

Science News of the Year

This is a review of important science news stories of 1976 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. 109 is Jan.-June; Vol. 110 is July-Dec.). Where several references exist, the news developed and was reported in more than one issue. Back issues or, when out of stock, copies of articles are available for 50 cents each by writing to SCIENCE NEWS, 1719 N Street, N.W., Washington, D.C. 20036.

Space

The space event of the year was unquestionably the Viking mission that landed two U.S. spacecraft on Mars while two parent craft monitored the planet from orbit. The complex and long-running studies were reported over many months in SN (virtually every issue from early June till mid-November), making individual reference citations difficult. Following are some of Viking's major discoveries:

- The first search for life on another planet was tantalizing but inconclusive, revealing at least an unexpectedly chemically active surface.
 - Numerous apparent signs were found that large quantities of water may have existed in the planet's past.
 - Researchers concluded that the residual north (and presumably south) polar cap consists almost entirely of water ice.
 - Isotopic analyses and signs that liquid may have existed strongly suggested that the Martian atmosphere used to be much thicker than it is today.
 - The surface material at the two landing sites was indicated to resemble an iron-rich clay, apparently lacking in detectable amounts of organic molecules.
 - The Martian sky as seen from the surface, reversing geochauvinist expectations, turned out to be largely pinkish with pale blue sunsets.
 - Nitrogen was detected in the atmosphere, as were a variety of hazes and fogs.
 - Several types of previously unknown terrain were discovered on the surface, such as large arrays of parallel, curving ridges and apparent large glacially formed channels more than 45° away from the north pole.
 - Clearly defined layering was photographed in the north polar cap, as was a vast belt of sand surrounding the cap and described as possibly "the largest dune field in the solar system."
 - Formerly unsuspected details were observed on the Martian satellites, Phobos and Deimos, including a baffling pattern of huge, parallel grooves across Phobos that some researchers felt might relate to its original formation.
- In other major space news, the space shuttle was rolled out in its public debut, and recruiting was begun for astronauts to crew the craft when it begins space operations in 1979. 109:153; 110:199, 347
 - Soviet cosmonauts Boris Volynov and Vitaly Zholobov spent 50 days in space, 47 of them aboard the Salyut 5 space station to which their Soyuz 21 craft was docked. 110:39, 134
 - The unmanned Soviet Luna 24 spacecraft landed on the moon, collected a core sample and successfully returned the sample to earth for study. 110:134
 - The second of the two German Helios probes was sent to study the sun from a path inside the orbit of Mercury. 109:55
 - Lunar studies yielded an apparently reliable date of 4.42 billion years ago for the end of the moon's initial differentiation, and produced lowered lunar heat-flow values suggesting that the moon is more earthlike in its composition than was previously believed. 109:196
 - The mirror-covered LAGEOS satellite was launched to enable laser studies of geophysical phenomena such as continental drift, carrying a message for future generations who may find it when its orbit decays in an estimated 10 million years. 109:248, 331
 - Major satellite launches during the year included the ITOS-H weather-watcher, 110:138; two SOLRAD probes for studies of the sun from earth orbit, 109:217; and a variety of communications satellites such as Marisat 1 for maritime use, 109:153; Indonesia's Palapa, 110:22, and Canada's experimental CTS-A, 109:73
 - The National Air and Space Museum opened in Washington. 110:29
- Radio waves emitted by the planet Uranus were detected. 110:86
 - A radio source was discovered in the center of our galaxy. 109:4
 - The redshift of a BL Lacertid was measured for the first time, aiding attempts to place these odd celestial objects in an evolutionary sequence with quasars and galaxies. 109:116
 - Mysterious pulses of X-rays were discovered coming from several globular cluster of stars. 109:151
 - The first means of measuring cosmological distances that uses radio instead of light was reported. 110:279
 - The use of infrared observations to detect interstellar molecules began with the finding of acetylene. 110:149
 - Oscillations of the sun's atmosphere up to 1,300 kilometers in amplitude were discovered by ultraviolet observations. 110:117
 - Study showed that the sun's behavior has changed in historical time: sunspots and solar activity were almost totally absent for 70 years beginning A.D. 1645. 109:154
 - Detection of methane ice on Pluto led to an inference that the planet may be smaller than our moon. 109:229
 - Cepheid variable stars that don't follow the usual period-luminosity relations for Cepheids may be the result of coalescence of binary stars into one star. 110:308
 - The best-resolved radar images of the surface of Venus to date indicated that volcanism may occur or has occurred on that planet. 110:181
 - Several asteroids passed close to the earth (one within 1.2 million kilometers on Oct. 20); one of them apparently has an orbit entirely between those of earth and Venus. 109:4, 38, 84; 110:293, 375
 - Evidence for clouds of unseen matter between the galaxies was reported. 109:276
 - The first instance of a pulsar "anti-glitch," sudden loss of speed rather than gain, added confusion to pulsar theory. 110:5
 - Potassium was detected in clouds around the Jovian moon Io. 109:41
 - The first true, high-resolution infrared images of Venus were obtained by the 200-inch telescope on Palomar. 109:150

