

# SCIENCE NEWS of the Year

This is a review of important science news stories of 1992 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. 141 is Jan.-June; Vol. 142 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 \$1 each (prepaid); write to SCIENCE NEWS, 1719 N Street, N.W., Washington, D.C. 20036.

## 1992 Anthropology

- Investigators announced the discovery of a 5,000-year-old city in the Arabian desert. The city, possibly the legendary Ubar, was a hub of trade along caravan routes to Mesopotamia and the Mediterranean (141: 100).
- A 2.4-million-year-old fossil fragment was dubbed the earliest known direct human ancestor, although some scientists questioned that claim (141: 134).
- Two studies challenged the statistical methods used in influential analyses of mitochondrial DNA that had indicated an African origin for modern humans around 200,000 years ago (141: 123).
- Carbonized seeds found at a Sahara Desert site yielded evidence that intensive harvesting of wild plants, or possibly plant cultivation, existed in Africa 8,000 years ago, much earlier than previously thought (142: 277).
- Analysis of ancient ape fossils supported the view that humans and chimpanzees form an evolutionary lineage that does not include gorillas (142: 198).
- The frozen body of a prehistoric man found in the Alps near the Italian-Austrian border last year was dated to about 5,300 years ago, placing him in the late Stone Age (141: 253).
- Anthropologists argued that two skulls found in China and estimated to be about 350,000 years old provide evidence that *Homo erectus* populations in Africa, Asia, and Europe independently gave rise to modern humans (141: 373). Some researchers contended that *H. erectus* should be split into two species; others proposed lumping it with a diverse population of *H. sapiens* (141: 408).
- The discovery of a contorted skeleton at an Israeli site helped confirm that a major earthquake leveled the fortress town of Dor around 3,000 years ago and heralded the passing of local control from Phoenicians to Israelites (142: 303).

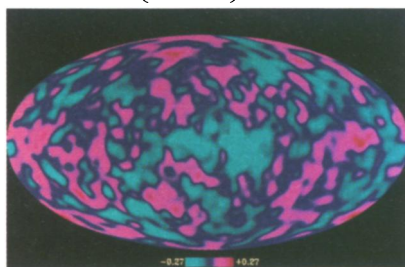
- Excavation of a 3,500-year-old site in Mexico indicated that coastal societies in the Americas often developed without relying on agricultural techniques usually considered essential to the growth of civilization (141: 86).

- Researchers debated whether recently deciphered hieroglyphics document important aspects of Maya civilization during its heyday, from A.D. 200 to 900, or present the propaganda of kings and lords (141: 40).

- A comparison of the cranial bases of Neandertals and modern humans indicated that Neandertals possessed speech and language abilities equivalent to ours (141: 230).

## 1992 Astronomy

- Using NASA's Cosmic Background Explorer, scientists detected temperature fluctuations in the radiation remaining after the creation of the universe. Cosmologists believe these fluctuations represent tiny variations in the density of matter that could have triggered the smooth primordial cosmos to evolve into the present lumpy collection of galaxies and galaxy clusters (141: 292). Using an independent sky survey, researchers found compelling evidence confirming these results (142: 420).



NASA/Goddard Space Flight Center

- Studies suggest that our galaxy and thousands of others are streaming across the sky at the furious rate of 375 kilometers per second (142: 408).

- Examining quasiperiodic fluctuations in the arrival time of radio signals from a Milky Way pulsar called PSR1534+12,

astronomers found evidence that two or three planet-like masses orbit the star (141: 20). Other researchers retracted their finding that a planet-like object orbits the Milky Way pulsar PSR1829-10 (141: 53).

- Researchers moved toward pinning down the much-debated numerical value of the Hubble constant, which plays a fundamental role in determining the age and size of the universe (142: 4).

- The detection of boron in an elderly star – also found to contain far more beryllium than originally predicted – called into question some key assumptions about the distribution of mass in the very early universe (141: 79).

- The earth-orbiting Hubble Space Telescope (HST) found evidence that the giant elliptical galaxy M87 may harbor a black hole some 2.6 million times the mass of the sun (141: 52). A dark X in an HST photo may mark the location of a black hole at the heart of the spiral galaxy M51 (141: 390). Astronomers detected infrared emissions from the center of our galaxy, indicating that a black hole about 2 million times the sun's mass lies at the galaxy's core. Scientists also reported that the hidden companion of a Milky Way star is a black hole about 8 to 15 times the mass of the sun (141: 101).

- Scientists gathered fresh evidence that millions of minigalaxies merged to form today's collection of spiral and elliptical galaxies (142: 22).

- Researchers detected molecular gas at the extreme fringes of the Milky Way disk, as well as 1,000 light-years above and below the plane of the galaxy (142: 13).

