

SCIENCE NEWS

of the Year

I'm amazed at how many people regard each new scientific report as THE TRUTH. They seem to view the latest research finding as the absolute answer. Science, however, doesn't work that way. Even the genius of Newton needed tweaking. Much as we might wish otherwise, the wisdom and truth of science advance in fits and starts, through revisions and sometimes reversals, rather than in a smooth march forward that expands human knowledge.

So findings from individual studies are best regarded as tentative. Science builds on the work of many, and what looks solid upon publication may crumble in time. Certainly, 1994 offers some examples of this. Consider:

- For more than 30 years, psychologists have held that excessive crowding brings out aggressive behavior in primates, including humans. But the largest study yet of primate crowding found a remarkably stable level of aggression across population densities (146: 20).

- Biologists usually depict cells as encased in smooth, flexible membranes that consist of a spherical, double layer of lipids. Now one researcher argues that the cell surface is cratered, pitted, and creased with deep labyrinths that fold into the cell's depths (145: 266).

- Since the late 1960s, atmospheric chemists have fretted that engine exhaust from a fleet of supersonic transports (SSTs) would damage the protective ozone layer in the stratosphere. New data suggest that such fleets would actually slow ozone destruction in the lower stratosphere, where SSTs fly, but that their exhaust would move to higher altitudes and seriously damage ozone there (146: 260).

- Sometimes science disabuses us of cherished notions. The devastating 1737 Calcutta earthquake and its 300,000 deaths never happened (145: 250). For some 3 decades, pediatricians have told parents to put their infants to sleep on their stomachs; now, they say parents should let babies sleep on their backs to help prevent sudden infant death syndrome (146:13). And the great attractor, a vast mass toward which the Milky Way and many other nearby galaxies seem headed, apparently doesn't exist (145: 271).

Astronomers have long disagreed about the Hubble constant, which, if measured accurately, should reveal the universe's rate of expansion. I suspect researchers will argue that issue well into the 21st century, as they will the risks of electromagnetic fields, whether dinosaurs were hot-blooded, and the origins of language. Along the way, some interesting and tentative findings will emerge to intrigue and confound scientists and our readers.

— Patrick Young

A n t h r o p o l o g y

- An Ethiopian site yielded the 4.4-million-year-old remains of a hominid dubbed *Australopithecus ramidus*, the oldest member of the human evolutionary family (146: 212).

- Research at a Siberian site raised the controversial possibility that humans inhabited northeastern Asia as many as 500,000 years ago (145: 84).

- Investigators at another Ethiopian fossil site unearthed a 3-million-year-old skull, as well as other bones, that belonged to ancient human ancestors known as *A. afarensis* (145: 212).

- Genetic traces of tuberculosis infection extracted from a 1,000-year-old Peruvian mummy confirmed that Europeans did not introduce the disease into the Americas (145: 181).

- A redating of Indonesian fossils suggested that human ancestors left Africa and reached eastern Asia at least 1.8 million years ago, much earlier than previously thought (145:150).

- Scientists announced the discovery of a Neandertal baby's remains in an Israeli cave, where the child apparently was buried around 60,000 years ago (145: 5).

- An analysis of the inner ear in fossil hominids, modern humans, and chimps indicated that *Homo erectus* was the first human ancestor to spend all its time on the ground (145: 231).

- Fossil finds in China fueled a controversial theory that primates evolved in Asia much earlier than previously thought (145: 245).

- Genetic analyses suggested adding a third chimpanzee species to the two generally accepted ones (146: 168).

N.J. Perkins, M. McNaughton/Carnegie Museum



Preliminary reconstruction of newly discovered primate in China.

- Tests revealed that a December 1993 repair mission successfully corrected the blurry vision of the \$2 billion Hubble Space Telescope (145: 52).

- Several groups reported new measurements of the Hubble constant, which indicates the age and rate of expansion of the universe. Many of the findings, including a long-awaited set of observations by the repaired Hubble telescope, reinforced the paradox that the cosmos appears to be younger than its oldest stars (146: 232, 265, 278).

- After years of searching, astronomers reported the most compelling proof to date that a black hole exists at the center of a galaxy (145: 356).

- Radioastronomers found more evidence that two planetlike bodies orbit a star 1,300 light-years from our solar system (145: 151). Images suggest that disks of dust and gas — the raw material of planets — surround at least half the stars in a nearby stellar nursery (145: 391). Astronomers gathered new evidence that one or more planets orbit the star Beta Pictoris (145: 404).