Astronomy

- A new dating method using radioactive decay of rhenium to osmium extended the age of the universe to 20 billion years. 110:19
- Clouds near quasars yielded new evidence in support of the contention that quasar redshifts are cosmological. 110:54

Physics

- Discovery of particles that openly show the characteristic called charm and finally the recording of an actual track of a charmed particle were the most significant of numerous experimental and theoretical developments in the charmed-particle field. 109:20, 408; 110:86, 116, 356



- Finding of a particle of about 6 billion electron-volts mass, which would make it the most massive particle yet known, was claimed but not confirmed. 109:100

- Laser-ranging experiments between the earth and the moon supported Einstein's theory of general relativity, leaving rival theories with almost no credibility. 109:181

- A new quasi-atom called pionium, composed of a pion and a muon bound together, was discovered. 109:356

- Soviet scientists announced that they had produced a metallic form of hydrogen. 110:181

- The first synthetic crystal with controlled composition in each layer of atoms was produced. 110:196

- The proton was found to be made of three layers, each of which has a different spin. 110:58

- Experiment demonstrated that neutrinos move at the speed of light as theory has always required. 109:244

- Progress in the unification of general relativity, quantum mechanics and thermodynamics led to a prediction that miniature black holes (10^{15} grams) created early in the history of the universe are exploding now, yielding bursts of gamma rays that should be observable. 110:388

- Important advances in the separation of fissionable uranium isotopes from non-fissionable ones by laser excitation and chemical reaction were disclosed. 109:100

- Experiments looking for a flux of solar neutrinos continued to show a negative result despite rumors to the contrary. 109:199

- Soviet scientists reported that they

had induced thermonuclear fusions in fuel pellets imploded by electron beams. 109:212

- Several wavelike effects were demonstrated in the behavior of neutrons. 109:268; 110:105, 153

- A light-emitting diode that behaves in a quantized fashion was developed. 110:245

- The Synchrotron at the Fermi National Accelerator Laboratory produced 500-billion-electron-volt protons, the world's most energetic, for the first time. 109:325

- The Super Proton Synchrotron at the CERN laboratory in Geneva went into operation, producing the 400-billion-electron-volt protons it was designed for. 109:311; 110:6

- In mathematics, the four-color conjecture, a problem resisting solution for a century, was finally resolved. 110:71

Earth Sciences

- Establishment of a detailed climatic chronology from sediment cores produced virtually conclusive proof that the cycles of ice ages on earth are caused by variations of earth's orbit. 110:356

- Interest in earthquake prediction intensified. A Caltech geologist predicted (on 4/20/76) a 5.5-to-6.5 magnitude quake in the San Fernando Valley within a year, geologists discovered an uplift of land known as the Palmdale bulge in the same area of southern California, scientists sifted details of a successful Chinese quake prediction and a computerized registry of predictions was set up. 109:277, 326; 110:373

