

SCIENCE NEWS of the Year

This is a review of important science news stories of 1986 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. 129 is Jan.-June; Vol. 130 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 one dollar each by writing to SCIENCE NEWS, 1719 N Street, NW, Washington, DC 20036.

Astronomy

- Studies of the distribution of galaxies in a sizable slice of the universe showed that they are clustered in sheets that surround empty spaces, a configuration analogous to a collection of bubbles. 129:38

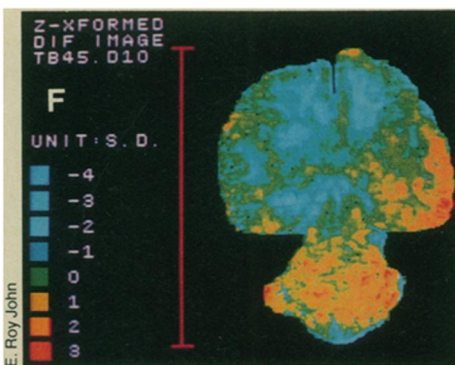


Center for Astrophysics

- Motion studies of a large number of galaxies indicated that they are engaged in sizable drifting motions in addition to the motion produced by expansion of the universe. 129:182
 - Observers claimed to have found the first evidence of a body falling into a giant black hole in the center of a galaxy. 130:359
 - The discovery of a quasar that radiates mainly in the infrared filled what many experts consider a void in the morphological and evolutionary classification of those objects. 130:167
 - Radioastronomers successfully operated the first arrangement in which antennas on earth were combined with an antenna in orbit to form an interferometer for determining fine structural details of quasars and similar objects. 130:245
 - European astronomers claimed discovery of the gravity-mode vibrations of the sun. Of the two possible kinds of acoustic vibrations — gravity mode, in which the force of gravity causes the ups and downs, and pressure mode, in which pressure causes the backs and forths — only the pressure modes had been known before. 130:20
- A new kind of visible-light interferometer, an amplitude interferometer, measured the diameter of a star (Sirius) for the first time. 130:214
 - The fastest orbital period for a binary star system, 11 minutes, was reported. 130:231
 - The strongest stellar magnetic field, 700 million gauss, was reported. 129:245
 - Half a dozen “superluminal” quasars were discovered, indicating that these objects, in which components appear to be moving faster than light, are not rare. 130:245

Behavior

- Computer-generated maps of metabolic activity in cats' brains indicated that their memory for a simple cue is regulated by millions of widely distributed brain cells. 130:313



- A little-known but potentially lethal complication of antipsychotic drug use was found to be more common than previously thought. 130:260
- Two research teams reported that television news coverage and fictional movies about suicide appear to trigger a temporary increase in teenage suicides. 130:182
- Autopsy studies revealed abnormalities in specific areas of autistic individuals' brains. 130:154

- The ability to use and understand sign language was found to be a function of the left hemisphere of the brain, indicating that this side of the brain is involved in visual and spatial tasks necessary for communication. 130:70
- Initial studies failed to yield a consensus on whether physical training eases physiological responses to stress. 130:75
- The babbling of babies typically goes through several stages between birth and the baby's first words, but research showed that a type of babbling thought to signal an emerging speech capacity is delayed and distorted in hearing-impaired babies. 129:390

- A scientist who analyzed rodent-overcrowding studies and estimated human population trends concluded we may be entering a critical period requiring rapid adaptations to an increasing population density. 129:346

- Two forms of brief psychotherapy were found to alleviate symptoms of depression as effectively as a commonly prescribed antidepressant drug; all three active approaches worked better than a pill placebo. Long-term effects of the treatments are being analyzed. 129:324

- Evidence suggested that every conscious voluntary act may be initiated by unconscious processes that begin about one-half second before the act. 129:266

- Psychologists reported that declines in two important types of intellectual function among the elderly are largely avoidable and can often be counteracted by supervised training. 129:244

- Recurrent dreamers were found to be more psychologically distressed than people who no longer have or never had recurrent dreams. 129:197

- Parental attitudes and the labeling of mathematics as a “male” subject were not found to contribute to the math advantage of intellectually gifted boys over their female counterparts. 130:357

- A 17-year study uncovered a strong link between social isolation and subsequent death from cancer among women, but not among men. 129:166

- Scientists proposed that MPTP, a toxic compound in some synthetic opiates that causes brain damage and Parkinsonian symptoms, selectively sticks to dopamine-producing neurons containing plenty of the natural pigment neuromelanin but few protective nerve terminals. 129:132

- Marked elevations in heart rate and blood pressure during communication were reported for both hearing and deaf individuals; the increases were steepest for hypertensives. 129:116

