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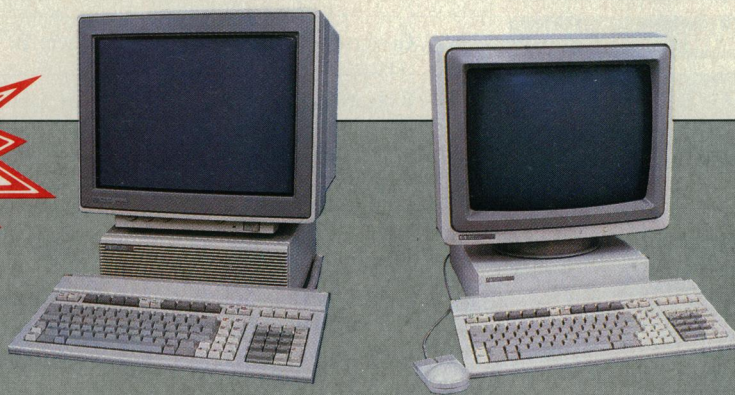
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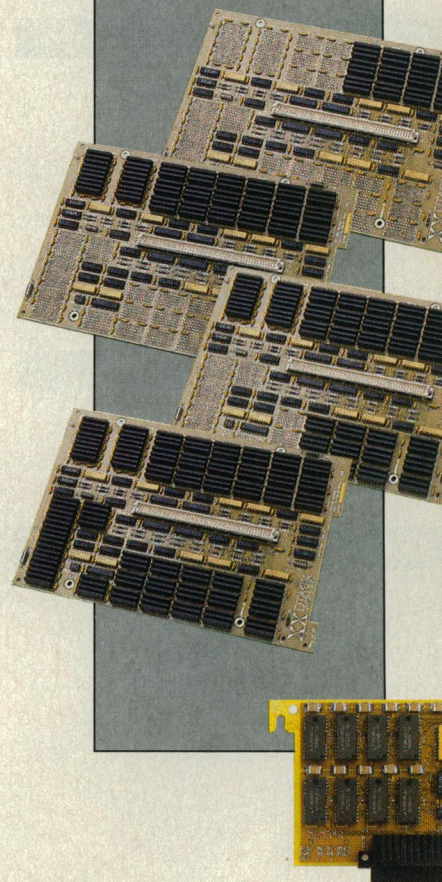
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COVER Chimeric mice derived from embryonic stem cells and progeny carrying a targeted gene disruption at the *c-abl* locus. The agouti coat color is contributed by the embryonic stem cells. Three male chimeras of different host genetic backgrounds, CD-1, C57BL/6, and MF1, are shown clockwise from the top. C57BL/6 chimeras have transmitted the *c-abl* mutation to their progeny (for example, center left). See page 799. Meanwhile, difficulties in working with human stem cells have spurred research on an alternative approach—human endothelial cells as a delivery system for gene therapy in medicine. See page 746. [Photograph by Vergil Sweden]

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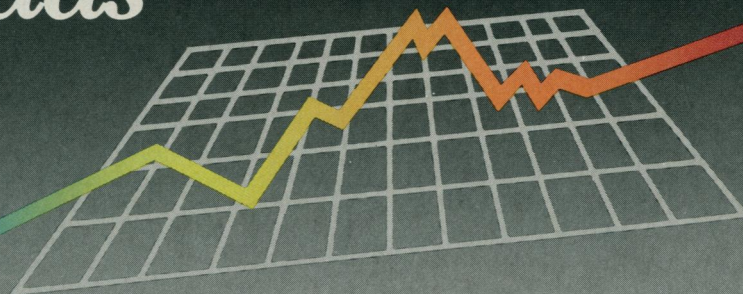
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This Week in SCIENCE

Verification scheme for sea-launched missiles

ONE of the issues in the Strategic Arms Reduction Talks between the United States and the Soviet Union has been whether sea-launched cruise missiles armed with nuclear warheads could be limited and whether such limits could be effectively monitored. A workable plan for monitoring has now been proposed that could be applied to all kinds of sea-launched cruise missiles, those acting at long range and short range, those accommodating nuclear and conventional warheads, and those designed for launch from surface ships and from submarines (page 765). The plan involves establishment of verification facilities either near or distant from production plants; new missiles would be inspected, tagged, and sealed in tamper-proof fashion so that later, during spot checks at ships, inspectors could verify that only tagged and sealed missiles armed with conventional warheads were being deployed. In explaining why covert production and deployment of nuclear cruise missiles are unlikely, Lewis *et al.* debunk the myth that monitoring and verification could not be successfully implemented because they would be too intrusive.

