

of the Year

“Man’s mastery of the air was improved, diseases were conquered, new chemicals were produced, the probing of the heavens, unknown lands, and the mysteries of the human past was continued, communication continued to compress the dimensions of the world, and the human mind and temperament were further explored. . . .”

However appropriate that statement may be for 1997, it actually introduced the first annual review of notable scientific advances—for the year 1927.

This year, SCIENCE NEWS celebrated its 75th anniversary. We used the occasion to step back from the rush of new research findings and ponder the larger picture of where science is going and how it is changing people’s ideas. The March 1 anniversary issue contained a timeline of scientific advances and the writers’ speculations about what awaits on the horizon. Science Service’s archive of photos from the 1920s to the 1960s, developed into an exhibit by the International Center for Photography in New York, has been displayed in New York, Washington, D.C., and the March 15 SCIENCE NEWS.

What stays the same in science and what changes? In 1927, Charles A. Lindbergh made the first nonstop flight from New York to Paris; in 1997, a spacecraft landed on Mars and relayed information back to Earth. In 1927, an electric current applied to eggs gave rise to fatherless marine worms; this year, a scientist engineered the birth of a lamb from a mammary cell of an adult sheep. The female sex hormone was detected in males 70 years ago; this month, scientists report that it has a direct effect on sperm production.

“The advances that come to fruition in one year had their foundations laid by the labors of the past year and they will in their turn contribute to the accomplishments of future years,” explained the 1927 review. This year’s review can help you track all those interconnected works.

—Julie Ann Miller, Editor

Anthropology

- The first successful isolation of mitochondrial DNA from a Neandertal fossil fueled the long-running debate over modern human origins (152: 37).
- Native Americans built large-scale earthworks in Louisiana around 5,400 years ago, a sign of surprisingly sophisticated cultural practices at that time (152: 180).
- The world’s oldest known hunting weapons, 400,000-year-old wooden spears, were excavated in a German coal mine (151: 134*).
- A new fossil analysis indicated that a largely upright stance evolved in a 9-million- to 7-million-year-old ape, upsetting notions that only members of the human evolutionary family can claim this posture (152: 244*).
- Well-preserved footprints of a person who lived about 117,000 years ago were found in South Africa (152: 117).
- New fossils of a 1.4-million-year-old human ancestor suggested that it possessed more biological variation than has often been assumed (152: 215). Scientists attributed fossils from a Spanish cave to a new Homo species, *H. antecessor*, that lived around 800,000 years ago (151: 333).
- Ugandan fossil finds dating to more than 20 million years ago may represent the earliest known ape (151: 239). New fossils of a 15-million-year-old eastern African ape revealed close evolutionary links to living apes and humans (151: 240).
- New analysis of plant remains from a Mexican cave placed squash domestication in the Americas at 10,000 years ago, considerably before the cultivation of corn or beans (151: 322).

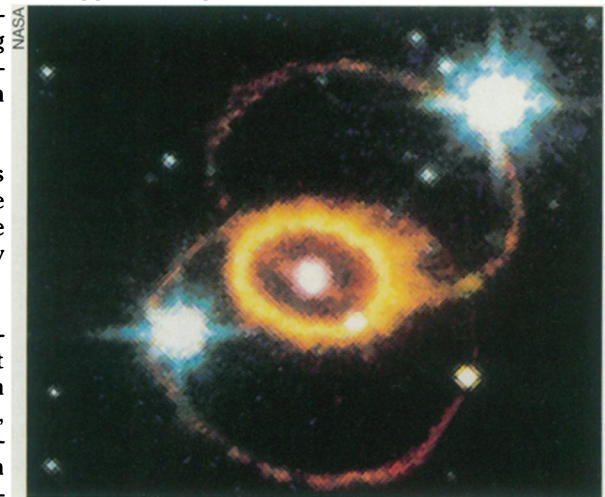


Ancient footprints in South Africa.