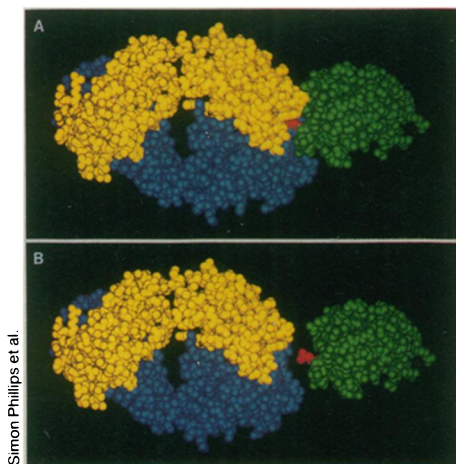
Biology

- Experiments designed to trigger re-growth of central nervous system cells offered hope for eventual repair of damaged spinal cord or brain tissue. 129:204

- Microelectronic chips enabled scientists to "eavesdrop" on communication between brain cells. 129:408

- "Cocktails" made by mixing human antibodies against bacteria were proposed as a preventive treatment of hospital-acquired infections due to *Pseudomonas aeruginosa*. 129:198

- The first detailed three-dimensional views of the antigen-antibody-complex structure, using X-ray crystallography, supported the traditional "lock and key" theory. 130:134



Simon Phillips et al.

- Scientists found a species of mussel that, with the help of bacteria, thrives on methane. They believe this to be the first example of a methane-nourished sea animal. 130:198

- Gene therapy restored fertility in mice characterized by a deletion in a reproduction hormone gene. 130:373

Biomedicine

- As it has for the past several years, AIDS dominated the medical news. This year brought the first evidence that a drug could at least slow the disease; azidothymidine (AZT), though not a cure, was introduced into widespread clinical trials after its use was associated with improved six-month survival rates (130:196). But levels of a key AIDS-sensitive immune cell eventually dropped despite the treatment (130:212). Progress toward a vaccine continued at a slower pace (129:340, 410; 130:104, 328). Among other advances, genetic material from the virus associated with the disease was hooked to a vaccinia virus to allow greater production of AIDS proteins (129:228), and proteins from the virus triggered immune responses in animals (129:151). Several year-end discoveries also suggested new therapeutic approaches (130:388). Epidemiologically, more evidence of heterosexual transmission was collected (129:11, 101, 164; 130:212), though practices associated with intravenous drug abuse and male homosexuality still were believed responsible for the bulk of the cases. And a study of AIDS in Florida found no evidence for mosquito-borne transmission (130:252). Two relatives of the AIDS virus were found, one of which was associated with the disease (129:212). The AIDS virus itself was more closely characterized, and it may have even gotten a name: An international taxonomy group suggested human immunodeficiency virus (HIV), a name accepted by many AIDS researchers. 129:265

- Nasal interferon was shown to reduce the rate of cold transmission, but it had some side effects and has yet to be approved by the Food and Drug Administration (FDA) (129:20). A computer-synchrotron combination yielded an image of how an experimental anti-cold drug interacts with the virus. 130:222

- Interferon normalized blood and genetic changes in patients with chronic myelogenous leukemia (129:262), and a bacterially manufactured interferon was approved for use against hairy cell leukemia. 129:377

- A study found that cigarette smoking is the leading cause of premature death *internationally*, as scientific research supported a strong addictive effect of nicotine (129:40, 44). A National Academy of Sciences branch declared that "passive" smoking is hazardous. 130:325

- Research suggested that genetics may be more important than environment in determining a person's ultimate weight. 129:56

- Genetic profiles linked to heart disease were found (129:58). Scientists washed cholesterol out of people's blood (129:169). Transplanted muscle was used to patch a human heart (129:284). Lasers zapped heart arrhythmias and atherosclerotic arteries in human trials. 130:341

- Researchers found a similarity between brain tissue from people with Down's syndrome and with Alzheimer's disease (129:60), which may explain why most Down's victims who survive into adulthood get Alzheimer's disease. A new drug that prevents the breakdown of a neurotransmitter needed in normal brain function showed positive results in early trials with Alzheimer's patients (130:308). Researchers studying the disease also identified a possible causative gene and diagnostic indicators. 130:327

- Electrical signals in the stomach were used to monitor "butterflies." 129:117

- The College of American Pathologists determined that most women with fibrocystic breast changes are at no greater risk of breast cancer than other women (129:151), and researchers cleared the oral contraceptive pill of a role in breast cancer. 130:100

- Advances toward using lasers in root canal surgery were made (129:184). As scientists learned more about the bacteria in the mouth and their adherent properties (129:396; 130:12), benign bacteria were used to crowd out decay-causing bacteria in humans. 129:203