Fetal and fetal tissue research

TREMENDOUS and wide-ranging benefits have been realized from fetal research and research with fetal tissues; the states-of-the-art of these forms of research are reviewed by Hansen and Sladek (page 775). Fetal patients themselves have benefited greatly. Diagnoses of various genetic and metabolic disorders are now possible, and procedures have been devised for a number of interventions before birth. For example, cardiac arrhythmias can be treated in utero with drugs, and bladder and brain obstructions can be unblocked surgically before birth. The importance of fetal cell lines to basic and applied research has been established

repeatedly: such lines serve as vehicles in which viruses can be grown and from which vaccines (polio, for example) can be made; they are systems well suited to the study of cellular control mechanisms; they have served as proxies for tumor cells that, like fetal cells, grow and divide rapidly; and they are used for screening the effects of drugs. Fetal cells are being considered for the treatment of neurologic diseases (Alzheimer's and parkinsonism), immune deficiencies, and diabetes, because the transplantation of the appropriate neural, lymphoid, and insulin-producing cells has the potential to restore normal functioning to defective organs. The progress of this research like the progress of often precedent animal research continues to be strongly affected by political and moral considerations.

Aqueous alterations of asteroids

MAIN-BELT asteroids, which orbit the sun between the paths of Mars and Jupiter, appear to have undergone extensive aqueous alterations; outer-belt asteroids orbiting between the main belt and Jupiter show, with increasing distance from the sun, decreasing evidence of such alterations (page 790). These conclusions, reported by Vilas and Gaffey, are based on studies of the absorption features and albedos (amount of visible light reflected from the surface) of the main-belt asteroids and the Cybele, Hilda, and Trojan groups of outer-belt asteroids; absorption features in the visible and near-infrared spectral regions provided clues to surface mineralogy. Comparisons were made with spectra of reference meteorites (the carbonaceous chondrites) and earth rocks (phyllosilicates); in these bodies, too, the original chemistry is believed to have been changed as a result of aqueous alterations. The inverse relation of extent of aqueous alteration with distance from the sun is consistent with the assumption that heating processes and ice-associated weathering effects are less efficient farther from the sun.

Altered genes inserted in germ line

IT is now possible to introduce altered genes into the germ line of an animal (page 799). Schwartzberg *et al.* describe pioneering experiments in which the *c-abl* gene was specifically altered and then introduced into a developing embryo; later, when chimeric males matured, their sperm carried copies of the altered gene to some of their progeny. *c-abl* is a normal cellular gene that has oncogenic potential. Its products are not characterized, but one may be involved in signal transduction in cells. The initial alterations that were made were targeted to a region of *c-abl* that is not considered crucial for the normal functioning of the mouse, and, in fact, no gross abnormalities were noted in progeny (cover). Now that the techniques have been developed, other, more functionally relevant areas of *c-abl* can be targeted for change in order to better evaluate the role played by *c-abl* and its products in development and functioning of the individual.

Thymotaxin = β^2 -microglobulin

SOME immature lymphoid cells from the bone marrow can migrate toward a substance called thymotaxin; later, the cells that show this chemotactic response differentiate into mature T lymphoid cells. Thymotaxin is made by epithelial cells of the thymus, and may, therefore, be responsible for the "homing" of T cell precursors to the thymus in vivo. By several criteria, thymotaxin has now been shown to be identical to the protein β^2 -microglobulin (page 803). A role for β^2 -microglobulin, a subunit of histocompatibility complex molecules, in T cell development was not previously known. Dargemont *et al.* speculate on how such a widespread and common protein as β^2 -microglobulin might exert a specific and localized effect on the migration and homing of a distinctive subset of lymphoid cells.

