"The decision is a slam dunk for universities," says attorney Susan Braden of Baker & McKenzie in Washington, D.C., who represented 20 research institutions and academic groups that saw the earlier ruling as a threat to the more than 16,000 patents that universities have won over the past 2 decades. Opponents are also claiming victory, however, saying that the ruling will make it harder for inventors to file frivolous infringement claims. And attorney Dan Bagatell of Brown & Bain in Phoenix, Arizona, who represented technology firms asking the court to uphold the ruling, thinks that the picture is still cloudy. "The patent system as a whole may not be any better off," he says, because the decision still leaves "a lot of uncertainty about what constitutes infringement."

The legal battle—dubbed "the patent case of the decade" by court watchers—focused on a 150-year-old legal concept called the "doctrine of equivalents." The doctrine bars inventors from making minor changes to a patented technology and then claiming it as their own. Companies that have patented proteins, for instance, have invoked the doctrine to prevent competitors from marketing molecules with slightly different amino acid sequences that perform the same biological function.

The decision came in a decade-old case involving a mechanical cylinder made by Festo Corp. of Hauppauge, New York, that has been used in everything from sewing machines to amusement park rides. Festo claimed that SMC Co. of Japan had infringed on its patent by producing a cylinder that, although not an exact copy, was equivalent to Festo's. Two years ago, a federal appeals court stunned many experts by ruling that the doctrine of equivalents doesn't apply to patent claims that were narrowed during their review by the government. It's a process that most patents go through.

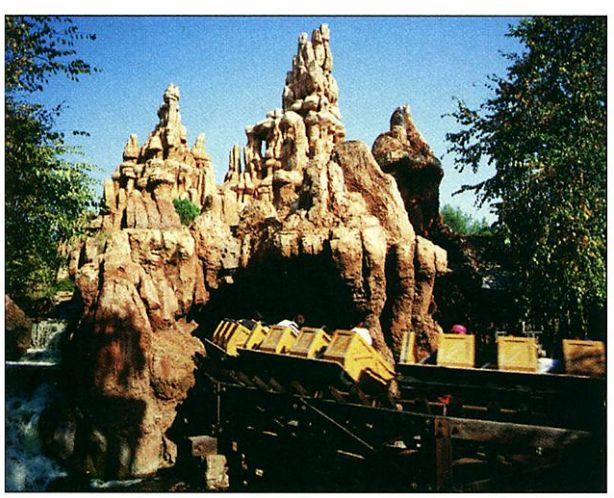
Festo appealed the decision to the Supreme Court, which was swamped by briefs from dozens of biotechnology, computer, and other firms on both sides of the issue (*Science*, 21 December 2001, p. 2460). In general, individual inventors and small companies said the lower court ruling left them with few options for battling infringement, whereas companies with vast patent estates backed the decision because it clarified their vulnerability.

In a 17-page opinion, Justice Anthony Kennedy handed Festo and its allies a partial victory by declaring that the earlier ruling went too far. Because "language remains an imperfect fit for [describing an] invention," Kennedy wrote, the holders of narrowed patents should still be able to employ the doctrine of equivalents to fight infringement. But the justices also put more of a burden on inventors to prove that a competing invention infringes on their discovery. In sending the case back to the lower court, the justices also hinted that Festo might lose to SMC under the tougher standards.

Overall, the decision "enhances the economic value of patents" and restores to judges the leeway to decide infringement claims on a case-by-case basis, says attorney Edward W. Gray of Fitch, Even, Tabin, & Flannery in Washington, D.C. That is good news for critics of the earlier ruling, who warned that it could undermine 1.2 million existing patents—including university patents that have generated more than $4 billion in income.

But Bagatell says the high court gave little comfort to corporate executives who would like to know if a new technology might be covered by someone else's patent before they invest in it. Uncertainty about the outcome of a doctrine-of-equivalents claim, he adds, might cause companies to pay up on even weak legal challenges to avoid further litigation. The justices were willing to accept such costly uncertainty "because they believe that the [patent] system works and promotes innovation," says Braden. Applying the doctrine of equivalents "is an art, not a science," she adds, a warning to scientist-inventors that going from discovery to commercialization might include a roller-coaster ride.

–DAVID MALAKOFF



Legal roller coaster. This amusement-park ride at Disneyland uses a technology that is at the center of a high-stakes patent fight.

