RANDOM SAMPLES

edited by CONSTANCE HOLDEN

Keeping Up With 2000

Crashed computers, failed businesses, the government tied up in knots. That's the picture that many are predicting if the country doesn't get its act together to solve the "2000 problem."

What's the problem? Most computers aren't ready to go into the next century. It seems that back in the dark ages of the 1960s and 1970s, programmers needed to save computer memory, so any programming that related to dates left room for only two digits for the year. After 99 comes 00—which computers will interpret as 1900. At the time, programmers expected their work to be superseded quickly, says an administration official. And it was, but the double-digit habit persisted—indeed, even the calendar in Windows 95 won't go beyond 1999.

Government officials explain that 2000 could play havoc with all the government's date-dependent activities—such as sending out checks, scheduling, forecasting, and calculating benefits. Without a fix, "you get erroneous results or your program stops completely," says Judith Draper of the Social Security Administration. For example, subtracting 12/31/95 from 12/31/05 to get a 10-year old's age in 2005 would yield –90.

Draper manages a year 2000 project for Social Security, and similar efforts are sprouting at other agencies. But the complexity and cost of solving the problem is turning out to be mind-boggling. Declared a Treasury Department official at a congressional hearing last spring: "Neither the government nor industry has ever tackled a computer-systems problem this massive or pervasive." Millions of lines of computer code have to be scanned for anything related to dates; hardware engineers and software programmers have to decide how to fix the code; then the fixes have to be tested. Computer scientist Kevin Schick of the Gartner Group, international consultants, has estimated that because the task is so labor-intensive, it will end up costing the government between $20 billion and $30 billion.

Schick says getting all of North America's computers ready for 2000 will cost up to $300 billion; the tab for the whole world he pegs at $600 billion. But most people are still behind the curve, he says: "All I see is hand-wringing."

Liquor-Loving Mice

Scientists may have come a wee bit closer in their quest for a gene or genes contributing to alcoholism. Behavioral geneticists in Oregon have demonstrated in so-called knockout mice that the loss of a single gene that affects the neurotransmitter serotonin is enough to turn healthy rodents into heavy drinkers. "What [we] have now is proof that this gene is important for consumption," at least in mice, says Herman Sampson, a behavioral neuroscientist at the Bowman Gray School of Medicine at Wake Forest University in Winston-Salem, North Carolina.

The gene in question codes for the 5-HT_{1B} serotonin receptor, a protein that sits on the surfaces of nerve cells and is thought to help control serotonin release, says John Crabbe at the Veteran's Affairs Medical Center in Portland, Oregon. When Crabbe's colleague René Hen, now at Columbia University, made these knockout mice 2 years ago (*Science*, 23 September 1994, p. 1875), the animals were found to be abnormally aggressive. Now the team reports in the September *Nature Genetics* that the loss of this receptor also causes the mice to prefer liquid containing 20% ethanol over tap water and to consume twice as much alcohol as normal mice. They had suspected this might be the case from mouse studies that have pointed to a number of genes, including this one, possibly linked to alcoholic behaviors.

The yen for alcohol has nothing to do with taste, as the knockout mice show no unusual taste preferences, says Crabbe. Instead, "it appears they are making this selection on some pharmacological grounds." Drink for drink, the knockout mice get less tipsy and are less likely to stumble than are those with the gene.

The work dovetails nicely with findings from human studies showing low levels of serotonin in some alcoholics and in people prone to violent behavior, says Crabbe. "What this [finding] does is allow us to link aggression and alcoholism together," says Denise Tomkins, a behavioral pharmacologist at the Addiction Research Center in Toronto. As such, she adds, the mouse will likely be used "for screening novel agents that have potential for use in the clinic" in treating violent alcoholics.

JAMSTEC

Denuclearized. *Mirai* ("the future"), Japan's newest oceanographic research vessel and, says Japan, the world's largest, was launched last week. It was a new beginning for the 130-meter, 8600-ton ship, which began life as an experimental nuclear-powered ship in the early 1970s as part of Japan's ambitious plan to build some nuclear-powered commercial vessels. Then called *Mutsu*, it broke down on its maiden voyage—and just about every time it put to sea thereafter. After 20 years of breakdowns and hostile receptions in port by nuclear-phobic Japanese, *Mutsu*—rumored to be leaking radioactivity—was towed to Mutsu, its eponymous port, and Japan's Science and Technology Agency (STA) threw in the towel on commercial nuclear vessels. They have now replaced the *Mutsu's* reactor with a diesel engine, renamed the ship, and given it a new mission. The STA-affiliated Japan Marine Science and Technology Center plans to use the *Mirai* for a wide range of oceanographic and meteorological observations including limited sea-floor coring.

Endowment for NIH

Although it has some of the elements of a university—a vast campus, regular classes, and a large faculty—the National Institutes of Health (NIH) lacks one thing many great universities have: an endowment. But that may soon change. Last month a handful of biomedical leaders announced that they are creating a private fund, called the National Foundation for Biomedical Research (NFBR), to support special projects at NIH.

The NFBR has been a long

(continued on page 1343)

(continued from page 1341)

time in the works, explains its executive director, George Galasso, NIH's recently retired associate director for extramural affairs. First suggested by Senator Edward M. Kennedy (D–MA) as a means of endowing research chairs at NIH, it has been authorized by Congress twice since 1990, but never got an appropriation.

Galasso says it has taken 6 years to get a definitive legal opinion allowing NIH to donate money to the project without an appropriation. Now that it has the green light, the goal of the fund has shifted to improving the NIH research environment, possibly by financing sabbaticals and other amenities of academic life, as well as special projects such as research training, public education, and collaborations with outside groups. With "a blessing" from the top brass, NIH this year provided a gift of "a few thousand dollars" to get the ball rolling, says Galasso. NFBR is now incorporated as an independent tax-exempt foundation in Maryland and has a nine-member board of directors, chaired for the time being by biochemist Paul Berg of Stanford.