- Anti-idiotypic antibodies protected chimps from disease. 129:231

- Oxidation was blamed for the aging process. 129:247

- Shock waves from a machine used to bust kidney stones broke up gallstones (129:265), and lasers dissolved kidney stones in trials on humans. 130:157

- The statistics on cancer survival were debated (129:310), and some improvements were seen (130:372). Researchers discovered a substance that promotes the migration of tumor cells (129:359). A lipoprotein change was detected in people with cancer; the change, which can be picked up with nuclear magnetic resonance spectroscopy, may someday be useful as a blood screen. 130:356

- A brain hormone was linked to depression and anorexia nervosa. 129:324

- Poor immune function was linked to recent marital breakup. 129:340

- A biochemical defect was found in cystic fibrosis (130:85) and Huntington's disease. 130:229

- Among substances approved by the FDA: a monoclonal antibody that prevents rejection of transplanted kidneys (129:407) and a yeast-produced hepatitis B vaccine. 130:52

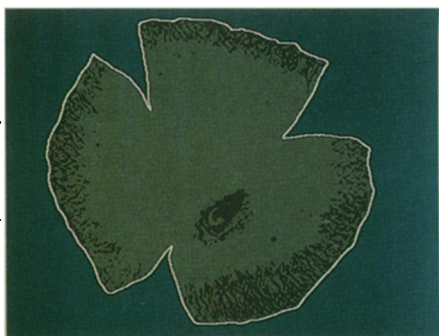
- New fertility-regulating hormones were discovered (130:5), and a possible role in fertility for epidermal growth factor was suggested (130:135). Researchers began human trials of vaccinations for spontaneous aborters. 130:234

- The onset of cerebral palsy was found to occur not at birth, as had been believed, but sometime during fetal development. 130:23

- A prenatal test for phenylketonuria was developed. 129:84

- Computer image analyzers were used to gain insight into the eye. 129:311

David Chandler/Duke Univ. Eye Center



- A second receptor on the surface of the immune-fighting T cell was found. 130:36

- An anti-inflammatory agent was extracted from coral. 130:164

- Researchers designed a protective nitrogen-bond coating to get protein drugs past the stomach. 130:150

- There was some sharing of honors this year, as Rita Levi-Montalcini and Sidney Cohen won both Lasker Awards and Nobel Prizes. Other Lasker winners: Luc Montagnier, Robert Gallo, Myron Essex, Ma Haide. 130:197, 244

- Rheumatic fever, once a serious childhood disease in the United States, may be making a comeback. Several states reported large increases in the last year and a half. 130:228

- Dietary deficiencies of copper and zinc were linked not only to heart disease but also to a degenerative disease affecting small arteries. 129:279; 130:201

- Pretreatment with an iodine-based drug appeared to make some cancers more susceptible to radiation therapy. 129:124

- A way to block the cell cross-linking believed to cause diabetes's long-term effects was discovered. 130:6

- Several laboratories characterized the delta hepatitis particle, an occasional co-infectant in hepatitis B that can make hepatitis B lethal, and the hepatitis B virus itself was grown *in vitro*. 130:244

- The gene whose absence leads to a rare eye cancer was localized (130:260), and the aberrant gene in muscular dystrophy was characterized. 130:261

- A new herpesvirus was isolated from six people. 130:302

- Researchers transplanted genes from cells involved in atherosclerosis into a cell line, which began growing like cancer cells. When the cells were injected into mice, the mice developed tumors, suggesting that the atherosclerosis genetic material is associated with control of normal cell growth and division. 130:310

- A new chemical, tested in animals, showed initial promise in the search for drugs to therapeutically sober up the dangerously drunk or to treat alcoholics. 130:358

Chemistry

- Researchers discovered a significant chemical difference between isotopes of a given element, suggesting the possibility of an efficient chemical method for enriching or separating isotopes. 130:292

- A team of researchers detected the minute magnetic fields accompanying an electric current generated by corrosion-causing chemical reactions. 130:132

- Chemical modification of hemoglobin showed promise for treating heart attacks and strokes. 129:260

- Studies showed that manganese may be an important factor in preventing osteoporosis, in regulating the production and release of insulin and in fighting cell and tissue damage. 130:199

- Experiments showed that quartz crystals coated with proteins could be used for detecting traces of pesticides and drugs in the air. 130:181

- Dudley R. Herschbach, Yuan T. Lee and John C. Polanyi won the chemistry Nobel Prize for their research on how chemical reactions occur. 130:262

- Researchers reported a way to use magnetic fields to align polymer molecules quickly and efficiently. 129:297

- Theoretical mechanisms that account for how lead works to reduce engine knock were proposed. 130:165

- A group of chemists developed a computational method for theoretically predicting how strongly two particular molecules bind together in the presence of a solvent. 129:297