- A federal Earthquake Prediction Council was established, the first of its kind in the U.S. 110:262

- Studies after the devastating Guatemala earthquake of Feb. 4 showed that the Caribbean plate shifted relative to the North American plate and that western Central America is being pulled apart within the Caribbean plate. 110:234

- Marine paleontological evidence strengthened the case that geomagnetic reversals may have been responsible for species extinctions, and a new theory was proposed showing how solar proton events during times of weakened geomagnetism could reduce the ozone ultraviolet shield. 109:204

- The Glomar Challenger recovered samples of crust only one million years old from the Mid-Atlantic Ridge, the youngest yet obtained. 110:199

- Deep-sea drilling in the eastern Atlantic revealed that the separation of Africa and South America 100 million years ago was relatively abrupt. 109:357

- The first leg in the international phase of the Deep Sea Drilling Project obtained a core that may encompass the entire available magnetic history of the Mid-Atlantic Ridge site. 109:70

- Wormlike impressions on 620-million-year-old rocks from North Carolina were said to represent the most ancient yet known metazoan animals in the United States and possibly North America. Other tubelike structures found in Wyoming also looked like fossil traces of metazoa, but their great age of 2 billion years made that seem unlikely. 110:123, 346

- The mantle plume beneath Yellowstone was charted to a depth of 400 kilometers; a model of a chemical mantle plume was proposed. 110:219

- Government volcanologists predicted a major eruption of Mauna Loa on Hawaii before July 1978. 109:199

- A major eruption of a volcano on Guadeloupe was predicted and a controversial evacuation was carried out; the volcano remained in an unstable state. 110:167

- Studies of the Rio Grande Rift through New Mexico and southern Colorado elucidated the character and history of crustal extension along its length and identified one or more magma bodies beneath Socorro, N.M. 110:327

- Evidence was pulled together to reopen the case that a huge meteorite crater lies beneath the ice of Wilkes Land, Antarctica. 110:151

- Much of the energy from differential movement between crustal plates was said to be released in low-frequency "silent earthquakes." 109:213

- Computer simulation of the atmosphere's response to termination of solar radiation showed that the atmosphere is more resilient than expected. 110:138

- The three-year International Magnetospheric Study, with research programs from more than 40 countries, commenced. 109:6

Biology

- Formal guidelines regulating research using genetic recombination were issued by the National Institutes of Health. Other scientific groups recommended that those rules be followed by all U.S. scientists and similar regulations be imposed in other countries. The city of Cambridge, Mass., however, passed a three-month moratorium on moderate-risk recombinant DNA research at Harvard and MIT. 110:3, 36, 259, 327

- Recombinant DNA was used to incorporate a rabbit gene into a bacterial host, but no rabbit protein was found in the bacteria. 109:231

- Researchers synthesized two DNA sequences, copies of regions of a bacterial chromosome. In a host cell, one region produced a natural cell component, tyrosine transfer RNA, and the other controlled production of specific proteins. 109:389; 110:148, 293

- Scientists documented alterations in

cellular DNA by chemical carcinogens. Disagreement continued on whether this damage is the primary cause of cancer. 109:276

- Research on animals and humans indicated that acupuncture may work by activating the brain's own pain suppression mechanisms. 110:324

- Researchers learned that a single stretch of DNA in a tiny virus is read in different frames to produce two distinct proteins. 110:310

- Genes for the variable and constant regions of an antibody polypeptide chain were found to be separate in embryo DNA but adjacent in DNA of differentiated tumor cells from bone marrow. 110:372

- Plant and animal cells were successfully fused in three laboratories. 110:70

- A study comparing one protein, cytochrome c, from various organisms resulted in a seven-step model of early evolution. The scheme indicates that respiration evolved from photosynthesis. 110:36

- A rapid rate of evolution, 1 percent genetic difference per 20,000 years, was derived from a study of eight species of fruit flies and the geologic evolution of the Hawaiian islands. 109:118

- HeLa cells, a research line of human cancer cells, were found to have contaminated over 70 other types of human cell cultures. This discovery invalidated many experiments on human cells. 109:36

