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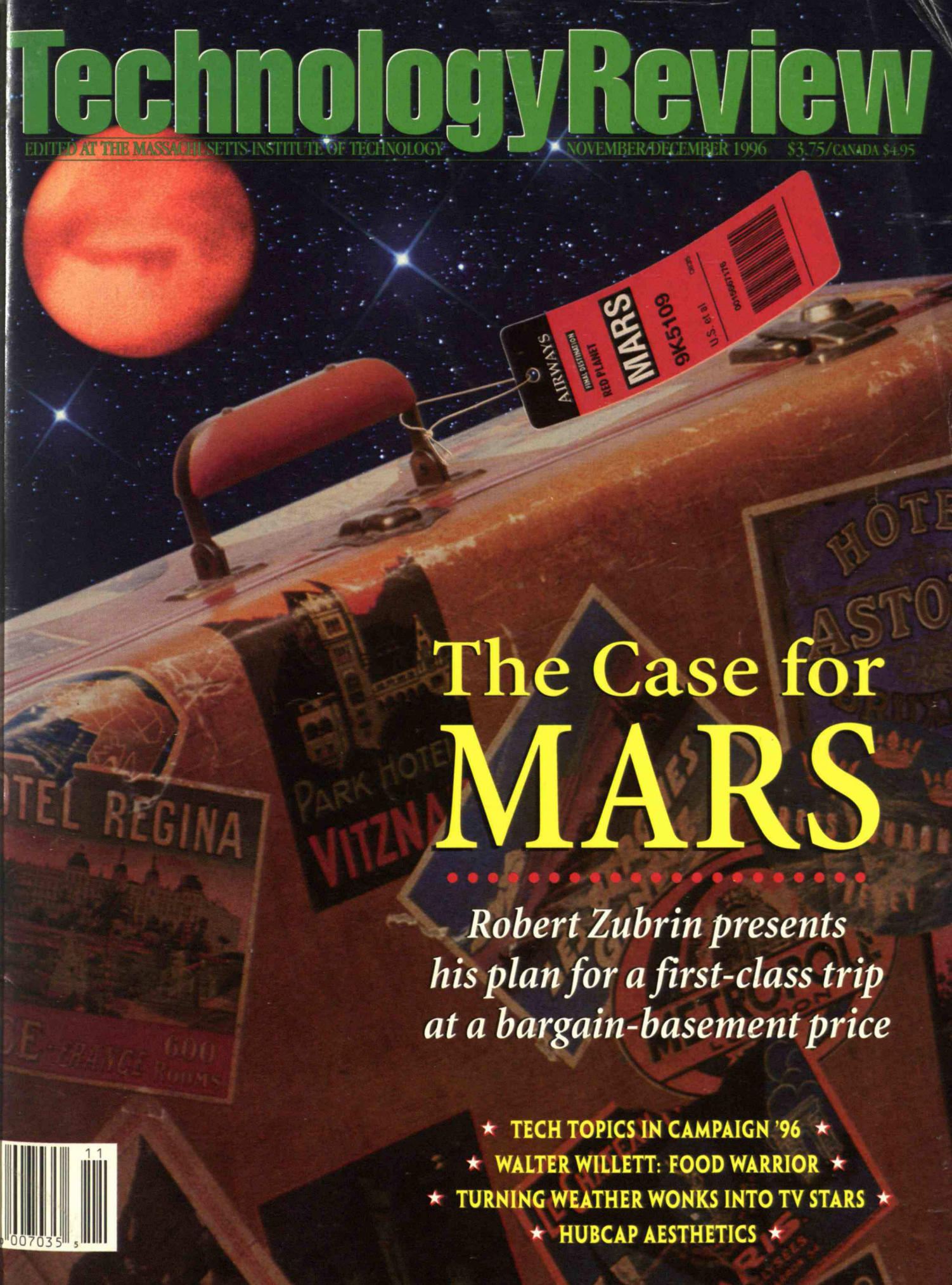

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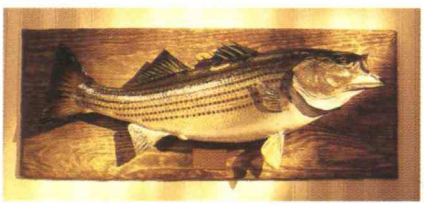

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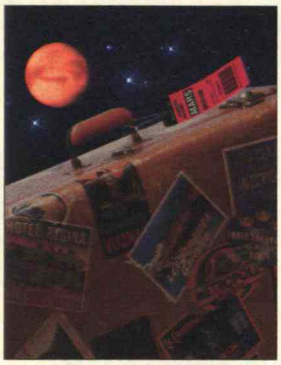
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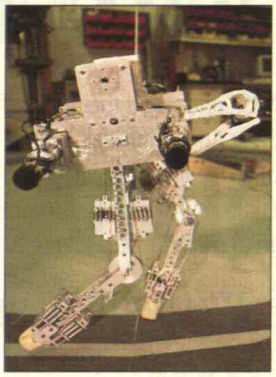