- Studies of X-ray-emitting gas around neutron stars and suspected black holes suggested that spinning bodies drag space-time along with them (152: 308).
- The visible-light afterglow of a gamma-ray burst coincides with the position of a faint galaxy, a discovery that may help astronomers determine the origin of bursts (151: 174*, 305; 152: 197).
- Astronomers obtained evidence of a black hole's event horizon and suggested that such holes lie at the heart of nearly every galaxy (151: 39*; 152: 346). Measurements revealed a link between the spin rate of black holes and their emission of high-speed jets of debris (151: 399). Researchers are measuring the speed at which black holes at the centers of galaxies devour their surroundings (152: 278).
- A controversial study suggested that the universe has an axis, a finding that flies in the face of the Big Bang theory and other cosmological models (151: 252*, 287*).
- The oldest stars in the Milky Way may be much younger, and the cosmos slightly older, than astronomers had thought (151: 101).
- The heart of the Milky Way pumps a foun-

tain of antimatter and hot gas into the halo of material lying several thousand light-years above it (151: 268*).

- New data may cast doubt on the first report of a planet around a sunlike star (151: 133). Researchers deduced the presence of planets orbiting other sunlike stars (151: 305).
- Astronomers are on the brink of testing whether random subatomic ripples during the first fraction of a second after the Big Bang gave rise to the cosmic structures seen today (151: 355, 368).
- High-velocity gas clouds may be the building blocks of the Milky Way and nearby galaxies (151: 55).
- A decade after witnessing the brightest supernova explosion in nearly 400 years, astronomers continued to grapple with puzzles about supernova 1987A (151: 120).

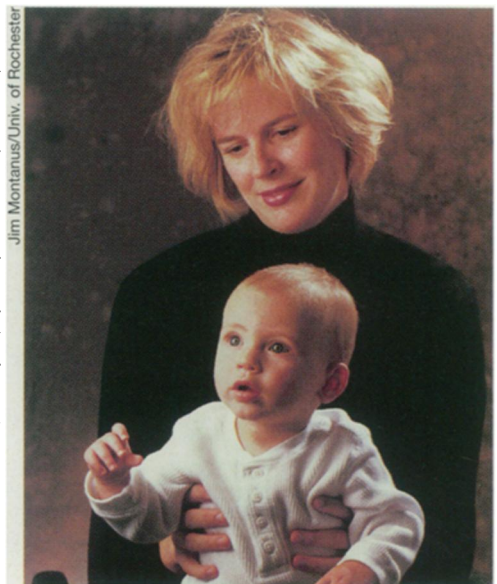


Supernova 1987A.

Behavior

- A survey of U.S. Navy recruits uncovered disturbingly high numbers of volunteers who had experienced or committed acts of physical or sexual abuse in the past (152: 116*).
- A section of the X chromosome may contain a gene that influences social thinking (151: 365).
- A severe form of grief increases the likelihood of developing a host of physical and mental ailments (151: 301*). In related studies, monkeys of low social status and people with few social ties proved more susceptible to infection with cold viruses (151: 381; 152: 11).
- Even in the poorest neighborhoods, crime rates fall if residents share a sense of mutual trust, unity, and public duty, researchers reported (152: 101*).
- Elderly spouses remember as much as or more than young married couples when allowed to collaborate during story recall, challenging the influential view that memory inevitably declines with age (152: 174).
- A community study uncovered critical influences on the development of bulimia in young women, including obesity, dieting during childhood, and strained relations with parents (152: 7*).

- Preschoolers develop a sense of right and wrong in different ways, depending on the fit between their temperament and their parents' child-rearing approaches (151: 189*).
- New evidence indicates that schizophrenia involves a prolonged process of derailed brain development (152: 261) that undermines working memory (151: 174). Other studies introduced a promising new form of psychotherapy for schizophrenia (152: 293*) and suggested that a specific genetic repetition influences the emergence of this mental disorder (152: 294).
- General reasoning skills inculcated by ultraorthodox Jewish schools in Israel prepare students to solve tricky geometry problems better than do mathematics and science classes in Israel's mainstream schools, a study found (151: 53*).
- Psychologists reported that, by 8 months of age, babies detect statistical regularities in speech that may help them learn a native language (151: 276).