- Biologists identified the mechanism by which purple bacteria convert absorbed light into stored chemical energy. That process may provide a useful model for the more complex series of reactions in photosynthesis and vision. 109:149

- Special cell membrane receptors on the stigma of gladiolus plants were found to recognize pollen of plants of the same species. 110:197

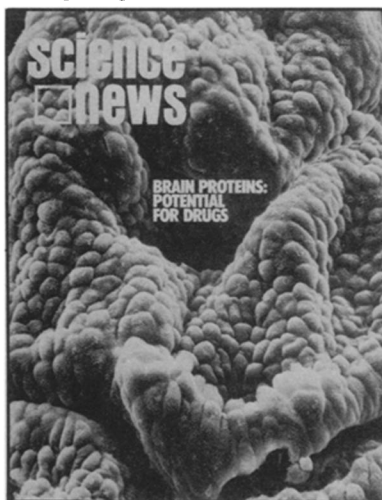
- A protein or group of proteins in axolotl eggs was discovered to play a role in the activation of development, possibly interacting with the embryonic genes that direct gastrulation and organ formation. 109:197

- Conditions simulating the noise, vibration and crowdedness of a daily subway ride increased the death rate of hypertensive rats. 109:266

- Biologists observed the first example in ants of enslavement by members of the same species and ritualized aggression. 109:358

public debate. 110:90, 168

- Natural pain-relieving molecules were culled from the brain and body, triggering great interest in the scientific community and the hope that the molecules might provide new kinds of pain-relieving drugs. 109:310, 406; 110:202



- A Russian scientist reported achieving, in rats, central nerve regeneration and recovery from spinal-cord paralysis. American scientists attempted to confirm his success and hoped that the technique might eventually benefit certain paraplegics. 110:42

- A strange disease killed 27 persons and made 152 others seriously ill at an American Legion convention in Philadelphia. Despite intense efforts by the Center for Disease Control epidemiologists, the cause of the so-called Legionnaire's disease was not determined, although it seemed to center around Philadelphia's Bellevue Stratford Hotel. 110:102

- Scientists made the first continuous test-tube propagation of the malarial parasite, setting the stage for a vaccine against the world's most widespread disease. They also grew the bacterium that causes syphilis in the test-tube and made an experimental vaccine from the cultivated syphilis bacteria. 109:181, 361

- Sickle cell anemia was diagnosed in living human fetuses. The technique was expected to become available to the general population and to have a profound impact on the black community, which is mostly afflicted with the disease. 109:325

- In debate over the paucity of antiviral drugs on the American market (two in 1976), some scientists laid the blame on the Food and Drug Administration, others on the difficulty of designing drugs to destroy viruses without hurting host cells as well. 109:186

- Tiny proteins isolated from human urine killed cancer cells while sparing normal cells and looked promising for treating certain kinds of cancer. 109:260; 110:362

- Antibiotics injected into female hamsters prevented conception and appeared to act specifically on the ovaries,

bringing immunization as a method of birth control a step closer to reality. 110:133

- A skin sensor measured the levels of oxygen in the blood of newborns and helped in the management of their breathing problems. 109:407

- The CAT (computerized axial tomography) scanners continued to revolutionize diagnostic radiology, revealing brain tumors, strokes, headaches, tumors of lung, pancreas, liver and bone, as well as other abnormalities. 109:170; 110:295

- The National Institute of Aging finally got underway and received its first director. 110:214

- The brain of a blind person was electrically stimulated so that he could read sentences. 109:68

Chemistry

- Arguments on the effect of aerosol fluorocarbons on the earth's ozone layer, and the effects of ozone-layer changes on health and climate, led to a National Academy of Sciences report concluding that the propellants are depleting that layer. Although the report recommended delay of regulation for up to two years of further study, the Food and Drug Administration immediately proposed a ban on nonessential uses of fluorocarbons in foods, drugs and cosmetics. 109:180, 292; 110:166, 180, 262