- After a lengthy period in which supernova 1987A remained quiet or emitted only faint radio signals, the star resumed broadcasting relatively strongly at radio wavelengths (141: 20).

- Astronomers who probe the early universe typically study distant, luminous galaxies near the edge of the observable cosmos. But newly discovered dim galaxies that are far closer to Earth may also illuminate conditions in the young cosmos (141: 36).

- Astronomers detected the most distant object known to undergo gravitational lensing (141: 410). HST captured the sharpest image of a lensed object (142: 260).

- For the first time, astronomers detected high-energy gamma rays from an object outside our galaxy (142: 85).

- HST revealed that some globular clusters — dense collections of stars that normally range in age from 10 billion to 15 billion years — are less than one-tenth that age (141: 52).

1992

## Behavior

- A psychologist reported that infants 5 months old can add and subtract small numbers of items (142: 132). Other evidence suggested that babies rely on surprisingly specific cues from their surroundings to retrieve memories (141: 244) and employ innate knowledge to reason about moving objects (142: 325).

- Researchers found that mild to moderate depression boosts the impact of several risk factors for serious blood-vessel disease (141: 196). Depression was also linked to a more rapid physical decline and higher death rate among men in the early stages of infection with the AIDS-causing HIV virus (142: 53).

- Controversial evidence based on a twin study suggested that genes exert an important influence on the sexual orientation of men (141: 6). Another twin study indicated that genes substantially influence the development of female homosexuality (142: 117).

- Researchers proposed that the reading disorder known as dyslexia ranges from mild to severe, with no clear cutoff between dyslexics and good readers (141: 36). Further data suggested that dyslexics have difficulty matching letters with appropriate sounds (142: 212).

- An antidepressant drug known as clomipramine diminished many impulsive and ritualistic behaviors of autistic children in two studies (141: 164).

- Scientists found that anxiety before surgery — but not relaxation training — protected patients from a potentially harmful postoperative surge of stress hormones (141: 406).

- Psychologists described a vicious cycle in which workplace contaminants cause headaches, fatigue, and other symptoms that then intensify for a variety of psychological reasons (141: 260).

- A twin study found that environment is the predominant influence on alcoholism among women of all ages and men who start imbibing during adulthood (141: 69). However, other researchers asserted that genes play a key role in female alcoholism and that a specific gene helps predispose people to indulge heavily in many types of drugs (142: 332).

- In a finding that challenged widely held assumptions about child care, researchers found that infants in an African foraging group, who spend large amounts of time away from their mothers, established close emotional ties to many caregivers (142: 69).

- Tests with a sea lion suggested that logical judgments formerly thought possible only by humans do not depend on the ability to use language (142: 293).

- Experiments indicated that multiple demands on conscious thought in social situations promote false impressions of other people (141: 200).

- A controversial theory held that the brain constructs multiple versions of experience rather than producing a “stream of consciousness” (142: 232). Established theories that assume unconscious rules guide mental life received a philosophical challenge (142: 264).

- Studies of depressed people suggested that they certify their low self-esteem by seeking out negative comments from loved ones and friends (142: 110).

1992

## Biology

- By finding a naturally occurring protein that prompts mature nerve cells to grow and divide, neuroscientists overturned the theory that central nervous system nerve cells in adult mammals lose the ability to reproduce (141: 212).

- Identical twins may not be so identical after all: A geneticist reported evidence that such twins result from tiny genetic mutations that lead one portion of a developing embryo to reject the other as foreign, causing the two to split (142: 84).

- Geneticists mapped two human chromosomes — chromosome 21 and the Y chromosome — in their entirety, a significant advance in the Human Genome Project (142: 212). They also found a gene responsible for characteristics that trouble an individual's risk of myocardial infarction (142: 92) and a gene that may predispose a person to develop hyper-

tension (142: 230). They also identified genes responsible for myotonic dystrophy (141: 102), maturity-onset diabetes of the young (141: 300), two forms of the eye disorder macular degeneration (142: 37), and a gene that predisposes women to breast cancer following exposure to extremely low doses of radiation (141: 4).

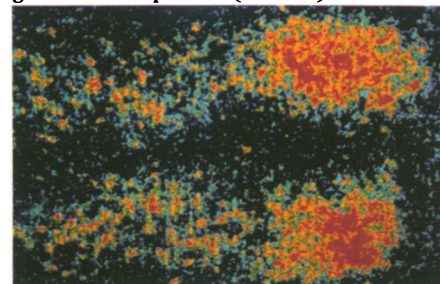
- In a major step toward understanding how higher organisms copy their genes, biologists isolated a cluster of proteins that initiates the process in baker's yeast (141: 340).

- Scientists developed the first animal model for cystic fibrosis by inserting copies of the defective gene that leads to the disorder into mice (142: 154).

- A botanist found evidence that a distant ancestor of a desert shrub known as “Mormon tea” was the first to develop endosperm, a nourishing seed structure that allowed the evolution of flowering plants (141: 38).