- Analysis of high-energy bursts of radiation detected by the Compton Gamma Ray Obser-

vatory suggested that they originate billions of light-years beyond the Milky Way and bear the imprint of the expanding universe (145: 85).

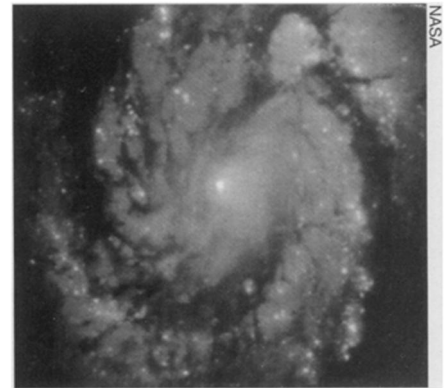
- Two studies indicated that galaxies formed stars very early in the history of the universe (145: 311).

- Two sky maps gave astronomers their first direct glimpse of gravitational ripples in the primordial universe (145: 69).

- A series of images taken by the repaired Hubble telescope showed what galaxies looked like when the universe was a fraction of its current age (145: 247; 146: 389).

- Astronomers reported that they may have found the most distant cluster of galaxies ever observed (145: 110).

- Most known quasars lie billions of light-years from Earth, but scientists confirmed that one of these brilliant beacons lies at the heart of a galaxy just 600 million light-years away (146: 235).



Galaxy M100 image taken to test repaired Hubble camera.

Behavior

- Psychologists reported that stressful or emotional events activate hormones that help preserve memories of such happenings, a finding that disputes the influential theory that memories of emotional experiences are often inaccurate (146: 262).

- The most comprehensive national survey to date found that half of all adults have suffered from a mental disorder at some time in their lives; nearly one-third have experienced one — usually major depression — during the previous year (145: 55).

- Controversial studies indicated that human decision making relies on evolved “reasoning instincts” and an inherent ability to track the frequency of co-occurring events in one’s surroundings (145: 72). Related research suggested that people appraise themselves and others better than has often been assumed (146: 280) and that specific brain systems, including those regulating emotion, direct social decisions (145: 248, 326).

- Scientists obtained evidence that babies as young as 2 months begin to babble with a rhythm and acoustic structure that underlie speech (146: 196). Another research team found that 4½-month-old babies recognize their own names (145: 389).

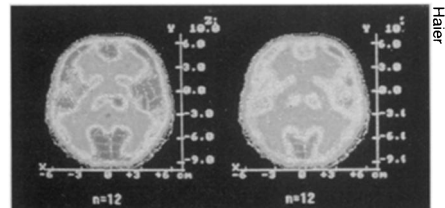
- Rhesus monkeys studied in a variety of population densities use specific behaviors to keep aggression in check under crowded conditions, defying the theory that crowding increases aggression (146: 20).

- Brain-scan investigations yielded surprising clues to the nature of intelligence, including evidence that different brain processes promote superior mathematical ability in men and women (146: 236).

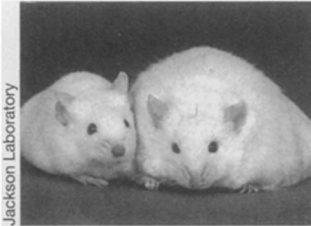
- A study of Spanish-speaking immigrants to the United States found that most learned English well without losing any knowledge of Spanish for up to 50 years, thus supporting the use of bilingual education programs that emphasize English (146: 148).

- Teenagers adopted as infants display good overall psychological adjustment, according to a study that elicited praise from researchers and cautions from some mental-health clinicians (146: 104).

- Psychologists reported that, regardless of sexual orientation, men and women evaluate potential dates and mates in sex-specific ways (145: 372).



Brain scan of a memory test.



Mice provided first evidence of a fat-regulating gene.