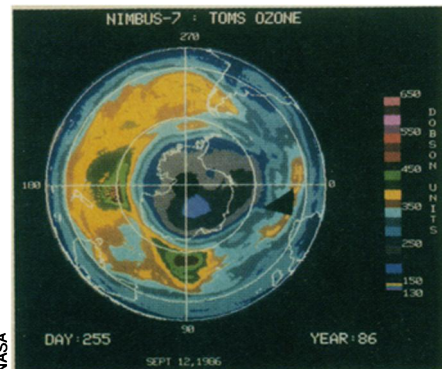
- Soviet scientists discovered a material that burns with a liquid flame. 130:302

- A technique was developed for incorporating neutral molecules within salt crystals to create a new kind of composite material. 130:310

- New experimental data suggested that the formation and linking of amino acids and nucleotides into molecules essential for life on earth may have been almost inevitable. 130:182

Earth Sciences

- Scientists were surprised by the discovery that ozone levels above Antarctica have dropped dramatically each Antarctic spring and that this "ozone hole" has been getting more severe over the last several years (129:133). Satellite data also showed that a smaller ozone hole has been developing over the Arctic and that global levels of ozone over the last six years have dropped about 3 percent (130:215). Atmospheric chemists on an expedition to Antarctica concluded that chemicals are primarily responsible for the hole (130:261), but some other scientists think the solar cycle (130:239) or atmospheric winds (130:344) are to blame.



- Almost 2,000 people were killed by a gas cloud emitted from a lake in Cameroon. Preliminary reports concluded that the people were suffocated by carbon dioxide that had escaped from the lake, perhaps when winds or temperature changes caused the bottom waters of the lake to rise to the surface. 130:133, 148, 180

- Scientists discovered traces of the oldest known meteorite impact in 3.5-billion-year-old rock in South Africa (129:69), and geologists argued that a 300-kilometer-wide depression at the bottom of the Indian Ocean may be the site of an asteroid or comet impact that some scientists posit caused mass extinctions 65

million years ago (129:356). Researchers also unearthed the oldest known oil bubbling from 1.4-billion-year-old rocks and found 4.3-billion-year-old zircon crystals, making them the oldest piece of the planet yet found. 130:136

- The debate continued over what killed the dinosaurs and other earth life 65 million years ago. Some scientists suggested that showers of comets raining on the planet might be responsible, while others argued for more earthly causes such as disease and climate change due to volcanic eruptions. Some atmospheric chemists concluded that both cometary impacts and volcanic eruptions would have made the world a bleak place indeed, with the noxious air and acid rain asphyxiating and burning plants and animals (129:75; 130:121). Other scientists found some intriguing links between the timing of mass extinctions and reversals of the earth's magnetic field. 129:197

- Scientists uncovered the wooden remains of an extensive forest that flourished in east Antarctica 3 million years ago, indicating that the climate on that continent has varied more than previously believed. 129:148

- The worst drought on record parched the U.S. Southeast (130:68), while in Utah the Great Salt Lake reached a record high (129:325). Scientists conducted a large field experiment to study storms that paralyze East Coast cities with little warning. 129:314

- Using seismic waves to probe the earth, seismologists made the first maps of its core (130:10). Seismic imaging also stirred debate about how deeply the earth's tectonic plates plunge into the mantle (130:106) and whether there are deep roots under the old, stable parts of the continents (130:380). Other kinds of seismic studies suggested that the dividing line between the crust and the mantle is not as immutable as once thought. 130:326

- On the 100-year anniversary of the earthquake that devastated Charleston, S.C., seismologists continued to debate its cause as well as the origin of all earthquakes in the eastern United States (129:165, 263). Some clues may come from the recently discovered geologic traces of ancient eastern quakes. 130:6

- Ocean Drilling Program researchers made the second discovery of high-temperature hydrothermal vents and accompanying exotic sealife on the Atlantic Ocean floor. 129:54

- Scientists discovered that there is an Atlantic counterpart to the El Niño that periodically warms Pacific Ocean waters (130:36). A state-of-the-art computer model predicted that an El Niño would occur this year (129:184) but the forecast did not pan out. 129:357

- The data base for estimating whether the increased emissions of carbon dioxide and other "greenhouse gases" have warmed the planet was improved with the first estimates based on measurements of both land and ocean temperatures (130:87). One researcher suggested that rising carbon dioxide levels lead to increased levels of methane, another important greenhouse gas (130:150). Other scientists concluded that the oceans may not be as robust a sink for carbon dioxide as once thought, indicating that more of the gas may accumulate in the atmosphere than assumed. 129:198

Environment

- The worst nuclear accident in history ripped apart a Soviet reactor, caused a meltdown of its radioactive core, killed dozens of plant workers, led to evacuation of some 26,000 Ukraine residents and sent radioactive contamination throughout the globe (129:276, 292, 308, 326). A Soviet investigation of the accident indicated operator error and design flaws were to blame. 130:135