- A group of plant biologists permanently transferred a foreign gene into wheat, paving the way for future improvements in that important food crop (141: 379). Another such group developed two genetically engineered rice varieties that resist infection by the rice stripe virus, a major scourge (142: 261).

- Two light-sensitive genes may help mammals reset their biological clocks, geneticists reported (141: 196).



Jon B. Kornhauser, Joseph S. Takahashi

- Geneticists determined that a gene that controls the programmed death of unnecessary cells in a developing roundworm resembles a human gene responsible for some common cancers of the lymph nodes (141: 230; 142: 229, 344).

- Agriculture Department scientists declared nickel essential to the healthy growth and reproduction of plants — the first addition to the required-plant-nutrient list in 38 years (141: 270).

- Contrary to what many pediatricians preach, children do not grow steadily, but rather in occasional spurts, an anthropologist demonstrated (141: 102).

- A brain protein called galanin may dictate an individual's appetite for fat, neuroscientists reported (142: 311).



- Infectious disease experts found Asian tiger mosquitoes carrying the dangerous eastern equine encephalitis virus in a tire dump in Polk County, Fla. (142: 79).

- Transplant researchers created a human-sheep chimera by implanting human bone marrow cells into a sheep fetus, a new technique that could one day be used to treat human fetuses with genetic blood disorders (141: 182).

- Antioxidant vitamins help plants withstand stress, a university entomologist reported (141: 94).

1992

## Biomedicine

- On the AIDS front, researchers split over the survival benefits of zidovudine (AZT) after conflicting reports on whether early treatment with the drug prolongs the lives of AIDS patients (141: 100, 300). A panel of the Food and Drug Administration (FDA) advised approval of the anti-AIDS drug dideoxycytidine (DDC) for use in conjunction with AZT (141: 303). AIDS researchers reported evidence suggesting the discovery of a new virus that can cause an AIDS-like illness (142: 70). And scientists developed a vaccine that protects chimpanzees against infected white blood cells and found a primate species besides humans and the endangered chimpanzee that they can use in vaccine tests (141: 405).

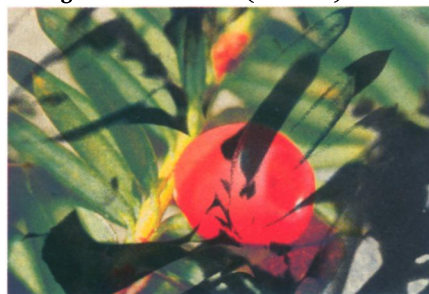
- Epidemiologists found evidence that high concentrations of iron stored in the body may be a more significant risk factor for coronary disease than elevated concentrations of cholesterol in the blood (142: 180). Heart researchers discovered that patients with unstable angina face an elevated risk of suffering a heart attack during a hospital stay if their blood contains the protein cardiac troponin T. Another study hinted that such patients may suffer recurrent chest pain – and even heart attacks – when they stop taking heparin, a widely prescribed anticoagulant (142: 38).

- Heart researchers discovered evidence that a diet high in calcium may lower an individual's risk of high blood pressure (142: 340). Others found that treating hypertension can stop, and even reverse, kidney damage caused by the disorder – at least for nonblacks (142: 388).

- A series of studies indicated that tamoxifen – a drug used to prevent breast cancer recurrence – might itself induce cancers (141: 266). The National Cancer Institute launched a cancer-prevention trial using

tamoxifen in healthy women, even as a new and potentially lethal side effect was reported (141: 309). At a congressional hearing, researchers challenged the government's claim that women recruited for the trial had had adequate notice of potential risks to give their informed consent to participate (142: 378).

- Cancer researchers confirmed that adjuvant therapy – postsurgical treatment with drugs – improves survival among women with early stages of breast cancer. Oncologists also reported encouraging results against breast cancer with an experimental drug (taxol) derived from yew tree bark (141: 124). Another study reported that sloughed-off cells in breast fluid may one day become a technique for monitoring breast-cancer risk in non-nursing women (141: 165). Other research traced some women's elevated breast cancer risk to exposure to high levels of estrogen in the womb (142: 293).



- An elevated concentration of a protein called prostate-specific antigen in the blood serves as a better tip-off to cancer of the prostate than a rectal examination does, researchers determined (142: 94).

- Pilot studies suggested that drugs that prevent ovulation may help protect women from cancers of the breast, endometrium, ovaries, and cervix (142: 298).

- Heritable defects in the p53 gene can show up in cancer patients with no family history of the disease, geneticists reported, which suggests that physicians could someday use tests for defective p53 genes to identify patients at high risk of developing cancer (141: 324). Preliminary tests determined that the amounts of protein produced by a cancer-associated gene, retinoblastoma, can predict the aggressiveness of particular cancers (141: 348). And cancer researchers reported encouraging results in using monoclonal antibodies to block the activity of the cancer-promoting gene HER-2/neu in women with breast or ovarian cancer (141: 372).

