RANDOM SAMPLES

edited by CONSTANCE HOLDEN

Battle Brewing Over Endangered Species

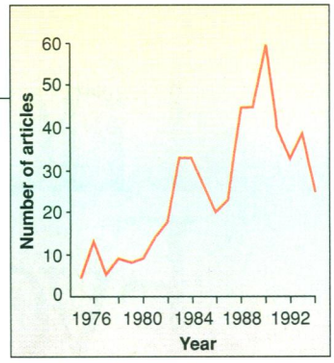
Debate over the Endangered Species Act is expected to heat up this winter as the House and Senate consider two bills that scientists have sharply criticized as inadequate and scientifically dubious.

Both bills offer what everyone seems to agree are much-needed incentives to landowners to protect habitats (*Science*, 1 September, p. 1212). But beyond that, there are problems. The main Senate bill under consideration, sponsored by Senator Dirk Kempthorne (R–UT), is replete with "scientific fallacies and mistakes," according to a letter released 29 November by 16 biologists, all of them presidents or former presidents of the Ecological Society of America, the American Institute of Biological Sciences (AIBS), or the American Association for the Advancement of Science (*Science*'s publisher).

The writers criticize the bill for its unscientific definition of "endangered," which is described as being "on an irreversible course to extinction" within 40 years. There is too little known about most species to tell whether they fit this rigid criterion, critics say. The bill also says that only species with "a complete lack of gene flow"—that is, that have never bred with other populations or subspecies—can be labeled "endangered." The critics say this would exclude already listed subspecies such as Pacific Northwest salmon. And the measure wouldn't cover species that can't be saved "without extraordinary efforts." That, say the scientists, is an unscientific cutoff point. "This bill would make it very, very difficult to save species," says AIBS President W. Hardy Eshbaugh of Miami University. A House bill due to be voted on in early 1996, sponsored by Representative Don Young (R–AK), has similar problems, say the scientists.

A Kempthorne staffer says the scientists' complaints concern policy, not science, and that the senator has gone out of his way to include all views in his bill.

Meanwhile, a group of biologists and environmentalists, including E. O. Wilson of Harvard University and Thomas Eisner of Cornell, is looking to House Speaker Newt Gingrich (R–GA) to help prevent the passage of either bill without major alterations. They've met several times this year with Gingrich to act as "an honest broker of information" about how best to conserve endangered species, says Wilson. Congress is expected to take up the bills in February or March.



Hot topic. Popular coverage of the movement has peaked.

Animal Rights Fading?

Has public interest in animal rights peaked? Psychologist Harold Herzog of Western Carolina University thinks so, based on declining mentions in the popular press and statistics indicating the use of animal products is growing. Others believe, however, that the movement is as strong as ever.

Herzog reported in the November issue of *American Psychologist* that he did a computer search of popular magazine and newspaper articles published over the past 20 years that mentioned topics such as "animal liberation." The number of stories peaked in 1990 (see chart). His conclusion: "The visibility of the animal rights movement has leveled off and may be declining." Herzog says that data from other sources support this conclusion: According to tax records, contributions to animal rights organizations no longer show the "dramatic growth" they experienced in the 1980s. And government statistics on annual cattle slaughter suggest that meat-eating has been on the increase after a decline during the '80s. Fur sales—according to the Fur Information Council—have also been growing, Herzog notes.

Other observers agree that not as much newsprint is being devoted to animal rightsers. Veterinarian Andrew Rowan of Tufts University's Center for Animals and Public Policy sees a "plateauing" of public interest, noting that contributions to People for the Ethical Treatment of Animals peaked at $9.8 million in 1991. He says some support may

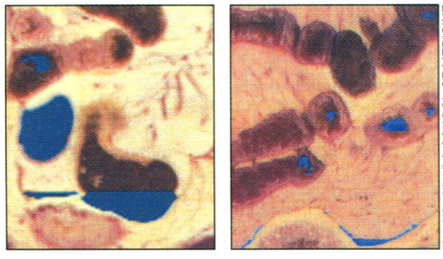
(continued on page 1929)

Visible Man Gets High-Resolution Mate

A woman who died of cardiopulmonary arrest at 59 has been cross-sectioned, photographed, digitized, and installed on the Internet, joining a 39-year-old man who underwent a similar fate a year ago (*Science*, 2 December 1994, p. 1483).

