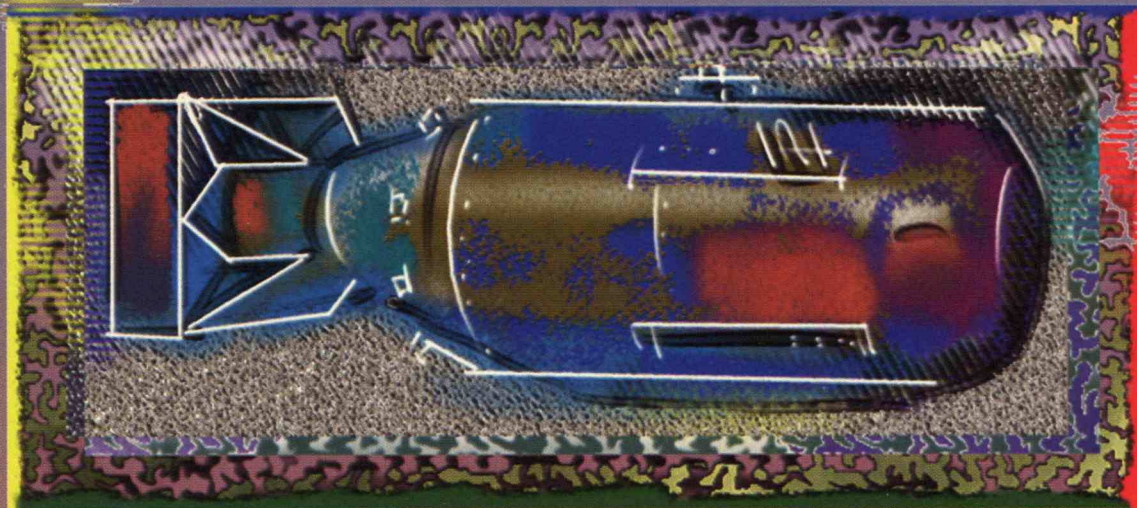


Technology Review

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Little Boy

THE Atomic Age ^{AT} 50

TWENTY-ONE EXPERTS REFLECT ON
HIROSHIMA AND NAGASAKI, THEIR AFTERMATH,
AND THE FUTURE

- ♦ Did We Need to Drop the Bomb? ♦
- ♦ Why Can't We Talk About It? ♦
- ♦ What Was the Price of the Cold War? ♦
- ♦ Can We Rid the World of Nuclear Weapons? ♦
- And Should We?



SPECIAL ISSUE



THE
JUNGLE
BOOKS

Twenty
Thousand
Leagues
Under
the Sea

JULES VERNE

Dante
THE
DIVINE
COMEDY

VANITY
FAIR

The
Canterbury
Tales

Geoffrey
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THE
BROTHERS
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
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Contents

FEATURES

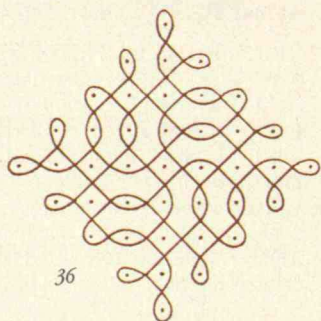


24

24 BACK TO THE EVERGLADES

BY NORMAN BOUCHER

After decades of encroachment by cities, farms, and waterworks, south Florida's ailing wetland may soon host yet another massive civil-engineering project—this one designed to restore its status as one of the world's most extraordinary ecosystems.



36

36 EVERYBODY COUNTS: TOWARD A BROADER HISTORY OF MATHEMATICS

BY DIRK J. STRUIK

Studies reveal that numerous non-Western—and even nonliterate—societies have developed remarkably sophisticated mathematical concepts. Such knowledge is deepening our understanding of the field's origins and improving our teaching methods.

