

Technology Review

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\$3.00

The Overworked American

*Why higher productivity
hasn't given us more
leisure time
(and what to do
about it)*

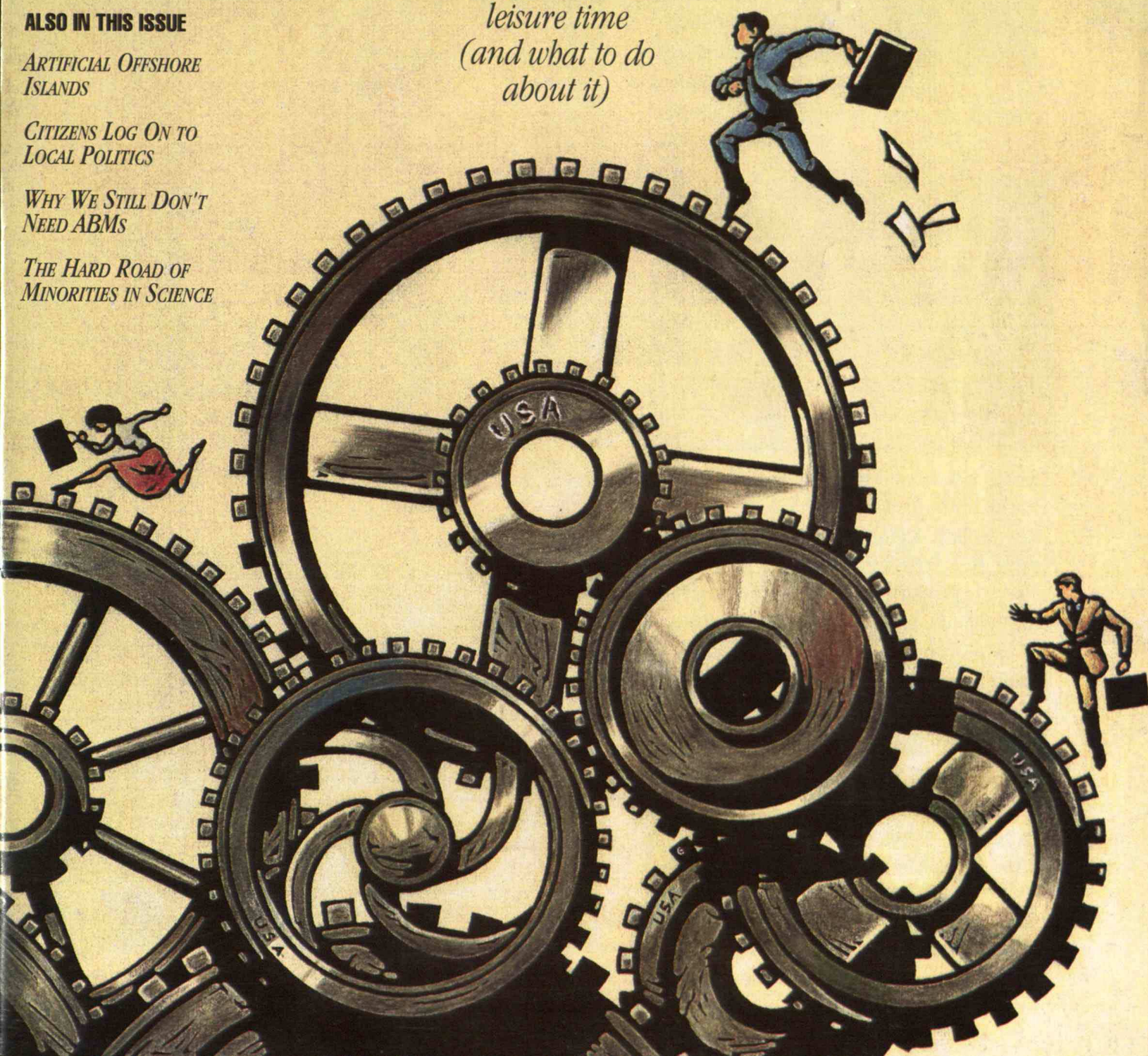
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ARTIFICIAL OFFSHORE
ISLANDS