Statistical steps toward language.

- The birth of Dolly, a lamb cloned from the cells of an adult ewe, surprised the world (151: 132*, 214*).
- Researchers deciphered the DNA sequence of every gene used by the bacterium *Escherichia coli* (151: 84*).
- A long-lost tree, central to the evolution of flowering plants, was rediscovered in Madagascar (152: 68*).
- Genetic analysis of wheat indicated that it was first domesticated in the mountains of southern Turkey (152: 308).



Dolly the clone.

- Pastel-pink centipede-like worms, a new species of polychaete, live in deep-sea deposits of frozen gas (152: 86).
- The cell surface protein that responds to capsaicin, the spicy agent in hot peppers, also acts as a heat sensor (152: 297).
- Insect pests have more than one way to resist the lethal effects of environmentally valuable Bt toxins (152: 343). Microorganisms, such as the bacteria that live inside nematodes, may serve as sources of biological pesticides (152: 58, 89).

- A dozen newly discovered genes on the Y chromosome are probably involved in male fertility or essential cellular duties (152: 297).
- The platypus experiences REM sleep, challenging theories about the function of this type of slumber (152: 298).
- Analysis of Y chromosomes shed light on what group of people founded Japan (151: 106).
- Investigators obtained the first images of

language-related activity in a developing brain (152: 315).

- Mutations in the gene that encodes a protein called myostatin produce cattle and mice with abnormally large muscles (152: 325).
- Debate arose over why menstruation evolved, with a new study suggesting that it is an energy-saving mechanism (151: 230).
- The uterus makes a marijuana-like compound called anandamide (151: 236).
- Primates on a low-calorie diet develop a slow metabolism, perhaps leading to longer life (151: 162*).
- Geneticists assembled the first human artificial chromosomes (151: 204*).
- A gene shared by many animal species creates doubt that eyes evolved independently many times (151: 288).
- Biologists found a molecular component of the mammalian biological clock that drives daily cycles of activities (151: 300).
- Biologists continued to unravel how the body creates a left-right axis to place its internal organs in the proper location (152: 311).
- The buildup of a brain chemical called adenosine may trigger the need for sleep (151: 316*).
- Biologists identified a gene needed for creation of bone-forming cells called osteoblasts (151: 349).
- Cocaine triggers the brain's production of a chemical that regulates food intake (152: 278).
- Specialized proteins escort RNA and other molecules from the cell nucleus (152: 316).

Biomedicine

- Two diet drugs were pulled off the market after studies suggested they can cause heart valve damage, potentially placing millions of people at risk (152: 252).
- The bacterium *Staphylococcus aureus* showed resistance to vancomycin, the lone remaining antibiotic effective against it (151: 348*).
- Stanley B. Prusiner won the Nobel Prize in Physiology or Medicine for his controversial theory of prions, malformed proteins implicated in neurological disorders such as Creutzfeldt-Jakob disease and mad cow disease (152: 229).
- The finding that inflammation plays a crucial

role in the development of heart disease forced cardiologists to overhaul traditional thinking about atherosclerosis formation (151: 374*).

- Abnormal accumulation of proteins in the nucleus of the cell may explain Huntington's disease and other brain disorders (152: 102).
- Pig viruses may infect human cells, raising concerns about cross-species transplants (151: 245).
- Cells from telomerase-deficient mice can form tumors, dimming hopes that this enzyme is a weak link in the cancer chain (152: 228*).
- Melanoma, a deadly skin cancer, can recur

after a long dormant period, invading internal organs 20 years after the initial tumor was removed (151: 383).

- Three new treatments show promise against age-related macular degeneration (152: 198).

- Proteins encoded by two genes that are sometimes defective in breast cancer seem to protect a cell's DNA (151: 386*).

- A genetic mutation may explain why some HIV-positive individuals don't get AIDS as quickly as others (152: 103). Also, people whose immune systems respond to HIV infection by producing diverse T cells may survive longer than those with less diverse defenses (151: 36).

- Defects in one gene are linked to several deadly cancers, including brain, breast, and prostate tumors (151: 191).