- The National Institutes of Health approved a number of gene therapy protocols, including plans to repair the cancer-causing genetic defects of patients with non-small-cell lung cancer (142: 207), a proposal to insert "suicide genes" into the tumors of patients with brain cancer

(141: 372), and three proposals to correct the genetic defects underlying cystic fibrosis (142: 405).

- Sex became riskier than ever: Infectious disease specialists reported that the sex partners of heterosexual men and women infected by the virus that causes genital herpes run a "substantial" risk of catching the disease, even when the infected partners show no symptoms. Moreover, a statistical analysis indicated that people with genital herpes have an increased chance of infection with human immunodeficiency virus (HIV), which causes AIDS (141: 68). Another study concluded that nonoxynol 9, the active ingredient in most spermicides, provides no protection against HIV (142: 54).

- The FDA considered approving the first condom-like contraceptive designed for women: a plastic sheath that lines and shields the vagina (141: 168). An epidemiological study also found that a diaphragm or contraceptive sponge provides some women with better protection against certain sexually transmitted diseases than does relying on their male partner's use of a condom (141: 310).

- Besides its controversial use in inducing abortions, the drug RU 486 makes an effective "morning-after" birth control pill, obstetricians reported (142: 228).

- Researchers discovered that nitric oxide triggers the male erection, opening the door to better understanding of the causes of impotence (142: 10).

- Epidemiologists found that marrying a smoker increases a nonsmoking woman's risk of developing lung cancer, while childhood exposure to a smoking parent does not boost her lung cancer risk. A related study also indicated that a mother's smoking may elevate a child's risk of asthma (141: 54).

- Current tests for Lyme disease have major accuracy problems: Pediatricians found that such tests misdiagnosed nearly one-half of a group of children who never developed the disease (141: 325). Researchers seeking a vaccine for Lyme reported that vaccination with either of two specific proteins isolated from the bacterium that causes the disease protected mice from infection (141: 396).

- Researchers reported evidence that Alzheimer's disease may result from an imbalance between two biochemical pathways for breaking down a precursor of beta amyloid, a major constituent of the brain-wrecking plaques characteristic of Alzheimer's (141: 152). Other researchers have found surprising evidence that the immune system plays a role in the development of Alzheimer's disease (142: 394).

- A controversial scientific report claimed that a new type of cell therapy boosted the muscle strength of boys suffering from Duchenne muscular dystrophy (141: 167).

- A preliminary study suggested that an enzyme that breaks down DNA can cut through the thick mucus that clogs the lungs of cystic fibrosis patients (141: 220).

- In experiments that offer hope for patients with spinal cord injuries, neuroscientists found that transplants of Schwann cells – cells that normally coat nerves (141: 270) – or transplants of cells genetically engineered to produce nerve growth factor (142: 317) can coax severed spinal cord nerves in rats to grow toward one another.

- Neuroscientists determined that biochemical defects that prevent brain cells from generating sufficient energy may prompt the brain-tissue death responsible for Huntington's disease (142: 292).

- Three separate studies indicated that transplants of fetal brain tissue can ameliorate the symptoms of Parkinson's disease and reduce patients' need for escalating doses of drug therapy (142: 372).

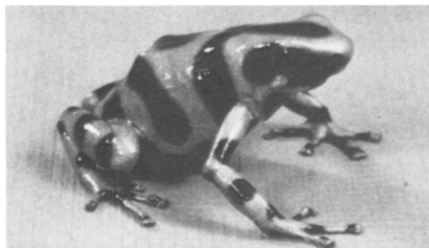
- Infusions of white blood cells called killer T cells can arm bone marrow transplant recipients against a virus that often causes deadly lung infections, researchers found (142: 21).

- High blood pressure, even if well controlled by medication, may cause the brain to shrink, researchers who study aging reported (142: 166).

- A computer program for analyzing data from X-ray diffraction studies greatly accelerated the process of determining the structure of crystals (142: 118).

- Chemists developed alternative sources of taxol, the promising anti-cancer drug found in yew bark (141: 244).

- The toxic skin of a colorful frog from Ecuador has yielded a powerful analgesic that works differently than morphine (142: 40).



George Grill/National Aquarium

- Scanning tunneling microscopy (STM) made possible the creation of the tiniest battery yet (142: 102) and the splitting of individual molecules (141: 206). Researchers used hydrogen to peel off surface atoms so they could examine the structure of semiconductors with STM (141: 38) and fitted an STM with a flexible metal tip to map variations in a surface's magnetic force (141: 135, 206).

- Modified atomic force microscopes that monitor friction can determine the nanoscale distribution of the surface's chemical components (142: 183).

