RANDOM SAMPLES

edited by CONSTANCE HOLDEN

Quicker Ozone Recovery Forecast

An international panel of experts has come up with some good news for the next generation: If ozone-destroying compounds are phased out on the schedule laid down by the 1987 Montreal Protocol, Earth's protective ozone layer will return to normal levels in less than 50 years. Earlier projections had indicated a 75- to 100-year recovery period. The revised estimate reflects recent studies showing that the atmosphere can clean itself more rapidly than had previously been supposed.

The comeback will still take decades. Although restrictions on some compounds are already taking hold, the chemicals are extremely long-lived and will continue to accumulate. The 226-member panel, convened by the World Meteorological Organization and the United Nations Environment Program, estimates that stratospheric levels of ozone-depleting chlorine and bromine will peak by around 1998.* By then, ozone levels will have dropped 7% to 13%, depending on the season and latitude, from those of the late 1960s. These declines would let in 8% to 15% more cancer-causing ultraviolet radiation than before.

After that, ozone levels should gradually recover. By about 2045, the panel estimates, ozone-destroying chemicals will have fallen to low levels, and ozone concentrations will have risen enough to heal the Antarctic ozone hole.

The parties to the Montreal Protocol may consider further restrictions at a meeting next month in Nairobi. According to the panel, a ban on methyl bromide, an agricultural fumigant, and an accelerated withdrawal of a chlorofluorocarbon replacement (which still produces some chlorine) could cut another 15 years off of the recovery period.

* For information on the forthcoming report, *Scientific Assessment of Ozone Depletion: 1994*, call 212-963-8098.

ROYAL ONTARIO MUSEUM; INSET: STEPHANIE HALOWKA

Theban beauty bares painful secret. Djedmaatesankh heads into CT machine. Inset shows hole *(right)* enlarged by tooth abscess.

22nd-Dynasty Toothache

A well-to-do Egyptian matron has made her second contribution to science. Djedmaatesankh of Thebes, mummified in Egypt about 3000 years ago, in 1978 became the first mummy to undergo a full-body CT scan. And just recently, she demonstrated that such imaging could determine an ancient cause of death—hers. This is the first time a CT scan has been used to make such a determination, according to Peter Lewin of the Hospital for Sick Children in Toronto. The cause: a "horrendously large dental abscess" an inch in diameter, he says. "With no antibiotics—and this looked as if it was a very active infective lesion—I'm sure she had blood poisoning and generalized disease and died," says Lewin, a pediatrician and paleopathologist.

Djedmaatesankh has been in the Royal Ontario Museum since the early part of this century. Her elaborate cartonnage—the decorated cloth-and-glue shell around the mummy itself—has never been opened. "That was a very important discovery—that we actually determined a major contributory cause of her death without disturbing the sanctity of her body," says Lewin, one of the first researchers to use CT scanning in archaeology.

While the resolution of her 1978 scan wasn't sharp enough to identify the abscess in the upper left side of the mummy's jaw, enhanced modern images showed a large hole in the bone; surrounding bone is swollen from the infection. The team was also able to produce 3D images of the skull showing the abscess, and images showing the lines left on the face by the linen wrappings and indentations from the metal plates that were placed over the eyes. As a final touch, Lewin's team created a 3D reconstruction of the way Djedmaatesankh may have looked in the last months of her life. "She was a beautiful lady," says Lewin.

MSU Affair Resolved

One of the more bizarre scientific misconduct cases has apparently been closed, with no clear winners but a cease-fire. Hostilities began in May 1989, when Jeffrey Williams, a professor of microbiology at Michigan State University (MSU), dismissed a graduate student who was doing her dissertation using data from Williams' decade-long study of African River Blindness in the Sudan (*Science*, 18 February, p. 907). Williams then accused the student of absconding with data from the project. MSU administrators sided with the student and helped her publish a paper on the data despite objections from Williams and his Sudanese collaborators. The affair then escalated: Williams filed formal scientific misconduct charges against the student and four faculty members who helped her publish; he turned his $4.5-million research project over to collaborators at Brigham Young University; and as the affair dragged on, he filed lawsuits against 19 MSU officials. The MSU administration sued Williams back, charging him with misappropriating funds in the Sudan.

Last month, the parties finally settled. Williams agreed to drop his remaining lawsuits, and MSU agreed that Williams should have control over his research data. MSU also agreed to pay Williams $43,000, plus $165,000 for new equipment and graduate student stipends to revive his languishing research. Williams will also be reimbursed for two summers' worth of back pay, according to the local *Lansing State Journal*. "This has been a sore on the university for a long time. I think settling this is very positive for everyone," said MSU president Peter McPherson.

Williams told *Science* he regards the agreement as a "cease-fire," adding that the case has finally "crystallized" the idea that a principal investigator on a grant must have ultimate control over all the data.

Memory Metal Unwinds Scoliosis

Smart materials may soon lead orthopedic surgeons to a gentler way of correcting scoliosis, a lateral bending and twisting of the spine that in most cases develops in infancy or childhood.

In severe cases, surgeons try to force the spine to straighten by implanting a rigid rod that is screwed to the vertebrae. But mechanical engineer Marc Sanders at Twente University in Enscheda, the Netherlands, has propounded a better idea in his doctoral project that he may soon see in use. It's a "shape memory metal" rod that acts like an uncoiling spring, gradually

straightening the spine.