- An expert panel endorsed acupuncture as a treatment for certain conditions (152: 344). Another scientific panel backed specific medical uses of marijuana (151: 178*). A third recommended genetic tests for some couples to see whether they are at risk of passing cystic fibrosis to their children (151: 253; 152: 111).

- Scientists isolated human embryonic stem cells (152: 36*).

- Current methods of screening donated blood may miss fragments of a virus linked to a form of leukemia (152: 60).

- A protein implicated in Parkinson's disease may cause damage by forming abnormal clumps inside cells (151: 396; 152: 255).

- Inhaled steroids, an asthma treatment, hike the risk of glaucoma (151: 143*). Such steroids were also linked to cataracts (152: 60).

- Samples of 1918 lung tissue revealed some genes of the deadly virus that caused an

influenza pandemic (151: 172*).

- A vaccine for the diarrhea-causing rotavirus finally proved successful in a developing country (152: 263).

- Insulin may guide some of the activity of genes that direct metabolism, including sugar processing, in nematodes—a finding that may have parallels in humans (152: 276).

- Scientists found a gene in the malaria parasite that enables it to develop resistance to chloroquine (152: 340*).

- A study indicated that abortion does not increase the risk of breast cancer for most women (151: 20*).

- Antibodies can ferry radioactive atoms directly to cancerous cells, killing the cells yet causing little damage to healthy tissue (151: 117*).

- Researchers have paved the way for a genetic test for iron overload disease (151: 46*).

- Conditions in the womb can affect the risk of breast cancer and other adult diseases (151: 108*).

- Studies of mummies revealed that ancient peoples suffered from schistosomiasis and Chagas' disease (152: 136*).

- Warmth after surgery can boost survival rates (151: 220*).

- Several people in Hong Kong were infected and two died from a new influenza virus they caught from chickens (152: 372).



Mummy tested for modern diseases.

Chemistry

- Contrary to what scientists had thought, the enzyme that synthesizes DNA seems to rely more on shape than on hydrogen bonds when matching up complementary bases (151: 157*).

- Researchers have synthesized a molecular rectifier, in which electric current flows more easily from one side of the molecule to the other than in the reverse direction (152: 293*).

- Scientists took movies of the world's smallest rotary motor, an enzyme that makes fuel for biochemical processes (151: 173; 152: 262).

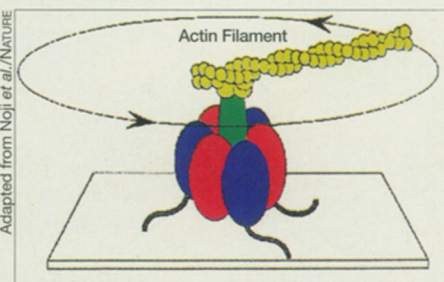
- A new slate of names for the heavy elements numbered 104 to 109 was adopted (151: 228).

- Carbon dioxide may be the ideal replace-

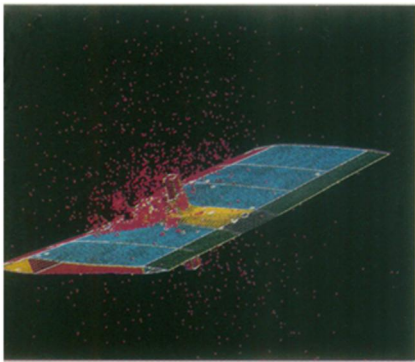
ment for the hazardous organic chemicals typically used in dry cleaning and plastics manufacturing (152: 108*).

- Converting all donated red blood cells to the universal type O (151: 24*) or masking their surface (152: 92) may keep people from becoming oversensitive to frequent transfusions, avert deadly transfusion mistakes, and make more efficient use of blood supplies.

- A protein isolated from insects acts as a potent antifreeze (152: 135*). A related protein, which controls the growth of calcite, could help researchers understand how mollusks make their shells (152: 327).



The enzyme F₁-ATPase, attached to a glass slide, spins a fluorescent actin filament counterclockwise.



Computer simulation of an airplane wing striking a vertical pole.