The Visible Woman, sponsored by the National Institutes of Health's National Library of Medicine (NLM), took up residence on the World Wide Web (her address is <http://www.nlm.nih.gov>) at the end of November. And she's expected to be even more useful than the man. While cross sections of his body were photographed every millimeter, chunks of the woman, preserved in frozen blocks, were photographed after being milled off at 1/3-millimeter intervals.

Anatomist David Whitlock of the University of Colorado School of Medicine, who helped slice up both cadavers, explains that the man's resolution left something to be desired "if you wanted to put images into a computer and stack them up and reformat them and look from side or front to back." But with the Visible Woman, he says, "you can reconstruct her in any plane at high resolution." The computer stacks the horizontal images and lays a surface over the contours for the vertical views.



UNIV. OF COLORADO SCHOOL OF MEDICINE

Innard vision. Reformatting of cross-sectional data to show 10-cm vertical slice from woman's abdomen *(right)* is much clearer at 0.33 mm resolution than similar section from man (1 mm resolution). (Reddish blobs are small intestines.)

The Visible Man has already been used as a simulator to train medical students and as a substitute for dummies in crash testing, among many other projects. With higher resolution, the woman will be of more use, for example, in simulations of delicate surgery. Physician Jonathan Merril of High Techsplanations in Rockville, Maryland, says his company is using the data to develop simulations to train surgeons in what's sometimes called "Nintendo surgery"—procedures like laparoscopies or cardiac catheterization where the doctor is guided by the image on a monitor.

The visible people—access to the full data set requires a license—will become even more useful with Phase 2 of the project, says Michael Ackerman of the NLM. That involves cataloging every voxel (a voxel is a 3D pixel, $0.33mm^3$) of every image, so researchers will be able to call up specific types of data.

And who knows what will happen next—"The entertainment industry is interested in this database," says Ackerman.

(continued from page 1927)

be shifting to more moderate "animal welfare" groups—which are usually not opposed to killing animals for human use—which have shown strong growth in recent years.

Yet Frankie Trull of the Foundation for Biomedical Research believes that while animal rights stories have fallen off, the sentiment has not. Activists "are not burning down buildings any more," says Trull, but the movement has become more "insidious": For example, "kids starting in kindergarten are being taught about animal rights" and the idea that using them for research is wrong.

Robot Mine Detector

Fertile-minded California inventor Bill Wattenburg, who brought you railroad flatcars as post-quake highway bridges and minesweepers in the form of giant chain blankets dragged by helicopters, has come up with another ingenious adaptation: a kamikaze robot minesweeper, at 1.2 meters long not much bigger than a vacuum cleaner, but well-suited to clean up the fields for NATO troops in Bosnia.

LLNL

Rolling robot. Prototype in the field.

Currently under development at Lawrence Livermore National Laboratory, Wattenburg's "spiral tube all-terrain vehicle" is made of what look like two horizontal Rototiller blades, or Archimedes screws, mounted on a frame. The screws propel it forward, backward, and sideways. The device can go just about anywhere, including through mud and up stairs, says Wattenburg, who is affiliated with California State University, Chico. And the critter can be fitted out with cameras and sensors to serve a multitude of purposes, including disarming weapons, pulling sniper fire, and sniffing out toxins. Most ground casualties are caused by land mines, booby traps, and snipers, says Wattenburg. His device could "run out in front of a soldier like a German shepherd" and take on most of the risk .

The corkscrew robot has been under development since last spring. It's only in the early prototype stage, says Lawrence Livermore Deputy Associate Director Milton Finger: "There's a lot to be done yet," including work on the controls, sensors, and power source. But Los Alamos physicist Stirling Colgate, who worked with Wattenburg on the helicopter-and-chain scheme in Iraq, says he has great faith in the inventor and "if Wattenburg thinks this is the way to do it," then the concept deserves to be explored.