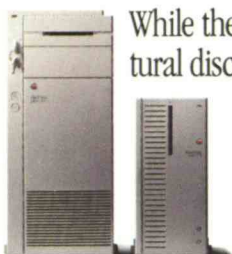
CITIZENS LOG ON TO
LOCAL POLITICS

WHY WE STILL DON'T
NEED ABMs

THE HARD ROAD OF
MINORITIES IN SCIENCE



Attila t



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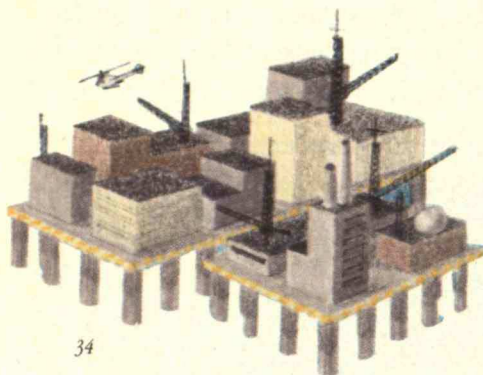


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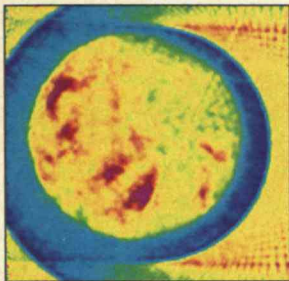
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If it had less legroom, a lesser warranty, and cost thousands more, it could be a Cadillac.

Logic would seem to dictate that when you pay thousands of dollars more for a car, you should get a lot more car. Apparently, in the case of the Cadillac Sedan DeVille versus the Chrysler Fifth Avenue, logic does not apply. Both cars provide ample room for six, air-conditioning, automatic transmission, automatic load leveling, stereo



sound system, fully reclining seats, all as standard equipment. Both offer safety and performance. A driver's air bag is standard on the Chrysler Fifth Avenue, as is a powerful fuel-



injected, 3.3-liter V-6. Anti-lock brakes are also available. Here, however, is where logic totally falls apart. The restyled Chrysler Fifth Avenue costs thousands less, yet it has more rear legroom than the largest Cadillac*. And it offers a better warranty: bumper-to-bumper

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First Line

A Splash of Cold Water

A French industry scientist was recently telling me how European companies acquire prestige and commercial advantage by supporting research at U.S. universities. "And at our firm," she added, "we especially like to support meat!"

"Meat?" I asked, not certain whether my ears, after a week of trying to process French, were a bit worn out or whether this administrator knew American slang and was referring to substance.

"Yes," she said, "we fund projects at 'meat'—you know, MIT—and other leading academic institutions in your country."

Despite the universities' well-earned reputations, people at home and abroad may lately have started wondering just how meaty they may now be. Researchers in the ivory tower—once regarded as saintly, thrifty to a fault with the public dollar, and, most awesome of all, steeped in nature's secrets and skilled in tapping them for humanity's benefit—have lately come down to earth.

University scientists work with companies seeking to commercially apply (that is, derive financial gain from) their academic research. Hardly the exploitable absent-minded-professor type, they often help found the companies themselves. Whole universities, once deemed oblivious, even disdainful, of the profit motive, now wheel and deal with the best of them. Meanwhile, academic researchers demand more money than ever from public coffers, predicting widespread disaffection in the R&D community and eventual economic calamity for the nation should they not receive it.

Add to the newly mercenary perception of academia a straight-out series of black eyes—misuse of federal funds (university yachts and presidents' home furnishings charged to the taxpayer), allegations of price fixing in awarding scholarships, and cases of misjudgment, fraud, and plagiarism—and it's safe to say the public has been rudely awak-

ened. Researchers turn out to be just plain folks. Like everyone else, they look out for themselves, they sometimes make mistakes, and they bruise when they fall.

With the meaty image now seemingly tarnished, people may well ask "Where's the beef?" No longer regarded as demigods, some academics worry that funds will dry up if disappointed and overreacting patrons begin to question the value of the present research enterprise altogether.