46 THE ATOMIC AGE AT 50



RECALLING THE ORIGINAL EVENTS

- 48 HIROSHIMA, NAGASAKI, AND THE POLITICS OF MEMORY *by John W. Dower*
- 51 REVISIONIST HISTORY HAS FEW DEFENDERS *by Peter Blute*
- 52 SECOND-GUESSING HISTORY *by I.B. Holley, Jr.*
- 53 THE BOMB MINIMIZED CASUALTIES *by Norman Polmar and Thomas B. Allen*
- 55 WHAT SCIENTISTS KNEW AND WHEN THEY KNEW IT *by Ronald Takaki*
- 56 TALES OF THE CITY *by Hugh Gusterson*

FACING A DIFFICULT LEGACY

- 58 THE AGE OF NUMBING *by Robert J. Lifton and Greg Mitchell*
- 60 "LET'S NOT TALK ABOUT THE BAD THINGS" *by Paul Rogat Loeb*
- 62 THE BOMB IN POP CULTURE *by Bryan C. Taylor*
- 64 "NOTHING NATURAL COULD HAVE CAUSED THIS" *by Carole Gallagher*

WEIGHING THE VALUE OF NUCLEAR WEAPONS

- 66 THE ULTIMATE BOMBING *by Carl Kaysen*
- 67 KEEP THE BOMB *by Alex Roland*
- 69 FIVE LESSONS FROM THE COLD WAR *by Richard Ned Lebow and Janice Gross Stein*

ENDING THE REIGN OF TERROR

- 72 A NUCLEAR-WEAPON-FREE WORLD *by Joseph Rotblat*
- 74 THE ROAD TO ZERO *by Jonathan Dean and Randall Forsberg*
- 76 A BAN ON NUCLEAR TECHNOLOGIES *by Theodore B. Taylor*
- 78 CLEARING THE DEBRIS *by Bernard Lown*



DEPARTMENTS



12

5 FIRST LINE

6 LETTERS

12 MIT REPORTER

A Program That Puts a Smile on Your Face
Defending an Endangered Act

16 TRENDS

AI as Training Tool
Outsmarting the Immune System
A Job for Super Rice
Tracking Poachers with Forensic Science



16

81 THE NATIONAL INTEREST

ROBERT M. WHITE

Once-preeminent U.S. engineers must now contend with professionals abroad who offer high-quality but low-cost technological skills. Thus to remain economically competitive, the United States must wisely invest in its inherent strengths.

82 THE CULTURE OF TECHNOLOGY

LANGDON WINNER

The bygone era of *The Organization Man*, when paternalistic companies provided stable employment to managers and technical professionals, looks increasingly attractive as lean corporations and perpetual expendability become the norm.



83

83 REVIEWS

Thomas Frick on *American Technological Sublime*
Simson L. Garfinkel on *Computer-Related Risks*

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First Line

The Atomic Age at 50

DURING the 1980s I could panic at the sound of a siren and often woke during the night with a pounding heart. Although I was a veteran of the “duck-and-cover” days, when schoolchildren had to practice crawling under desks at the wail of an air-raid siren designed to warn of impending nuclear attack, the spectre of atomic war had seemed remote. But President Reagan’s inflammatory rhetoric and the massive U.S. arms buildup had apparently convinced me that someone might actually push the button.

Fortunately, the constant fear of nuclear armageddon now no longer haunts us. But the first half-century of the nuclear age, marked this August by the fiftieth anniversary of the bombing of Hiroshima and Nagasaki, saw a relentless quest by two powerful nations to acquire ever-more-sophisticated nuclear weapons. That arms race and those weapons—the ultimate embodiments of the human capacity for both technological genius and self-destruction—leave a legacy that will endure for generations. *Technology Review* has devoted much of this issue to examining that legacy.

Covering the dilemmas of the arms race is not new to the magazine. During past decades numerous *TR* authors have analyzed the effects of innovations such as “multiple independently targetable reentry vehicles” (better known as MIRVs) and stealth on the strategic balance, proposed alternatives for reversing the arms race and preventing proliferation, and debated the feasibility of attempts to create a foolproof missile defense.

