

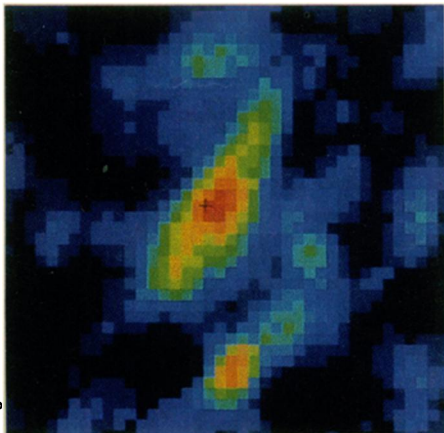
# SCIENCE NEWS of the Year

This is a review of important science news stories of 1987 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. 131 is Jan.-June; Vol. 132 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, N.W., Washington, D.C. 20036.

## 1987 Astronomy

- The nearest supernova in almost four centuries, called supernova 1987A, exploded in the Large Magellanic Cloud on Feb. 23, and has occupied the attention of hundreds of astronomers ever since. 131:148, 165, 183, 231, 279; 132:117, 122, 229, 263, 268, 286, 361, 380

- Several discoveries indicated the possibility that substellar objects, either brown dwarfs or planets, are orbiting stars other than the sun. (Shown below.) 131:52, 405; 132:24, 327



Sargent and Beckwith

- A galaxy so primitive in appearance that it may be a protogalaxy, a galaxy just starting to form, was reported. 131:23

- The first pulsar to be found inside a globular cluster of stars on the edge of our galaxy was discovered. 132:7

- Astronomers suggested that the dark galaxy Malin 1 may be a relatively recent formation, contradicting the theory that all the galaxies formed at a very early stage of the history of the universe. 131:308

- Without ruling out the existence of Planet X, the hypothetical tenth planet of the solar system, the discovery that it does not significantly disturb the motions of certain space probes narrowed down its possible location. 132:21

- The first polymeric molecule found in space was polymerized formaldehyde. 132:100

- Laser light, reflected off a layer of the upper atmosphere, made an artificial guide star for adjusting telescopes. 132:54

## 1987 Behavior

- Researchers located an area on chromosome 11 that may contain a gene predisposing its bearers to manic depression, at least among the Amish population of Pennsylvania (131:132). In different populations, two other genetic markers for manic depression were located on the X chromosome. 131:199, 376

- Emotional recovery after the sudden loss of a spouse or child was found to be slower and more difficult than researchers have assumed. 131:84

- A drug not approved for prescription use in the United States showed promise as a treatment for schizophrenics who do not respond to other medications. 131:324

- People exposed to an influenza epidemic during their second trimester of fetal development were shown to have an increased risk of hospitalization for schizophrenia up to 26 years later. 132:180

- IQ scores increased markedly across a single generation in 14 developed nations. Researchers proposed that the surge may have been sparked by unknown environmental factors. 132:108

- Deaf stroke victims provided clues to the role of the left side of the brain in sign language. 132:40

- Research showed that, compared with the typical approach of learning new words in a foreign language over several days or weeks, monthly practice sessions led to improved recall up to eight years later. 131:244

- Type A behavior was linked to chronic stimulation of receptors that trigger muscle cells to constrict coronary arteries. 132:293

- Depression was found to increase the risk of dying from cancer, but it was not a factor in cancer's onset. 132:244

- In a small group of creative writers, creativity was shown to be associated with mood disorders such as depression and manic depression. 132:262

- Rats experimentally exposed to a heavy dose of cadmium, a common metal and environmental pollutant, preferred alcohol over water and may have suffered cadmium-induced anxiety. 132:101

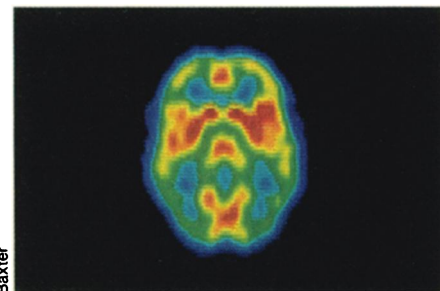
- Regular blood pressure monitoring proved surprisingly effective in promoting lower blood pressure among newly diagnosed mild hypertensives. 131:405

- Chimpanzees who chose the greater of two paired amounts of chocolate chips may have employed a primitive calculation system. 131:334

- Women's faces rated as attractive by adults were also preferred by 2-month-old infants, for reasons that are unclear. 131:310

- Exposure to small amounts of lead before birth was found to slow key aspects of mental development in the first two years of life. 131:277

- PET scans indicated that the symptoms of obsessive-compulsive disorder are linked to a mismatch in the brain's metabolic activity. 131:236



- Vietnam combat veterans were shown to have had a much higher death rate, mainly from violent causes, in the first five years out of the service than veterans who served elsewhere in the same period. 131:117