Shape memory metals, used widely in industrial applications, can be bent beyond their "elastic limit" and still retain a memory of their original shape, which they resume when heated above a "transition" temperature. Sanders suggests that a rod of titanium-nickel alloy with a transition temperature of 25°C (77°F) could be heated to 400°C (752°F) to "program in" a normal spine shape. Then it could be molded at room temperature into the same shape as the deformed spine and implanted in the patient's back. At body temperature, it begins to revert to its original shape, easing the spine with it. Sanders says one advantage is that "we can apply a corrective force over several weeks, instead of the transient force obtained by traditional methods," where most of the force exerted by the rod dissipates soon after the operation. And, he says, "we can achieve a better correction," changing the twist as well as the bend in the spine.

The memory rod hasn't been tested on a living person yet, but Sanders has done promising experiments with two cadavers—first using curved rods to bend the spines, then inserting corrective rods with straight memories. A patent on the system is pending, and the Dutch office of the firm Acromed plans to bring it to market. Orthopedic surgeon Albert Veldhuizen of the State University Hospital, Groningen, is planning to try it out in November in a young patient. "This is a revolutionary new concept in dealing with scoliosis...taking advantage of the [elastic] properties of the spine," he says.

2 Firms, 4 Engineers Win Technology Medals

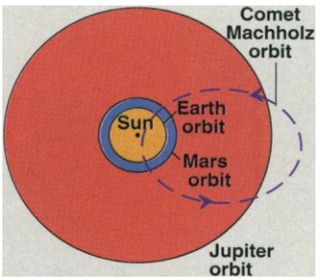
An old-timer and a newcomer in the U.S. corporate high-tech world have been awarded 1994 National Medals of Technology, the federal government's most prestigious technology awards.

Amgen Inc., the first biotech company to be honored in the 10-year history of the awards, was recognized for developing two medicines: Epogen for severe anemia and Neupogen to prevent chemotherapy-induced infection. The venerable Corning Inc. was honored for innovation and manufacturing ranging from bulb glass for Thomas Edison's first electric light to space-shuttle windows.

Medals also went to: Joel Engel, vice president of technology for Ameritech Corp., and Richard Frenkiel, a retired AT&T Bell Labs engineer, for work on cellular mobile communications; H. Joseph Gerber, founder of Gerber Scientific Inc. in South Windsor, Connecticut, for work on automated manufacturing; and Irwin Jacobs, head of Qualcomm Inc. in San Diego, for contributions to digital wireless communications.

Another Comet Crackup

Disintegrating comets are rare beasts—before comet Shoemaker-Levy 9 smashed into Jupiter in July astronomers had not observed one since 1976. But now another one has turned up—and this time its orbit crosses that of Earth. "It's quite remarkable that a disintegrating comet on an Earth-crossing orbit should have been found soon after SL-9," says Duncan Steel of the Anglo-Australian Observatory in New South Wales, who studies near-Earth objects.



Close—but not too close. Because its orbit is on a tilted plane, comet does not intersect with Earth orbit.

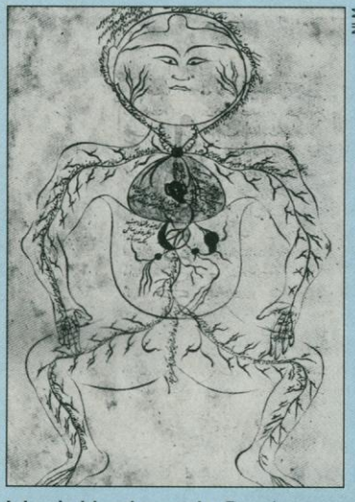
The latest observations of comet Machholz-2—named for Californian amateur astronomer Don Machholz, who found the comet last month—have revealed five fragments, the largest perhaps half a mile across. There's no need to panic: According to present calculations, none of the chunks is expected to come closer to Earth than 11 million miles over the next 100 years.

The new discovery may have important implications for attempts to detect future Earth-threatening objects, however. Some astronomers believe that the most serious potential hazard comes from certain groups of asteroids—interplanetary chunks of rock—on Earth-crossing orbits. That was one of the factors that led the National Aeronautics and Space Administration to consider setting up Spaceguard, an international network of telescopes that would scour the parts of the sky these asteroids traverse.

But a number of researchers argue that fragmenting comets like Machholz-2 may also pose a risk. And because the orbits of comets—which pop into the solar system from random directions—are not on the same plane as the rest of the solar system, they could be missed by detection networks peering only into asteroid-rich regions. Steel says "it's easiest to discover comets when they're near to the sun," where they gain highly visible tails from melting ice particles. "Spaceguard might miss Machholz-2, as it would be looking in the wrong part of the sky."

Exaggerations of Ancient Medicine

The notion that medieval Islamic physicians had advanced skills that enabled them to carry out Caesarean sections is a false one, according to Oxford University medical historian Emilie Savage-Smith. People have been misled by Persian pictures of the births of famous men like Julius Caesar, for whom myth-makers liked to fancy exceptional origins, that show physicians extracting a baby from a woman's abdomen. But Savage-Smith said that from her examination of the medical literature she could find "no evidence that the operation was even contemplated on a living woman."


NLM

Islamic blood vessels. Drawing depicting the arterial system and various organs, from a 15th-century Persian anatomy manuscript in the NLM collection.

Savage-Smith related her conclusion at a symposium at the National Library of Medicine in Bethesda, Maryland, held to celebrate the 900th anniversary of the oldest book in its collection: a treatise on gastrointestinal disease by the famous 10th-century Islamic physician Abu Bakr Muhammed ibn Zakariya al-Razi.

Islamic surgeons, lacking effective antibiotics or anesthetics, were quite conservative. "Major or invasive surgery was scarcely ever attempted," said Savage-Smith. She also noted that just because procedures were described in textbooks doesn't mean they worked, or even that they were performed. For example, she said some books depict hollow needles to be used to treat cataracts by sucking them out. But she related that a modern-day attempt to see if such a needle could draw up viscous fluid of cataract consistency was thoroughly unsuccessful.