Writing in this issue of the decision to use atomic weapons on Japan, historian I.B. Holley, Jr., decries “Monday-morning quarterbacking of scholars long after the event.” An Air Force officer during World War II, he notes that whether the decision seems wise or unwise depends on your perspective. The real question, he says, is: Did the bomb save lives? The answer of journalists Norman Polmar

and Thomas B. Allen is a resounding yes; they recount the horrifying loss of life on both sides during the Pacific campaign and assert that the bomb averted what promised to be “the bloodiest invasion in history.”

Yet events as momentous as the use against civilians of the most powerful weapon ever devised inevitably entail moral complexity. In our collection’s lead essay historian John W. Dower not only recounts the many motivations that might have propelled this awesome

A Special Issue on a special anniversary

move but bemoans the nation’s recent loss of opportunity to reflect on it—the Smithsonian Institution’s decision to drastically scale back a planned exhibit on Hiroshima and Nagasaki and their aftermath. U.S. Rep. Peter Blute (R-Mass.) counters that the reason for killing the proposed exhibit was simple: it was fatally flawed.

Public debate of the events spawning the atomic age would have been particularly important, psychiatrist Robert Jay Lifton and journalist Greg Mitchell maintain, because the “cumulative influence of Hiroshima is much greater than most Americans suspect.” In U.S. censorship of on-site footage from Hiroshima and Nagasaki and official reference to agonizing radiation deaths as “hoaxes and propaganda,” these authors see the start of “patterns of...concealment that have contaminated American life ever since.” Yet if secrecy and fear have often prevented a closer examination of this excruciating time, communications professor Brian C. Taylor shows how novels and films about irradiated monsters and post-nuclear landscapes have provided alternative vehicles for expressing the “shock, fantasy, regret, denial, and resolve of society as it has struggled with the possibility of nuclear destruction.”

Ironically, even as we indirectly dealt with this grim reality, historian Alex

Roland maintains that by convincing the superpowers to avoid all-out confrontation, the bomb actually reversed the accelerating growth in war-related deaths set off by the Industrial Revolution, thus saving hundreds of millions of lives. Yet deterrence posed its own contradictions: political scientists Richard Ned Lebow and Janice Gross Stein show that it fueled the arguments of advocates for unlimited atomic arsenals and encouraged brinkmanship that made nuclear launch imminent on more than one occasion.

Dealing with those massive arsenals and vast quantities of associated detritus poses an unprecedented challenge. *TR* authors make it clear that meeting that challenge will require all the technological, political, and social resources the global community can muster. Defense analysts Jonathan Dean and Randall Forsberg, for example, present a comprehensive three-stage plan to wean nuclear and would-be-nuclear nations alike from equating the bomb with ultimate security. To help ensure against future efforts to build atomic weapons, several authors propose putting fissile material under the watch of international monitors. Pointing out that the world’s “inventory of plutonium produced in nuclear [power] reactors now totals about 1 million kilograms, nearly five times the amount produced for the world’s nuclear weapons,” former weapon designer Theodore B. Taylor would phase out the entire nuclear enterprise.

Although these authors’ ultimate goal of a nuclear-free world may seem beyond humanity’s grasp given endemic levels of global violence, physicist Joseph Rotblat maintains that failure to take action will result in a much more dangerous world in which many nations feel “entitled to [their] own nuclear deterrent.” Citing the millions of people worldwide who actively urged disarmament during the height of the nuclear standoff, physician and Nobel Peace Prize winner Bernard Lown sees citizen diplomacy as equally essential in convincing leaders to embrace a more hopeful future. ■

—SANDRA HACKMAN

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Letters

NASA THINKS SMALL

As Bruce Berkowitz notes in "More Moon Probe for Your Money" (*TR* April 1995), Administrator Daniel Goldin and other senior agency officials of the National Aeronautics and Space Administration are leading major efforts to incorporate the relevant parts of the *Clementine* mission, including shorter development schedules and streamlined budgets and staff, into the way NASA conducts business. But Berkowitz is far too quick to dismiss these efforts as "only a small portion of NASA's activities."

