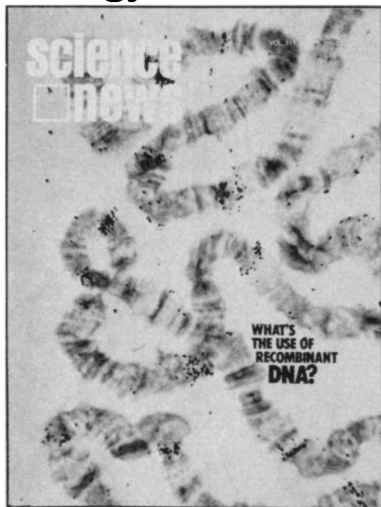


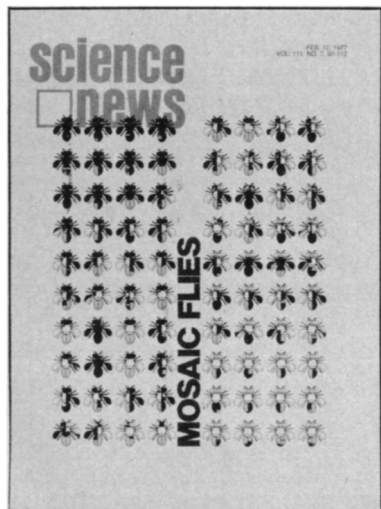
Science News of the Year

This is a review of important science news stories of 1977 as reported in the pages of SCIENCE NEWS. The references after each item refer to the volume and page number in which the main article on the subject appeared in SCIENCE NEWS (Vol. 111 is Jan.-June; Vol. 112 is July-Dec.). Where several references exist, the news developed and was reported in more than one issue. Back issues or, when out of stock, copies of articles are available for 50 cents each by writing to SCIENCE NEWS, 1719 N Street, N.W., Washington, D.C. 20036.

Biology



- Recombinant DNA's promise began to come true as yeast genes were shown to function in bacterial cells, rat insulin genes were inserted and reproduced in bacteria and finally bacteria were forced to produce the human hormone, somatostatin, by following direction of a chemically synthesized gene. 111:165, 340; 112:310
- The strict linear relation, described in bacteria, between DNA and its products did not hold up in analyses of genes of higher organisms. In mammalian cells and their viruses some DNA sequences were found to attach to several products, while other genes include unexpressed stretches of DNA. 112:70, 214, 233



- Researchers determined the complete nucleotide sequences for the genetic content of two viruses. 111:148; 112:233
- Detailed genealogical study of single-celled organisms that metabolize carbon dioxide to methane indicated that they may be a third major branch of evolution, as separate from bacteria as from higher plants and animals. 112:310
- Communities of animals were found clustered around hot water vents deep in the ocean at the Galapagos Rift. Sulfide-oxidizing bacteria seem to be the basis of their food chain. 111:182
- Despite copious discussion, Congress failed to pass any legislation on recombinant DNA research. California scientists admitted violating the NIH guidelines. 111:165, 181, 245; 112:36, 212, 229, 420
- Rearrangement of genes within chromosomes was implicated in control of gene expression in bacteria and yeast. 111:164
- Key areas of the brains of schizophrenic patients were found to contain twice the normal number of receptors for the neurotransmitter dopamine. 112:342
- Researchers isolated the components of sperm and egg surfaces that are responsible for species-specific binding. 112:356
- Secretions from a gland in an octopus were discovered to direct copulation, eating and brooding behavior and, finally, the animal's death. 112:375
- Biologists accumulated examples of palatable, unprotected animals imitating unpalatable, well-armed species, thus verifying the importance of Batesian mimicry. 111:54, 139; 112:71

Energy

- President Carter created a cabinet-level Energy Department by combining energy R&D programs of eight existing agencies. James Schlesinger, former Defense Secretary and Atomic Energy Commission chairman, heads the new organization. 112:199
- Two months after taking office, President Carter announced a controversial energy program that promoted conservation, downplayed development of a liquid-metal fast-breeder reactor and offered to raise the price of oil enough to make several new technologies economically competitive. But Congress was still considering the proposal at year's end. 111:277, 112:261
- President Carter indicated he wanted to

reduce funds for the Clinch River breeder reactor, a liquid-metal fast breeder, to \$33 million, a level that would nearly kill the program. Congress passed legislation that would have funded it at \$75 million. The President vetoed the bill, thereby stopping funds for many other energy programs. 112:247, 312