But it may well be the researchers themselves who are overreacting in their

*The recently
sullied image of academic
research could, ironically,
help make scientists
more effective
than ever.*

assessment of the damage. Scientists' remarkable record of achievement has made research universities a unique resource, and the American people know they can expect that quarter to continue improving their lives and their country's standing. Yet as the world changes, so too must the relationships between researchers and those who support their work. And the greatest attitudinal change must be in how the research community regards the public, not vice versa.

When I was an engineering graduate student in the late 1960s, colleagues would joke about how research proposals inevitably boasted that the work would use a "high-speed electronic digital computer." Such terminology—forbidding to outsiders at the time—was often meant to wow potential funders. It was a reminder that a great divide existed between them and us and that close scrutiny would be practically impossible. Nonresearchers, it was assumed, were simply too ignorant to

understand our methods, much less make useful suggestions.

But along with the public's growing sophistication in matters scientific and technological—ordinary people now routinely use high-tech tools far more powerful than the machines we invoked for smokescreen value—has come the realization that researchers' work not only is understandable to, but is the business of, everyone else. This doesn't diminish the value of the academic enterprise; it simply means that R&D is a human endeavor like any other and that its practitioners should not expect to be exempt from the usual rules.

Thus the deflation of the superhuman academic scientist is actually a good thing and long overdue. Why, after all, should the desire to make money, or the capacity to make mistakes, be so shocking? Researchers *should* seek to apply their work to the benefit of their institution, their country, and themselves. Such strivings are a basic human trait. So, too, of course, are frailties and excesses, though ways of minimizing their adverse effects can also be evolved—as long as the environment is one of tolerance and mutual respect. Having discovered our partners' shortcomings doesn't mean we should quit working with them; on the contrary, it lets us collaborate more effectively.

In that spirit, even the recent lapses and scandals can be regarded as potentially beneficial to the long-term health of the research enterprise. They underscore the need for public accountability, public communication, and even public oversight, which should not be viewed as intrusions but as opportunities for interacting more fruitfully with the rest of the world. Instead of regarding the recent affronts to the academic image as a signal to defensively circle the wagons, researchers should see them as little more than a wake-up call. The appropriate response may be, like that of the guy who got slapped with after-shave in the television commercial, "Thanks, I needed that!"

STEVEN J. MARCUS

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Letters

AUTONOMOUS WEAPONS

In an otherwise well-informed article ("Behind Desert Storm: The New Military Paradigm," TR May/June 1991), Michael Klare succumbs to a common misconception. Specifically, he states that some of the weapons used in the gulf conflict employed "sensors and microcomputers to locate, track, and strike targets."

In fact, "autonomous" location and tracking, as it is known to weapon designers, is an extremely demanding problem that has not been solved. Of the weapons Klare discusses, only the troubled Tacit Rainbow anti-radar drone, which probably will never be deployed, is designed for such a mission. And if it can complete that mission, it will be only because targets cooperate by emitting their distinctive signals. The Tomahawk, Paveway, SLAM, and HARM missiles also mentioned in the article rely on human beings—either mission planners or pilots—to pick out targets and assign weapons to them. Interestingly, fewer than 83 targets were found in all of Iraq and Kuwait for the Tomahawk, which can be thought of as an ancestor of future autonomous missiles because of its long range.

The misguided notion that the age of autonomous weapons is at hand is important to correct for at least three reasons. First, it may foster overconfidence in political leaders and the public that mid-intensity conflicts can be "discriminate" or "surgical." Second, it helps promoters of new systems to secure funding from members of Congress who are not always able to distinguish legitimate descriptions of a system's capabilities from spurious claims. Discredited cruise missile designs are already being dusted off in hopes that they might benefit from the postwar wave of enthusiasm for the Tomahawk.

And third, implicit in the belief that cruise missiles can find and attack camouflaged targets on their own is the argument that the B-2 bomber—which would carry better sensors, more electronics, and two human brains—can succeed in its primary mission of search-

ing for and destroying mobile strategic missiles. This conclusion, though false, might have serious implications for federal spending priorities if widely accepted.

ERIC H. ARNETT
American Association for the
Advancement of Science
Washington, D.C.

