Biology

Artificial hip lets leopard leap again

The first feline to receive an artificial hip is no ordinary cat. It is a four-foot-long snow leopard at Canada's Calgary Zoo. Last summer the eight-year-old animal seemed to be in pain, crippled by severe arthritis in its left hindleg. Today the leopard is once again leaping from 35-foot ledges, and it is expected to breed.

The unique surgery was performed by a physician-veterinarian team, experienced with hip replacement in humans and dogs. William Barger is chief of the Joint Replacement Service and Howard Paul is a veterinary surgeon at the Medical Center of the University of California at Davis.

To tailor the operation to the exotic cat, a member of an endangered species, the surgeons studied specimens of snow leopard bones loaned by the California Academy of Sciences in San Francisco. They decided that a commercial, stainless steel and plastic joint, developed for large dogs, would best fit the leopard. Paul frequently performs hip replacement surgery on pet dogs, some weighing more than 60 pounds. During surgery on the leopard, as expected, adaptations had to be made for differences in the feline anatomy.

The operation was a dramatic success, even though the cat went into cardiac arrest at the outset of the operation and required closed-chest cardiac massage. The day after surgery, the 100-pound leopard was pacing its cage with no sign of its previous limp. The question remains of how long the prosthetic will hold up in such an active animal. "We can't tell him to stop jumping," Paul says. But the surgeons hope the replacement will function throughout the animal's remaining lifetime, which is expected to be another eight to ten years.

Gene-spliced plants go to seed

The budding field of plant genetic engineering has just reported major, although predictable, accomplishment. Tobacco plants that had been genetically engineered to be resistant to an antibiotic have produced seeds that grow into fertile plants, some of which are also resistant to the drug. The trait is passed on to succeeding plant generations according to the basic laws of genetics, as a dominant Mendelian characteristic.

"Antibiotic resistance is not a commercially important trait," says Ernest G. Jaworski of the Monsanto Company in St. Louis, Mo., where the research was done, "but it provides us with a useful model system for understanding plant genetics, and brings us a step closer to being able to make crop plants more productive."

The work by Robert B. Horsch, Robert T. Fraley and several colleagues was published in the Feb. 3 SCIENCE. About a year ago they first reported that they had incorporated into cells taken from several types of plants the bacterial gene for resistance to the antibiotic called kanamycin (SN: 1/29/83, p. 68). Later the investigators announced they had regenerated petunia plants from such genetically engineered cells (SN: 4/30/83, p. 277). In the more recent experiments, the presence of the new gene in progeny was established both by analysis of the DNA and by testing whether leaf cells could multiply and form shoots on medium containing kanamycin. Horsch has also demonstrated normal Mendelian inheritance of a spliced gene in petunia plants. These results indicate that genetically engineered plants can be propagated with traditional agricultural methods.

Top dog at the zoo

An animal behaviorist and conservationist has been appointed director of the National Zoological Park in Washington, D.C. Currently deputy director of the Smithsonian Tropical Research Institute, Michael H. Robinson has been doing research on mating behavior in freshwater fish and on intelligence and learning in free-living tropical birds.

Technology

'N Depth': Another 3-D TV contender

Many have tried to develop television systems that convey crisp images having the appearance of three dimensions. However, boasts Dwin Craig, "We're the first ones to do it right." While some may challenge his claim, the "N Depth" system Craig developed — and formally unveiled two weeks ago — clearly renders the impression of true continuous depth.

Material for display with Craig's 3-D system may be recorded either of two ways using standard video cameras. In one, the image to be recorded first enters a set of mirrors where it is split into two. In the process, one of the twinned images is deflected several inches to the right of the original line-of-sight. Each twin is then routed via mirrors into the camera's lens. Along the way, a small part of the initially selected visual field is lopped off each twin so that one retains more of the right-hand view, the other more of the left. (This variation corresponds to the slightly different view contributed by each eye in the human visual system.)

As one twin enters the top half of the camera's lens, the other enters the bottom. But the camera, not "knowing" this, treats the twin images as a single, ordinary one. In subsequent video broadcasting, the twins are also treated as a single, normal image, though the twins in fact appear separately on the TV screen, one above the other.

In an alternate recording scheme, side-by-side video cameras take in a common view much the way each of our eyes takes in a scene — one slightly displaced from the other. Then each camera's recorded image is "sliced and stacked" in an electronic process that emulates what the single-camera system did optically. The result is the same: an ability to broadcast and display not-quite-identical twin images on an ordinary TV.

To achieve 3-D, however, the viewer's brain must be fooled into perceiving the twin images as one, which is where the special glasses come in. Fitted with an optical wedge over the right eye, the glasses pull one image down so that the brain effectively merges the twins into a single 3-D view.

To erase the component twin images on the TV (which would otherwise compete with the apparent, merged one, creating a confusing array of what would appear to be three stacked views of roughly the same scene), a mask is attached to the TV screen, bordering each image in black and covering each twin with a different polarizing filter. Lenses on the glasses are similarly fitted with polarizing films. Optical properties of these filters serve to cancel out the competing upper and lower images.

Craig, who in December applied for patents on "N Depth," says he has no intention of developing a commercial system. Instead, he's displaying his prototype, hoping to interest others into a licensing arrangement. The Gaithersburg, Md., entrepreneur expects his system will make its consumer-market debut as under-$100 kits to augment home televisions for use in viewing and recording 3-D videocassettes.

Electronic wounded-soldier reporter

Researchers at Purdue University in West Lafayette, Ind., are developing a wristwatch style personal vital-signs communicator with which battlefield medics can monitor troops. Medics would relay signals to the wrist-device, triggering two electrodes on its back to deliver a mild electronic shock to its wearer. To report that he or she was uninjured, a soldier would press a button. However, if the button was not activated, sensors would immediately begin monitoring heart rate, body temperature and movement — telemetering the data back on request. According to project director Willis Tacker, not only would the monitors send back data indicating whether the person was "slightly wounded, critically wounded or dead," but also data on location, so rescue squads could find the casualty. Medics could query the wrist communicators from field hospitals, ambulances, helicopters or remote battlefield stations.