- Two approaches to controlled nuclear fusion using inertial confinement yielded successful fusion reactions: Los Alamos Scientific Laboratory using a two-beam carbon-dioxide laser, and Sandia Laboratories using an electron-beam accelerator. Later, Lawrence Livermore Laboratory reported achieving thermonuclear burn in the center of a laser-imploded pellet—the first “explicit demonstration” of a burn within the target core. 111:166; 112:4, 22

- Russian Nobel laureate Nikolai Basov claimed to have achieved a confinement time and plasma density necessary to demonstrate breakeven laser fusion. 112:361

- The light-water breeder, an alternative to the liquid-metal fast-breeder reactor, began operation in Shippingport, Pa. 112:164

- Gas-fired heat pumps under development by the Consolidated Natural Gas Service Co. operated efficiently at lower temperatures than electric versions now available. 112:185

- The State of Ohio ordered the first commercial fluidized-bed combustors in the United States. The plants can use any grade of coal and easily meet clean-air standards. 112:134

- A reflective coating developed by MIT scientists could reduce the electrical energy consumed by light bulbs by 60 percent when applied to the inside of bulb glass. Duro-Test Corp. expects to market such bulbs by 1979. 112:135

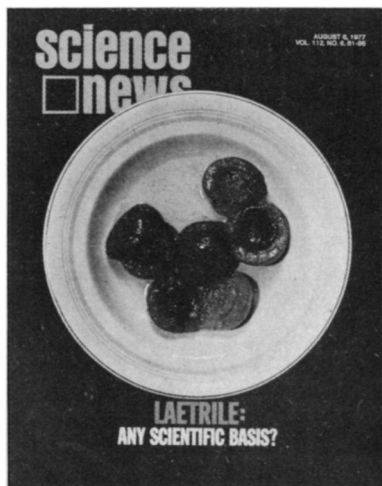
- A MITRE Corp. study sponsored by the Ford Foundation concluded that nuclear power will continue to be the economic choice over other major alternatives, at least for the rest of this century. 111:249

- A study reported by an economist from the University of California at Irvine showed that new rapid-transit rail systems may waste more energy than their passenger-car equivalent. The conclusion could warrant closing existing systems in the future. 111:106

- California Institute of Technology scientists seeded plastic with dyes that not only concentrate but also extend the range of wavelengths of light that solar cells can use. 112:313

Medicine

- A vaccine against pneumonia was demonstrated effective in children and adults. Because South African officials earlier reported a new strain of pneumonia resistant to most antibiotics, the vaccine was an especially welcome alternative to drug defenses. 112:292
- An anti-viral drug became the first successful treatment of herpes encephalitis, a brain infection. 112:116
- Thousands of citizens clamored for the legal use of Laetrile as a cancer treatment, but most scientific studies did not support its effectiveness. 112:92



- The World Health Organization announced the global eradication of the killing form of smallpox. A less virulent form still officially exists, although the last known case occurred in October. 112:407
- An unusual bacterium turned out to be the culprit of Legionnaires' disease. The microbe has been implicated in outbreaks of an inexplicable fever in Washington 12 years ago and around the country this year, as well as in the 1976 deaths of 29 American Legionnaires at a Philadelphia meeting. 111:69; 112:180
- National Cancer Institute epidemiologists mapped the cancer death rates of non-whites living in the United States. Similarities to the geographic pattern previously found for Caucasians strongly suggested that environmental carcinogens are often responsible. 111:38
- Researchers in Africa developed a laboratory technique for growing the infective form of the parasite that causes sleeping sickness. 111:261
- Injections of red blood cells loaded with a needed enzyme helped restore the immune system of an infant born with severe combined immunodeficiency disease. 111:4
- Surgeons drained the full supply of blood from a patient's body for 37 minutes while they repaired a tear in his heart's arterial wall. 112:5
- Cytomegalovirus, which can cause mental retardation in newborns, was found to have at some time infected 82