- Scientists suggested that the brain's left hemisphere may have developed an advantage in recognizing communication sounds early in mammalian evolution. 131:69

## Biology

- The molecular biological revolution continued to dominate the news, as researchers developed new methods of manipulating genetic material. Marking a gene age milestone, the first authorized outdoor release of genetically altered bacteria in the United States was performed in California (131:277). Meanwhile, scientists completed a sketch of the genome of the common bacteria *E. coli*, and similar work on some human chromosomes revealed the "mosaic" nature of the human genome (131:134). The Office of Technology Assessment convened a conference to tally the potential costs of a project that would map the entire human genome (132:101). Before their report was published, however, researchers announced they had completed the first rough map of the human genome by finding the relative positions of more than 400 genetic "markers" spread among all 46 chromosomes. 132:245
- Among the medically significant genes and gene defects identified this year: a rare gene defect that can lead to Gaucher's disease (131:167), a likely candidate for the gene that causes cystic fibrosis (131:296), the approximate location of the gene responsible for neurofibromatosis, the so-called Elephant Man Disease (131:359) and a new gene marker, the closest one yet, for Huntington's disease. 132:343
- The protein responsible for triggering blood clots in the body was cloned and its genetic code cracked, raising hopes for the development of a new family of anti-clotting drugs (132:104). Scientists detected an abnormal absence of protein activity that may be responsible for many of the medical problems associated with diabetes (131:327). Two independent studies implicated oncogenes as a causal factor in colorectal cancer (131:343), while researchers found that many colorectal tumors characteristically lack genetic material from a specific region of chromosome 5 (132:102). Researchers found that a missing pair of genes on chromosome 3 is the underlying genetic defect behind small-cell lung cancer. They said it is possible that smoking can cause the defect. 132:229
- An experimental vaccine aimed at preventing meningitis in infants showed promise in Finnish trials (132:198). But controversy emerged over the value of such trials, as the currently approved vaccine showed signs of lack of efficacy (132:260). Meanwhile, progress was reported in the development of an oral vaccine against hepatitis B. 132:39
- In the area of gene transfer and gene therapy: Gene-altered mice were induced to produce a variety of potentially therapeutic proteins in their milk (132:84). Successful gene transfers in cultured liver cells and lung cells in mice suggested that gene transfer may someday take the place of certain organ transplants (132:119). Mice suffering from congenital convulsions were cured by injection of a normal gene that codes for a nerve-sheath protein (131:188). Scientists experimented with the use of herpes viruses as vectors of gene transfer directly into the central nervous system (131:390). And scientists for the first time used viruses to transfer DNA into corn. 131:37
- Federal agencies played "catch-up" as they tried to formulate biotech regulations relevant to the quickly growing research area (131:87). But the regulatory debate only intensified when the U.S. Patent and Trademark Office made the controversial decision to allow patents on all types of bio-engineered organisms except humans (131:263). Legislation was introduced to put a moratorium on such patents pending congressional review of the policy (132:69). Meanwhile, the number of patent disputes among biotechnology companies outnumbered the number of such products actually approved for sale. 132:124
- Researchers applied computerized tomography (CAT scan) to agricultural research. 132:164
- Scientists used human placental tissue to stimulate central nervous system nerve regeneration in rats (131:377). Central nervous system nerve transplants were shown to be capable of transmitting information in response to specific stimuli (132:245). The first functional regeneration of peripheral nerves into the spinal cord was reported (132:324). Research suggested that skin can be regenerated from muscle tissue, spurring hope for new methods of burn and wound healing. 132:164
- The discovery of a role for anti-idiotypic antibodies in transplant survival suggested new means of improving the success rate for organ transplants. 131:375
- A new class of naturally occurring antibiotics was discovered in frog skin. 132:85
- Scientists identified what they believe to be the mechanism linking the hormone cholecystokinin with the enhancement of memory and learning (131:327). New research showed that learning and memory involve actual anatomical rearrangements of neuronal connections. 132:342
- Researchers identified the first shape-inducing chemical, or morphogen, believed to play a key role in embryonic development. 131:406
- Scientists cryopreserved insulin-producing islet cells, in hopes that transplantation of such cells may be a possible therapy for diabetes. 132:47