■ RUTH LEVY GUYER

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A Question of Information Policy

Two of the nation's premier libraries, the Library of Congress and the National Library of Medicine, may be growing disenchanted with their altruistic images. More likely, implicitly being asked to assume an unfair share of the federal deficit, they are looking for solutions to their own budget crunch. Encouraged by Congress to reduce operating costs, the Library of Congress announced that on 1 January 1990 it would begin charging licensing fees and imposing restrictions on some of the reuse of bibliographic records distributed to libraries and library utilities. The fees would be in addition to subscription fees currently charged to recover costs of reproduction and distribution. Librarian of Congress James Billington says he is tired of everybody making money off Library of Congress efforts except the Library of Congress. The National Library of Medicine has also announced plans to implement restrictions and licensing fees.

The response by the library community was swift and uniformly negative: the community had problems, not only with the licensing philosophy, but also with interpreting the proposed licensing agreement which, as written, did not capture the Library of Congress intentions for implementation. The Library of Congress has since announced that implementation of a licensing policy will be delayed until an evaluation can take place. The library and academic communities will thus have an opportunity to discuss policy questions, an opportunity that should have been provided prior to issuing the conditions of the agreement.

Many questions come to mind. Is it ethical and legal for the Library of Congress and the National Library of Medicine to charge costs over and above reproduction costs for bibliographic records created by government employees at libraries funded by tax receipts? Since the government subsidizes many libraries, is this not largely a case of taking funds out of the left pocket to put in the right? And, if already financially strapped academic, research, and university libraries are required to use more of their budgets to purchase machine-readable records for their electronic catalogs, will not other aspects of our libraries, such as collection development and patron services, suffer? Through a variety of cooperative programs libraries other than the Library of Congress have contributed records to the files that would be licensed. Should not these partner libraries have some influence on any potential licensing arrangement for their records?

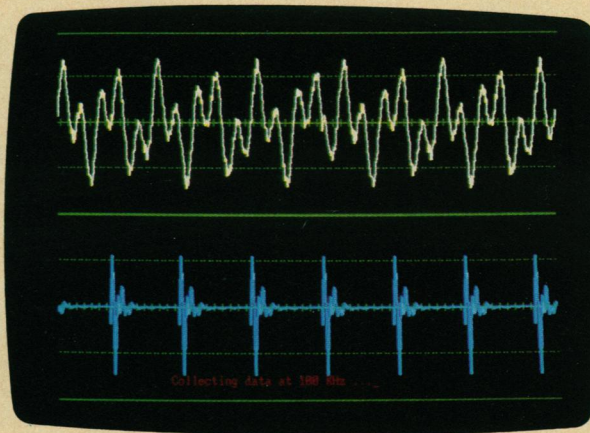
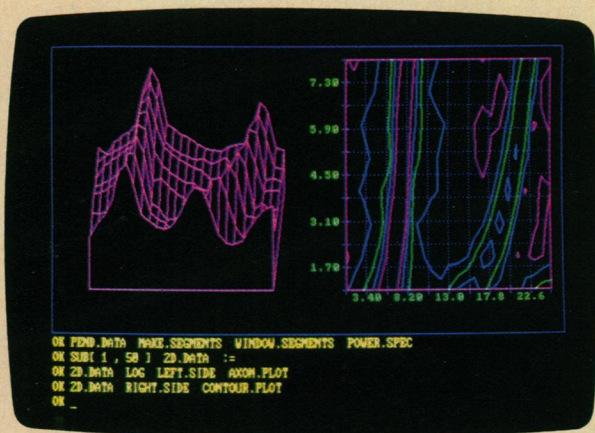
The planned charges and restrictions seem to challenge the intentions of statutory and constitutional provisions that shape U.S. federal government information policy—the First Amendment to the Constitution, the Freedom of Information Act, the Privacy Act of 1974, the Paperwork Reduction Act of 1980, and section 105 of the Copyright Act.