- Several studies indicated that the key molecule for permanent memory may be the same in mice, insects, and people (146: 244), as may some of the molecules involved in making nerve connections (145: 165; 146: 135, 325).
- Scientists found a fat-regulating gene shared by mice and people (146:372).
- Long-term research demonstrated that having more species, or greater biodiversity, enables communities to recover more quickly from disaster (145: 84) and that carnivores control populations of other organisms in a food chain (146: 373).
- Geneticists have harnessed a bacterial virus and a bacterial gene to control the expression of mouse genes (146: 20; 404).
- A laser gene-mapping technique streamlined gene searches in complex disorders such as diabetes and schizophrenia (146: 85), resulting in two new diabetes genes (146: 164).
- Researchers began testing the immune messenger interleukin 12 to treat several diseases (146: 120).
- Several scientists found more evidence that a lipid carrier, ApoE, plays a role in Alzheimer's disease (145: 9, 295; 146: 111, 198, 308). Boston neuroscientists devised a diagnostic eye test for Alzheimer's disease (146: 308).
- A monoclonal antibody helped restore blood sugar control in diabetic mice (145: 37). Amyloid plaques were implicated in the death of insulin-producing cells in the pancreas (145: 303).
- Biologists determined that animals with and without backbones share developmental genes (146: 116).
- Ecologists have shown that plant-animal interactions make tropical forests diverse (146: 170). Also, the rate at which trees come and go in these forests has increased since 1950 (145: 116).
- Researchers tied the tumor-suppressor gene p53 to clogged coronary arteries that can develop after angioplasty (146: 36).
- The protein p16 proved critical for controlling cell growth (145: 262) and was implicated in several cancers (146: 150).
- Several research teams elucidated the role of a gene called bcl-2 in programmed cell death (145: 44).
- Insects may have evolved wings by first skimming on water (146: 276).
- Geneticists found genes involved in allergies (145: 373).
- One researcher demonstrated the complexity of cell shape (145: 266); another discovered surface indentations used in signaling (146: 4).
- Immunologists verified that excess T cells die in the thymus (146: 295).
- Biochemists made prions outside cells and found prionlike proteins in yeast (146: 202).
- Biologists discovered a self-incompatibility gene in plants (145: 117).
- Cancer researchers tracked down a metastasis-suppressor gene (145: 222), discovered that an inactivated tumor-suppressor gene, maspin, could lead to breast cancer (145: 69), and found that the anticancer drug tamoxifen shuts down a tumor's blood supply (146: 292).

B i o m e d i c i n e

- Researchers nabbed the first breast cancer gene (BRCA1) and homed in on the DNA region housing a second (146:197). Three teams described 22 mutations in BRCA1 (146: 372).
- Federal officials delayed large-scale human trials of two genetically engineered AIDS vaccines, citing the need for additional efficacy and safety data (145: 404). The antiviral drug AZT was found to slash the risk of mother-to-child transmission of HIV, the virus that causes AIDS (145: 134). California researchers reported that HIV inserts itself into human DNA and causes cancer by disrupting an oncogene (145: 244). Animal researchers inserted HIV genes into the Sabin polio vaccine and demonstrated an immune response to HIV (146: 187).
- A National Institutes of Health advisory panel recommended that the federal government pay for research on very young human embryos (146: 212). Scientists using private funds had already reported strides in diagnosing genetic diseases in human embryos (146: 286). Meanwhile, President Clinton announced the federal government will not pay for studies that call for the creation of human embryos. (146: 388).
- Two teams found a second mutant gene that leads to colon cancer (145: 182). Researchers also fashioned a test that foretells the development of colon cancer in high-risk individuals (145: 407).
- An experimental drug, riluzole, slowed the progression of amyotrophic lateral sclerosis,

the neuromuscular disease also known as Lou Gehrig's disease. Riluzole's apparent success focused attention on glutamate and a chemical conspiracy that kills nerve cells (145: 202, 203).

- Researchers showed that surgery to remove blockage in neck arteries can reduce the risk of a stroke (146: 228).

- Drugs used to combat inflammation slowed the inexorable progress of Alzheimer's disease (145: 116).

- In human trials, a drug that targets white cells slowed the progress of multiple sclerosis (145: 378). In studies with mice, scientists found that a computer-designed peptide blocked the development of a multiple sclerosis-like disease (145: 279).

- Gene therapy partially corrected one patient's inherited form of high cholesterol, the fatty deposits that can lead to a heart attack (145: 214). Scientists made strides in cystic fibrosis research by transferring the normal version of the CF gene to the lungs of a CF patient (146: 149). And researchers used a gene therapy technique to cure mice of an autoimmune lupuslike disorder (145: 180).

- A Swedish study indicated that cholesterol-lowering drugs reduce the chances that heart attack victims will die of heart disease (146: 357).