- A multiprocessor computer became the first machine to surpass a calculation rate of 1 trillion operations per second (151: 7; 152: 5*).
- Chess computer Deep Blue defeated world champion Garry Kasparov in a six-game match (151: 300; 152: 76*).
- In theory, quantum computations can be speeded up by letting many quantum computers work together on data encoded as particles in an entangled quantum state (151: 367*).
- The mathematics of lattices offers an alternative basis for a public-key cryptosystem (152: 12*).
- The number pi was computed to a record 51 billion decimal digits (152: 92).
- A computer program designed to reason in a general way solved a problem that had stumped mathematicians for more than 60 years (151: 176).
- A participant in the Great Internet Mersenne Prime Search discovered the largest known prime number, an 895,932-digit behemoth (152: 164*).
- Frequent spikes of high activity occurring at random times and typically lasting a fraction of a second punctuate Internet traffic (152: 53*).
- Despite strong support from statisticians, the Census Bureau's plan to increase the use of sampling in the next census has met resistance in Congress (152: 238*, 327*).
- A worldwide effort has determined the two prime factors of a 167-digit number, setting a record for the largest number yet factored (151: 340).

Earth Science



Researchers can gauge the warping of the land near the San Andreas fault using long laser beams.

- A record El Niño developed in the Pacific Ocean (151: 316*; 152: 75), altering the typical hurricane pattern (152: 245). Forecasters struggle to predict how the ocean warming will affect weather (152: 268).
- Satellite data support the controversial theory that house-size snowballs continually pelt Earth (151: 332*; 152: 117), but other evidence argues against the idea (152: 107; 152: 200, 389).
- Long ago, areas of western North America migrated northward thousands of miles (152: 164).
- Debate over the rate of global warming intensified with the detection of errors in satellite temperature data (151: 156).
- The Antarctic ozone hole reached new heights (152: 262).
- Ocean drillers pulled up the best record so far of the 65-million-year-old Cretaceous impact (151: 133).
- Microbes inhabit rock several kilometers below Earth's surface (151: 192*).
- Geologists looked down the throat of the Old Faithful geyser (152: 232).
- Rock studies suggested that Earth's outer shell became unbalanced 535 million years ago, possibly triggering an explosion of animal evolution (152: 52*).
- The global average temperature in 1996 rose to a near-record value (151: 38).
- Global warming has raised temperatures mostly at night (152: 38) and has made the world wetter (152: 341).
- Volcanic eruptions devastated the Caribbean island of Montserrat (152: 101).
- Satellite data hint that the sun's radiation is growing stronger (152: 197).
- Studies of seafloor sediments suggest that interplanetary dust may have triggered the ice ages (152: 220).
- Images of Earth's interior showed where old ocean floor goes when it sinks into the planet (152: 46).
- Continents grew surprisingly early in Earth's history (151: 70).
- The San Andreas fault showed signs of unusual activity near the town of Parkfield, Calif. (152: 8).
- Water is percolating into a proposed nuclear waste repository faster than scientists had thought (152: 277*).
- Southern California may enjoy a dearth of earthquakes for the next 5 to 10 years (151: 116).
- The geometry of faults can boost or weaken their destructive power (151: 6*).
- Nevada's Basin and Range geologic province may have stood tall and then lost elevation (151: 366*).
- Geologists investigated a huge crater in South Africa (152: 71).

- Negotiators in Kyoto, Japan, drafted a treaty that would set binding limits on greenhouse gas emissions for industrial nations (151: 320; 152: 388). Such controls may save hundreds of thousands of lives annually by cutting exposure to more conventional pollutants (152: 292*).

- Ecologists estimated the economic value of goods and services provided annually by Earth's ecosystems at \$33 trillion, almost twice the total of all nations' gross national products (151: 303*).

- A new measure of biodiversity is based on researchers' estimates of distinct populations—1.1 billion to 6.6 billion—in the world's species (152: 260*).

- Human activities now contribute more nitrogen to biological communities than natural sources do, a trend that may explain some loss of biodiversity (151: 100*).