- The Environmental Protection Agency (EPA) published a five-volume analysis on stratospheric-ozone depletion and its threats to earth's environment (130:308). The most newly recognized of those environmental effects is a dramatic increase in the smog-ozone and acid rain that may form in urban areas (130:362). The nitrous oxide emitted from soil after tree cutting was identified as a potential threat to additional stratospheric ozone destruction. 130:119

- The President signed a bill reauthorizing the Superfund toxic-waste-cleanup program and vetoed the Clean Water Act reauthorization. 130:264, 316

- Congress toughened up U.S. drinking water regulations, adding protection for groundwater and banning use of lead in new plumbing. 129:341; 130:40

- In preparation for announcing plans to reduce the permissible levels of lead in drinking water, EPA reported that more than halving the limit would produce large economic benefits (130:317). On the basis of many new studies, an EPA panel and EPA scientists have independently recommended lowering the blood-lead concentration considered excessive (130:333). Among those new studies were ones showing that even low levels of lead can affect neuromotor development and hearing in children. 130:164, 390

- EPA proposed a new strategy for bringing into compliance those areas — home to one-third of the U.S. population — whose smog-ozone levels violate federal regulations. 129:405

- A National Academy of Sciences panel reported there is enough evidence to conclude that acid rain is damaging U.S. lakes (129:182); and the U.S. government took a major policy step toward acknowledging acid rain as a serious trans-border problem (129:37). Meanwhile, research indicated that chemical fogs that form from the emission of pollutants in areas such as oil fields may be 100 times more acidic than acid rain, and that nitrogen fertilizers may cause more soil acidification than does acid rain. 129:59

- EPA proposed banning the five major asbestos products and phasing out within 10 years all remaining uses of this carcinogen (129:70). The Occupational Safety and Health Administration toughened its rules to protect workers from asbestos (129:391), and a new law was created to deal with asbestos in schools. 130:264, 316

- Animal studies showed that smog-ozone damage to lungs is magnified in the presence of acidic aerosols — not an uncommon occurrence. 130:85



- The earth was restless in the western United States. Augustine (130:149) and three other Alaskan volcanoes either erupted or threatened to blow, and there were eruptions of both Mt. St. Helens (130:279) in Washington and Hawaii's Kilauea (129:309). Strong earthquakes shook Adak Island in Alaska and both northern and southern California. 130:69

- An estimated 4 million U.S. homes may have indoor radon concentrations that exceed the level at which EPA recommends taking remedial action, a study showed (130:325). But for many homeowners, there is an inexpensive solution for getting the radon out. 130:201

- A study indicated that women in industrialized nations who nurse their infants for a year may pass on to the infants more than 18 times the total lifetime dioxin body burden deemed potentially allowable by the Centers for Disease Control (129:264). Other studies showed the body can hold a dioxin "fingerprint" for decades, and that the fingerprint can be discerned even in blood. 130:212

- Exposure to 2,4-D, the most common U.S. herbicide, was shown to cause cancer. 130:167

- A decision was made to bring into captivity the last remaining wild California condors and black-footed ferrets — both highly endangered species. 129:389; 130:151



Ron Garrison/Zoo. Soc. of San Diego

- Studies showed that long-ultraviolet wavelengths — from the sun or suntanning lamps — may not only cause cancer, but also destroy blood levels of certain plant substances suspected of offering natural protection against cancer. 129:281

- A 300-acre intentionally set forest fire was used to gather data on the environmental impacts — in air, soil and living things — of forest fire management and nuclear winter. 130:213, 375, 390

Mathematics & Computers

- News surfaced that two mathematicians had finally proved the Poincaré conjecture, but later reports indicated that their proof may contain a flaw. 129:215

- Computer scientists worked out a method for proving a theorem in a way that prevents others from claiming it. 130:140

- Michael H. Freedman, Simon K. Donaldson and Gerd Faltings each won a Fields Medal, a mathematics award carrying the prestige of the Nobel Prize. 130:85

- A computer scientist discovered a mathematical technique that may speed up computer division. 130:37

- A Cray-2 supercomputer was used to compute pi to more than 29 million digits. 129:91

- A group of university professors initiated a push to revitalize college calculus teaching. 129:220

- The largest (at 81 digits) "hard" number yet factored using a general-purpose factoring method was cracked using eight linked microcomputers. 129:377

- Software engineers continued looking for ways to eliminate computer program errors that could lead to catastrophic results. 130:171

- An Association for Computing Machinery panel recommended ways to channel computer "hacking" into creative rather than destructive pursuits. 129:248

- Defending champion CRAY BLITZ won the world computer chess championship. 129:391