- Transplanted cartilage cells showed promise in the repair of injured knees (146: 318).

- Researchers documented a disturbing rise in non-smoking-related cancers (145: 102).

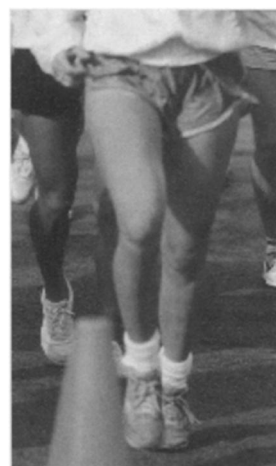
- A study suggested that nonsmokers can ward off lung cancer by consuming lots of fresh fruits and vegetables (145: 23). Diets rich in leafy greens reduced the risk of a blinding eye disease (146: 310).

- Breast cancer joined the list of other cancer threats for women who smoke cigarettes (145: 367). Another study revealed that smokers increase their risk of pancreatic cancer by 70 percent (146: 261). But researchers found that smokers who kicked their habit can stave off a deadly lung disease (146: 327).

- A controversial study showed that middle-aged women who have had an abortion run a greater risk of developing breast cancer than women who have never had this procedure (146: 294).

- A Canadian team suggested that cold and hay fever drugs called antihistamines may promote the growth of malignant cells (145: 324).

- Scientists linked the silicone gel used in breast implants to rare tumors in mice (146: 54). Some children breast-fed by mothers with silicone-gel implants may later develop autoimmune disease (145: 70). Another study found no health risks associated with these implants (145: 389).



Cell transplants can help injured knees mend.

C h e m i s t r y

- An isotope of element 110 with an atomic weight of 269 made its debut in Germany (146: 356).

- Synthesizing the anticancer drug taxol lessens the need to fell yew trees (145: 223).

- Light-harvesting pigment proteins, essential to photosynthesis, reveal their structures (146: 23).

- Synthetic beta-sheet proteins opened a new path in de novo protein design (146: 396).

- Synthetic self-replicating molecules entered a second generation (146: 362).

- A model protein with four heme groups, vaguely resembling hemoglobin, was synthesized (145: 239).

- A new chemical pathway for making stratospheric ozone may account for unexplained "missing" ozone (146: 199).

- A chemical reaction in the retina lasts a mere 200 femtoseconds (146: 279).

- Native chemical ligation lets scientists synthesize proteins with natural chemical bonds (146: 293).

- High-resolution X-ray imaging yielded 3-D pictures of microscopic objects (146: 326).

- A mathematical model showed how salt tightens DNA (146: 85); a related model showed how molecules move (146: 93).

- A synthetic double helix self-assembles around sodium ions (145: 87).

- Buckyballs emerge when fullerene precursors wind themselves into a spherical cage (145: 119).

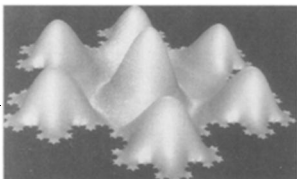
- Scientists, using fluorescence microscopy, watched DNA wriggle (145: 293).

- Thin glass capillary tubes focus X rays for high-resolution images (145: 63).

- Synthetic carbon dust irradiated in a lab tells much about space dust (145: 230).

1994 Computers & Math

Griffith, Lapidus, Renka, and Neuberger



Vibration of a drum with fractal boundary shaped like a Koch snowflake.

- A mathematical proof that quantum computation can greatly speed factoring focused attention on the feasibility of building computers based on quantum mechanical principles (145: 308).
- Researchers found a new candidate for the space-filling, geometrical arrangement of equal-size bubbles having the least surface area (145: 149).
- In the first example of a computation carried out at the molecular level, a computer scientist used simple DNA manipulations to solve a mathematical routing problem (146: 308).
- Improved factoring methods enabled researchers to crack a 129-digit number (145: 292; 146: 71).
- After fixing a flaw in his original proof of Fermat's last theorem, Andrew Wiles distributed a refined, corrected version of the proof (145: 406; 146: 295).
- Studies of standing waves on drum membranes bounded by fractal rims provided new insights into wave behavior in convoluted geometries (146: 184).
- Researchers discovered a new type of error-correcting code, opening up the possibility of achieving quicker digital error correction (145: 170).
- Controversy continued to surround the federal government's proposals to implement key-escrow encryption and a digital signature standard (145: 100, 383).