Verma

## Biomedicine

- AIDS continued to capture headlines, claim lives and involve armies of scientists, whose research focused on both prevention and cure. Development of AIDS vaccines met grim obstacles (131:297), but human testing of two potential AIDS vaccines was approved by the U.S. Food and Drug Administration (132:116, 357). Earlier, in the first reported human test of an AIDS vaccine, a French researcher had injected himself and volunteers from Zaire with another vaccine candidate (131:198;132:391). Azidothymidine (AZT), later called zidovudine, became the first AIDS treatment approved for sale in the United States (131:198). Other drugs, such as ribavirin and amplitgen, showed promise in early clinical trials using AIDS patients (131:372). A crowd of other potential drugs, aimed at different features of AIDS pathology, pushed closer to extended clinical trials: For example, granulocyte-macrophage colony-stimulating factor (GM-CSF) boosted the number of white blood cells in patients (132:165), and drugs that stopped an AIDS-related enzyme reduced the cell-to-cell spread of

the AIDS virus (132:294). But many specifics about AIDS remained a mystery. Reports of "killer" cells in the body that destroy AIDS-infected cells, AIDS-related hereditary factors and causes of AIDS dementia provoked as many questions as answers (132:52, 150). Scientists also isolated two additional viruses that apparently cause AIDS (131:356). Despite increased emphasis on education and prevention, AIDS threatened to break out into the U.S. heterosexual community, with intravenous drug use recognized by scientists as being the most likely conduit (132:60). While studies attempted to determine the number of sexual contacts needed for virus exposure and possible routes of infection, new epidemiologic surveys reflected a steady rise in the projected medical and economic effects of the AIDS virus. 131:356

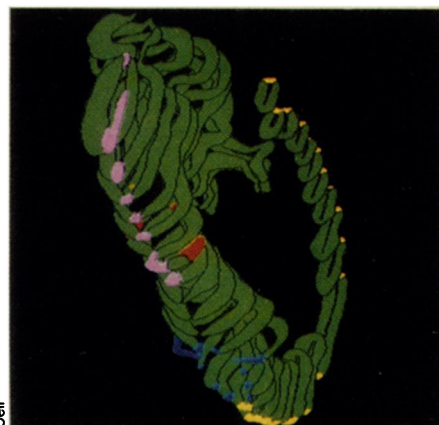
• Researchers remained divided over whether blood cholesterol levels are related to the risk of developing cancer (131:4) and whether ingesting less cholesterol actually extends life expectancy (131:261). New studies lent support to previous observations that drinking small amounts of alcohol helps prevent heart disease (132:348). Along with the release of new federal guidelines regarding healthful blood cholesterol levels (132:254), medical experts began calling for a nationwide cholesterol screening program similar to that for blood pressure (131:343). New cholesterol-lowering drugs showed promise (131:407; 132:166, 349), while scientists reported that blood cholesterol levels could affect a person's response to other drugs (132:212). Other researchers found that the structural similarity between part of a cholesterol-carrying lipoprotein and a protein involved in clot dissolution may help explain the process of hardening of the arteries. 132:311

• Conflicting studies indicated that the hereditary form of Alzheimer's disease may or may not be caused by a single genetic defect leading to overproduction of amyloid protein in the brain (132:181). Based on animal studies, nerve growth factor injected into the brain showed promise as a treatment to improve impaired memory conditions like Alzheimer's (132:149). But clinical trials on another memory-improving drug called THA were discontinued due to drug toxicity (132:292). Other studies suggested that the yet-unknown mechanisms causing Alzheimer's disease resemble those leading to cancer. 132:348

• After a regulatory battle, the Food and Drug Administration approved a genetically engineered form of the "clot-busting" protein called tissue plasminogen activator (tPA), which is expected to change how physicians treat victims of heart attacks. 132:325, 376

• The theory of type I diabetes as an autoimmune disease gained more support with the discovery that an immunity-suppressing drug increases the rate of remission in diabetics (132:292) and that diabetics have a specific genetic defect in molecules activated during autoimmunity. 132:247

• Using special chemical probes and computer models of developing mouse embryos (shown below), scientists have localized a protein thought related to virus-induced tumor growth. 132:68



• Studies showed that women with high levels of autoantibodies got pregnant one-fifth as often as those with normal autoantibody levels. 132:52

• Known as stress hormones, adrenocorticotropic hormone (ACTH) and cortisol were found to be chronically elevated in runners who train more than 45 miles weekly (131:325). Scientists also found a chemical link between the immune system and stress: Secretion of ACTH by the pituitary gland can be induced by interleukin-1, a protein made by immune system cells. 132:277

• Researchers discovered receptors for the hormone atrial natriuretic peptide (ANP) on certain cells in the brain. The findings suggest that ANP, which is secreted by the heart and is known to affect blood pressure, apparently can regulate spinal fluid production as well. 131:68

• Researchers found that atherosclerosis in blood vessels may cut off the normal supply of endothelium-derived relaxing factor made by vessel-wall cells, thereby leading to localized spasms of vessels and subsequent heart disease. 132:342

• Occasionally heralded as a promising anticancer drug, interleukin-2 was found to cause serious, though apparently temporary, psychiatric side-effects in some patients. 132:196