It also seems that the scientific research community will be disadvantaged. With our libraries paying additional fees, there will be fewer already scarce dollars to purchase materials and fewer funds to provide access to materials not held by particular libraries.

Although the Library of Congress and the National Library of Medicine provide highly respected cataloging information, these libraries do not have wide distribution mechanisms in place. That task falls to nonprofit bibliographic utilities such as the Online Computer Library Center (OCLC) and the Research Libraries Information Network. These utilities add value to the Library of Congress and National Library of Medicine records as they are shared with libraries. OCLC has estimated the proposed agreement from the Library of Congress could cost an additional \$500,000 to \$6 million a year, most of which would have to be passed on to member libraries. The fees required by the National Library of Medicine will result in significant increases in the prices of compact disc databases containing library records.

Perhaps a reexamination of the missions of these great libraries is in order. The Library of Congress serves Congress, the American people, and their libraries. It exists to make its resources maximally accessible and to facilitate and celebrate free intellectual creativity by all people on all subjects. The National Library of Medicine's purpose is to assist the advancement of medical and related sciences and to aid the dissemination and exchange of scientific and other information important to the progress of medicine. These are noble objectives. Let's hope they are not forgotten.—RICHARD C. ATKINSON, *Chancellor, University of California, San Diego, La Jolla, California 92093*

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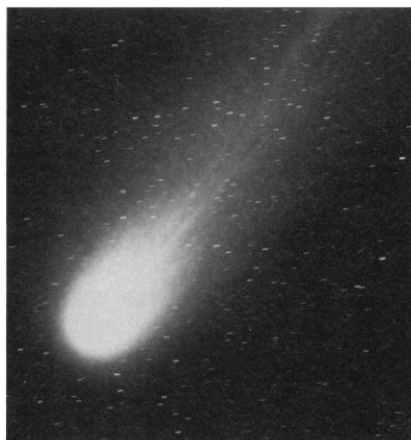


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Letters

NASA and University Astronomers

The Research News article "Why won't NASA talk to scientists?" by M. Mitchell Waldrop (18 Aug., p. 699) is incomplete, both in its report on community reaction to NASA's plans for the Advanced X-ray Astrophysics Facility (AXAF) and in its description of the plans themselves.

The draft document referred to did not leave all astronomers who saw it "aghast." In fact, it is consistent with the mode of operation employed in *all* of the most successful astrophysics missions over the past 10 years and in the highly productive and widely praised Astrophysics Data Program. NASA makes the formal selection of winning proposals upon recommendations of a peer-review panel and then provides funds to support this research from headquarters. The Space Telescope Science Institute is the only exception to this rule—the director makes final decisions on observing time and funding. It is certainly too early in the HST program to conclude that the latter method is vastly superior.

The management structure NASA has proposed for the AXAF center is modeled after the Infrared Processing and Analysis Center at Caltech, the science center which received the highest grades for service to the scientific community from a senior peer-review panel 18 months ago. The plan specifies a "close teaming arrangement" between a manager who "provides day-to-day management" and a chief scientist who "establishes scientific goals," "represents the scientific interests of the [community of] users," "acts as the primary interface to the AXAF project office," and so forth. That is not really such a horrifying division of responsibilities. Finally, with a mandate that includes "defining an optimum observing strategy for AXAF," "organizing and conducting the review processes for the selection and allocation of observing time," "providing continuing scientific guidance, advice, and analysis in support of the AXAF project," and "performing scientific research," the center NASA envisions hardly seems like a passive "library."

Many astronomers feel that large institutes such as the Space Telescope Institute are not the only way to run a successful space science program. The Space Science Board Committee on Space Astronomy and Astrophysics of the National Academy of Sciences issued a report 2 years ago which

explicitly endorsed a number of alternative strategies for the operations of the "great observatories." It is interesting to note that this advisory structure has not been consulted on the current issue.