- A new ion, hydrogen with three electrons, was detected in a stream of particles from ionized gas. 109:86

- Analysis of haloes in samples of mica from Africa produced evidence for the existence in nature of elements 126 and 116, and possibly 124, but subsequent worldwide experiments failed to provide confirmation. 109:404; 110:357

- Scientists proposed that another of the transuranic elements, probably element 115, once existed in the Allende meteorite that fell in northern Mexico in 1969. 109:4

- Researchers called for establishment of criteria that a claim to a new element must satisfy, after Soviet scientists claimed synthesis of element 107. 110:229

- X-ray crystallography revealed that chlorophyll molecules in a photosynthetic bacterium are grouped in bunches in protein sacks rather than in large, orderly arrays. 110:204

- Scientists identified, on the surface of a fungi and other microorganisms, a polysaccharide that initiates the immune response of a wide variety of plants. 109:230.

- A technique of peroxide treatment produced long-term resistance to bacterial growth in fabric. 110:204

- Chemists developed an accurate method for measuring the corrosive air

Medicine

- The U.S. government launched a massive and controversial government-sponsored swine flu vaccination program. 109:261; 110:277

- A task force of scientists reported to the National Cancer Institute that mammography presents more risks of cancer than protection against cancer for women under the age of 50, setting off widespread

pollutant, sulfuric acid. 109:233

- Spherical membranes of surfactants, such as detergents, and oil or water were reported to have potential for removing poisons from victims, gradually releasing drugs in patients, and cleaning industrial waste water. 109:246

- Evidence accumulated that the function of the relatively rare element molybdenum in enzymes is to catalyze reactions that require simultaneous exchange of two electrons and two protons. 109:249

- The mechanical forces that maintain the shape of red blood cells were found to depend on molecules similar to actin and myosin of muscle. 110:298

Nature & Environment

- Studies of the Northern Hemisphere snow cover and removal of tropical rain forests led to conflicting results on whether or not the earth's climate is changing, and how. The Central Intelligence Agency, however, released a report saying that leading climatologists confirm a detrimental change and that this would bring "famine and starvation to many parts of the world." The National Academy of Sciences urged preparing for the worst. 109:38, 310; 110:294

- The Council on Environmental Quality reported that air quality is improving, water quality improvement is proceeding slowly, and that hazardous substances are not being dealt with adequately. 110:231

- The World Meteorological Organization released a study showing that a limited number of commercial supersonic transports would not harm the atmosphere. 109:37

- Amendments to the Clean Air Act failed to pass the Congress, leaving industry with auto exhaust standards they claimed could not be met. 110:231

- A study from Worldwatch Institute reported that deteriorating global environment is lowering the productivity of the world's farmland. 109:280

- A genetic criterion for determining when a species is endangered was proposed, together with suggestions on how to preserve such species. 110:266

- Efforts to replenish stocks of peregrine falcons and whooping cranes in their natural environment showed marked success. 110:23, 326

- The first ban on porpoise killing in connection with tuna fishing brought strong industry outcry. 110:262

- Studies of dinosaur footprints and bone structure indicated that while they may have run when they had to, in general they just lumbered along. 109:360

- A heavily instrumented search for the Loch Ness monster was conducted

throughout the summer without success; only some ancient stone cairns were discovered. 109:247, 359; 110:103

Anthropology & Archaeology

- *Homo erectus*, the unequivocally acknowledged primitive form of human being, was discovered in East Africa and dated at 1.8 million years, a million years older than previously confirmed. This find, plus a newly discovered 2.6 million year old *Homo*-like skull helps confirm the theory that *Homo* existed with rather than descended from the more primitive *Australopithecus*. 109:164

- Evidence was uncovered suggesting the presence of *Homo* in East Africa at least 3 million years ago. Fossilized bones of two infants and three to five adults were found in the Hadar region of Ethiopia. 109:20

- An enigmatic skull found near Olduvai Gorge in Tanzania seems to form an evolutionary link between *Homo erectus pekinensis* and *Homo sapiens*, having features in common with both. 110:102