REGULATION IN BIOTECH

Thank you for your fine and well-balanced article on bovine growth hormone ("Who Decides About Biotech?" by Wade Roush, TR July 1991). Thanks, too, for your sympathetic treatment of citizen input in scientific debates. Those who question the value or relevance of such input often assume that "the market" and existing regulatory agencies will protect us. Or they feel that even if citizen input were appropriate, our scientifically illiterate populace could scarcely be trusted to make sound judgments. Both of these assessments are misguided.

The framework for regulating genetically engineered organisms patches together several existing mechanisms, and the problem with this is that the challenges of biotechnology are unprecedented. As many regulators will themselves admit, biotechnologies tend to fall through the cracks of definitions that were developed for other purposes.

Even more worrisome, the Bush administration has attempted to block development of a regulatory apparatus that would deal specifically with environmental releases of genetically engineered organisms. The administration has stated that before oversight can be exercised, an organism must be proven to pose significant risks. Without this proof, oversight is actually prohibited. In other words, we must prove that something is harmful before we may study whether it is harmful.

Regarding the value of the market in weeding out bad products and encouraging useful ones, true consumer choice rests on adequate information, and a great deal of information about

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Book To Be Published

When the results are announced in 1993, a hardback book will be published containing details of many of the best entries. The publicity given to projects by previous editions has often led to the entrants receiving additional support from a wide range of sources.

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LETTERS

most biotechnologies simply does not exist yet. As long as it does not, the choices that prevail in the market will not be informed choices, and thus may not reflect underlying consumer preferences. Furthermore, if industry has its way, the labels of genetically engineered products won't even provide what information does exist.

It's also worth noting that many of the products consumers would like will never be available because they offer inadequate opportunity for profit. For example, farmers would like high-quality non-hybrid seed so that they could harvest their own seed and use it the next year. But seed companies do not find this attractive, since it would cut into their market, so they have focused on developing hybrid seeds that must be purchased every year.

Finally, it is unfortunately true that many of us are scientifically illiterate. However, an extensive study by the Public Agenda Foundation shows that there is cause for hope. This study assembled a series of citizen review panels, gave them a pre-test questionnaire about a problem, and then showed them a 15-minute video that presented a variety of possible solutions and explained the points of agreement and disagreement among experts. Afterward, participants in the study discussed the problem in groups and filled out post-test questionnaires.

Interestingly, the conclusions of the participants generally agreed with those of leading scientists. And in many cases where they disagreed, the reason was not a lack of scientific understanding. Rather, the citizens used different criteria in making their policy decisions—such as distrust of government and industry or a desire to avoid paying more taxes. In short, ordinary citizens, given balanced information and an honest view of disagreements among scientists, can make reasonable decisions—scientific and non-scientific.

KATHERINE GRIFFITH
Biotechnology Project Coordinator
Wisconsin Rural Development Center
Mount Horeb, Wis.

Editor's note: An article on the Public Agenda Foundation's study is scheduled to appear in the next issue of Technology Review.

SANITIZED WAR

In "Engineers and the Nintendo War" (TR July 1991), Samuel Florman claims that Operation Desert Storm demonstrated "a heightened concern for individual human lives."

He describes an "unprecedented effort to minimize casualties—at least among the allies—but also a studied determination to avoid discussing them." It is unfathomable to me how Florman can view these actions as evidence of "an amazing step forward on the road to civilization." Quite the opposite is the case.

The silence on casualties and the sanitized views of Nintendo-like destruction have made it easier for us to forget that there were real people being injured and killed. Many credible accounts suggest that over 100,000 Iraqi troops were killed in the war. That this slaughter was barely mentioned in the media amidst the heroic chest-thumping shows how little value we place on human lives.

JOEL WEISBERG
Eagan, Minn.

CORRECTION

In "The Invention That Got Away" by Richard Florida and David Browdy (TR August/September 1991), former MIT president Jerome Wiesner was incorrectly cited as the chair of an advisory board for the Boston investment firm approached by T. Peter Brody to fund development of active-matrix displays. Jerome Wiesner was instead one of several informal advisers to the group as well as an individual investor in Brody's work.