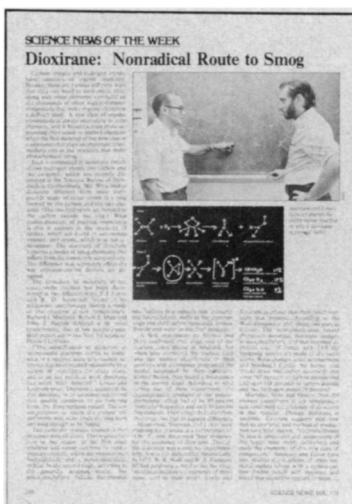
percent of a sample of pregnant women. Antibodies in the mothers' blood did not prevent infection of the infants during birth. 111:373



- Blood from asthmatics and cystic fibrosis gene carriers interfered with movement of the hairs that line the lungs. The active substances appeared to be abnormal immune system proteins, distinct for the two diseases. 111:232
- Continuing study of the brain peptides that were first identified as natural pain killers revealed their biochemical role and important behavioral effects. The chemicals can be neurotransmitters, carrying the signal from one nerve cell to the next, and they help mammals learn faster. 112:58, 59

Chemistry

- Serious human disorders were linked to a chemical mix-up in Michigan in 1973 in which a ton of flame retardants (PBB) was substituted for a cattle feed supplement. 112:100, 297



- Discovery of a new class of organic compounds, a one-carbon, two-oxygen ring, supported an alternate model of photochemical smog and may affect the design of emission control devices. 111:393; 112:340

- Quick, bacterial tests to identify chemicals that may cause cancer pinpointed a flame retardant used in children's pajamas. Tris-BP was later banned. 111:23
- Screening tests for cancer-causing substances were modified to test urine and feces, thus checking on the effects of chemicals as they are processed by the body. Urine from smokers, but not from nonsmokers, caused genetic changes in the test bacteria. 112:181, 388
- Although many groups argued against an FDA ban on saccharin, evaluation of bacterial, animal and human studies indicated that the sweetener or its contaminants are weak carcinogens. 111:182; 112:12, 245, 388
- New organic solids with metal-like properties were synthesized and investigated in pursuit of novel semiconductors, highly conducting materials and substances with unusual and potentially useful characteristics. 112:171
- Single atoms in a crystal were imaged for the first time by a technique combining X-ray crystallography and computer-processed holography. 111:5
- Lasers were used to study rapid chemical reactions and provoked argument about the earliest chemical step in vision. 112:26, 183, 216
- A small research company developed food additives that are long, repeating molecules that never enter the body as they travel through the digestive tract. 111:198
- Scientists demonstrated that ancient clays may have selectively bound and linked simple chemical segments into the first complex, biological molecules. 112:277
- The chemical profile of a collection of green leaves, preserved under volcanic ash for 30 million years, revealed a surprising similarity to the leaves of their modern descendants. 111:391
- Chemists identified some substances in plants that deter feeding by insects and others that are natural pesticides. 112:268
- Scientists continued to revise their prediction of the effects of aerosols and high-flying aircraft on the ozone layer on the basis of new data on atmospheric molecules and their reactions. 111:220, 372

Astronomy

- A motion of the earth with respect to the universe as a whole was discovered. 112:44
- What appears to be a planetary system in process of formation was discovered. 111:404
- Rings were discovered around Uranus. 111:180, 245; 112:52
- X-ray observations indicated that there is a large amount of hot gas in the space between galaxies. 112:36
- The first catalog of celestial gamma-ray sources was compiled. 112:14
- Long-distance radioastronomical interferometry was done with a satellite as the

link between telescopes for the first time. 112:278

- A minor planet that orbits between Saturn and Uranus was discovered. 112:311
- Five new quasars with redshifts greater than 3 were found. 112:69
- Searchers recovered only the third meteorite ever retrieved whose descent had been photographed accurately enough to allow the object's prior orbit to be determined. 111:212
- Water, in the form of water of hydration, was detected on an asteroid (Ceres) for the first time. 112:316
- Two more Apollo asteroids — those whose orbits intersect the earth's — were discovered. 111:325
- The Earth's Van Allen radiation belts were found to include a substantial contribution of ions from earth's own atmosphere. 111:378

