Stanford University. Madey and Stanford won several patents on the device, which generates light that can be tuned to different frequencies, making it a potentially versatile tool for everything from physics research to surgery. After a falling out with Stanford administrators, Madey gained full control of the patents, and in 1988 he moved his Mark III laser into a custom-built laboratory at Duke, in Durham, North Carolina. A decade later, Duke officials removed Madey as head of the lab and he moved again, this time to the University of Hawaii, Manoa. Madey soon sued Duke over his removal and demanded the return of the equipment. His suit also accused the university of infringing on his laser patents by continuing to use the devices (Science, 21 November 1997, p. 1393).

A lower court sided with Duke, ruling in 1999 that the university wasn't infringing because its researchers were using the devices "for experimental, nonprofit purposes only." That standard is rooted in an 1831 case. But a federal appeals court reversed the decision in October, noting that Duke is a businesslike entity that profited from the use of the lasers. The research "unmistakably further[ed Duke's] legitimate business objectives, including educating and enlightening students and faculty" and helped it "lure lucrative research grants," wrote Federal Circuit Court of Appeals Judge Arthur Gajarsa.

That language outraged many university research advocates because it implies that the research exemption doesn't apply in an academic setting. "To categorize a research university, with its educational mission, as just another commercial operation borders on ludicrous," says Sheldon Steinbach, general counsel of the American Council on Education (ACE) in Washington, D.C. It will be "disastrous," he says, if researchers have to stop and conduct expensive, time-consuming patent searches and make licensing deals every time they want to bring a new technology or technique into the lab.

It also will be difficult for administrators to keep track of which researchers are using patented material, adds James Severson, the new provost for intellectual property at the University of Washington, Seattle. "Academic scientists often don't know, and don't even think about, whether something is protected by a patent," he says. But the cost of not paying attention could be high, experts say, since alleged infringers could face triple-damages lawsuits.

Madey and some patent attorneys say that the threat of financial punishment is needed in a world where universities increasingly profit from their own patent portfolios—and sue infringers. The decision also follows legal precedent, they add. "What the court said isn't surprising to most businesses, but I guess it's been as unusual because the case [involved] a university," says Madey's attorney, Randall Roden of Tharrington Smith in Raleigh, North Carolina. It's been 70 years since a university was involved in a similar, potentially precedent-setting case, other attorneys note.

Duke officials hope the high court will rewrite that case law. The appellate court decision is wrong "on the merits," they say. AAMC, ACE, and other university groups say they'll support Duke on a request filed this week by the university attorneys, Fulbright & Jaworski in New York City.

If the high court decides to take the case, it likely will be heard sometime after October 2003. If the court declines, the case will go back to a lower court, where Duke might still prevail on other grounds. And some observers predict that Congress may want to have the final word on the right balance between patent holders and the needs of academic researchers. That is, if all the scientists haven't moved to China. —DAVID MALAKOFF

ANIMAL BEHAVIOR

Orangutans, Like Chimps, Heed the Cultural Call of the Collective

As evening falls in the Kinabatangan forest of Borneo, a careful listener can sometimes hear a loud spluttering sound, a sort of cross between a hoot and a sigh. The call signals that a local orangutan is bedding down for the night. The practice seems perfectly normal in Kinabatangan: Almost every orangutan in the region calls in the same way. But elsewhere on the island, in the Kutai forest, orangutans make their nests without making a ruckus.

The difference is a sign that orangutan groups have at least some hallmarks of what in humans is commonly called culture, says primatologist Carel van Schaik of Duke University in Durham, North Carolina. On page 102, he and his colleagues describe two dozen behaviors that are present in some orangutan groups and absent in others. The practices are apparently learned from other group members and passed from generation to generation. Such observations give biologists richer insights into animal behavior, others say, and they might help researchers understand how human culture evolves.

For many years, culture was thought to be unique to the human species, but evidence has been growing for socially learned traditions elsewhere in the animal kingdom. Behavioral studies have found some signs of social learning in birds, bats, capuchin monkeys, and even fish. Meanwhile, a study suggesting that whales exhibit culturally determined behaviors was met with skepticism (Science, 27 November 1998, p. 1616). But the best evidence until now for nonhuman culture came from chimpanzees: By pooling data from nine long-term sites in different regions of Africa, researchers documented 39 examples of behaviors that were specific to particular groups and did not seem to be determined by the environment (Science, 25 June 1999, p. 2070).

Van Schaik suspected that a similar pattern might be present in Asia's great apes, the orangutans. In the Suau Balimbing forest on Sumatra, for instance, he and his colleagues...
had observed these animals using sticks to extract seeds from the Neesia fruit. In Borneo, however, other researchers never see such handiwork, even though Neesia is readily available. Curious to see if the orangutan research community could come up with a list of behaviors similar to that compiled by chimpanzee researchers, van Schaik invited his colleagues to a 3-day meeting to compare notes.