- Conservation groups launched efforts to preserve rare breeds of livestock and to build public awareness of the genetic traits that could be lost if these animals become extinct (152: 216*).

- Dioxinlike compounds played a role in the decline of lake trout, one of the Great Lakes' top predators, and in the difficulty biologists have had in reestablishing this trout in its home range (151: 306*).

- Most electronic appliances, especially in the United States, consume energy even when they're turned off; new analyses tally the cost (152: 266*).

- Outbreaks of fish-killing *Pfiesteria* and other toxin-producing microorganisms plagued coastal areas, prompting congressional hearings (152: 149, 202*, 213).

- Low-level electromagnetic fields can block the beneficial action of certain drugs and hormones, at least in test-tube studies (152: 342*).

- The epidemic of deformed amphibians in Minnesota and elsewhere may be caused in part by an unidentified waterborne agent (152: 230*).

- Studies of mutant mice showed why male fertility depends on estrogen, thereby suggesting how estrogenlike pollutants may lower sperm counts and trigger other reproductive problems (151: 212; 152: 344, 356*). Though university scientists failed to confirm that dental sealants leach one such estrogenlike pollutant (152: 324*), federal researchers found that plastic can shed it into foodstuffs (152: 255).

- President Clinton formally proposed controversial new rules for smog ozone and soot (152: 6).

- The National Cancer Institute compiled regional estimates of exposure to fallout from U.S. nuclear weapons tests in the 1950s and 1960s (152: 231).



American Cream horses are facing extinction.

Food Science

- Women who eat whole-grain foods and other rich sources of phytoestrogens are less likely to have breast cancer (152: 230).

- Long-term use of vitamin C supplements appears to protect the eyes from the clouding effects of exposure to sunlight and oxygen (152: 244*).

- Supertasters perceive a bitterness in certain foods, causing them to shun those foods even though some—like broccoli—may ward off cancer (152: 24*). However, 3-day-old broccoli sprouts offer a more potent and palatable source of the vegetable's anticancer compounds (152: 183*).

- Recommended daily allowances (RDAs) of vitamins and other nutrients gave way to dietary reference intakes (DRIs), consumption guidelines for supporting optimum health rather than merely warding off deficiencies (151: 237).

- The Food and Drug Administration permit-

ted the first health claim for a food—low-fat, oat-rich cereals that lower cholesterol in the blood (151: 71*).

- Health benefits of another vitamin E, gamma tocopherol, surfaced in test-tube studies (151: 207).

- Supplements containing both garlic and fish oil lowered cholesterol and triglycerides in the blood of healthy men (151: 101*). Aged garlic appeared to slow the development of prostate cancer (151: 239*).

- Drinking too much coffee may cause the buildup of a potentially heart-toxic amino acid in the blood (151: 22).

- Diets rich in carbohydrates and low in fiber increase diabetes risk, a study of 121,000 nurses concluded (151: 161).

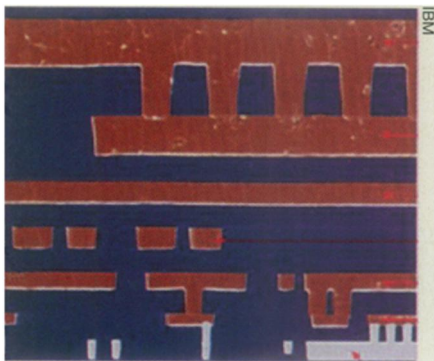
- Eating too little magnesium can make the body work harder to accomplish its tasks, a study of women found (151: 279).



Broccoli contains some potent cancer-fighting chemicals.

1997

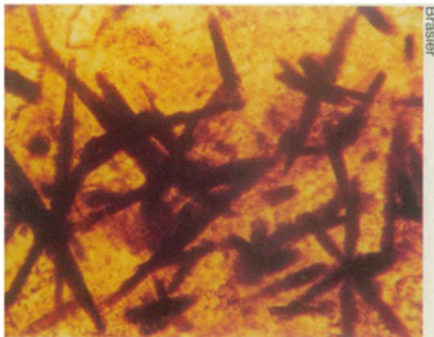
Materials Science



A cross-section of a new computer chip shows six layers of copper.