- The beginning of Maya settlement and civilization in the Yucatan peninsula was backdated to the third millennium B.C., 1,700 years earlier than previously believed. 109:261

- The date for the start of the Maya Classic or advanced period was pushed back by one or two hundred years from A.D. 292 as a result of a recently discovered monument containing what is thought to be the oldest recorded date yet found in the New World. 109:261



- Evidence in the form of 15,000 clay tablets covered in cuneiform script suggested that the ancient kingdom of Ebla (in Syria) may have been a vast and civilized empire 4,500 years ago. 110:117

- The site of the ancient city of Ophir, a land fabulously rich in gold cited in the Bible as the home of King Solomon's

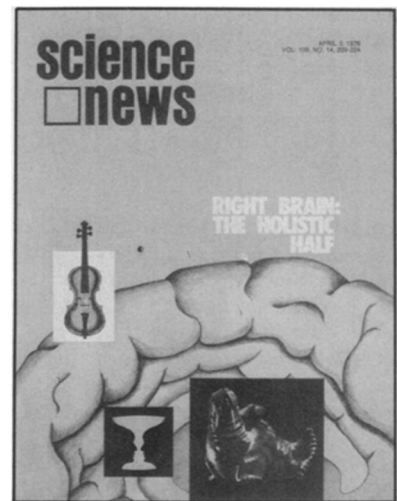
mines, was located in the mountains of Saudi Arabia along with the mines. 109:342

- An Indian government archaeological team reported finding a portion of the remains of Gautama Buddha, the founder of Buddhism. 109:342

- Analysis of hair samples from a previously unidentified mummy confirmed it to be the grandmother of King Tut-Ankh-Amun. 110:282

Behavior

- Anatomical and behavioral studies tended to confirm that the hemispheres of the human brain are structured differently and function differently from at least the time of birth. 110:277



- Additional evidence was reported that for most persons the right hemisphere of the brain is more emotional in its responses than the left. 110:40

- Sex differences in brain hemisphere specialization were reported, with specialization being present in males by at least age six but not in females until about age 13. 110:91

- Researchers found that even experienced meditators spend up to 40 percent of their meditation time in sleep. They questioned whether the beneficial effects reported for transcendental meditation are due to sleep or to some other function of the meditation process. 109:54

- Another group reported that rest (being seated quietly with the eyes closed) may be responsible for the physiological changes that accompany transcendental meditation. 109:390

- What appears to be voluntary control and increase of alpha waves (the 8- to 13-cycle-per-second brain waves that have been linked to such things as creativity and relaxation) may be nothing more than learning to ignore the stimulus (light) that decreases alpha production, it was reported. 109:148

- Four years ago, when the children were five years old, IQ gains of up to 33 points over control children were reported

for children taking part in the Milwaukee Project, an intensive educational day-care program that began within months of the subjects' birth. It was reported that these gains have held for most of the children past the age of entering school when any major fall off in IQ would have been expected. 110:21

- A large-scale, longitudinal study conducted in Manhattan found punitive parenting to be the most powerful predictor of later childhood behavior problems, including fighting, conflict with parents, anxiety and delinquency. 109:315

- Data from large numbers of IQ tests suggested that the more children per family, the lower the intellectual environment in which the children are reared, with the result being slowed intellectual development for children from large families (as compared with children from small families). This demographic theory was applied to the recent slump in Scholastic Aptitude Test scores, suggesting that the apparent intellectual decline may be the result of the post-war baby boom but that the present drop in birth rate will lead to an increase in SAT scores by 1980. 109:245

- A study of 30,000 men born in Copenhagen found no evidence for the theory that an extra Y chromosome is related to higher levels of aggression. 110:103

- Physicians were agreeing that hypnosis can be an effective technique for the control of pain and are putting it to use in several clinics. 110:283

- Research linking dreaming and memory suggested that dreaming may be a necessary process through which newly learned material is consolidated in the long-term memory. 110:135