- Chemists made great strides in harnessing enzymes to make complex molecules in a one-flask process (142: 148).

- Computer simulations of cluster collisions pointed to new chemistry (142: 52). Other simulations yielded better protein designs (142: 132), revealed the three-dimensional shape of catalysts (141: 229), and improved understanding of atomic interactions in friction (141: 360).

- Cultured "hairy roots" mass-produce key plant compounds (141: 366).

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## 1992 Computers & Math

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- Advances in theoretical computer science pointed to a powerful means of checking the correctness of specific answers supplied by a computer program (141: 382).

- New ways of looking at mathematical knots revealed surprising links between several different areas of mathematics (141: 186).

- Mathematicians unveiled a new kind of "chaos" embedded in remarkably simple mathematical expressions (142: 329).

- A trio of mathematicians proved the existence of an infinite number of so-called Carmichael numbers (142: 182).

- Researchers developed a neural network that teaches itself to judge depth and recognize objects (141: 23).

- Computer scientists uncovered the 32nd Mersenne prime number, the largest prime yet discovered (141: 213).

- A mathematical model of wave generation in a chain of coupled oscillators provided insights into lamprey locomotion (141: 39).

- A group of mathematicians discovered a new minimal surface having the same basic properties as the helicoid (142: 276).

- A novel variation on random walks provided a promising new mathematical model for studying the spread of populations (141: 84).

- World champion Marion Tinsley defeated the checker-playing computer program Chinook in a championship match (142: 217).

- Mathematicians refined their understanding of the tricky problem of turning a sphere inside out into a surprisingly simple, easy-to-visualize model (141: 404).

- A space-shuttle experiment provided evidence supporting a mathematical theory for modeling liquid surface behavior in a microgravity environment (142: 124).

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## 1992 Chemistry

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- Geochemists discovered fullerenes in rock (142: 20), while Japanese scientists mass-produced fullerene tubules (142: 36). Other researchers caused vaporized fullerenes to coalesce into giant fullerenes (142: 149) and fullerene tubules to form concentric spheres (142: 277).

- Theorists created fullerenes with seven-sided rings (141: 85) and showed that tubules act as molecular straws (142: 327). Other scientists used fullerenes to make diamonds (141: 108) and to filter and trap gases (141: 356).

- A cage-like molecule containing eight titanium and 12 carbon atoms (141: 250), a hollow tungsten-disulfide structure (142: 389), and predictions of others with 32 boron and 32 hydrogen atoms (141: 406) expanded the range of fullerene-like molecules.

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## 1992 Earth Science

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- The largest California earthquake in 40 years struck near the desert town of Landers on June 28, providing some of the best data seismologists have ever collected and raising new questions about how earthquakes work (142: 72). The Landers quake hit in an area that had suffered a strong shock in April (141: 293).

- Geologists reported finding strong evidence that a circular structure buried beneath the Yucatán Peninsula is actually a crater left over from the cataclysmic crash of a meteorite or comet 65 million years ago (141: 56; 142: 100).

- Research planes flying in the Arctic detected signs that chemical pollution has destroyed significant amounts of

ozone there and will likely destroy even more in coming years. The field experiment also showed that the global ozone layer is more vulnerable to chemical pollutants than previously thought (141: 84, 308).

- The ozone hole over Antarctica expanded to a record size this year (142: 229). Measurements also indicated that ozone values reached an all-time low at the South Pole, partly as a result of sulfuric acid aerosols from last year's eruption of Mt. Pinatubo (142: 278).

- The Intergovernmental Panel on Climate Change reaffirmed that greenhouse gases would warm the climate significantly but said sulfuric acid haze from industrial pollution would slow the warming (141: 232). Researchers reported that haze from agricultural fires could also reduce the rate of global warming (141: 343). Studies suggested that solar changes influence the scale of climate change but cannot prevent global warming (142: 282).

- Two seismologists challenged the standard theory of describing earthquake behavior (141: 136).

- After rising sharply for the last decade, the global average temperature declined during the first half of this year as a result of sulfuric acid aerosols from Mt. Pinatubo (142: 37). In the Pacific, an El Niño warming developed during late 1991 and then dwindled by the summer of 1992 (141: 37; 142: 5).

- Studying oxygen isotope changes in a Nevada mineral deposit, researchers challenged the widely accepted idea that variations in Earth's orbit control the timing of ice ages (142: 228).

- Two investigators reported that pieces of Earth's crust do not sink easily into the lower mantle, but instead hit a formidable barrier at the division between the upper and lower mantle (141: 132).

- By correlating volcanic deposits on either side of the Atlantic, geologists detected evidence of the largest volcanic eruption in the last half-billion years (142: 260).

