

SCIENTIFIC AMERICAN



A MICROSCOPE THAT CAN SEE objects smaller than an atom.

The first field test of a fleet of electric vehicles powered by fuel cells. A tariff to limit vehicular traffic in central London. These are but a few of the path-breaking developments that have taken place in recent months in laboratories, corporate suites and the halls of government. For the second year, the SCIENTIFIC AMERICAN 50 recognizes the singular accomplishments of those who have contributed to the advancement of technology in the realms of science, engineering, commerce and public policy. This year's selections by the Board of Editors pay tribute to individuals, teams and companies that have stood out in a wide variety of technological disciplines. It also honors Leaders of the Year for achievements in research, business and policy. Their work again demonstrates the ingenuity and resourcefulness that generate the ever more sophisticated tools and solutions for meeting society's needs.

- AEROSPACE
- AGRICULTURE
- AUTOMOTIVE
- CHEMICALS & MATERIALS
- COMMUNICATIONS
- COMPUTING
- DEFENSE
- ECONOMIC DEVELOPMENT
- ENERGY
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- IMAGING
- MANUFACTURING
- MEDICAL PHYSIOLOGY
- MEDICAL TREATMENT
- NANOTECHNOLOGY & MOLECULAR ELECTRONICS
- PRIVACY & SECURITY
- PUBLIC HEALTH & EPIDEMIOLOGY
- ROBOTICS

Defense

FRANK X. HURSEY

President, Z-Medica, Newington, Conn.

Developed a mineral sponge that stops blood loss on the battlefield and on the playground.

BADLY WOUNDED soldiers (like accident victims everywhere) are often at risk of bleeding to death before they can be treated, which is why blood loss is the primary cause of mortality from severe bleeding injuries. Frank Hursey's invention might change that. QuikClot is an inert granular substance that, when poured on a wound, concentrates the clotting factors in the outflowing blood and thereby speeds coagulation. Last year's approval of QuikClot by the U.S. Food and Drug Administration means a home version of the technology should be released in 2004. Hursey, a scientist who works on advanced oxygen-generating systems, discovered the properties of the QuikClot material by serendipity. Many years ago he cut himself while shaving. On a whim, he turned to an adsorptive agent that he had been developing for one of his research projects and applied it to his face. The bleeding stopped immediately.

Economic Development

RICHARD JEFFERSON

Chair, Center for the Application of Molecular Biology to International Agriculture, Canberra, Australia

Helps innovators in the Third World develop biotechnologies.

THE GREEN REVOLUTION—the steady increase in crop yields that started in the 1960s—is starting to bump up against limitations of land use, water supply, pest control and existing plant genetic variety. Biotechnology may be able to help, but so far it has pretty much passed the developing world by. Few have done more to change that than Richard Jefferson. Having made his name in the 1980s by creating a technique for probing protein synthesis, he has dedicated himself to ensuring that scientists and farmers in developing countries share the benefits. In 1991 he established CAMBIA, a nonprofit research institute whose mission is to make often proprietary technology more widely available. For example, CAMBIA is now putting together a do-it-yourself kit that lets start-up companies tinker with genes without having to confront battalions of intellectual-property lawyers.

Energy

JAMES A. DUMESIC

Professor of chemistry, University of Wisconsin—Madison

Pioneered economical catalysts for turning biomass into hydrogen fuel.

IF THE MUCH HERALDED hydrogen economy is ever to arrive, a cheap way to make hydrogen must be discovered. James Dumesic has developed catalytic methods that turn carbohydrates in biomass directly into hydrogen. The processes can operate at low temperature, in the liquid phase, saving a lot of energy compared with other approaches being researched. Last year Dumesic and his colleagues showed how the reaction could be mediated with a platinum catalyst; this year they did it with a far cheaper combination of nickel and tin. The main by-products are water and carbon dioxide. Although carbon dioxide is a greenhouse gas, the biomass grown for the next cycle of energy harvesting would absorb it all, so no net greenhouse gas would be produced.

Environment

DANIEL PAULY

Fisheries scientist, University of British Columbia

Advances the case for setting up marine reserves so that fisheries can make a comeback.

FOR YEARS, Daniel Pauly has been carefully documenting the devastating effects of overfishing, particularly on large predator species such as cod, snapper and tuna [see "Counting the Last Fish," by Daniel Pauly and Reg Watson; *SCIENTIFIC AMERICAN*, July]. This year Pauly attempted to spread the alarm to the general public with his book *In a Perfect Ocean* (Island Press). An iconoclastic and erudite researcher, he argues that governments must abolish subsidies to fishing fleets and establish marine reserves to allow fisheries to recover. (Present marine reserves cover less than half of 1 percent of the total sea area.) Pauly spent much of his early career developing new methods for estimating fish populations. One of his latest projects is FishBase, an online database with information on more than 28,000 fish species.



Granules stem bleeding when poured on a wound.



Marine reserves might combat overfishing.