Physics



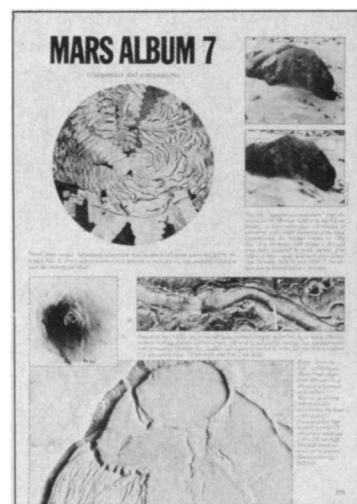
- The heaviest subatomic particle yet, the Υ resonance, with a mass of 9.5 billion electron-volts, was discovered at Fermilab. 112:87, 100
- Evidence for the existence of fractional electric charge (that is, a possible free quark) was reported. 111:296
- Dibaryon resonances, also known as quark molecules (composed in one case of two D mesons and in the other of two protons), were found. 111:154; 112:372
- The principle of operation of a free-electron laser was demonstrated. 111:260
- The magnetic moment of the muon was measured to 38 times the best previous accuracy. 111:358
- The magnetic moment of the electron was determined to an accuracy of 2 parts in 10 billion. 111:101
- A new mystery in the relationship between magnetism and superconductivity in ultracold metals was found. 111:229
- Experiments showed that the spins of protons have a surprisingly large effect on how they interact with each other. 112:196, 372
- A storage ring for neutrons was built and operated. 112:407

Space Technology

- The space shuttle took to the sky for the first time in a series of unpowered descent-and-landing tests. 111:134; 112:23, 117, 294
- Soviet cosmonauts flew the Soyuz 24 craft to a docking with the Salyut 5 space station, failed to link Soyuz 25 with Salyut 6, but later reached that station with Soyuz 26. 111:117, 158; 112:229, 246, 406



- The Voyager 1 and 2 spacecraft were launched toward Jupiter and Saturn, with the second probe possibly also bound for Uranus and Neptune. 111:10, 168; 112:86, 124, 132, 165
- The two Viking orbiters and two landers continued to study the planet Mars throughout the year. 111:36; 112:228, 295, 326



- A small sample of the moon's Mare Crisium, brought back by the Soviet Luna 24 robot vehicle, revealed a composition largely unlike that of any previously sampled lunar region. 111:199; 112:390
- The first High Energy Astronomy Observatory satellite was launched and began providing data. 112:38, 119, 406
- The first two of the three International

Sun-Earth Explorer satellites were launched to study solar effects on earth's magnetic field. 112:276

- Japan's Geostationary Meteorological Satellite and the European Space Agency's Meteosat joined the developing worldwide network of fixed-position, high-altitude weather satellites. 112:53
- For the second time, U.S. biological experiments were carried aloft and returned to earth aboard a Soviet Cosmos satellite. 112:230
- The Apollo Lunar Science Experiment Packages, left on the moon by Apollo astronauts, were shut down, except for their transmitters, for economic and other reasons. 111:199; 112:213
- Spaceflight pioneer Wernher von Braun died of cancer at age 65. 111:407
- NASA administrator James C. Fletcher resigned and was replaced by Robert A. Frosch, formerly of Woods Hole Oceanographic Institution. 111:197, 279