- Studies of glaciers in the temperate and tropical latitudes provided evidence that these regions have warmed considerably, in some cases exceeding the normal range of climatic variations in the last five centuries (141: 148).

- Weather data indicated that temperatures in the United States, China, and the former Soviet Union have increased mostly at night during the last four decades, with daytime temperatures remaining nearly steady (141: 4).

- Ancient ice drilled in Greenland shows that during the last ice age, the climate changed dramatically over spans as short as a year or two (142: 404).

- A panel of scientists rejected the controversial claim that the proposed site of a U.S. nuclear waste repository is prone to flooding (141: 247).

- Engineers built an eight-legged robot to study the inside of a volcanic crater in Antarctica (141: 376). But the robot broke half its legs during a test, and the project was postponed (142: 326).

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1992

## Environment

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- Negotiators representing 178 nations concluded 12 days of deliberations at the Earth Summit in Rio de Janeiro, Brazil. They produced a host of documents, including two proposed treaties — one to control greenhouse-gas emissions, the other to protect biological diversity (141: 407).

- The first global survey of soil erosion showed that since World War II, more than 3 billion acres of cropland — an area larger than China and India combined — have been damaged by human activity and will prove costly, if not impossible, to reclaim (141: 215).

- In February, the United States decided to accelerate its phaseout of chemicals regulated under the Montreal Protocol (141: 102). Later, representatives of more than half the world's nations agreed to make related revisions in the Montreal Protocol. Their changes would not only accelerate the phaseout of previously targeted ozone-destroying pollutants, but also initiate this treaty's regulation of three additional chemicals (142: 415).

- Though smoke from oil wells set afire during the Persian Gulf War traveled farther than atmospheric researchers had expected (141: 159), oil spills and fires damaged Gulf ecosystems less than expected, an international team of marine scientists reported (142: 143).

- In July, an appeals court struck down a 1989 air pollution standard that set worker exposure limits on 428 toxic chemicals (142: 39).

- A new Environmental Protection Agency (EPA) report concluded that airborne cigarette smoke should be designated "a known human carcinogen" and estimated that it causes some 3,000 lung cancer deaths among nonsmokers annually. Another report found that employers cannot rely on protecting workers from

smoke merely by limiting smoking to certain areas of the workplace (142: 127).

- Researchers associated several new adverse health effects with smoking — slowed bone repair (141: 133), potentially fatal coronary-artery spasms (141: 204), and the development of serious cataracts (142: 134).

- New studies calculated that drinking water contaminated with arsenic at the current federal limit poses a 1 percent lifetime risk of cancer — on a par with that from radon and environmental tobacco smoke (141: 253).

- Something in chlorinated water appears to foster bladder and rectal cancer, a new study suggested (142: 23).

- TCDD, the most potent dioxin, appears to function in the body as an "environmental hormone," a series of studies indicated. This insight may explain the chemical's perplexing array of biological effects — from cancer and immune system abnormalities to reproductive changes (141: 24, 359). Some 100 U.S. sites "contain serious dioxin contamination," totaling approximately 500,000 tons of wastes that await cleanup, the Office of Technology Assessment reported (141: 30).

- The administrator of EPA announced a series of initiatives to strengthen his agency's science programs and responsibilities after an internal audit found many of them wanting (141: 234).

- Naturally occurring humic acids in both groundwater and surface water can leach radioactive materials from borosilicate glass, the type planned for long-term encapsulation of radioactive wastes, a federal lab showed (141: 173). Another study conducted at that lab showed long-term exposure to moisture can transform the structure of that glass, causing it to release radionuclides into water (141: 294).

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1992

## Food Science

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- Antioxidant vitamins were shown to offer many health benefits as dietary supplements — from protection against exercise-induced muscle injury in athletes (141: 398) to protection from atherosclerosis (141: 198; 142: 76).

- An ongoing study of nearly 90,000 female registered nurses, begun in 1980, found no link between dietary fat and breast cancer (142: 276).

- Several existing and potential food additives appear to offer prospects of fighting cancer (141: 104).

- Restricting dietary protein in rats prevented cancer and many of the age-related changes previously seen only in animals raised on diets that severely restricted calories (142: 346).

- Scientists made progress in developing edible films (141: 12).

- Experimental repartitioning agents – drugs to increase an animal’s conversion of food into muscle – outperformed breeding in producing leaner livestock (141: 143).

- An analysis of serious food allergies – which may claim more children’s lives than insect stings – identified several factors that appear to distinguish individuals at highest risk of fatal reactions (142: 87).

- Broccoli contains a chemical that stimulates animal and human cells to produce cancer-fighting enzymes, a pharmacologist reported (141: 183).

- A study of Seventh-Day Adventists indicated that adults may reduce their risk of heart disease by eating nuts and peanuts (142: 52).

- Meta-analysis of 27 studies reconciled apparently contradictory evidence concerning dietary cholesterol’s impact on cholesterol in the blood (141: 390).