As chief of the Small Missions Development Branch in NASA's Solar Systems Exploration Division, I am responsible for the *Discovery* series of scientific probes mentioned in the article and the Mars program. The current *Discovery* flight projects, Mars Pathfinder and Near Earth Asteroid Rendezvous (NEAR), are being developed for less than \$150 million (1992 dollars), excluding launch services. Earlier this year, NASA selected Lunar Prospector as a new *Discovery* project. With its goal to fill in missing links in our knowledge about the moon, Lunar Prospector is slated for completion by 1997 and will cost \$59 million, including launch expenses.

The Mars Surveyor '98 missions involve the construction of an orbiter and lander at the cost of \$92.2 million. The current Mars Global Surveyor (MGS) is on a development schedule of 28 months at a cost of \$154 million, excluding launch expenses. The MGS will fly five of the seven instruments from the prior Mars Observer program.

All the missions I have mentioned have project management structures that are at least half the size of the one for Mars Observer. While the total value of these missions may not constitute a huge percentage of NASA's budget, they are nonetheless very high priorities for the agency.

WILLIAM L. SMITH
National Aeronautics
and Space Administration
Washington, D.C.

Bruce Berkowitz skims over the central reason why space missions incur high costs: the need for ultra-reliability. Spacecraft must function for extended periods of time without any opportunity for repair. Without its ancillary agenda to investigate the moon, *Clementine* might have been labeled a failure since it was unable to perform the Ballistic Missile Defense Organization's original mission of testing defenses in space against actual missiles. Very few programs have the luxury of being hailed a success for performing a secondary mission instead of its primary one.

THOMAS W. JOHNSON
Albuquerque, N. Mex.

Although Bruce Berkowitz captured the implications of *Clementine* for future space activities, I was disappointed by his omission of the project role played by Lawrence Livermore National Laboratory. At least an equal partner with the Naval Research Laboratory, we built all seven cameras for *Clementine*, produced much of the mission software, and made all the data easily accessible by putting it on the Internet.

C. BRUCE TARTER
Director
Lawrence Livermore National Laboratory
Livermore, Calif.

THOUGHT FOR FOOD

The life-cycle analyses of convenience foods that Lester Lave, Tse-Sung Wu, Chris Hendrickson, and Francis McMichael advocate in "My Shopping Trip with André" (*TR* February/March 1995) inappropriately seek to combine



market prices with unknown and in many cases incalculable environmental costs. Consumers don't—and probably can't—conduct such computations because they're virtually impossible to do. Life-cycle analyses require the identification of both the obvious and not-so-obvious environmental damage caused by a

product or a process. While the release of toxic chemicals from a manufacturing facility is easily identifiable, the environmental harm caused by the burning of fuels—say, to produce the energy to make one component of a product—is not.

As technologies change, so will the risk levels associated with certain products and processes. Could any organized body, including the government, be expected to keep track of all such developments? And even if it could, the “right” life-cycle analysis would still be unavailable to consumers because so many of these effects are unquantifiable.

An alternative approach to life-cycle analyses attacks the environmental harms or inappropriate resource uses where they occur instead of trying to calculate the damage at the end of the cycle. The advantage of such an approach is that it focuses directly on the environmental problem rather than trying to trace back through the complex interconnections of the economy.

RICHARD D. MORGENSTERN
Visiting Scholar
Resources for the Future
Washington, D.C.

DISINTERESTED EQUATIONS

In “Sheriffs of Scientific Correctness” (*TR February/March 1995*), Langdon Winner revealed a shocking gap in my physics education. He says that “a growing number of writers observe that even the knowledge claims of physics and biology are shot through with subjective judgments about the abilities of males and females as well as different ethnic groups.” Had I somehow missed this important point in spite of outstanding tutelage by the MIT physics faculty?

I reviewed the equations of mechanics and electromagnetism in both their classical and quantum mechanical forms. I even studied the equations using a mirror to obtain left-right inversion. I concluded that the equations of physics are supremely indifferent to the points raised by Winner. The equations also appear to have little to say about matters of diversity, multiculturalism, or the bounties of the rainforest.