• The Food and Drug Administration approved clinical use of the protein alpha<sub>1</sub>-antitrypsin (132:374), found effective in treating hereditary emphysema. 131:277

• Susumu Tonegawa won both the Nobel Prize in Medicine and an Albert Lasker Medical Research Award. Other winners of the Lasker award were Leroy Hood, Philip Leder and Mogens Schou. 132:198,244

• Researchers found that a so-called "anti-sense" genetic message may shut off viral replication and therefore be responsible for the latent periods between active infections that are characteristic of herpesviruses. 132:356

• Immunotherapy research offered the latest approach to finding effective treatments for rheumatoid arthritis. 131:228

• Vaccine research expanded beyond prevention of bacterial and viral diseases to include possible vaccination against parasitic diseases like malaria (131:181) and cancers like melanoma. 132:267

• Although sexually transmitted AIDS attracted more attention, certain venereal diseases continued to thrive in the United States. Scientists recommended that women treated for gonorrhea be treated for chlamydia at the same time (131:282). There was a large increase in reported cases of syphilis (132:23), and scientists reported that having AIDS accelerates the course of a patient's syphilis. 131:391

• Drinking moderate to large amounts of alcohol was found to significantly increase the risk of breast cancer in women, but scientists reporting the new data did not recommend that women quit drinking (131:292). Smoking cigarettes was strongly indicted as a cause of coronary artery disease in women (132:341). Studies on nicotine concluded that it may promote the spread of cancer cells. 131:213

• Research showed that adipin, a substance secreted by fat cells, may be the sought-after chemical that signals a satisfied appetite (132:70). Studies suggested that a person's individual rate of metabolism, which apparently is inherited, can predict later obesity. 132:308

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1987

## Chemistry

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• Chemical studies of newly discovered high-temperature ceramic superconductors revealed that these compounds have a perovskite structure and that their superconducting properties seem to depend on their oxygen content. 131:247

• Ultrafast laser pulses enabled researchers for the first time to see the movements and interactions of molecules during the making and breaking of chemical bonds. 132:372

- Researchers reported the first steps on the road to ferromagnets made from polymers and molecular solids. 131:252
- U.S. scientists Charles J. Pedersen and Donald J. Cramm and French chemist Jean-Marie Lehn won the chemistry Nobel for work on designing simple molecules that mimic enzymes. 132:90, 244
- Georgia Tech researchers developed the first chemically powered lasers capable of generating visible light. 132:261
- Research on the chemistry of vision led to the identification of a set of compounds that absorb radar signals. 132:137
- Theorists showed that the noble element helium may form neutral molecules when combined with beryllium and oxygen. 132:334
- Chemists found a way to synthesize an organic molecule that is structured and twisted like a three-bladed propeller. 131:357
- An ultrasonic cleaning bath was found to be capable of turning metal powders into better catalysts. 131:388
- Researchers continued to develop analytical chemistry techniques for making measurements on the scale of individual molecules. 132:74
- Studies of potential materials for biosensors showed that even common foods can be used as biologically based electrodes. 131:92
- Argonne (Ill.) Laboratory scientists identified a key photosynthetic structure responsible for converting sunlight into chemical energy. 131:168
- Probing into a pit near the foot of the Great Pyramid of Cheops in Egypt, scientists had hoped to recover 4,600-year-old air that might reveal how the atmosphere has changed since the Industrial Revolution (132:172), but the air they found did not seem to be pristine (132:295). Other researchers analyzed bubbles of air trapped in amber that may date back 80 million years to the time of the dinosaurs. The bubbles indicated that oxygen concentration in the atmosphere was apparently far greater than today. 132:293
- Off the coast of Nova Scotia, scientists identified the first known underwater crater caused 50 million years ago by a meteor impact (131:404). Pieces of "shocked" minerals supported researchers' contention that another, larger meteor hit earth 66 million years ago, contributing to the demise of the dinosaurs and other animals (131:309). Paleontologists who studied fossils on an island off Antarctica say these extinctions at the end of the Cretaceous may not have been as abrupt as earlier findings had suggested. 132:277
- Earth scientists continued to unlock some of the secrets of the earth's interior. By subjecting iron to high pressure and temperature, researchers obtained the first experimentally determined upper limit on the temperature in the center of the earth (131:245). High-pressure experiments also led researchers to identify magnesium silicate perovskite as the most abundant mineral of the planet (131:103) and to conclude that the earth's inner core is not pure crystalline iron (131:106). Studies of earthquake waves and changes in the earth's rotation rate supported the idea that the core-mantle boundary is made up of hills and valleys (131:9). As for the mantle of the earth, new evidence suggested that rising plumes of hot rock may drift about in the mantle. These plumes, which form volcanoes at the surface, had long served as stationary reference points for researchers studying the motion of tectonic plates. 132:250
- In Parkfield, Calif., seismologists are preparing to monitor one of the earthquakes that seem to occur every 22 years on this part of the San Andreas fault (131:268). And, contrary to most previous ideas about the Pacific Northwest, new evidence emerged that the coastline of Oregon and Washington might be prone to large earthquakes. 132:42
- A strong earthquake shook Ecuador, generating mudslides that buried villages, killing more than 1,000 people (131:200). Southern California also hosted several earthquakes (132:228, 358). Seismologists who analyzed the disastrous Mexican earthquake of 1985 and the San Salvador quake of last year said the local geology of each area served to amplify the ground-shaking, thereby increasing the quakes' destructiveness. 131:212
- Using computer models of the ocean, scientists predicted that "greenhouse" warming will cause sea levels to rise. A report from the National Research Council discussed how coastal areas might prepare for this rise. 132:326
- An oceanographer happened to be in the right place when an underwater seamount he was studying began to erupt under his research ship, granting him the unprecedented opportunity to witness the eruption of a seamount in shallow water. 132:262
- Ocean Drilling Project (ODP) researchers pulled up samples from the bottom of the Pacific (131:102), Antarctic (131:278) and Indian oceans (132:56). These cores of sediments and basement rock will answer questions about plate tectonics, hotspot volcanism and prehistoric climate shifts. Meanwhile, the U.S. government debated whether to let the Soviet Union join the ODP (131:280) and, to the chagrin of many international scientists, decided the answer was *nyet*.
- Atmospheric scientists and engineers teamed up to devise systems that can warn pilots about microbursts, the hazardous wind-shear condition responsible for many airline crashes. 131:185
- Scientists began drilling a 5-kilometer-deep hole in the Cajon Pass to get to the bottom of a long-standing paradox about the stresses and heat generated by the nearby San Andreas fault. 131:70
- Scientists who study the crater lakes in Cameroon concluded that the carbon dioxide at the bottom of those lakes was probably reaching the lakes through submerged springs of carbonated water. In the last several years, two separate lakes had expelled clouds of this gas, killing villagers in the surrounding areas. 131:388