- IBM started to manufacture computer chips that use copper instead of aluminum circuitry, making them faster, smaller, and cheaper (152: 196). Also, to create sufficiently small features on chips, the semiconductor industry is developing advanced lithography methods for widespread use (152: 180, 302*).
- Images of the surface of ice may help explain its slipperiness as well as its role in atmospheric ozone depletion (151: 4).
- Pills built with three-dimensional printing technology have the potential to deliver tiny amounts of a drug (151: 205).
- Crystal structure and impurities help explain why some materials give off light when fractured (151: 303*).
- Polymers and buckyballs, usually studied for their industrial applications, may offer treatments for nerve damage caused by injury, stroke, or disease (152: 119).
- A plastic that prevents bacteria from binding to it may help prevent the potentially deadly infections that can develop around medical implants (151: 253*).
- A novel technology allowed chemists to synthesize and screen as many as 25,000 different compounds at one time (152: 278).
- A material made of arsenic and selenium shrinks and expands when exposed to polarized light, making it potentially useful for nanotechnology (152: 183).

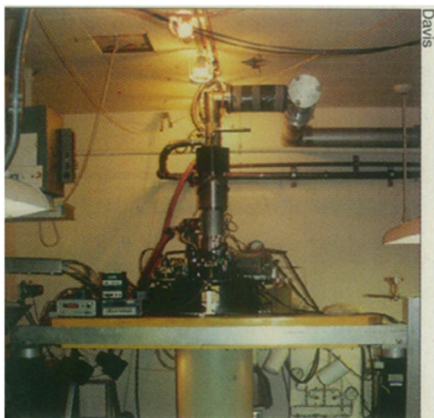
Paleobiology



Pieces of the oldest known sponges.

- A *Tyrannosaurus rex* skeleton sold at auction for \$8.36 million, raising concern among paleontologists about commercial fossil collecting (152: 382*).
- The greatest mass extinction in Earth's history may have resulted from a release of carbonated seawater (151: 74).
- Paleontologists debated whether a newly discovered Chinese dinosaur had feathers (151: 271).
- Russian scientists identified 550-million-year-old fossils of mollusc-like animals as among the earliest complex invertebrates (152: 132*).
- Dinosaur discoveries in Patagonia, Madagascar, and China rekindled debate about the hypothesis that birds evolved from dinosaurs (152: 120, 310).
- A Namibian fossil defies categorization as an animal or plant, raising questions about a bizarre group of creatures from 550 million years ago (152: 326).
- Paleontologists uncovered the earliest evidence of sponges, the most primitive type of multicellular animal (151: 206).
- Fossilized microbes were found in rocks 3 kilometers below Earth's surface (152: 181).
- A 97-million-year-old fossil with two stubby legs offered evidence that snakes came from aquatic reptiles (151: 238).

Physics

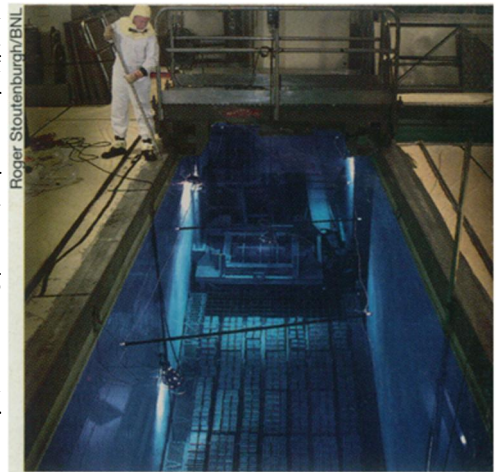


Special refrigerator used to chill helium-3 to less than 1 millikelvin.