Earth Science

- A strong earthquake tore through greater Los Angeles on Jan. 17 (145: 53), revealing critical weaknesses in steel-frame buildings and emergency services (145: 244).
- Oceanographers discovered that massive iceberg armadas filled the North Atlantic six times during the last ice age (146: 74).
- A great quake deep beneath Bolivia vibrated Earth for months and rattled people across much of North and South America (145: 391).
- The Jan. 17 earthquake in Los Angeles revealed gaps in current seismic theory and building codes (145: 408).
- Oceanographers identified a wave from the 1982-1983 El Niño lingering in the northwest Pacific (146: 84).
- Satellite measurements detected a rapid rise in global sea levels (146: 388).
- Climate researchers found a clear link between El Niño warmth in the Pacific and corn growth in southern Africa (146: 52).
- The National Research Council reported that scientists know too little about Mount Rainier to prepare for a future disaster there (145: 341).
- The Intergovernmental Panel on Climate Change concluded that greenhouse gas pollutants are the most important forces altering climate (146: 198).
- Oceanographers retracing Columbus' route across the Atlantic found substantial warming in six subtropical areas of that ocean (145: 295).
- A deadly Colombian volcano yielded clues to help scientists tell when an eruption is imminent (145: 164).
- Scientists realized that the biosphere is thicker and more full of life than they had realized (146: 215).
- Temperatures in the stratosphere remained skewed more than 2 years after the eruption of Mt. Pinatubo (145: 70).
- An international drilling team pulled up layers of ocean sediments that rewrote the glacial history of the Arctic region (145: 4).
- Researchers proposed that deep-rooted grasses in South America suck up much of the carbon dioxide pollution missing from the atmosphere (146: 180).
- Volcanologists in Papua New Guinea saved 30,000 people by predicting the eruption of Rabaul volcano (146: 213).
- An experiment in the Pacific showed that dumping iron into the ocean does not help slow global warming (145: 148).
- Atmospheric scientists identified and then photographed unusual types of lightning high above Earth's surface (145: 100; 146: 87).
- An eight-legged robot named Dante 2 descended into the active crater of an Alaskan volcano but flipped over while climbing out (146: 101, 117).



Bill Ingalls/NASA

Dante 2.

- Representatives of 87 nations signed a convention that would intensify efforts to slow or even reverse the desertification that now affects an estimated 900 million people (146: 303).

- Researchers identified a host of pollutants that can feminize males and impair reproduction by mimicking or blocking sex hormones (145: 24, 56, 142; 146: 15, 102, 239). Other reports noted that some of the same pollutants not only may be passed to babies through breast milk (145: 111), but also may play a role in fostering breast cancer in non-Asian Americans (145: 261) and immune abnormalities in marine mammals (146: 8).

- EPA's first inventory of mercury emissions in 20 years reported that 341 tons of the toxic metal are spewed into the air annually, mostly by power plants and incinerators (145: 119). But even lightbulbs, paint, and dental fillings contribute substantially, the agency found (145: 142).

- Rains fostered the collapse of earthen dams in Russia that had been erected to contain oil that had leaked from a pipeline. The resulting tundra- and river-fouling spill appeared to exceed the oil released in the *Exxon Valdez* accident (146: 303).

- The Fish and Wildlife Service removed the California gray whale from its endangered species list and announced plans to do the same for the arctic peregrine falcon and bald eagle (145: 410).

- The observation that many toxic and hormone-mimicking pollutants contain chlorine prompted several prominent organizations to recommend reducing — if not totally banning — all nonessential uses of chlorine (145: 59, 111; 146: 393).

- EPA's new assessment of dioxins' health risks confirmed that these pollutants are not only probable carcinogens, but also likely causes of immune, reproductive, and hormonal abnormalities (146: 181). Critics noted potential problems in EPA's attempt to tally industrial emissions of the most toxic dioxins (146: 206).

- Women in electrical trades face an increased risk of breast cancer, one study suggested (145: 388). Another reported a new mechanism by which electromagnetic fields might affect cancer risk (145: 127).

- Entomologists identified parasitic flies that might check the advance of imported fire ants now muscling out native U.S. ants (146: 358). Microbiologists reported genetically altering viruses to control other insect pests (146: 154).

- A pair of studies suggested that ultraviolet emissions from halogen lights and sunlamps may cause cancer in humans (146: 255, 296).



