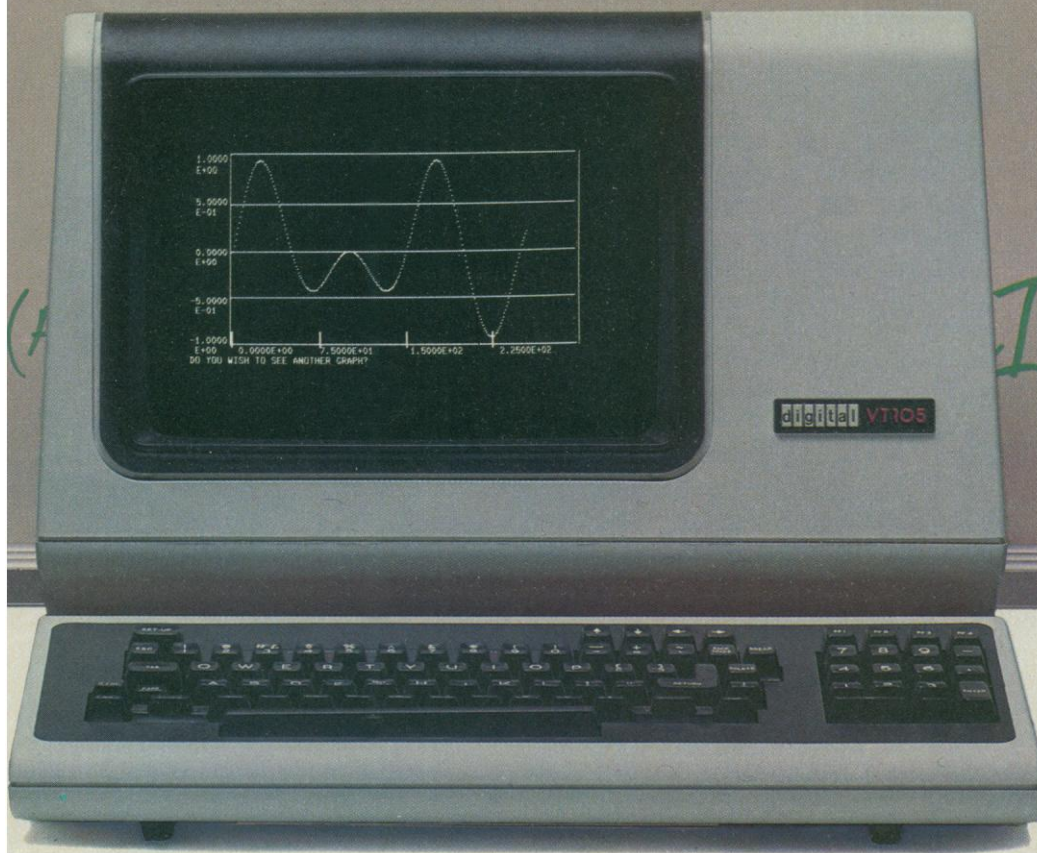
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