- An investigation of Kirlian photography concluded that the images obtained by the technique are not related to psychic phenomena but are a record of corona discharge activity. Variations in the images appeared to be the result of differing amounts of moisture on the subject being photographed. 110:263

- A theory was proposed linking the 17th century outbreak of "witchcraft" in Salem, Mass., to ergot, a fungus with LSD-like properties that grows on rye. 109:215

Science & Society

- The nuclear power debate came to a boil as opposing sides differed on safety, economics and the environmental effects of reactors. During the primary elections an antinuclear initiative was defeated in California, and similar referendums were defeated in six other states in the November general elections. President-elect

Carter, however, pledged to minimize nuclear energy. 109:44, 59, 357; 110:233, 309

- International efforts to limit nuclear proliferation grew as President Ford called for a three-year moratorium on the export of sensitive nuclear technology and pledged U.S. atomic fuel services to countries that did not build reprocessing plants. 110:244, 295

- Congress finally passed and President Ford signed legislation creating a new White House science advising apparatus. The Office of Science and Technology Policy was created to provide daily advice and the President's Committee on Science and Technology was charged with conducting a long-range study. 109:39, 279; 110:7, 70, 116

- The establishment of an experimental Science Court to handle disputes on technical issues came closer to a trial run with the holding of a colloquium on how best to set it up. 110:198

- World population growth slowed from 1.90 percent a year to 1.64 percent, between 1970 and 1975. The decrease was largely credited to better family planning programs, but rising death rates from starvation also contributed. 110:316



- The United States continued to slip in its competitive position in technological innovation. Private inventors faced increasing difficulties. 110:60

- The federal budget for fiscal 1977 proposed an 11 percent increase for research and development. Much of the increase was designated for energy and defense research, although basic research funds for the National Science Foundation were proposed to go up. 109:52

- Congressional supporters of the National Science Foundation finally fought back attempts to subject NSF projects to prior legislative scrutiny, following elimination of some programs. 109:215

- The State Department sponsored the first of several national meetings to prepare a cohesive U.S. position on technology transfer, in preparation for a United Nations conference on the subject in 1979. 110:342

- A group to critically study claims of

the paranormal was organized by the American Humanist Association with an avowed goal of helping the public sort out valid from invalid claims. 109:346, 397

- A detailed study revealed that women hold a key role to progress in developing countries. 109:407

Technology

- The feasibility and importance of high-energy laser weapons gained recognition as all three armed forces pursued active programs of development. The next two or three years are considered critical. 109:5; 110:11

- "Volume pumping," a long-sought goal in the development of self-critical nuclear lasers, was finally achieved. 109:309

- Optical communications research turned to building integrated optical circuits, but some experts warned that Japan was pulling ahead of the U.S. 109:216

- Devices that convert sunlight directly to electric current underwent rapid development and began to compete with conventional energy sources for some special applications. 109:316; 110:280

- The cost of teaching children by machine, compared to ordinary classroom procedures, continued to plummet, and nationwide computer-teaching networks expanded rapidly during the year. 110:170

- Washington, D.C., opened the first leg of its new Metro railway system—the largest ever constructed under one plan. 109:214, 250

- Lawrence Livermore Laboratory reported progress in developing a new, lightweight battery for use in electric cars of the future. 110:219

- A new type of lightbulb promised to revolutionize home lighting by consuming 70 percent less energy than common incandescent lamps. 109:185

- The National Science Foundation awarded a contract to study the feasibility of converting the \$300 million spy ship Glomar Explorer to a scientific research vessel, for use in the Deep Sea Drilling Project. 110:341

- A highly touted Russian MiG-25 Foxbat fighter-interceptor, flown to Japan by a defecting Soviet pilot, was examined and found to be less advanced than expected. 110:231

- The British Rail research center at Derby pursued a three-stage plan to revamp Britain's railways with technology that Derby engineers hoped would soon begin competing on the American market. 109:90

- The world's largest solar furnace, at Odeillo, France, attracted increasing American interest through defense and energy-related contracts, which took advantage of the installation's unique facilities. 109:235