Caption to come from SN

Alligators: Prove useful in studies of feminizing environmental pollutants.

Food Science

- Nerve fibers branching from the throat to the intestines monitor the caloric and nutrient content of every morsel eaten, helping to determine when an individual should feel satiated, neuroscientists discovered (146: 359).

- Heterocyclic amines, a family of carcinogens that form in cooked meats, can inflame the heart, perhaps leading to heart disease, researchers found (145: 165). Other studies identified ways of minimizing the formation of these compounds (145: 264), which could pose a particular risk to cooks (146: 103).

- A survey showed that margarine is the leading source of fat in the U.S. diet and the third leading source of calories. An analysis of the risk posed by the trans fat in margarines and many processed foods revealed that it may foster up to 30,000 deaths from heart disease each year (145: 325). Hoping to satisfy cravings for such fats without wrecking arteries, several firms have begun structuring "designer" fats (145: 296).

- Black tea offers the same anticancer benefits as green tea, and caffeinated forms of both prove more potent than decafs, a new study reported (146: 61).

- Heart disease patients can lower cholesterol and blood pressure by drinking milk from cows vaccinated against human-gut bacteria, scientists observed (145: 367).

- A pair of studies linked women's caffeine intake to increased risk of miscarriage and infertility (145: 61). A third tied high milk consumption to an acceleration of the normal age-related falloff in fertility (145: 175).

- FDA approved the genetically engineered Flavr Savr tomato, the first whole food the biotechnology industry has brought to market (145: 342).



Agriculture Res. Serv., USDA

High temperatures can imbue meats with cancer-causing agents.

1994 Materials Science

- STEM and EELS imaging techniques show single columns of atoms (145: 136).
- “Molecular Velcro” has polymers hook with interlocking strands (146: 117).
- Varying crystal sizes in a light-emitting diode also varies its color (146: 127).
- Digital data may be stored and retrieved holographically (146: 127).
- Field-effect transistors can be fashioned from organic polymers (146: 182).
- A protein that opens pores in cells may yield drug delivery systems (146: 204).
- A new, highly efficient polymer can store holograms (146: 245).
- Intermetallic compounds, using rare metals, may yield new families of high-temperature superconductors (145: 54).
- Thin-film solar cells make electricity with 10.2 percent efficiency (145: 255).
- Conductive ceramics grow in a beaker via electrochemical deposition (145: 390).
- Threadlike macrofibers from mutant bacteria can be biomineralized (145: 106).
- Polymer dendrites may one day improve parallel processors (145: 5).
- A quantum mechanical model of steel showed how the alloy can snap (146: 53).

Paleobiology

- Molecular biologists claimed to have identified segments of dinosaur DNA (146: 324).
- Tiny fossils push back the history of life on the continents (145: 173).
- Researchers unearthed a 50-million-year-old whale fossil from Pakistan that had functional hind limbs (145: 36).
- An expedition in the Sahara uncovered several new types of dinosaurs, revealing important clues about the evolution of these animals (146: 245).
- Researchers described *Anomalocaris*, monsters that terrorized the seas of Earth's Cambrian period (146: 138).
- Paleontologists debated whether dinosaurs were warm- or cold-blooded (145: 312; 146: 63).
- The discovery of an early tetrapod revealed new facts about how animals conquered the continents (146: 70).
- Scientists discovered clues about the most severe extinction on record (146: 38).
- A research expedition in Mongolia corrected a decades-old mistake about dinosaur eggs and provided new insight into nesting behavior (146: 294).

Courtesy NHK, Discovery Channel, Teie Image, and KBS.



Model of the Cambrian predator *Anomalocaris*.

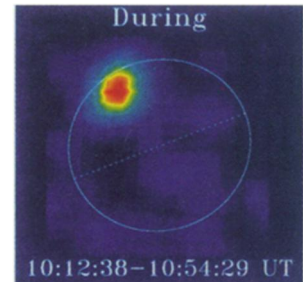
Physics

- Physicists at Fermilab presented the first direct experimental evidence of the top quark (145: 276).
- The discovery of a novel method for producing short-wavelength X rays in clusters of atoms opened up a promising path toward X-ray lasers (146: 132).
- Researchers succeeded in trapping and chilling to extremely low temperatures both radioactive atoms and highly charged ions (145: 303; 146: 79).
- The development of ingenious optical methods for cooling and trapping atoms produced record low temperatures and opened the possibility of studying exotic forms of matter (145: 326; 146: 47, 175).
- A microscopic device for sensing minute magnetic forces enabled researchers to detect nuclear magnetic resonance in a tiny crystal (145: 374).
- Experiments at the Tokamak Fusion Test Reactor produced record power levels for magnetic confinement nuclear fusion (145: 12, 341, 381).
- Laser fusion received a boost when researchers were allowed to publish the results of hitherto secret experiments and the Department of Energy announced its intention of proceeding with the National Ignition Facility (146: 303).
- Researchers pondered evidence that the proton may not be spherical (146: 140).