- A chemist discovered his grandmother was right after all – green tea contains compounds that fight dental caries (141: 253).

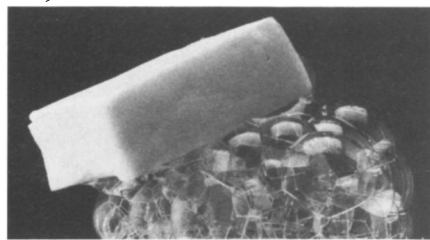
- Physiologists pinpointed the chemical responsible for the taste of beef – a short, 8-amino-acid peptide (141: 231).

- Chemists produced a see-through magnetic material by forming microscopic iron oxide particles in an ion-exchange resin used to soften water (142: 20). They also made a see-through conductor in which strands of metallic beads are embedded in a polymer (141: 68).

- Now light-emitting polymers come in many more colors and glow much more brightly because of new kinds of polymer building blocks (141: 164); some polymers even flex (141: 388).

- Scientists are learning how to make stronger materials by studying the structure of natural ones (141: 328).

- Physical chemists made a lighter-than-air agarose gel (142: 7). Aerogels were shown to be the best insulators known (141: 175), as well as useful filters (141: 300).



- In reversing electric fields, a new polymer wiggles like a muscle (141: 127).

- Enzymes immobilized in glass remain active and can function as molecular biosensors (141: 319).

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## Paleobiology

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- While geologists have strengthened the theory that a huge meteorite or comet slammed into Earth 65 million years ago, paleobiologists have discovered that not all animals and plants died off suddenly at this time (141: 72).

- Paleontologists working in Greenland discovered the fossil of an unusual animal from the early Cambrian period that may help sort out some of the odd creatures from this pivotal time in evolutionary history (142: 22).

- Studies of a tiny fossilized tooth from Australia threatened to overturn the standard theory about how marsupial mammals came to dominate the land down under while losing out to placental mammals everywhere else (141: 228).

- A team of researchers identified a protein in dinosaur bones, opening up the possibility of using ancient molecules to sort out the relationships between dinosaurs and other creatures (142: 213).

- By comparing DNA samples from extinct moas, researchers detailed the evolutionary history of flightless birds (142: 183). Other researchers found the oldest known DNA – in some 30-million-year-old bugs encased in amber (142: 280).

- Researchers studying fossils of an early whale reported finding strong evidence that the creature split its time between life on land and life underwater (142: 309).

- A study of marine invertebrates that originated in the last 250 million years suggested that the tropics favor development of new organisms (142: 30).

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## Physics

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- Scientists in the GALLEX collaboration reported detecting fewer solar neutrinos than predicted by theory, but the number was large enough for them to conclude that they had detected low-energy neutrinos produced by the initial step in the chain of fusion reactions at the sun’s core (141: 388).

- Researchers described the application of “squeezed light” to the detection of energy-level transitions in an atom (141: 356).

- Evidence mounted that planetary orbits are chaotic, suggesting limits on predictions of the solar system’s long-term future (141: 120, 231).

- Computer simulations of supercooled water suggested that water has a second critical point, which involves two phases of amorphous ice (142: 391).

- Researchers uncovered a number of novel behaviors exhibited by electrons confined to spaces small enough for quantum effects to become important (141: 222).

- Laser heating of a particular surface of a lead crystal furnished the clearest evidence to date of “superheating” in a metal crystal (142: 164).

- Researchers obtained the best experimental measurement yet of a neutrino’s mass (141: 292).

- Though particle physicists failed to find the elusive top quark, they collected sufficient data to set new upper and lower limits on its mass (141: 189).

- Advances in the precision of both theory and experiment spotlighted the helium atom as a prime setting for testing fundamental physics (141: 263).

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## Materials Science

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- The controversy over light-emitting porous silicon continued unabated. Chemists showed that microscopic silicon particles suspended in liquid luminesce orange-red (141: 7). They discovered that they could reproduce glowing images by projecting them onto a silicon wafer during etching (141: 423) or alter the color of light emitted by adding oxygen and heating the silicon before etching it in acid (141: 103). Researchers who think siloxene causes silicon’s glow made prototype siloxene devices (141: 324); other scientists eroded wafers with sparks to make silicon porous (142: 292).

- New techniques led to nanocrystals of silicon from solution (142: 214) and to nanochannel glass arrays (142: 318).

- Researchers failed in several searches for deviations from Newton's law of gravitation to establish the existence of a previously unknown "fifth" force (141: 14; 142: 215).
- As a by-product of a search for an extremely rare type of radioactivity, researchers detected the step-by-step transformation of a single atomic nucleus through four stages (141: 302).
- Experimental evidence suggested that cosmic rays can trigger the normally unlikely formation of one form of superfluid helium-3 at the expense of another (142: 38).
- Physicists obtained a hint that quantum tunneling within a tiny magnet allows transitions from one magnetic-field direction to another in large aggregations of atoms or ions (142: 295).