Even van Schaik was surprised by the results. With many of the commonly observed behaviors, he says, “you just assume every [orangutan] does it the same way everywhere.” But as the researchers compared notes—and videotapes when possible—it became clear that many behaviors were strikingly different between orangutan groups.

The list of probable cultural traits is not as long as that for chimpanzees. But Bennett Galef of McMaster University in Hamilton, Ontario, says that nevertheless, the evidence from the orangutan watchers is stronger in some ways. “They were able to document two behaviors that are present in every member of one group and [in] no member of another,” he says, strengthening the case that individuals learn behaviors from the group rather than discover them randomly on their own. Furthermore, orangutans’ tendency to interact with their neighbors less than chimps do made the pattern of learning even clearer. The researchers found that groups of more sociable orangutans had larger behavioral repertoires than groups of relatively solitary individuals had, supporting the theory that social contact spreads cultural behaviors.

The observations might help researchers learn more about the roots of human culture by clarifying what makes it distinctive. One critical difference, many researchers note, is that animal groups do not appear to improve upon a previous invention, although humans have been doing so for millions of years. Humans might excel at tinkering because they are great imitators, says psychologist Michael Tomasello of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. He and others have shown that human children can imitate a demonstrated skill more readily than captive apes can, an ability that might allow children to acquire complex behaviors more easily from other group members.

Tomasello cautions that the orangutan study is only a beginning. Researchers “talking about their impressions is an excellent way to generate hypotheses, but it’s only step one,” he says. Van Schaik agrees that he and his colleagues now need to return to the field with the full list of orangutan behaviors to verify that they’re present in some groups and not in others.

Chimp researchers, meanwhile, are meeting this month in Leipzig, Germany, to refine their list of possible cultural behaviors. The meeting will include representatives from three additional study sites not included in the first survey.

Chimp and orangutan researchers have little time to waste. Both species are gravely threatened by habitat loss and poaching. Illegal logging and civil unrest have taken a toll: One of the sites van Schaik canvassed for the current study is now “pretty much gone,” he says, with its unique cultural traditions wiped out as well. —GRETCHEN VOGEL

**Science Fares Well in a Tight Budget**

** TOKYO**—Japan’s scientific community last week got a pleasant surprise. Despite belt-tightening that will hold total growth in government spending to just 0.7% in the fiscal year beginning on 1 April, the administration’s budget includes a 3.9% rise, to $10.3 billion, for science. And a separate economic stimulus package, which will be appropriated during the last 3 months of the current fiscal year, will provide a hefty dollop of funds to upgrade research facilities.

The Cabinet approved both budgets on 24 December, and the legislature is expected to endorse them in the next few weeks.

“Compared to other fields, [science] has been treated very favorably,” says Toichi Sakata, deputy director-general for research promotion at the Ministry of Education, Culture, Sports, Science and Technology. The few grumbles within the community focus on worries that the spending is emphasizing quick results at the expense of long-term scientific health.

Particularly notable jumps are in store for competitive grant programs. Funding for peer-reviewed grants for scientific research, the largest source of support for individual academic researchers and small groups, will rise 3.6% to $1.5 billion. Several large-scale physics projects are also getting significant increases. Funding for a high-intensity proton accelerator being built in Tokai, northeast of Tokyo, will jump 54% to $41 million to support a ramp-up in construction. And support for neutrino studies—set to grow by 23% to $18.8 million—includes money to begin fully restoring the Super-Kamiokande neutrino observatory. An accident late last year destroyed two-thirds of the facility’s 11,000 photomultiplier tubes (Science, 11 January 2002, p. 247). The facility recently restarted observations using the remaining sensors. Super-Kamiokande project director Yoichiro Suzuki says that “we benefited from a tailwind,” in the form of publicity surrounding the award of a share of last year’s Nobel Prize in physics to Masatoshi Koshiba for his work on neutrinos using the original Kamiokande observatory.

The supplementary budget, intended to stimulate the economy primarily through public works spending, will also benefit science. The education ministry’s share of that pie includes $1.8 billion for upgrading university research equipment and facilities. Indeed, several programs facing reductions in the ordinary budget, including space science and earthquake research, managed to cover the cuts with funds from the supplementary budget.

One area that was not so fortunate is nuclear power, where the budget will drop 3.4% next year, to $2.6 billion. A spokesperson for the education ministry’s nuclear power research division says most of the cuts will be covered by efficiencies resulting from merging two major research labs. But he admits there will be a yet-to-be-defined impact on research.

Finance Minister Masajuro Shiozawa emphasizes that the government gave priority to science and technology, among other fields, because it is expected to help revitalize the economy. Those expectations make some researchers nervous. One institute head, who asked to remain anonymous, says there is “too much of an emphasis on short-term results rather than long-term benefits.” —DENNIS NORMILE