So far, the robot has involved the expenditure of only about $50,000 and doesn't have any funds from the U.S. military. But if U.S. brass aren't ready yet, others may be. "We had some people here yesterday from the Angola government talking to us," says Livermore engineer Erna Grasz.

Synchrotron Throws Light on Cement

Although fast-setting cement may be a useful product for gangsters ridding themselves of rivals, engineers don't like it—it can be excessively porous, leading to unpredictable weaknesses. For the past half-century, gypsum has been added to cement to get it to set properly, but no one knew why it worked. Now, however, thanks to some high-tech physics, that mystery has been solved.

Researchers at Birkbeck College, London, Schlumberger Cambridge Research, U.K., and the new European Synchrotron Radiation Facility (ESRF) in Grenoble, France, have used high-energy x-rays to identify a fleeting chemical intermediate, dicalcium aluminate-8-hydrate, that controls the conversion of water and the most reactive component of the commonly used Portland cement—tricalcium aluminate—into a hardened product. The gypsum, it turns out, slows down the formation of the intermediate. This allows the cement to get properly mixed before it hardens, according to Birkbeck crystallographer Paul Barnes and colleagues in an as yet unpublished paper.

Earlier efforts, using spectroscopy or other means to describe how cement sets, were stymied by the speed of the reactions and by the difficulty of testing bulk samples. But the ESRF, which opened for business last year, is the world's brightest source of high-energy x-rays, and the high energy allows x-rays to penetrate dense samples. And the x-rays yield real-time crystallographic data on a scale of seconds. (The speed is expected to be increased 10-fold next year.) As a result, other industrially important reactions such as high-temperature synthesis of new materials can be studied in fine detail for the first time, says Barnes. Says materials scientist Francis Young of the University of Illinois, Urbana, "It's good to see the application of synchrotron radiation to some intractable problems."

Dual-Use Seismology

If all goes well, the Comprehensive Test Ban Treaty, something atomic powers have been talking about since 1958, will be signed next year. Compliance with the treaty will be monitored by a sophisticated, coordinated global system of seismic monitoring, the International Seismic Monitoring System (ISMS). And instead of being classified, all the data from the system will be public property, a boon to seismologists.

But to be of use to scientists, it has to be the right kind of data and easily accessible. So the Advanced Research Projects Agency of the Defense Department asked the National Research Council (NRC) to devise "ways of ensuring multiple use" of the system.

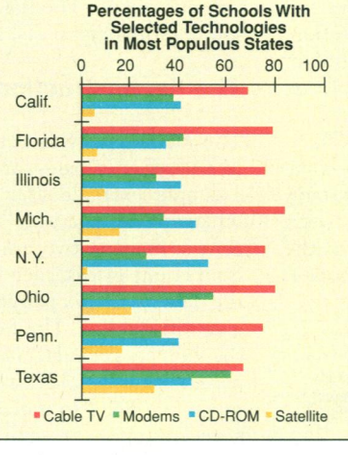
The NRC's report,* by a panel headed by seismologist Thorne Lay of the University of California, Santa Cruz, appeared last month. The panel made recommendations in three areas: instrumentation specifications (test ban monitors are interested in high-frequency signals from small events, but lower frequency ones should be available too for earthquake researchers); mechanisms to provide access (all data should be unclassified and "available in a timely manner"); and keeping up the U.S. research infrastructure. "The monitoring system will need a significant research program," notes Lay, "They're really pushing the envelope."

The multiple-use role for ISMS represents a "significant sea change," says Lay, who notes that in the past, U.S. test ban monitoring data have been classified or inaccessible even after being declassified.

A prototype network, which includes 50 primary stations, started operating last January; all stations will relay data instantly to an International Data Center to be set up in Vienna.

Getting Wired

Educational technology may or may not be making U.S. kids smarter, but the use of computers and telecommunications technology in the public schools is growing steadily nonetheless, according to a Denver-based group, Quality Education Data Inc. The group surveys the field every year, and reports that 98% of public schools now have at least one computer. And the ratio of students to computers has shrunk dramatically—going from 125:1 in 1984 to 10.5:1 this year.



* Seismological Research Requirements for a Comprehensive Test-Ban Monitoring System