- The detection of a matter-wave interference pattern demonstrated that the atoms of a Bose-Einstein condensate are in a coherent state and thus constitute an atom laser (151: 71*).
- Physicists uncovered evidence of a rare particle known as an exotic meson (152: 148).
- Two research groups exploited the peculiar quantum properties of superfluid helium to build gyroscopes that can be used to measure Earth's rotation rate (151: 223).
- Physicists have determined experimentally the quantum state of helium atoms passing through a pair of slits (151: 158).
- By carefully choosing how a message is encoded and decoded, it's possible to approach the theoretical maximum for transmitting information via photons or other quantum particles (151: 398*).
- An international agreement opened the way for U.S. participation in the construction and operation of the Large Hadron Collider at CERN (152: 375).
- Generating sound waves inside specially shaped cavities produces energy densities and peak pressures much higher than any previously achieved (152: 358*).
- Helium-3 atoms quantum mechanically shuttling back and forth between two reservoirs connected by an array of tiny apertures demonstrate the superfluid analog of the Josephson effect in superconductors (152: 69*).

- Russian science appears to be poised on the brink of collapse (151: 294).
- While the United States leads in most measures of scientific and technological prowess, on a per capita basis many other nations produce more research publications or more frequently cited research reports (151: 86).
- On April 29, the international chemical weapons treaty went into effect, stipulating that signatory nations must destroy their stockpiles by 2007 (151: 270).
- Overall U.S. spending on research and development was projected to climb almost 4 percent faster than inflation this year, though the federal component actually fell (151: 103; 152: 366).
- The Red River flood devastated a number of research laboratories in Grand Forks, N.D. (151: 302).

- An emphasis on science over safety led to environmental problems at Brookhaven National Laboratory—and to the ouster of the university consortium that had managed the lab for 50 years (151: 284*).
- Elementary school children in Asia outperform the rest of the world's children in science and mathematics (152: 31).
- The sciences do a poor job of retaining young talent, several surveys showed (151: 338*).
- A federal court ruled that the Food and Drug Administration can regulate tobacco as a device (151: 268).
- Researchers began grappling with the ethical and legal rights of people who donate human tissue and the obligations of those who use the tissue for research (152: 190*).



Leaking used-fuel storage pool.

Space Science

- After landing on the Red Planet on July 4, Mars Pathfinder and its rover proceeded to explore their surroundings (152: 20*, 39, 84, 264). Radio signals bounced off Pathfinder helped confirm that Mars has a core, mantle, and crust (152: 246). After failing to hear from Pathfinder for more than a month, NASA on Nov. 4 discontinued daily attempts to contact the craft (152: 330).
- Mars Global Surveyor entered orbit about the planet, the first U.S. craft to do so in 21 years (152: 182). Surveyor detected crustal remnants of an ancient, global magnetic field (152: 246), but a loose solar panel will delay its main mission until March 1999 (152: 360).
- Images, gravity maps, and magnetic field maps generated by the Galileo spacecraft are probing Jupiter's four largest moons inside and out (151: 5, 54, 194, 210; 152: 90, 330).
- Comet Hale-Bopp provided new information about the chemical contents of comets (151: 148, 222; 152: 264), surprised astronomers with its tail of sodium atoms (151: 272), and bolstered evidence that a reservoir of comets exists (151: 352).

- The search for organic chemicals and life in the solar system is focused on Saturn's moon Titan, Jupiter's moon Europa, and Mars (152: 284). Researchers continued to debate whether a Martian meteorite holds signs of ancient, primitive life (151: 87*, 190).
- A billion-ton magnetic cloud hurled from the sun on Jan. 6 squeezed and energized Earth's magnetosphere (151: 68*). A second eruption sent a giant blob of gas hurtling toward Earth on April 7 (151: 238*). Researchers have developed a new understanding of the most energetic eruptions (152: 390).
- Observations may explain why the sun's corona is much hotter than its surface (152: 295).
- A body discovered beyond Neptune's orbit hints at a new population of frozen objects at the fringes of the solar system (151: 364).



The rover Sojourner before setting out to explore the Red Planet

This is a review of important science stories of 1997 reported in the pages of SCIENCE NEWS. The reference after each item refers to the volume and page number on which the main article on the subject appeared (vol. 151 is January–June; vol. 152 is July–December). An asterisk indicates that the text of the

item is available on SCIENCE NEWS ONLINE (<http://www.sciencenews.org>).

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