Archaeology & Anthropology

- The presence of humans in America at least 40,000 years ago — nearly twice the previously accepted estimate — was confirmed for the first time by carbon dating. The find was made on California's Santa Rosa Island, off Santa Barbara. 111:196
- An international team found evidence of "pre-man" — primarily *Ramapithecus* — in the arid badlands of Pakistan's Potwar Plateau. The 8-million to 13-million-year-old remains represented the first major evidence that Asia, as well as Africa, may have been the birthplace of the human race. 111:244
- A new method of radiocarbon dating was announced, with its developers predicting that the technique would greatly improve the accuracy of the procedure while doubling its range. 111:405
- Researchers discovered the 140-million-year-old remains of "the oldest bird ever found" and the first direct evidence that mastodons were hunted by humans 11,000 to 14,000 years ago. 112:198
- A study of the African !Kung San tribe yielded clues supporting the theory that much of emotional development has a biological base. 112:74
- Earlier estimates of the existence of a Mayan settlement in Belize in 2500 B.C. were confirmed by excavation results. The archaeologists suggested that the original occupation may have occurred before 4000 B.C. 112:4
- Common death patterns were discovered among groups of humans who lived in North America and the Sudan between A.D. 700 and 1450. 111:358
- The piece of timber found on Mount Ararat near the Turkish-Soviet border was dated at 1,200 years old — conclusive evidence that it was *not* the remains of Noah's Ark, as some had suggested. 111:198

Behavior

- Chimpanzees and orangutans were found to have a "self awareness" of the type previously believed to exist only in human beings. The finding alters the structure of the mental evolutionary chain, according to researchers. 111:340
- At the World Congress of Psychiatry, Soviet psychiatrists were publicly and dramatically condemned for incarcerating political dissidents in mental hospitals. 112:164
- Youngsters classified as retarded by current standards were found to be normal and above normal in the right brain hemisphere processes of creativity. In a separate study, persons with damaged left hemispheres were found to be more expressive nonverbally than were non-damaged individuals. Researchers suggested that in most people the left brain may inhibit certain functions of the right, and that in the study cases the brain damage in effect freed the victims from the inhibition. 112:229
- For many smokers, emotional stress triggers an intricate "psychobiological machine" that dictates when and how much they will smoke. The mechanism is mediated by the person's urinary acid level. 111:297
- A combination of anticoagulant treatment and psychotherapy can in some cases reverse, or prevent, senility and pre-senile dementia. 111:292
- Psychologist Arthur R. Jensen backed off somewhat from his controversial assertion that genetic factors almost totally determine IQ. In his latest study of black students from rural Georgia, Jensen reported IQ shifts due predominantly to *environmental* factors. 111:390
- Children of natural parents from disadvantaged backgrounds were adopted by middle- and upper-class families and scored 5 to 15 points higher in IQ tests than would have been predicted if they had remained in their original parents' environments. 112:150
- The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research gave approval to the continued use of psychosurgery on a limited basis. 111:314
- A nationwide survey disclosed that more than one in twenty male Ph.D. psychologists have had sexual intercourse with their patients and more than one in ten have had other "erotic contact." 112:293
- Evidence that crowded environments contribute to escalated death rates among humans was reported. Correlations between crowding and increased blood pressure were also found. 112:341
- A 15-year followup of the famous Midtown Manhattan Study indicated that the mental health of New Yorkers is about twice as good as it was when the original data were reported in 1962. The same

study, compared with other recent results, also said that urban mental health is better than that in rural areas. 111:308

- Ronny Zamora, the 15-year-old from Florida who claimed to be "involuntarily intoxicated" by television when he shot and killed a woman, was found guilty of first-degree murder. 112:247
- Researchers reported that autism can be caused by inherited cognitive abnormality, brain damage at birth, or both. 111:167

Earth Sciences

- Rocks of the Figtree formation 3.5 billion years old were found to contain primitive microfossilized algae, the oldest fossilized material ever discovered. 112:245
- Manned dives to the Galapagos rift made the first observations of active hot water vents from pillow lava and discovered never-before-seen colonies of sea animals clustered around them. Scientists later obtained drill core samples of mounds of hydrothermal sediments near the rift. 111:182, 279; 112:85



- A variety of new evidence for links between solar activity and weather on earth was reported, including relationships between droughts and double sunspot cycles, major solar flares and thunderstorms, and solar-sector crossings and anomalous low-pressure regions. 111:100, 389; 112:264, 423
- The record of periodic irregularities, each lasting 50 to 100 years in the sun's behavior, was extended back to at least 3,000 B.C. The sun's rotation rate was confirmed to have increased at the beginning of the Maunder minimum in the 1640s. 111:152; 112:374
- The recent crustal uplift called the Palmdale bulge was found to cover a larger area of southern California than originally thought, but also to have partially subsided since 1974. Extensive monitoring continued. 111:167; 112:404
- Reports indicated that the Chinese had predicted three of six major (magnitude 7) earthquakes in the previous year. 112:133