It is, perhaps, an indication of the openness of the "astronomers contacted by *Science*" to a constructive dialog that, while speaking "not for attribution" they felt free to impugn NASA civil servants as exhibiting "intellectual quality [that] is mediocre at best." The scientific productivity of the magnificent AXAF mission will be optimized only through an early and continuing alliance that includes NASA headquarters, NASA center scientists, and a broad cross-section of the scientific user community. Let's get on with it.

DAVID HELFAND
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New York, NY 10027

It is certainly not a motivating, inspirational thing to see one's institution characterized as a place where the "intellectual quality is mediocre at best." M. Mitchell Waldrop received this assessment of civil service staff members of the NASA field centers as he was exploring the reasons for conflict concerning the proposed AXAF science center.

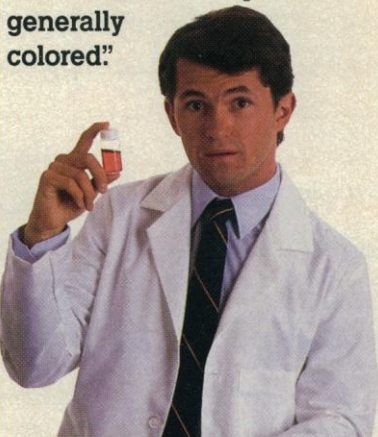
What leads to such an assessment of NASA in-house scientists? We suggest that all space scientists have been thrown into an increasingly competitive and restrictive environment in which too many good ideas are chasing too few fiscal resources. This has led to bashing of NASA scientists by the university community (and vice versa in some cases). The AXAF controversy may simply be another example of the sort of acrimonious relationship that has grown over the last decade due to the perception that some "other" group is getting too many of the limited resources.

There has been an unfortunate erosion of support of space science in this country since the 1960s. NASA centers have lost much of the flexibility that led to the remarkably high-risk, high-payoff feats at the dawn of the space age. Universities have also lost key engineering and technical personnel to such an extent that most university groups can no longer deliver space-qualified hardware. Thus, more and more hardware capability is being concentrated in the NASA centers and at other large federal laboratories. Since most of the NASA space science money flows to hardware activities, it is natural that resentment has grown in the university community.

The energy being wasted in these turf battles is not going into productive scientific



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sis added). The cumulative evidence of recycling (unacceptable economy of materials), the plethora of phantom localities, the absence of appropriate stratigraphy at so many specified localities, and the assertion of incredible associations of fossils never found associated elsewhere in the world, implying age-differences of 15 to 30 million years between faunal elements having high age resolution, must surely rank as something more compelling than "seems to be rather convincing." Especially so when considered in conjunction with the clear evidence from registers at a security checkpoint that there is no record of Gupta's visiting some of the localities in question. [In fairness, it should be pointed out that some of this evidence and especially the last item (4, 5) would not have been available to Erben at the time he wrote his apology.]

We did, incidentally, provide Gupta with a loophole—"laboratory misfortune: mislabelling, accidental contamination, or peripatetic locality labels" (1, p. 20). To date he has declined to accept this as a way out (6).

JOHN A. TALENT
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REFERENCES

1. J. A. Talent, R. K. Goel, A. K. Jain, J. W. Pickett, *Cour. Forschungsinst. Senckenb.* **106** (1988).
2. J. A. Talent, *Nature* **338**, 613 (1989).
3. Anonymous, *ibid.*, p. 604.
4. J. A. Talent *et al.*, in preparation.
5. A. D. Ahluwalia, S. B. Bhatia, U. K. Bassi, P. Janvier, *Nature* **341**, 13 (1989).
6. K. S. Jayaraman, *ibid.* **338**, 694 (1989); V. J. Gupta, *ibid.* **341**, 11 (1989).

Early Man Site Visits

Tom D. Dillehay (Letters, 29 Sept., p. 1436), in responding to Roger Lewin, points out that neither I nor anyone else has approached him about having a team of concerned scientists visit the Monte Verde archeological site in Chile to assess it and to offer outside opinions. I have not done so because such an effort would require a considerable expenditure of funds as well as time, and preliminary inquiries indicate that funding agencies would not be inclined to financially support such efforts. However, I have long believed that controversial yet critically important sites for understanding the peopling of the New World, such as Monte Verde, need independent verification.

