Science & Society

Banning bugs by mail

The U.S. Postal Service wants to stop carrying parcels containing microbes or their toxins capable of causing human disease — such as the agents responsible for AIDS, anthrax, botulism, rabies and bubonic plague. Such packages now require an "etiologic agents/biomedical material" label. The action was prompted by "an increase of mailings of all kinds of specimens, and the growing anxiety of postal workers" over their own safety and that of the public, explains Postal Service spokeswoman Jeanne O'Neill.

The proposed ban, announced June 24, would not affect routine diagnostic specimens — such as urine or blood — being sent to laboratories for testing. However, O'Neill says, once a diagnostic specimen has been identified as containing a pathologic agent — like the AIDS virus — it would be banned from further transit through the mail. The Postal Service will accept written comments on the proposal through Aug. 8.

The Atlanta-based Centers for Disease Control (CDC) estimates the ban could require that private carriers be found for some 90,000 samples annually. Leaks of shipped germs or toxins carrying the "etiologic agents" label are supposed to be reported to CDC. In congressional testimony on June 24, John W. McVicar, CDC's biosafety director, said his office records only about three such leaks annually, and none has been linked with causing infection thus far.

Computer data are open to FOIA searches

The U.S. government cannot withhold public access to nonclassified documents by filing those documents in computerized form, according to George B. Breznay, the Energy Department's director of hearings and appeals. His ruling clarifies an earlier response by his office to a Freedom of Information Act (FOIA) challenge by the Washington, D.C.-based National Security Archive, a nonprofit clearinghouse of government documents (SN: 3/19/88, p.181). The Archive wanted to receive a list of titles for some restricted-access nonclassified documents collected by the Energy Department's Office of Scientific and Technical Information (OSTI) in Oak Ridge, Tenn. OSTI initially refused the request, in part saying that since its data were in a computer, manipulating them to create the list of titles would amount to creating a new file — something it needn't do under FOIA. Breznay's new clarification of how far the agency must go in retrieving computerized information says that as long as OSTI's computer software is capable of doing a title search, the search has to be performed under FOIA.

"This is true even if the type of search that must be performed is different from the type normally performed by OSTI [because such a search] is not, in substance, significantly different from a search of a file cabinet for paper records," wrote Breznay in a letter the National Security Archive received last month. "If the FOIA required anything less," he added, "it would allow agencies to conceal information from public scrutiny by placing it in computerized form."

News updates

• The President signed into law on June 28 new minimum efficiency standards for fluorescent-light ballasts (SN: 5/7/88, p.297) that will go into effect in 1990. Though they will cost about $4 more than regular ballasts today, each should save 10 times that much in electricity costs.

• On June 6, the Smithsonian Institution Libraries system in Washington, D.C., opened its newest branch — its Horticultural Library — to researchers from around the country. The holdings, which include more than 5,000 books, bound journals and early (1885 to 1920) seed catalogs, can be viewed by appointment only.

Technology

A neural robot learns to see

The robot itself seems rudimentary: an electronically controlled mechanical arm mounted on a pedestal and two miniature video cameras, like a pair of disembodied eyes, resting on a tripod. An image-processing computer links the cameras with the arm. Nevertheless, this primitive robotic system represents the initial implementation of a sophisticated strategy aimed at teaching a robot to see. The system, developed by Michael Kuperstein of Neurogen in Brookline, Mass., learns about objects in space by associating how the arm moves with what the cameras see (SN: 6/6/87, p.362).

Initially, the robot knows practically nothing about the space around it. Learning begins when the robot's computer controller puts the arm, gripping an object such as a ball or a cylinder, into various positions. At each new posture, the stereo cameras sense where the object rests and generate a pattern of signals corresponding to the camera angles. From hundreds of such stored and processed signals, the robot's controller establishes a relationship between camera angles used to point to a target and arm joint angles needed to get to the target.

After the learning phase, which may require several thousand trials over a period of hours, the robot is ready to sense and grasp an object placed in an arbitrary location. Its controller senses the object's position and automatically converts that information into the appropriate arm movements for reaching and grasping the object. Even during this operation, the robot is learning. If it misses its target, it tries again. Each time, the controller adjusts the robot's arm movements until there is no error.

Kuperstein is now working on the more difficult problem of teaching a robot to handle a sequence of steps needed to accomplish a particular goal in a variety of settings. NASA is considering the use of such a robotic system for assembling space-station components in earth-orbit. In that environment, the positions of parts are likely to be less constrained and predictable than on a factory or shop floor.

Kuperstein predicts his robotic technology will become the method of choice in those tasks — such as walking over rough terrain or lifting loads of unknown weight — where a programmer cannot determine ahead of time what the robot is likely to encounter.

Racing to a place in the sun

The same solar-powered car that sped across Australia to win the 1,950-mile World Solar Challenge race (SN: 11/28/87, p.349) has now established a new speed record for a land vehicle powered solely by direct energy from the sun. Sunraycer, developed by GM Hughes Electronics in Detroit, last month achieved an average speed of 48.712 miles per hour on a 5-mile circular track in Mesa, Ariz. That run broke the 1987 record of 35.22 miles per hour set by a Sunraycer prototype (SN: 10/3/87, p.219).

In separate runs, Sunraycer used solar energy boosted by battery-supplied electricity to set new speed records for an electric-powered land vehicle. The 430-pound car completed a 10-kilometer test run at an average speed of 74.592 miles per hour, a world record for electric-powered vehicles weighing less than 1,100 pounds. Sunraycer's power was supplied by an array of 8,800 gallium arsenide and silicon solar cells and by five lightweight, 24-volt lead-acid batteries. The car's 2-horsepower electric motor weighed only 11 pounds.

Although some of the technologies developed for Sunraycer may lead to practical applications in the automotive industry, GM's main purpose in building the car was to generate interest in engineering education. The California Institute of Technology in Pasadena, for one, plans to use the vehicle as the subject of an engineering case study course.