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1987

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## Earth Sciences

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- The concentrations of stratospheric ozone over Antarctica dropped to their all-time lowest level in the history of the satellite measurements. At the same time, an international team of more than 100 scientists and technicians traveled to Punta Arenas, Chile, to mount the most comprehensive set of experiments to date designed to study the ozone depletions. The preliminary results revealed that Antarctic weather patterns play some as-yet-unknown role in disturbing the ozone concentrations (132:230). They also confirmed that human-made chlorine chemicals are at least partially responsible for the ozone hole (131:326; 132:182). U.S. and Soviet scientists announced an agreement to trade information and equipment in an effort to study the ozone loss. 131:408

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1987

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## Environment

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- The National Acid Precipitation Assessment Program stirred up controversy when it concluded that some effects of acid rain, such as its impact on lakes and streams, are less serious than once feared (132:36, 197). Another study found that acid dew can be harmful and that its acidification process may be more complex than was previously suspected (132:247). As a way to control acid rain, President Reagan asked Congress to approve a \$2.5 billion clean-coal technology program. 131:199

- As Congress was considering re-authorizing the Clean Air Act, the American Forestry Association concluded that air pollution threatens the health and productivity of the nation's forests. 132:340

- Researchers conducting the first major long-term study of water quality in the nation's rivers found decreased contamination from fecal bacteria and inorganic lead, but also reported increases in nitrate levels, salinity and toxic metals (131:214). A congressional report warned that waste-disposal activities are polluting the nation's estuaries and coastal regions and that current pollution-control programs are neither adequately focused nor fully enforced. 131:309

- The last wild condor was caught in California by scientists trying to increase the numbers of this endangered bird (131:263), and researchers started to evaluate the best habitats for the birds' eventual release. 132:319

- The National Council on Radiation Protection and Measurements found that current levels of exposure to radiation from all sources in the United States are, on average, not dangerously high, but it recommended that a national survey of radon levels be conducted (132:347). A 10-state survey by the Environmental Protection Agency (EPA) found that 21 percent of homes tested had levels of naturally occurring radon exceeding the agency's "action level," suggesting that the lung-cancer-inducing radioactive element may be a problem in virtually every state (132:105). To better predict where radon levels might be highest, researchers correlated different types of geological settings with radon concentrations. 132:335

- Wet-process copying machines were found to emit volatile organic compounds that make people ill. 132:166

- Scientists intensified their hunt for ways to detoxify PCBs, the banned toxic chemicals that contaminate the Hudson River and other sites. 132:154



EPRI

- Research tied the extremely low-frequency electromagnetic radiation emitted by residential power lines to changes in laboratory animal behavior and to increased risks of childhood cancer. 131:107, 132:39

