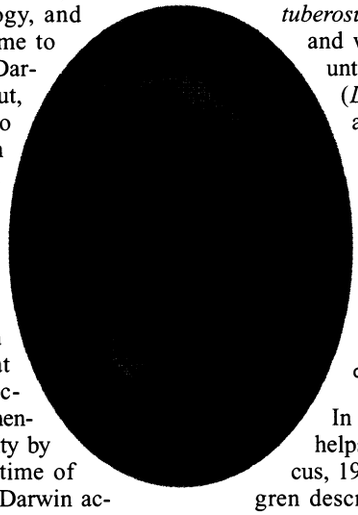
The ascent of human intelligence is described by Darwin, propelled by yams, and vaulted by the intelligence quotient. Consumers are given a chair at the table of research review. The claim "new paradigm," as made in many papers, founders. And physician-researchers are given a boost.

Evolving Smarts

In his book review (*1*), "The benefits of selective thinking" (2 Apr., p. 57), Mark Pagel states, "Perhaps [the 20th-century evolutionary biologist Theodosius Dobzhansky] hadn't realized that such diverse fields as psychology, genetics, economics, anthropology, and medicine would come to be...illuminated by Darwinian thinking." But, at least in regard to psychology, Darwin himself predicted this in the first edition (1859) of *The Origin of Species* when he wrote (p. 488), "Psychology will be based on a new foundation, that of the necessary acquirement of each mental power and capacity by gradation." By the time of the second edition, Darwin acknowledged that psychologist Herbert Spencer had already been applying evolutionary thinking. Spencer, in his 1855 book, *The Principles of Psychology*, had written (p. 578), "that Life in all its forms has arisen by a progressive, unbroken evolution ...."



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In the article "Did cooked tubers spur the evolution of big brains?" (News Focus, 26 Mar., p. 2004), Elizabeth Pennisi describes the work of Harvard anthropologist Richard Wrangham, who hypothesizes that "tubers—and the ability to cook them—prompted the evolution of large brains, smaller teeth, modern limb proportions, and even male-female bonding." Wrangham could have added one more interesting bit of speculation about human male-female size differences. Many of the leguminous tubers of Africa contain estrogenic isoflavones, and the African yams (*Dioscorea*) are sometimes so loaded with phytoestrogens (diosgenin) as to be used more for medicine or soap than for food. Today, we hear that estrogens enhance the thought processes, if not the size, of the brain.

Pennisi should perhaps not have mentioned the cassava and manioc (both *Manihot utilisissima*) and potato (*Solanum tuberosum*), which are native American and would not have reached Africa until this millennium. As for yams (*Dioscorea* spp), Africa, Asia, and America have their own assortment of edible species. But the sweet potato (*Ipomoea*) also would have been a post-Columbian addition from America to the African flora.

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In her fascinating article, "Nurture helps mold able minds" (News Focus, 19 Mar., p. 1832), Ingrid Wickelgren describes how J. Flynn (a political scientist at the University of Otago in Dunedin, New Zealand) has documented a 20-point rise in average IQ in every 30-year generation.

How far can the Flynn effect be extrapolated? Let's assume that the IQ tests are renormed at 100 in the year 2000. If the effect is taken in a purely additive sense (*1*), then we reach an IQ of zero in 1850, and the framers of the U.S. Constitution would have labored under a negative IQ. Granted that the Constitution may need some tinkering with, but this result does seem a little drastic.

So, perhaps the Flynn effect should be interpreted as an exponential (*2*). In that case, the IQ doubling time is 114 years, leaving the Founding Fathers with IQs of 26.

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Notes

1. IQ = 100 + [(year – 2000)/30] * 20
2. IQ = $1.20^{(\text{year} - 2000)/30}$ * 100

Inner Sanctum

The article " NIH invites activists into the inner sanctum" by Bruce Agnew (News Focus, 26 Mar., p. 1999) brings to mind the wisdom of the National Science Foundation in abandoning that term in favor of "merit review" several years ago. The first criterion for peer review by the U.S. National Institutes of Health (NIH) (*1*) is "Significance: Does this study address an important problem?" The arrogance of assuming that only scientific "peers," in a narrow technical sense, are in a position to judge this issue is breathtaking. Most biomedical research is highly experimental. Agnew describes a reluctance on the part of advisers to NIH's Center for Scientific Review (CSR) to experiment with the contributions of "consumers" on merit review panels. The U.S. Department of Defense and several institutes within NIH are doing such experiments, and more power to them. This is not a question that should be settled by rigid ideology on either side.

In study sections reviewing proposals that involve risks (participants contribute personal information or tissue, for example, or test a drug, device, or procedure), the absence of the participants' perspective is not just unwise, it is irresponsible. In study sections reviewing narrow, highly technical proposals such as DNA sequencing technologies or crystallographic methods, a consumer presence may not be of great benefit (because "significance" has been decided at a higher level than that of the study section). But many standing CSR study sections do cover a broad intellectual domain where the question of significance is real and important, requiring balanced perspectives outside the purely technical domains.

Fortunately, CSR's position not to invite patient advocates onto these panels anytime soon is belied by experience. If my memory serves me correctly, in the half dozen or so NIH study sections that I have been part of, at least two (organized by CSR or its predecessor, the Division of Research Grants) have included people who described themselves as "consumers," if not consumer advocates.

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1. www.nih.gov/grants/guide/1997/97.06.27/notice-review-criter9.html

As a breast cancer survivor and advocate who has participated in several review panels, I think Agnew does an excellent job of quoting scientists on both sides of the debate.

Patients bring another type of expertise to the table that is as important as technical know-how. Much of the progress made in breast cancer treatment has been patient-driven, challenging the prevailing scientific "wisdom" of the time. Some ex-

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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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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.