GREGORY R. JOHNSON
St. Louis, Mo.



BLENDING FACT WITH VALUE

In “Suffer the Little Children” (*TR April 1995*), Stephen Solomon examines the ethical dilemmas health care professionals face in providing advanced medical treatment. However, in his reference to the Oregon health prioritization project, Solomon incorrectly concludes that its primary goal was saving money.

The Oregon legislature developed the prioritization project in an effort to provide health care to a greater number of state residents, even at the cost of increasing expenditures. Through consultation with health care experts and surveys intended to determine the community’s health care priorities, the Health Services Commission spent four years weighing the ethical questions posed by certain kinds of treatment and it derived what it considered to be an effective and efficient package that blended fact with value.

But the federal government interpreted biases against certain segments of the population, criticizing the prioritization project for discriminating against the disabled under the Americans with Disability Act. The federal government thus weakened the commission’s project; in particular, it had the commission drop its recommendation that only comfort care be provided to babies whose gestational age was under 23 weeks and whose birth weight was less than 500 grams. Although the commission had based the recommendation solely on the inevitability of death, the federal government was concerned that it violated the Child Abuse Amendment by singling out children with underdeveloped body systems.

Until ethics and technology are in agreement, the public will continue to

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LETTERS

pay a great emotional price and the health care system will continue to undergo financial drain at the expense of preventive services.

PAIGE R. SIPES-METZLER
Executive Director
Oregon Health Services Commission
Portland, Ore.

ENERGY EFFICIENCY

Since I share Flavin and Lenssen's concerns about environmental quality, I hope their forecasts in "The Electricity Industry Sees the Light" (*TR May/June 1995*) for an electricity industry that depends more on decentralized power generation and renewable energy sources are correct. But, as the debates continue and the industry structure develops, we should remember that the goal for the future electric industry is not only environmental quality but also economic efficiency.

Curiously, Flavin and Lenssen provide little information about efforts by utilities to help customers become more energy efficient. The discussion of smart utilities providing real-time pricing does not consider that this method will encourage consumers to demand more electricity off-peak when prices are low. Real-time pricing will have a major effect on when electricity is used but not on how much electricity is consumed.

The authors also envision an industry in which wholesale competition is widespread but retail competition is limited. Their model includes a retail monopoly franchise for local utilities, which can then plan on behalf of all customers in their service area. However, some groups strongly favor "retail wheeling," which enables customers to choose their energy supplier.

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Readers of Flavin and Lenssen's excellent review of the electric industry may wonder how their vision relates to proposed retail wheeling—letting retail customers buy power from any supplier at market prices. This development has been widely but falsely reported as imminent nationwide.

No state has authorized retail wheeling and none seems likely to. The president of the five-member California Public Utilities Commission unexpectedly proposed retail wheeling in 1994, but it got only one vote in May 1995. Nevada offered it to woo operators of a steel rolling mill into the state in 1994, but the plant has still not materialized. Michigan authorized a small experiment with retail wheeling in 1994, but immediately landed in court.

Wrapped in the superficially attractive rhetoric of choice and competition, retail wheeling has a venal motive: industries using 4 percent of the nation's electricity want to grab the cheapest power and bur-

den ordinary consumers with costlier plants, which are primarily nuclear. The Federal Energy Regulatory Commission said in March 1995 it will not allow such unfairness.

Talk of retail wheeling nonetheless caused panic among utility managers. Expecting that rewards for selling more power would resume and that only low rates would matter, they have slashed highly cost-effective programs aimed at encouraging customers to cut bills by using electricity more efficiently. The immense benefits of saving electricity (ultimately worth perhaps more than \$100 billion per year nationwide) rather than generating more of it are thus being sacrificed for the much smaller benefit of buying bulk power competitively. Yet that benefit will be captured by wholesale competition already required by federal law. Combined with proper state regulation that rewards utilities for cutting customers' bills, wholesale competition will yield both benefits.

Especially if everyone buys bulk power