- Soil scientists proposed using a fungus as an inexpensive way to detoxify California's Kesterson National Wildlife Refuge, which is polluted with selenium. 132:8

- In the final stage of the Love Canal cleanup, EPA announced that it will dredge and burn dioxin-contaminated sediments from sewers and streams (132:319). Two reports indicated that the levels of dioxin and other toxic chemicals produced when garbage is incinerated can be controlled. 132:118

- A study found that the home use of incense and pesticides or a parent's workplace exposure to various chemicals, including chlorinated solvents, may increase a child's risk of developing leukemia. 132:38

1987

## Mathematics & Computers

- The American Mathematical Society tangled with the issue of military funding for mathematics research. 131:71, 132:187

- A Georgia Tech mathematician used fractal ideas to develop a technique for reducing the amount of information needed to recreate an image. 131:283



Barnsley et al./PNAS

- The continuing development of multi-processor computers made them competitive with more conventional supercomputers. 131:28

- New computer-graphics techniques allowed the creation of surprisingly realistic graphic images and offered novel ways of representing scientific data and visualizing mathematical forms. 131:20, 392; 132:87, 184, 264

- Computer models of neural networks helped researchers begin to untangle the complexities of biological processes such as vision. 131:60, 362; 132:14, 76

- Supercomputers pushed computation of the decimal expansion of pi to more than 134 million digits. 131:118

- Several studies of mathematics achievement showed that U.S. students tend to lag behind their counterparts in Europe and in Asia (131:72). Mathematicians and other educators took a close look at college calculus teaching. 132:317

- Mathematicians closed in on a proof for Fermat's last theorem, one of the most famous unsolved problems in mathematics. 131:397

- A major report recommended that, in order to stay ahead of the rest of the world, the United States should increase its spending for supercomputing by at least \$1.5 billion over the next five years. 132:335

- A mathematician and a metallurgist working together developed a new kind of mathematics for looking at the nature of the boundaries between adjacent crystals in a metal. 131:76

- Billed by NASA as the world's most advanced supercomputer facility, the National Aerodynamic Simulator was declared operational on March 9. 131:166

- A software engineer programmed a computer to solve a long-standing polyomino tiling problem. 132:310

- Chiptest, from Carnegie-Mellon University, captured the North American Computer Chess Championship. 132:335

1987

## Paleontology & Anthropology

- Remains of a member of the first truly human species were found in Africa. The 1.8-million-year-old *Homo habilis* specimen had a surprisingly small, ape-like body. 131:340

- Two main versions of an evolutionary tree for hominids, the family of creatures that includes modern humans, emerged from an international conference. 132:7

- A rich fossil find in Nova Scotia led a team of paleontologists to suggest that, contrary to previous beliefs, the mass extinctions at the end of the Triassic period might have been quite abrupt and possibly related to a meteor impact. 132:149

- Researchers found fossilized networks of tubular burrows in 488-million-year-old rocks, making these the oldest known traces of land animals. 131:41

- A ceremonial offering, including jade heirlooms and an oyster shell that may have held blood from a human sacrifice, was found at a Maya site dating to A.D. 756. 131:212

- Scientists pursued several explanations for mass extinctions of North American mammals around 11,000 years ago, including hunting by humans and climate change. 132:284

- The 11,000-year-old bone of a North American bear showed signs of infection with the same organisms that cause syphilis, and this find is helping scientists trace the history of that disease. 132:205

- Examination of several skulls of East African robust australopithecines, an extinct line of hominids often portrayed as heavily built, indicated that they were instead relatively small creatures. 131:229

- Archaeologists discovered that ancestors of modern Polynesians left evidence of a complex culture on islands near New Guinea 3,600 years ago. 132:232

- A 23,000-year-old piece of mammoth tusk was found in Poland and may be the world's oldest known boomerang. 132:215

- An analysis of modern ape skulls challenged the notion that robust australopithecines had a unique, keystone-shaped pattern of nasal sutures. 132:71

- Researchers found that the high consumption of salt and animal fat does not translate into high blood pressure among Tibetan nomads. 131:312

- Controversial data were presented suggesting that humans settled in North America 100,000 years ago or more. 131:172

- A diet composed primarily of red meat and marrow may have been favored by early human ancestors, researchers proposed. 131:7

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1987

## Physics

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- Superconductivity appeared at higher and higher temperatures. Theorists could not agree on an explanation. Fabrication of the materials into useful objects proved difficult. 131:23, 116, 164, 196, 215, 308, 327, 358; 132:4, 106, 356, 359

- The Reagan administration endorsed the Superconducting Super Collider, a 40-trillion-electron-volt proton accelerator. The Department of Energy began a search for a site, as physicists continued to work on plans for the apparatus. 131:84, 119, 364; 132:103, 167, 247, 314