At present, says Galasso, the NFBR has a "zero" endowment, so fund raising is the first order of business. The board will meet on 24 September in Bethesda, Maryland, "to define our mission," says Berg—and to decide whom to tackle for donations.

Hitting the Spot With Genes

A technique for putting a foreign gene in the right place in a mouse chromosome—and in the right amount—strikes a bull's-eye every time, say researchers at the University of North Carolina, Chapel Hill. The technique, called targeted transgenesis, avoids the hit-or-miss results that typify efforts to insert foreign genes, called transgenes.

Adding a transgene to a mouse genome usually involves sticking a stretch of foreign DNA into a newly fertilized egg. But a lot can go wrong—the DNA may get copied multiple times, it may be only partly activated, or it may disrupt adjacent genes.

Now scientists can get the cells to do the detail work. Molecular geneticists Sarah K. Bronson, Oliver Smithies, and their colleagues describe in the 20 August *Proceedings of the National Academy of Sciences* how they first cultured embryonic mouse stem cells carrying a partially deleted and defective *Hprt* gene. They then constructed their insert by splicing a transgene, *bcl-2*, with the missing part of the *Hprt* gene. The insert also contained a stretch of DNA, or promoter, that activates the transgene. When the insert was added to the stem cells, their DNA recombination machinery "recognized" the *Hprt* gene and put the insert just where it belonged, the Bronson group reports. To test how much the expression of the transgene could be controlled, the researchers made inserts with two different promoters, one from human DNA and one from chicken DNA. Each led to consistent expression of the *bcl-2*, with the human promoter causing greater activation.

Smithies says that because this procedure can be reliably and precisely reproduced, it is "much more efficient" than the traditional one. As such, comments Maria Jasin, a molecular biologist at the Memorial Sloan Kettering Cancer Center in New York, "it is a nice continuation of developments in the field."

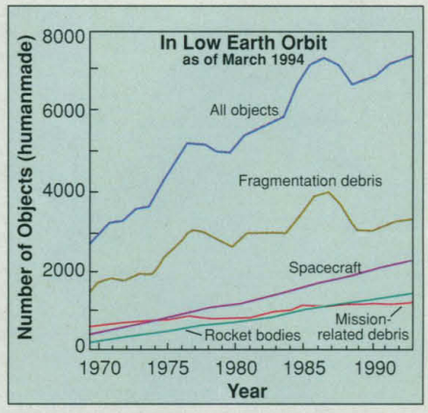
Colliding Space Junk

The first collision between two "cataloged" objects—which include working satellites and assorted space junk—in low Earth orbit occurred in late July, according to satellite watchers at the University of Surrey in the United Kingdom. NASA confirmed the event last month.

Scientists observed a sudden change in the attitude of Cerise, a French military satellite, as it tumbled through its 700-km polar Earth orbit. It seems Cerise, which was sent up last year to monitor earthly radio transmissions, got smacked by a piece of an Ariane rocket. Part of the rocket's third stage, which exploded after it was cast off from a 1986 launch, apparently destroyed the satellite's 6-meter-long stabilization boom, hitting it at about 50,000 km per hour. Scientists say Cerise will be able to carry on, though—engineers are reprogramming the onboard computer to get it reoriented, and are relying solely on its onboard electromagnets to maintain its attitude.

Once Cerise was jolted, it was a simple matter to look up the orbits of all the known pieces floating around and finger the guilty party, says Joe Loftus, an expert on orbital debris at the Johnson Space Center in Houston.

Loftus says rocket explosions are "the major source of debris" in space. Space-faring nations have taken measures to reduce explosions by burning or venting leftover fuel, but without further action, more debris is expected to accrue. So, says Loftus, defensive measures are necessary. The space station, for example, to be launched next year, is being armored against the 1-in-77 chance that over a 10-year period it will be hit by an object larger than a centimeter.



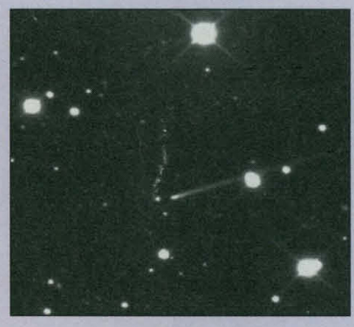
NASA

Space clutter. Orbiting objects over 1 mm are mostly humanmade.

Cosmic Identity Crisis

An asteroid with a tail and a comet without one? The astronomy community is abuzz over sightings of these unusual beasts in the last few weeks.

The first misfit "looks like an asteroid but walks like a comet," says Lucy McFadden, a planetary scientist at the University of Maryland. Like a comet, the object follows a cigar-shaped orbit that carries it to the solar system's outer reaches, but it looks like a rocky asteroid because it lacks the usual halo and tail of gas and dust that emanates from a comet's icy surface. Theories abound about its nature: It may be a comet whose ice is completely smothered by dust and dirt or was lost completely on previous passages around the sun—or it may be an asteroid whose orbit was perturbed by Jupiter's gravity. Detailed observations of its orbit may tease out an answer, says McFadden. As for the tailed object, its stable orbit in the asteroid belt between Mars and Jupiter makes it look "outrageously like an asteroid," says minor-planet specialist Gareth Williams of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts. Asteroids don't have tails, however, so researchers have officially designated it a comet. But instead of being a comet's vaporous tail, says McFadden, this object's plume might consist of dust from a recent collision with an asteroid. Careful measurements of the tail's shape and orientation may help solve the riddle.



WARREN OFFUTT/W&B OBSERVATORY

Strange tail. Comet or asteroid?