Archeology, being an inexact science, needs on-site second opinions and has had a tradition of having them. The acceptance of the original Folsom discovery was the result

of verification by a team of concerned archeologists, a paleontologist, and a geologist. Subsequently other interdisciplinary teams have visited such sites as Santa Rosa Island and Calico Hills in California and Tule Springs, Nevada. The latter was thoroughly reinvestigated in the field and in the laboratory over a 4-month period funded largely by private sources plus some NSF support, which included an NSF-sponsored team that made monthly visits to evaluate the procedures and to observe the findings.

There are now four or five sites in South America that suggest a pre-Clovis entry of early man into the New World. These need independent verification before the textbooks are rewritten. Dillehay is to be commended for his willingness to have this done. Alan Bryan has also expressed similar thoughts regarding the Taima Taima site in Venezuela. If grant-giving organizations would support such an effort, New World archeology could move on to greater understanding.

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Erratum: The caption for figure 1 (p. 1497) of the report "Transformation by *v-sis* occurs by an internal autoactivation mechanism" by B. E. Bejcek *et al.* (29 Sept., p. 1496) was inadvertently not printed. The caption should have read, "Fig. 1. (A) Plasmid pSEB3. (B) Mutations used."

NOTICE

Ballots for the 1989 American Association for the Advancement of Science (AAAS) election of officers were mailed to all AAAS members on 18 August 1989. The contractor, who managed AAAS elections for the past 2 years, has informed AAAS that due to an error by them, members with institutional addresses may have received ballots in envelopes for which one line in the address, typically the departmental affiliation, was missing. This error could result in delays in members' receipt of ballots or, in some cases, nonreceipt. Thus, the AAAS Board of Directors has extended the deadline for receipt of completed ballots to 8 December. In addition, the Board has arranged for a replacement ballot to be issued to any member who claims nonreceipt by calling the contractor toll free at 1-800-247-4322. All candidates in the general election have been contacted and have registered their approval of this notification.