- Double-beta decay, the long-sought rarest form of radioactivity in nature, was finally found. 132:148

- The long-standing question of whether neutrinos have a small rest mass received both positive and negative indications from studies of supernova 1987A and from laboratory experiments. 131:231, 246, 342; 132:117

- Delicate experiments gave both positive and negative indications for the existence of a fifth force, a kind of repulsive adjunct of gravity. 131:6; 132:135, 212

- Coherence effects can cause red or blue shifts in the wavelengths of light and sound, experiments showed. This way of making wavelength shifts was not suspected until a recent theoretical prediction by Emil Wolf of the University of Rochester (N.Y.). 132:22

- Cold fusion, thermonuclear fusion mediated by muons, shows promise as a potential energy source, according to recent experiments. 131:133

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1987

## Science & Society

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- Delegates from 23 nations agreed to a historic 50 percent reduction in the use of ozone-destroying chlorofluorocarbons by the end of the century. 132:196

- It was a tough year for the Nuclear Regulatory Commission (NRC). A report issued by the National Academy of Sciences said the commission's research program is inefficient and is ignoring important reactor-safety questions (131:38), while the General Accounting Office concluded that nuclear power plants have operated under inadequate safety guidelines and that existing guidelines have been applied inconsistently (132:213). The NRC also came under attack from public-interest groups when it decided that nuclear power plants could be licensed without state or local input into emergency planning (131:100, 150; 132:279, 309). Meanwhile, the federal program aimed at finding sites and setting standards for the disposal of radioactive nuclear waste continued to suffer setbacks. 132:73

- The American Physical Society provoked both criticism and praise when its study group concluded that at least a decade of intense research will be needed before an informed decision can be made regarding the feasibility of directed-energy weapons, proposed for the Strategic Defense Initiative (SDI)

(131:276; 132:38). Later, a former associate director for nuclear weapons at the Lawrence Livermore (Calif.) National Laboratory asserted that the Reagan administration had been given overly optimistic and technically incorrect information about the development of the X-ray laser, a key SDI element. 132:276

- The Reagan administration, in stepping up its national-security efforts to control the flow of science and technology information out of the United States, took some actions that some say strain the bounds of legality (131:314). And a National Academy of Sciences panel concluded that export controls are hurting the sales of U.S. high-tech products to military allies. 131:55

- As scientists struggled to develop AIDS vaccines, ethicists, lawyers and policy-makers worried about the problems that will have to be faced during testing and distribution of candidate vaccines, particularly in the absence of a U.S. vaccine-liability program. 131:329

- In settling a suit, the Department of Defense agreed to submit its biological warfare research programs to environmental impact studies. 131:132

- Universities debated how best to lobby for funds to upgrade and expand their research facilities. 131:246, 341.

- Four years after it was first submitted for publication and amid considerable controversy, a report detailing biomedical research misconduct at Harvard University and Emory University was published along with a rebuttal from one of the physicians whose research methods were criticized. 131:52

- While the Reagan administration established the Exclusive Economic Zone in 1983 in part to spur the mining of minerals in this offshore region, a congressional report concluded that near-term prospects for mineral development are hampered by technological, financial and regulatory problems. 132:86

- The Supreme Court struck down a Louisiana law that would have required the teaching of creation science in public-school courses that cover evolution. 131:404

- The Soviet Union announced that it will allow U.S. geologists to monitor Soviet nuclear tests with seismic stations located inside the USSR — an agreement that will aid in determining the yield of Soviet explosions (132:6). This came as part of a continuing agreement between the Soviet government and the Natural Resources Defense Council to establish seismic stations near the Soviet and U.S. test sites. 131:345

- The possibility of the news media acquiring their own space satellites to photograph activities on earth raised national-security and first-amendment questions in a study by the congressional Office of Technology Assessment (132:28), soon followed by the issuance of Commerce Department regulations governing the activities of private satellite owners. 132:87

1987

## Space Sciences

- NASA, having achieved only six of 25 planned space launchings in 1986, due to the Challenger disaster as well as the failure of several "expendable launch vehicles" (ELVs), scheduled only six launchings in total for 1987, all with ELVs. By year's end, the agency had conducted just half that many, only two of which — the GOES-7 weather satellite for the National Oceanic and Atmospheric Administration (131:150) and a communications satellite for Indonesia — were successful. In addition, the shuttle's return to service had been targeted for February 1988 (131:22), but it slipped at least four months more before the year was out (132:330), despite the successful test-firing of one of the shuttle's redesigned solid rocket boosters (132:151). Returning the increasingly shuttle-dominated space program to a shared reliance on ELVs was urged by numerous advisory groups and individuals both outside and within NASA (131:85), before the agency finally announced that it would indeed go back to the use of a "mixed fleet."