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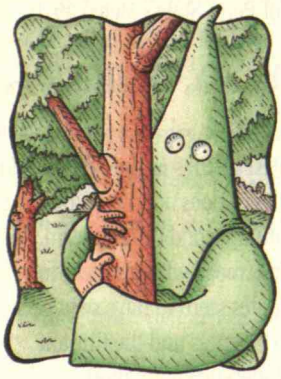

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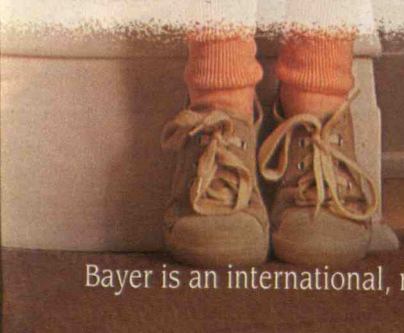

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Pam Jones is a chemical engineer, mother of two, nature lover and part of a team that pioneered a revolutionary regeneration process called Petretec℠. It takes used polyester plastic, unzips the molecules and allows it to be reused, good as new. An everyday jar can become a videotape, then a seat belt, then a designer shirt. "Evergreen polyester," Pam says, "the cycle continues on and on."

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THE World Wide Web is one terrific diversion. I've spent many a delightful hour with it, checking out some of the offerings of the mighty troupe of players who strut and fret upon this truly worldwide stage.

And I've been pleased by my modest but growing skill in using the Web to find practical bits of information: movie times, restaurant reviews, airline schedules, the weather in places nearby and far away. But I agree with critics who say that although the Web could become the ultimate library—a vast network of links to the repositories of the world's knowledge—it is not yet a convenient tool for serious researchers, or for most other professionals, such as journalists, seeking solid documentation in their work.

It's not as if research-quality bytes aren't out there—somewhere—it's just that the particulars one seeks through the Web are often devilishly hard to find. Though *PC/Computing* columnist John C. Dvorak asserts that "95 percent of the pages served up on the Web are useless garbage," I'd point out that 5 percent of some 50 to 100 million pages (the current range of guesstimates by leading webmeisters) sounds like a lot of good stuff, and there's no reason why that percentage shouldn't climb as more heavy-duty players get into the act.

And it's not as if we need to muck around in all that "garbage." A huge advantage of the electronic medium is its precision and potential selectivity: our computers should enable us to pull from the Internet only what we need, leaving us unfettered by all the rest.

That selectivity, however, remains potential. When we click now on a link there's no way to predict the relevance, depth, or quality of what will appear on the screen. The reason is that Web documents, unlike those of a true library, are largely uncatalogued and unorganized. Unable to logically and systematically track down what we need, most of us endure numerous false leads and dead ends until we get there—*if* we get there. We partake of the intellectual riches of cyberspace mainly by chance.

That chance is manifested in the Web's "search engines"—easily accessed services such as InfoSeek, Yahoo, and Alta Vista—that depend mostly on keywords. Type into the search box a few of the terms that will likely appear in the documents you're looking for and then click on the search icon; the engine will scour the Web, sort through mass quantities of diverse information, and promptly deliver an essentially undifferentiated list of sites—often, thousands of them.

Most of the search engines do provide a dozen or so broad subject categories, apart from the main search function, that seem to promise a deliberate, focused, and logical sequence from the general to the particular. But in fact the categories usually lead to just a few bonbons—a small, arbitrary, and not particularly tasty sample—from the great big candy store. As the chairman of one search-engine firm explained to me, such categories are not meant to satisfy the needs of "searchers" but are offered merely for the amusement of "browsers." For the latter, he said, we "improve the quality by limiting" rather than deepening the nominally organized offerings.

A great deal of innovation is obviously required if the Web is to transcend its entertainment value and also serve a serious research function with resources organized in the best scholarly traditions. It needs the contributions of a wide range of professionals, especially those in the field of "information sciences" itself, to help build, as computer-industry guru Mitchell Kapor has put it, an "overarching classification scheme to avoid knowledge chaos."

While we await such schemes, a good strategy is simply to ask a knowledgeable person. And what could be better, writes columnist John Yemma in the *Boston Globe Magazine*, than to "do what your third-grade teacher taught you: ask the librarian." These "astronauts of cyberspace," he says, "aren't just working in book-lined warrens these days." They've gone high-tech, and can provide the online researcher with reference assistance just as capably as they've traditionally done with print. (I must admit to some bias here: my wife is one of them.)

But these experts are a scarce resource; we should reserve them for the truly difficult searches and learn to do the prosaic ones ourselves. My own third-grade teacher used to say that there's an art to just about everything, and that it can usually be taught. Therefore, in the spirit of "give a man a fish, and he'll eat for a day; teach him how to fish and he'll eat for a lifetime," why not teach students just enough of the librarian's art so that they'll develop some Internet self-reliance—and, in our information-rich world, a minimum degree of functional literacy?