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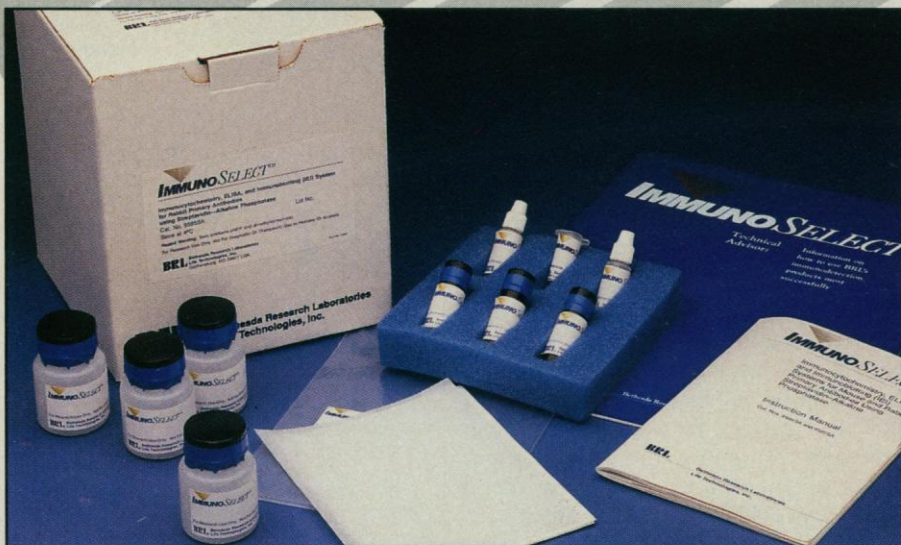
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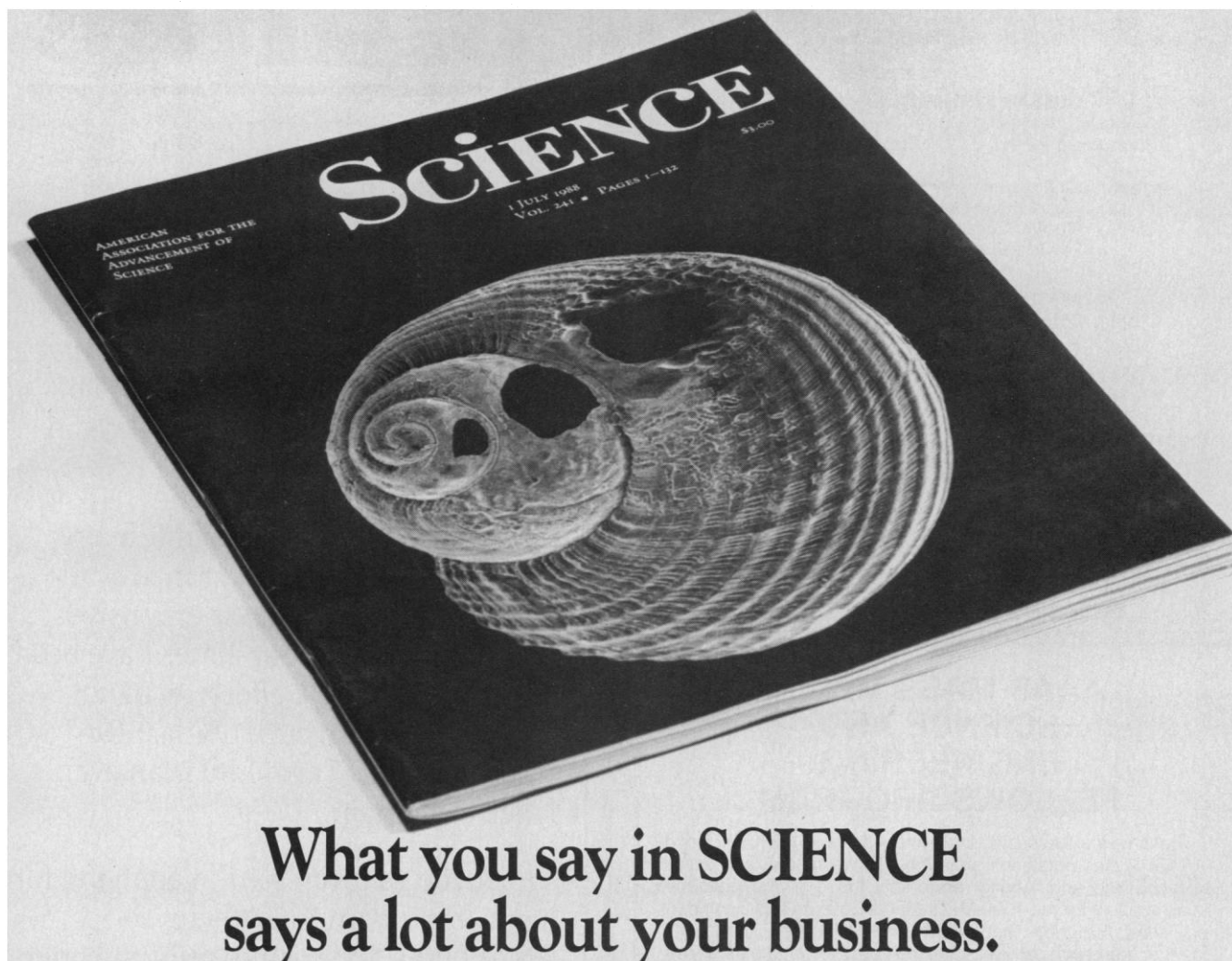
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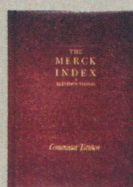
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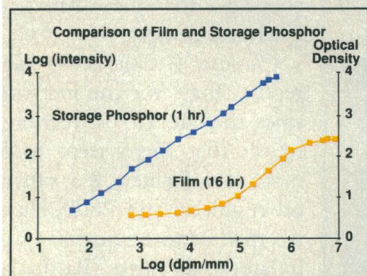
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