- The development of mathematical models of a cat's eardrum and of blood flow through the human heart represented two significant applications of computer simulations. 129:311; 130:204

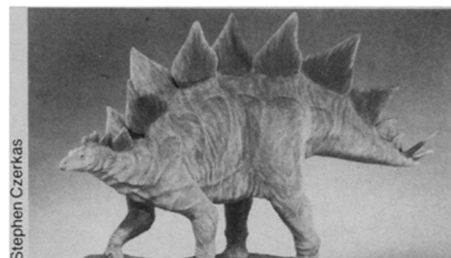
Paleontology & Anthropology

- Scientists unearthed the fossils of the longest dinosaur, the oldest bird (130:103) and probably the oldest marsupial (129:295). They also found the first fossils of slime bacteria, embedded in 2-billion-year-old rock. 130:347

- The first discovery of dinosaur remains on Antarctica confirmed suspicions that dinosaurs lived on every continent. 130:333

- Fossil remains of two newly identified types of ape-like ancestors of modern humans and apes were found in Kenya; the 17-million-year-old bones point to a greater diversity of ancient ape species than was previously assumed. 130:324

- The *Stegosaurus* was given a new look by a paleontologist who argued that the animal had a single, rather than double, row of plates on its back. 130:69



Stephen Czerkas

- Scientists isolated the oldest known examples of human DNA and cell structure from remarkably preserved 8,000-year-old brains discovered in a Florida peat bog. 130:293

- After a five-year study, investigators announced that Columbus's point of arrival in the New World was on the Bahamian island of Samana Cay rather than the nearby island of San Salvador. 130:247

- An Egyptian site containing the earliest known ancestors of modern humans and apes was once a tropical swampland bordered by rain forests, according to scientists who compared 30-million-year-old bird fossils at the same site to the birds' modern counterparts. 130:166

- Field work at a 16-centuries-old Roman city on the island of Cyprus uncovered evidence of an earthquake-generated catastrophe that may have been comparable to the volcanic destruction at Pompeii. 130:148

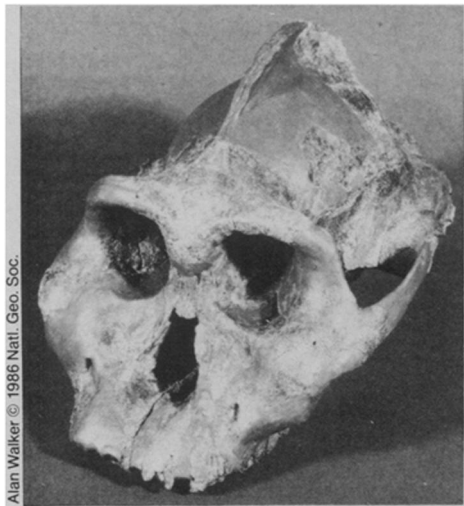
- An archaeological site in Florida provided a glimpse of life 10,000 years ago, when humans and many now-extinct animals coexisted in North America. 129:52

- Investigators returned to the wreckage of the *Titanic* and found that water seepage between steel plates in the hull, rather than an immense gash thought to have been caused by an iceberg, led to the ship's fatal plunge to the ocean floor. 130:86



© Woods Hole Ocean. Inst.

- A 2.5-million-year-old skull found in East Africa caused some paleontologists to reconsider the evolutionary relationships of some of the earliest species of humanlike creatures. 130:100



Alan Walker © 1986 Natl. Geo. Soc.

- The strongest evidence to date of cannibalism during the Stone Age was gleaned from human and animal remains at a cave in southeastern France. 130:52
- The earliest known human occupation in the Americas was found at a 32,000-year-old rock shelter in Brazil. 129:405
- Investigators who are deciphering the art and language of the ancient Maya reported that ritual bloodletting and warfare once dominated this Central American culture. 129:360
- *Archaeopteryx*, a 150-million-year-old fossilized bird, was carefully analyzed and then defended against charges that it is a forgery. 129:276
- A study of bone weathering among animal remains at several 1.7-million-year-old African sites indicated that human ancestors periodically used the sites to cut up and process meat. 129:261
- Some of the oldest known tools manufactured by human ancestors, dated at 2 million to 2.5 million years old, were discovered in a rain forest in Zaire. 129:149

Physics

- Theoretical physicists were enthusiastic about a theory in which elementary particles are represented by tiny "superstrings" as a promising route to the unification of physics. 130:168
- Antiprotons were trapped and nearly brought to rest in an electromagnetic Penning trap. The achievement opens a number of possibilities for precise study of the properties of antimatter. 130:340

- Atoms were trapped in an arrangement that uses beams of laser light to stop them and hold them. This opens a number of possibilities for precise experiments with atoms and other microscopic objects. 129:388