- It was proposed that the original primordial land mass Pangaea contained an eighth continent, Pacifica, whose fragments dispersed themselves in collisions with the present continents of the circum-Pacific belt. 111:389
- A modification in the way the ancient supercontinent of Gondwanaland fit together was proposed. 111:372
- Meteorites were discovered on the Antarctic ice sheet, the Kirin meteorite shower in China was shown to have left the largest stony meteorite known, the second largest meteorite ever discovered in the United States was unearthed in California, and a 10-kilometer-wide impact was identified in Alaska. 111:92, 405, 406; 112:297
- Drilling into the Emperor Seamount chain and studies of undersea ridges near the Galapagos added support to the hot-spot hypothesis for formation of many such features. 112:215, 264
- A possible weekend effect of slight fluctuations in the earth's ionosphere and magnetosphere was identified. 111:379
- Superlightning bolts 100 times more intense than any known before were detected by satellite. 112:15
- Current crustal movements in California were directly measured for the first time by radio interferometry and laser ranging. 112:404
- A Soviet nuclear icebreaker became the first surface ship to reach the North Pole. 112:135
- Researchers succeeded in drilling through Antarctica's Ross Ice Shelf. 112:407, 421

Environment

- There were further warnings from several sources on the increased threat of massive climatological change due to carbon dioxide released through coal (and other fossil fuel) combustion. 111:356; 112:68, 375
- The Carter Administration decided to support permanent traffic of the controversial Concorde — a French-British supersonic jet. 112:212
- The Supreme Court ruled that the En-

Environmental Protection Agency (EPA) could issue industry-wide regulations on pollutant discharges. 111:153

- Results of a seven-year study of a "relatively small" oil spill indicate extensive, long-lasting physiological and behavioral damage to salt-marsh fiddler crabs. 112:84
- University of California biologists identified PCB's, a group of dangerous organic chemicals, in Antarctica and concluded they spread through the atmosphere. 111:44
- Among conclusions in the final report of an 18-month safe-drinking-water study were findings that inorganic chemicals present little threat to health, nitrate concentrations leave little margin for safety, evidence does not support claims that fluoridation leads to cancer or birth defects, and that it is "plausible" that hard water decreases the risk of heart disease and stroke. 111:374
- New predictions of atmospheric-ozone depletion decreased the anticipated contribution by supersonic aircraft but indicated an increased threat from chlorofluorocarbon aerosol sprays. 111:372
- A study by two environmental groups charged that rampant chemical pollution in the Hudson River endangers the health of those drinking its water. 112:233
- The International Whaling Commission issued a total ban on hunting bowhead whales, which created an uproar among Eskimos who depend on bowhead meat for survival. At a later meeting, the IWC reconsidered and permitted Eskimos a quota of 12 whales. 112:185, 398, 406

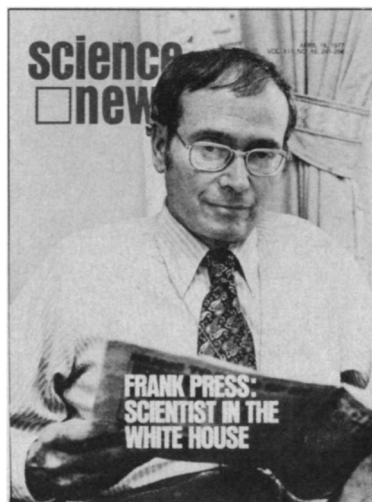
Technology

- In an action that could do much to encourage commercial genetic engineering, the U.S. Court of Customs and Patent Appeals ruled that Upjohn Co. can patent microorganisms it develops to produce antibiotics. 112:247
- A nuclear-pumped argon laser, developed by NASA's Langley Research Center, operated with a power output 100 times as high as before. It marks an important step toward development of a nuclear reactor that emits much of its energy as coherent light. 112:69
- Two major contributions toward cutting costs of photovoltaic cells were announced. IBM's gallium-arsenide cells achieved a sunlight-to-electricity conversion efficiency of 22 percent — 4 percent higher than the best silicon cells. Bell Laboratories took a different approach: liquid-junction semiconductors. Although only 9 percent efficient now, they have a long lifetime and are cheaper to manufacture than all-solid ones. 111:348, 410
- Bell Telephone Laboratories began an experimental trial of optical fibers for telephone transmission in Chicago. Miniature gallium-arsenide lasers generate message-carrying light waves. 111:375
- Salk Institute scientists used a refine-