1992

## Science & Society

- The President proposed a cut in federal spending on defense but earmarked a 4 percent increase — after inflation — for civilian research and development (R&D) for fiscal 1993 (141: 86). In contrast, Congress appropriated bigger increases for defense than for civilian spending for fiscal 1992 (141: 92).
- The President signed into law the Energy Policy Act of 1992, legislation to decrease dependence on imported oil and increase reliance on conservation, renewable resources, and energy sources that create less pollution (142: 350).
- Several major surveys analyzed likely causes and implications of a U.S. decline in industrial research supremacy and offered recommendations for turning things around (142: 190).
- Together, the threatened strike at a Canadian reactor and the publication of a new federal report brought home the serious research implications of having no reliable U.S. source of many important isotopes (142: 68).
- A federal court judge issued an injunction blocking Energy Department plans to begin shipping nuclear-defense wastes to the Waste Isolation Pilot Plant (WIPP) in New Mexico (141: 101). The President signed into law provisions designed to guarantee that tests on the nuclear wastes could begin within 10 months (142: 350).
- Two studies argued that the federal government should target more of its

research spending toward solving national problems — and be prepared to kill programs that aren't meeting well-articulated objectives (142: 238).

- President Bush vetoed legislation that would have lifted the current ban on federal funding of research involving the transplantation of tissue from electively aborted human fetuses (142: 15, 271).
- An appeals court ruling upheld the controversial Delaney clause — which requires the Food and Drug Administration to prohibit the sale of processed foods containing higher levels of carcinogens than existed in the raw foods from which they were made (142: 39).
- A Senate subcommittee report criticized the accounting and oversight of spending by federally funded, privately operated R&D centers (142: 61).

• Scientists criticized a widely quoted, unpublished National Science Foundation (NSF) report forecasting a shortfall of 692,000 U.S. scientists and engineers within 20 years, saying the forecast was flawed, grossly exaggerated, and misused (141: 303).

- Standardized and textbook-prepared tests exert a strong detrimental influence on elementary and high-school science and math teaching, a \$1 million NSF study concluded (142: 277).
- An expert panel found that the controversial genetic identification technique known as DNA fingerprinting offers a valid and useful way to collar criminals, but it also recommended tighter standards for use of the procedure (141: 261).

1992

## Space Science

- Scientists detected the most distant object ever imaged in the solar system—a body in the frozen reaches beyond Pluto and Neptune. This object may reside in the Kuiper belt, the purported reservoir of short-period comets (142: 196).
- Space scientists discovered a puzzling, 200-kilometer-wide object circling the sun between the orbits of Saturn and Neptune. It is only the second large, asteroid-like object found in that part of the solar system and is redder than any known comet or asteroid (141: 87).
- Exactly 500 years after Columbus landed on the shores of the New World, astronomers began the most extensive search ever attempted for intelligent life in the universe (142: 317).

• Astronomers produced a sharper visible-light image of the dusty disk surrounding the star Beta Pictoris — a possible solar system in the making. Another research team reported that the disk contains the same type of dust as comets and Earth rocks (141: 413).

- The Gamma Ray Observatory (GRO) detected an afterglow of neutrons and gamma rays emitted from the sun's upper atmosphere hours after a solar flare erupted. In depicting the spray of solar neutrons, the GRO became the first instrument to use these subatomic particles to produce a celestial image (142: 54).
- When the Giotto spacecraft flew within 200 kilometers of Comet Grigg-Skjellerup in July, it established a new record as the closest visit yet to the core of a comet (142: 78).

• New laboratory experiments suggested that noble gases trapped in the icy nuclei of comets helped create the atmospheres of Mars, Venus, and Earth (142: 150).

• For decades, astronomers regarded comets as flying snowballs mixed with small amounts of rocky debris, dust, and organic goo. But a new analysis of infrared data suggests that comets resemble mudballs, with rocky debris accounting for three-quarters of their mass and half their volume (141: 170).

• The Magellan spacecraft produced the first radar images clearly showing evidence of landslides on Venus (141: 374). Other Magellan images suggested that subduction, one portion of the surface being pushed under another, has scarred the face of Venus (142: 86).



• A new map of the surface brightness of Pluto indicated that the planet may undergo seasonal changes during its 248-year orbit of the sun (141: 379). Astronomers detected nitrogen and carbon monoxide on Pluto; nitrogen appears to be the most abundant element on the planet's surface (142: 278).

• The satellite Yohkoh provided an X-ray view of the violence of the sun and shed new light on the evolution of magnetic structures that store and unleash vast amounts of energy in the sun's corona, triggering solar flares (141: 404).