- Experiments appeared to show that quantum mechanical correlations — logic-defying relationships between objects widely separated from one another — do exist. This reopens hotly debated questions about the nature of reality in the microcosm. 129:28, 70

- Experiments observed single quantum jumps in the behavior of atoms, the first such observations claimed. 129:388

- The Tokamak Fusion Test Reactor produced the hottest thermonuclear plasma yet made, 200 million °K, which is also the hottest temperature ever achieved in a laboratory and an important step on the way to controlled thermonuclear fusion. 130:102

- Electric currents that behave in a quantized way were produced in macroscopic wire rings, a development that seems to point to important changes in both the pure physics of electrical conductance and the design of microcircuits. 129:229

- Reanalysis of a 66-year-old experiment produced the claim that a fifth kind of force exists in nature, triggering a continuing controversy. 129:38; 130:55

- A newly discovered trio of subatomic particles, the U particles, were found to have a structure inexplicable by present theory. 130:55

- Protons and antiprotons collided in the Tevatron at the Fermi National Accelerator Laboratory at a total energy of 1,600,000,000 electron-volts, the world's highest energy to date for a particle physics experiment. 129:180

Science & Society

- The EPA administrator said stratospheric-ozone protection has become so imperative that decisions must be made despite scientific uncertainties (129:404). U.S. chlorofluorocarbon manufacturers and users agreed to support a limit on the growth in production of their products in recognition of the growing evidence of their threat to ozone. 130:197

- The Gramm-Rudman-Hollings deficit-reduction law went into effect March 1, cutting roughly \$2.5 billion from research and development programs. Though the Supreme Court later struck down a key procedural provision, it did not invalidate the law. 129:135; 130:22

- Threatened closure of the nation's only commercial low-level radioactive-waste dumps was narrowly averted when a controversial bill was passed, ratifying multi-state pacts to develop new radioactive-waste landfills and creating sanctions for states that do not establish an individual or regional landfill for the wastes they generate. 129:22, 74

- President Reagan named William R. Graham as his permanent science adviser. 129:372; 130:231

- A White House panel recommended sweeping changes and commitment of at least an additional \$10 billion to reverse the declining health of U.S. university research. 129:328

- The Defense Department proposed a rule that not only would speed the review of agency-sponsored unclassified scientific papers but also would restrict the publication of some of this research to special export-controlled sessions (129:185). In its efforts to speed review of sensitive technologies, the Patent Office created two new classes of secrecy orders. 130:230

- The federal government's plan to resume production of chemical weapons met with congressional criticism, fueled in part by a General Accounting Office report that said these bombs cannot yet be counted upon to function as expected or to be used without endangering U.S. crews. 129:389

- The World Bank found that as a result of poverty, one-third of the people in the developing world (excluding China) lack sufficient nourishment to lead productive lives; nearly half of them are so malnourished that the health and physical stature of the children among them is imperiled. 129:169

- Widespread opposition surrounded plans to conduct what was thought to be the first deliberate environmental release of genetically engineered microbes — frost-inhibiting bacteria (129:56). When EPA learned that the company involved had already conducted open-air experiments with this microbe, it revoked its approval (129:148, 198). The Agriculture Department halted sales of a viral vaccine upon learning it was a genetically engineered microorganism (129:228). Such activities focused tighter scrutiny on environmental-release experiments. 129:366; 130:252

- The Office of Technology Assessment predicted that biotechnology will increase agricultural productivity dramatically over the next 14 years, but will also lead to the disappearance of an estimated 1 million small or medium U.S. farms. 129:233

Technology

- A Senate report compiled from interviews with Strategic Defense Initiative scientists and program managers cast serious doubts about the Defense Department's claims as to the program's progress, feasibility and goals (129:215). Separate surveys indicated a majority of physicists and engineers in fields related to these technologies appear to share the view. 129:233; 130:15, 294

- Pork-barrel allocations to 10 universities — many earmarked for things quite different from what the recipients were actually going to spend them on — provoked a political and legal reevaluation of the move before the money actually arrived. 129:196, 325; 130:21

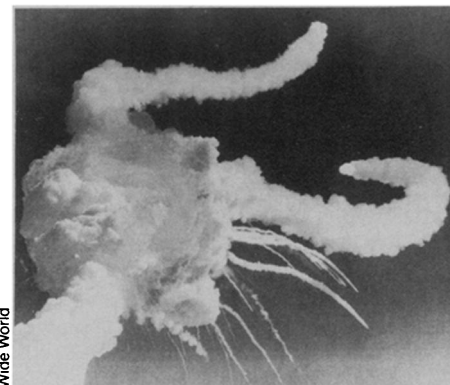
- The new tax law will make the United States the first nation to tax scientific achievement awards like the Nobel Prize. 129:308