- President Clinton issued a formal policy prescription for U.S. science — the first president to do so since Carter. It called for greater use of outside peer review for projects funded by U.S. agencies, modernization of the research infrastructure, and a focus on solving national problems (146: 100).
- The White House set up a year-long task force to investigate the extent of human radiation experimentation (145: 39; 87). Halfway through its tenure, it identified 400 such experiments and evidence of extensive, early ethical debate on the issue (146: 276).
- Data irregularities led to suspension of a series of breast cancer trials and investigations into their management (145: 277, 282; 146: 30, 326). Additional ethical questions prompted one treatment center to withdraw permanently from a prevention trial that used the most widely prescribed breast cancer drug (146: 268).
- The U.S. government worked out an agreement with the Pasteur Institute of Paris to offer the center a more equitable share of global royalties from the AIDS blood test (146: 37).
- FDA accused the tobacco industry of manipulating nicotine concentrations in cigarettes to keep smokers hooked, a charge the industry denied vigorously (145: 190, 330; 146: 7, 30).
- Controversy erupted over an incinerator to destroy the nation's largest stockpile of chemical weapons when that facility's former safety manager alleged the plant was flawed and dangerous (146: 394).
- In March, discoverers of element 106 announced plans to name it after their mentor, 82-year-old Nobel laureate Glenn T. Seaborg (145: 180). But in August, an international commission on nomenclature voted against naming any element for a living person (146: 271).

Space Science

- People watched in awe as more than 20 shards of Comet Shoemaker-Levy 9 crashed into Jupiter (146: 55, 68). Two months later, the impact sites had been smoothed by Jovian winds (146: 196, 229), giving researchers their first measurement of wind speed in Jupiter's upper atmosphere. Several aspects of the impacts remain puzzling, including the size of the fragments, whether they indeed came from a comet or from an asteroid, and how deeply they plunged into Jupiter. The Galileo spacecraft, the only direct observer of the Jovian fireworks in visible light, may shed light on some of these mysteries (146: 133, 412).
- Instead of a single icy body, the typical comet may resemble a collection of small, similar-size snowballs (145: 298).
- The Hubble Space Telescope found an intriguing set of bright and dark patches that appear to lie on the surface of Saturn's moon Titan. The dark patches may be hydrocarbon oceans; the brightest patch could be a continent-size chunk of frozen water and ammonia ice (146: 309).
- The Galileo spacecraft discovered a tiny moon orbiting the asteroid 243 Ida, the first asteroidal satellite ever imaged (145: 164; 146: 93).
- New images of Neptune revealed that the planet's Great Dark Spot has vanished (146: 312).
- Researchers identified the first meteorite believed to have formed beneath the surface of Mars (145: 206, 214).
- Planetary scientists discovered a new storm on Saturn (146: 423).
- After 4 years of mapping Venus, the Magellan spacecraft was ordered to crash, leaving behind puzzling findings about the planet's upper atmosphere (146: 262).
- The Clementine spacecraft discovered a heavily shadowed impact basin near the lunar south pole that could be an icy storehouse for water delivered to the moon by comets (145: 383).
- The solar system appears to be embedded in a cloud of interstellar gas; analysis of satellite data suggested that the sun first entered this cloud only a few thousand years ago (146: 148).
- Investigators identified leaky valves as the probable cause of the loss of the Mars Observer spacecraft in 1993 (145: 36).



X-ray burst after Comet Shoemaker-Levy 9 fragment struck Jupiter.

Waite, G. Randy Gladstone, et al./Southwest Res. Inst.

This is a review of important science news stories of 1994 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 (Vol. 145 is Jan.-June; Vol. 146 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 1994 articles are available for \$1 each, \$2 each for earlier articles (prepaid); write to Science News, 1719 N Street, N.W., Washington, D.C. 20036.