- ELVs, meanwhile, were a story in their own right. During NASA's third launch attempt of the year, an Atlas-Centaur rocket carrying a military communications satellite, FLTSATCOM F-6, veered off course due to lightning and had to be destroyed from the ground (131:215). Less than three months later, lightning unexpectedly ignited a small Orion sounding rocket that had not yet been raised to its proper firing position, causing it to take off horizontally before ending up in the water (131:390). On the other hand, the European Ariane — which even before the Challenger explosion had been the shuttle's chief competition for launching commercial satellites, due to the shortage of U.S. ELVs — scored a successful launch that signaled its recovery from a 1986 failure of its own (132:198), as did the U.S. Air Force's powerful Titan 34D (132:330). Another failure, however, occurred during a ground-test of a solid-propellant "strap-on" rocket motor of a type planned to augment the performance of the usually reliable Delta ELV; the enhanced Delta's first job is to be the launching of a satellite formerly intended to have been deployed from the shuttle. 132:166

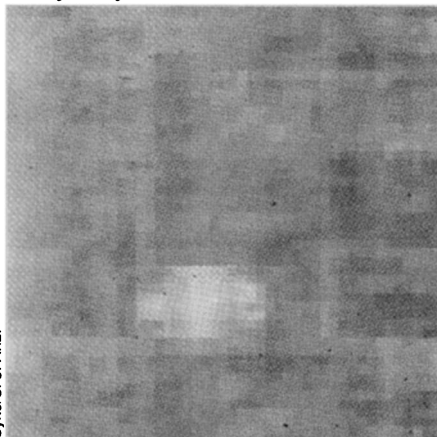
- The administration's plans for a U.S. space station became an object of increasing controversy regarding both its envisioned purposes and its multi-billion-dollar cost (131:293). The President approved a modified design that would spread the cost over a longer period and delay completion by at least two years to 1996 (131:230), but even then, a National Research Council panel concluded that the project would cost nearly twice the amount being officially cited by NASA. 132:37, 183

- A U.S.-Soviet agreement calling for peaceful cooperation in the exploration and use of space was signed by President Reagan, five years after he had allowed the previous version to lapse as a protest against Soviet imposition of martial law in Poland. 131:260

- Light and dark patches said to be the first details ever observed on the surface of an asteroid were identified in speckle interferometric images of the asteroid Vesta. 132:343

- Ambitious plans to send several unmanned spacecraft to Mars beginning in 1988 were announced by Soviet scientists, while the launch of the one approved U.S. mission to the planet, called the Mars Observer, was delayed from 1990 to 1992 (131:197). Meanwhile, a number of U.S. and Soviet scientists, officials and space advocacy organizations repeatedly raised the possibility of sending humans to explore the red planet. 131:293; 132:68, 117

- Scientists raised the possibility that there is water-ice on the surface of Pluto's moon Charon (shown below), on the basis of spectral measurements made while planet and satellite were eclipsing one another — an alignment visible from earth only during a roughly six-year span every 124 years. 132:207



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- Uranium-235 left in the atmosphere by the 1983 reentry of the Soviet Cosmos 1402 satellite was found to have been still aloft more than a year later, according to samples taken by high-altitude balloons. 132:278

- In the race to develop memory chips that can store large quantities of computer data, Japanese and U.S. companies revealed prototype designs for chips holding up to 16 million bits. 131:189

- Researchers in Israel developed a photoelectrochemical cell that converts sunlight into electricity and contains a storage capability allowing it to continue working in the dark. 132:325

- Sunraycer, an experimental car developed by GM Hughes Electronics, set a new world speed record for a land vehicle powered solely by direct sunlight, then won a 1,950-mile race across the middle of Australia. 132:219, 349

- A team of IBM researchers generated electrical pulses so short that each lasted only half a picosecond. 132:20

- The aircraft Voyager completed the first nonstop flight around the world without refueling. 131:5

- Improved measurement techniques led to changes in the numerical value of fundamental physical constants. 131:104

- The human-powered aircraft Daedalus was rolled out in preparation for a flight from Crete to the Greek mainland. Its predecessor, the Light Eagle, set a record for the longest flight by a human-powered aircraft. 132:302

- Inventor Gordon Gould won his long battle to receive a patent on the gas-discharge laser. 132:349

- Improvements in laser technology led to new lasers capable of producing extremely intense beams and very short pulses. 131:149

- Researchers developed a technique for constructing novel artificial crystals, allowing the possibility of making silicon-based light-emitting devices. 131:294

- Two reports showed that municipal incinerators can be operated under conditions that minimize dioxin production. 132:118

- Japanese researchers fabricated a boron-nitride diode, showing that this material can be used to create electronic devices capable of surviving high temperatures. 132:247

- Researchers at GTE laboratories succeeded in growing the basic components of a transistor, letting nature do the work of creating a suitable silicon structure. 132:25