- None of the 26 nations using nuclear power is prepared to cope with the costs and environmental problems of dismantling a retired reactor, a study showed. 129:230

- An Italian researcher admitted that he tampered with data from an experiment he worked on while he was a visiting Fellow at a Harvard cancer institute. The revelation prompted the scientist and his Harvard colleagues to write a letter in *SCIENCE* retracting their report, which had claimed the discovery of an immune-system stimulant with possible cancer-fighting potential. 130:340

Space Sciences

- The worst mishap in the history of the U.S. space program was the Jan. 28 explosion of the space shuttle Challenger, killing all seven members of its crew and grounding the remaining shuttles for more than two years. Major redesign and testing programs were undertaken, high officials were replaced and future plans hung in limbo as technological and management reappraisals rippled throughout NASA and industry. 129:68, 85, 119, 164, 372; 130:39, 229

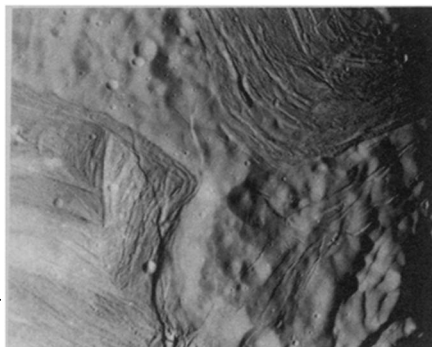


Wide World

- A few months later, the difficulties of launching virtually anything into orbit came to seem almost epidemic, as a six-week span saw failures of three major expendable rockets: the Defense Department's Titan 34D (129:260), NASA's Delta (129:292) and the European Ariane (129:359). Of the lot, only the Delta had gotten back into space by year's end. 130:167.

- The long-awaited return of Comet Halley was met in space by craft from the Soviet Union, Europe and Japan, and on earth by the coordinated efforts of astronomers around the world, revealing the comet's unexpectedly large nucleus and a host of other details. 129:180, 327

- Uranus was viewed from close up for the first time by the Voyager 2 spacecraft, which tripled the planet's number of known moons, photographed the surfaces of some of them in detail (including bizarre Miranda) and detected its wildly tilted magnetic field. 129:72, 103; 130:4



Jet Propulsion Lab.

- The Soviet Union successfully orbited a space station called Mir ("peace"), larger than its predecessors and described by Soviet news sources as "a base module for assembling a multipurpose, permanently operating complex." 129:136

- A French earth-observation satellite named SPOT was launched, and began providing images of the surface with nine times the sharpness of those from the U.S. Landsats. 129:136

- Evidence of a possible aurora in the atmosphere of Venus was published for the first time, as scientists worked to figure out how such a thing is possible over a planet with such a weak magnetic field. 130:364

- A U.S. satellite called Polar BEAR was launched to study changes in earth's aurora, magnetic field and other terrestrial responses to changes in the output of the sun, which can affect satellite communications. 130:361

- A controversial hypothesis of numerous otherwise unidentified comets striking earth's atmosphere was posed on the basis of "dark spots" in satellite images. 129:199

- Studies confirmed that vapor deposition of continuous diamond films is practical and that such films may be useful for electronic circuits. 130:118

- Researchers discovered a way to deposit gallium arsenide on top of silicon wafers. 129:102

- The Statue of Liberty restoration provided useful data on corrosion and the long-term behavior of materials. 130:392

- Using an ammonia-water mixture in boilers may increase the efficiency of electricity-generating power plants. 129:69

- A new tamper-proof nuclear-reactor seal was developed to safeguard nuclear fuel from theft. 129:36

- A prototype "point-contact" solar cell reached a record efficiency of 27.5 percent. 129:261

- A small group of volunteers began to construct a human-powered aircraft capable of flying 69 miles from Crete to the Greek mainland. 129:229

- National Bureau of Standards experts concluded that an energy machine invented by Joseph Newman does not generate more energy than it takes in from an external source. 130:8

- MIT researchers unveiled three-dimensional holographic images generated by a computer. 130:52

- Uses of the scanning tunneling microscope were extended to show chemical bonds and to reveal details of water-covered surfaces. 129:244; 130:149

- The race to develop the world's fastest transistor escalated with the designing of a "modulation-doped, field-effect" transistor. 130:247

- A National Academy of Sciences study concluded that the best way to preserve documents stored in archives is to photocopy them onto paper fabricated to last or to copy them onto microfilm. 130:153

- The U.S. Synthetic Fuels Corp. was abolished. 129:22

- The Department of Energy established a \$400 million clean-coal technology program. 129:132

- A new chemical process developed by Sandia researchers was found capable of eliminating nitrogen oxides from combustion exhaust. 130:388