My wife used to teach just such a course, in pre-Internet days, to college freshmen. Called "Information Searching and Media Communication," it was one of four (the others being English, history, and speech) in an integrated program funded by the National Endowment for the Humanities and the Council on Library Resources. She worked with teachers of the other three, more traditional, subjects to help students make effective use of the library's wares for researching and presenting their assignments. I envied those kids, who were gaining the ability to "eat for a lifetime" from waters that forever intimidate most other people.

Sadly, that program was terminated, and to our knowledge has not been revived. Yet in the midst of an "information revolution" it ought to be a major national trend. At present, we relegate the acquisition of online know-how largely to *self*-teaching, but that works for only the gifted. As is generally true for acquiring literacy and skill, the rest of us need some formal help in learning early, learning well, and keeping up to date. ■

—STEVEN J. MARCUS

Letters

ALIVE AND WELL

In "The Twilight of Science" (*TR July 1996*), John Horgan ignores the reality that our species inhabits an environment where physical laws are constant but change is the norm. As long as humans interact with their changing environment, they will ask questions that are probably best answered by science.

Several years will most likely pass before we have a satisfactory understanding of matters such as the nature of consciousness, the control of cancer, and the existence and nature of extraterrestrial life. Will we run out of the questions that fuel scientific inquiry? Only if humanity loses its taste for useful answers.

By making a distinction between applied science and science at its "purest and grandest," and observing that the latter is in its twilight, Horgan discourages people from learning about scientific reasoning and thus pursuing the preceding questions.

Also, by "science at its grandest" Horgan seems to mean science that addresses our place in the universe, tells us who we are, where we come from, and where we are going. But such interpretation is more a matter of philosophy than science.

SIMON DELAGRAVE
Arlington, Mass.

How curious that in this time of scientific efflorescence, Horgan should follow the lead of two prophets of the end of science, Oswald Spengler and Gunter Stent, and look in the rearview mirror. Perhaps Horgan has transposed his end-of-the-millennium angst to science.

As Horgan knows, major unknowns remain. Physics is confronted with the origin of particle masses and the reconciliation of gravity and quantum theory. Cosmology is still attempting to understand the dark matter that may comprise 90 percent of all mass and stars of age seemingly greater than our universe. Biology merely hints at the strategy by which human beings develop and therefore the mechanisms by which evolution proceeds. Scientists have devised mere outlines of the brain's neuronal organization and functions. And we have hardly a glimmer of understanding about the basis of consciousness. In psychology, we are just beginning to perceive the genetic factors that underlie the nature-nurture interaction that produces the psyche.

And these are only some of the conundrums we can now envision. Science has far, far to go before ennui.

ROBERT L. SINSHEIMER
Professor of Biology, Emeritus
University of California
Santa Barbara, Calif.

In his interesting essay, Horgan seems to treat science and engineering as the same thing. In fact, they are quite different activities—to the extent that while science may be nearing its end, the age of engineering has scarcely begun.

By failing to distinguish the two, Horgan implies that human life will remain Earth-bound and rather dull. He seems to be thinking of government-funded science when he writes that "the prospects for space exploration on anything more than a trivial scale seem less and less likely." The need for living space, adventure, and business will prompt humans to use engineering prac-

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tices to spread throughout the solar system and then the galaxy.

Horgan is even too quick to draw down the curtain on science. Without justification, he writes, "Biologists are unlikely to make us immortal." Considering our progress toward total understanding of DNA, I offer three possibly revolutionary topics in biology: immortality/longevity, artificial life, and reengineering the human body.

PATRICK COLLINS
Visiting Research Fellow
University of Tokyo

FIGHTING THE EXOTICS

As someone who fights California's "Weeds from Hell" (*TR August/September 1996*), I found that David Tenenbaum did an excellent job of explaining the problem of invasive, exotic plant

species. In our state alone, arundo (a.k.a. big cane) competes with salt cedar for possession of riparian habitats. Yellow star, bull and Italian thistle, and numerous species of Eurasian annual grasses carpet meadows and grasslands. German ivy creeps under and over our forests and coastal savannas (similar to the kudzu highlighted by Tenebaum, German ivy is a vine on steroids). Fennal and lepidium cover our seasonal wetlands, while pampas grass and ice plant have overrun coastlands. Woody shrubs occupy more than 1,000,000 acres of former forest and rangeland. These are only a sampling of the 90 species listed as exotic plants of greatest ecological concern in California.

Are we discouraged? Sometimes. But the 417 members of the California Exotic Pest Plant Council have found that a combination of education, coordination, and protracted volunteer efforts is effective in locally removing and controlling these species—even with a low level of funding. Education is imperative to marshalling funding, volunteers, and support for legislation. Coordinating removal and control efforts among government, conservation groups, and private landowners is necessary because exotic plant species left on the other side of the fence will soon reinfect treated lands. Coordination also maximizes the effects of monetary and human resources.