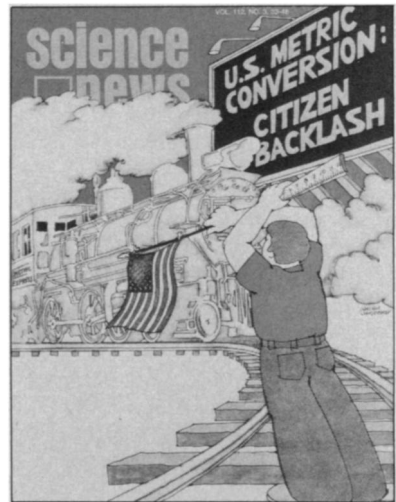
ment of two-dimensional electrophoresis to double the number of cell proteins that can be individually distinguished and permit their mapping by computer. 112:152

- Cells grown on cellulose beads coated with sugar demonstrated the first efficient way to mass produce individual cells for experimentation. 112:72
- The cruise missile and neutron bomb marked a new direction in weaponry that blurs the distinction between tactical and strategic warfare. 112:60
- Reports of Soviet advances toward a weapon-size charged-particle beam appeared based on good data but raised many technical and political questions. 111:329
- Thermomigration (making a dopant migrate through a crystal)—General Electric's new method for manufacturing semiconductors — could save time and money. 111:348
- The Los Alamos Scientific Laboratory announced development of a stronger, more thermal-shock resistant form of manufacturing tantalum carbide, one of the hardest substances known. It may eventually be used in making high-speed drills and dies or as a coating for rocket nozzles and nose cones. 112:25
- Realizing a da Vinci dream — man-powered flight — under conditions set by the British Royal Aeronautical Society won Bryan Allen and associates 50,000 pounds sterling. 112:149
- NASA has patented a process that appears to control cell division by changing ion concentrations within a cell. 112:134
- University of Utah researchers have developed what they believe is the first three-dimensional medical X-ray imager. Its primary benefit may be as a diagnostic tool for abdominal scans. 112:217

Science & Society



- Geophysicist Frank Press became the President's science advisor and director of the Office of Science and Technology Policy. 111:119, 215, 250
- As deterrents to proliferation of nuclear



- weapons, President Carter announced an indefinite deferral of the reprocessing of commercial spent fuel, and Congress passed the Nuclear Antiproliferation Act, but a study by Oak Ridge National Laboratory concluded that any country with access to spent fuel could build a "quick and dirty" reprocessing plant to produce bomb-grade plutonium. 111:60, 244; 112:231, 357
- A study of the 14-year decline in Scholastic Aptitude Test scores indicated that changing cultural attitudes and student demographics are to blame, not the test. 112:148
- The United States and Soviet Union renewed for five years their agreement to share information and perform joint research in the sciences and engineering. 112:36
- A national commission proposed new, separate rules to cover the use of prisoners, children and mentally ill subjects in biomedical research. 111:230
- Two sociologists conducted a study of the peer-review system for evaluating research grant proposals and found the system is eminently fair and equitable, with no sign of systematic bias. 111:170
- The Human Rights Committee of the National Academy of Sciences announced a program to support and identify scientists abused and repressed by their governments. 111:294
- Discrimination still bars many women from careers in science and engineering and harasses those who do make their way in, according to 60 women Ph.D.s at a conference on women in research. 112:279
- The swine-flu immunization program has been called a "rank political boondoggle," but it was also useful in mapping administrative and other problems that could plague future programs. 111:324
- A SCIENCE NEWS survey of leading figures in the sciences and humanities suggested that their "two cultures," described 20 years ago by C. P. Snow, still generally fail to communicate but are finding new common ground out of necessity. 111:122