amples are the replacement of mastectomy with lumpectomy; the change from the one-step procedure (when biopsy and breast cancer surgery were done at the same time) to a two-step procedure; and, more recently, the growing popularity of sentinel node biopsy as a less invasive and possibly more accurate method of staging than auxiliary dissection.

I was surprised by the comments of Keith Yamamoto, CSR chairman, that activist participation could make it more difficult for creative but unorthodox projects to win funding. Breast cancer advocates know firsthand the terrible side effects and limited survival advantage provided by chemotherapy and are looking for less toxic and more effective treatments. Advocates played a key role in the design and enrollment of the clinical trials of the first gene-based therapy for breast cancer, Herceptin. The main thrust of the U.S. Department of Defense Breast Cancer Program, which has involved breast cancer advocates from its inception, has been to fund more innovative research.

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Paradigms Lost

In the article "The march of paradigms" (News Focus, 26 Mar., p. 1998), Jon Cohen found that the many papers that invoke the term "new paradigm" appear "to have little impact" within their field. It would seem that this lack of effect is not inconsistent with Thomas Kuhn's original ideas (*1*). New theories are challengers to an incumbent theory, and the presence of a challenger does not mean that a paradigm shift will occur. Indeed, an incumbent paradigm has proved itself to have high fitness to survive its competition, and Kuhn points out certain conditions that necessarily precede a shift: inconsistencies mount during a period of normal science, the growing crisis weakening the incumbent. Without these conditions, a challenger is unlikely to displace a reigning paradigm; if it does not, it will be marginalized because of its incompatibility. Rational readers should therefore conclude that "new paradigms" are rarely going to make it, and give appropriate, and cursory, attention.

The moral is that genuinely challenging a paradigm is risky. To which might be added: Don't claim a new paradigm if you want your work read.

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References
1. T. S. Kuhn, *The Structure of Scientific Revolutions* (Univ. of Chicago Press, Chicago, 1962).

Response

Astute readers have pointed out that my analysis of the "new paradigm" usage exaggerated the actual increase because I did not include a critical detail: The number of abstracts/titles in databases dramatically increased during those same years, 1991–98. Taking this into account, one critic noted that usage of the word "the" similarly might have increased dramatically during this time frame. But remiss as I was for not including this critical denominator in my text and graphs, the data from the Institute for Scientific Information (ISI) still strongly support my thesis. Between these years, the number of abstracts/titles increased 37.7%, while usages of "new paradigm," in contrast, jumped by 400%. I regret the error and any confusion it might have caused.

Jon Cohen

Physician-Scientists: Staying Alive

With reference to the Policy Forum "Physician-scientists—Endangered and essential" by Leon E. Rosenberg (*Science*'s Compass, 15 Jan., p. 331), I would like to comment on his proposals and to clarify the record regarding applicants to the Howard Hughes Medical Institute (HHMI) physician postdoctoral program.

Rosenberg suggests several initiatives for the U.S. National Institutes of Health (NIH) and private funders, including a year out for research by medical students, more postdoctoral fellowships, and a national database of physician-scientists and their research careers. All of these programs are in place at HHMI.

Through two programs, the Research Scholars at NIH and the Research Training Fellowships for Medical Schools, we have supported more than 100 medical students each year since 1989 in a full-time research year at NIH, at their own medical school, or at another institution. Since 1990, through the Postdoctoral Research Fellowships for Physicians program, we have awarded 3 years of support to more than 300 M.D.'s and M.D./Ph.D.'s and supported hundreds of postdoctoral associates in the laboratories of Hughes investigators.

Through a collaboration with the Association of American Medical Colleges, we continue to support a project that uses national databases to track the research involvement of all M.D. graduates from U.S. medical schools since 1980. Outcome measures include NIH support of postdoctoral training, NIH research grants, and appointment to the clinical or basic science faculty of U.S.

medical schools. (Early data suggest that the Research Training Fellowships for Medical Schools program is indeed successful in reinforcing interest in research, at least to the point of seeking postdoctoral training.)

Another relevant initiative is the HHMI Biomedical Research Support for Medical Schools program, which awarded $80 million to 30 medical schools in 1995. Those 4-year grants have provided start-up funding for more than 150 faculty, of whom 33 are M.D.'s or M.D./Ph.D.'s. In addition, 46 M.D.'s and M.D./Ph.D.'s have received funding for pilot projects. A second competition in the year ahead will award $90 million.

Rosenberg presents compelling data on the relative decline of physician applications to NIH for research grant support, and notes that our physician postdoctoral program data support his concern for the future pool of physician-scientists. While the HHMI data cited show a 57% decline (from 174 to 74 applicants), the actual decline was 45%. The latter figure includes not only M.D. but also M.D./Ph.D. applicants. The actual decline was from 276 (a 5-year high) to 152. Although of definite concern in the context of future trends in the pool of physician-scientists, the numbers are confounded by the increase in K awards by NIH. We see application withdrawals and fellowship declines because of these awards, and will follow closely their future impact on the HHMI program.

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CORRECTIONS AND CLARIFICATIONS

The word "innervation" was misspelled as "enervation" in This Week in *Science* of 19 February (p. 1083, column 2, line 13 from the top) and "innervate" as "enervate" in Letters of 8 January (p. 175, column 1, line 8 from the bottom).

In his article "Galaxies seen at the universe's dawn" (News of the Week, 1 Jan., p. 19), Govert Schilling states that the photometric method of measuring the redshift of galaxies was pioneered "a few years ago." In fact, it was pioneered by W. A. Baum, then at the Mount Wilson and Palomar Observatories, in 1957 [*Astronom. J.* **62**, 6 (1957)].

In the map accompanying the Policy Forum "Conservation targets in South American temperate forests" (13 Nov., p. 1271), Uruguay was misspelled.

The Institute for Advanced Study in Princeton, New Jersey, is not "at Princeton University," as was stated in the biographical sketch of Nathan Myhrvold (Essays on Science and Society, 23 Oct., p. 621).