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BIOMEDICAL RESEARCH

Australia Pushes Stem Cell Advantage

SYDNEY—Australia's new policy on embryonic stem (ES) cells has already started to pay big dividends for researchers. Last week the government announced that it will invest $25 million in a new Center for Stem Cells and Tissue Repair at Monash University in Melbourne that will work to develop therapies for blood and tissue diseases based on new and existing ES cell lines. "We want to take stem cells all the way through to the patient," says cell biologist Alan Trounson, head of the Monash Institute of Reproduction and Development and director of the new center.

All smiles. Prime Minister John Howard (left) and Monash's Alan Trounson welcome new center.

The center, a consortium involving some 300 scientists at a dozen institutions, won a stiff competition to become the country's first National Biotechnology Center of Excellence. (Last month the government also selected a center of excellence in information and communications technology.) The biotechnology center is a direct outgrowth of an agreement struck 2 months ago in Canberra between federal, state, and territory leaders to allow scientists to work with established ES cell lines and derive new cell lines from surplus in vitro fertilization embryos created before 5 April (*Science*, 12 April, p. 238).

Those rules are much less restrictive than the ones federally funded U.S. researchers have to follow: They can use ES cells only from cell lines created before 9 August 2001 (*Science*, 17 August 2001, p. 1242). Curt

Civin, a cancer expert and stem cell researcher with the new Institute for Cell Engineering (ICE) at Johns Hopkins University School of Medicine in Baltimore, says more research and new cell lines will be "great" for getting better treatments to patients faster. "Hopefully," he says with a touch of envy, "the U.S. would someday approve our use of them."

The center's first task will be to produce ES cells in bulk quantities from the 10 to 12 lines that researchers will bring to the consortium. It also hopes to generate 20 new ES and adult stem cell lines. Its most difficult challenge, however, will be to coax stem cells to develop into specific tissue types that could be used for therapies. Trounson says he hopes that the center can develop treatments for blood conditions such as leukemia that could go into clinical trial within 5 years and be available commercially a few years later, with help for solid-tissue disorders like Parkinson's to follow. Reagents for identifying stem cells will be ready "straight away," he adds.

Researchers also anticipate a collaboration with a primate research center, Maccine, at the Bogor Agricultural Institute in Indonesia. Trounson says he hopes to use animals at the primate center to test potential therapies involving blood, skin, cardiac muscle, lung, liver, and brain cells.

The government is preparing legislation to codify the April agreement, which appears to have resolved a heated public debate on the use of ES cells in research. Speaking 30 May at a press conference in Canberra, Prime Minister John Howard called the potential benefits from stem cell research "quite literally unlimited" but said that the work would be "guided by the community's ethical considerations." A raft of committees will be set up to oversee research in the field, and Trounson emphasized that "any procedures banned under these agreements will not be undertaken by the center."

The new center will also receive money from state governments and two companies, ES Cell International and BresaGen, created to commercialize work conducted at Monash and Adelaide universities, respectively. Trounson anticipates that a staff of 150 scientists will eventually work at the center, which will occupy its own building on campus. "Some very well-known U.S. scientists," he adds, have already expressed interest in coming aboard.

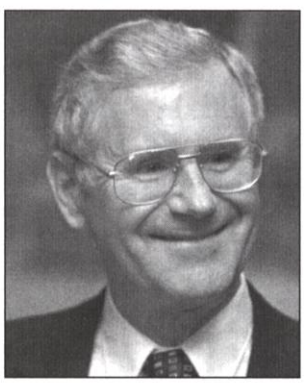
Stem cell researcher Ronald McKay of the U.S. National Institute of Neurological Disorders and Stroke doesn't think the new center will cause U.S. researchers to migrate to Australia. Nonetheless, he says that it, combined with the work done in Singapore to derive the Monash cell lines, gives the South Pacific a substantial presence in stem cell research. —LEIGH DAYTON

Leigh Dayton writes from Sydney.

SWITZERLAND

Report Aims to Rescue Science From Doldrums

BERN—A decade of stagnation has sent Swiss science into a downward spiral that only broad reforms and a massive infusion of funds can reverse. That, at least, is the diagnosis offered last week by the Swiss government's science advisory body. However, it's unclear whether leaders of the Swiss Federal Council, the government's executive branch, are prepared to prescribe strong medicine.



Savior? Gottfried Schatz is pressing for action.

At a press conference here, officials of the Swiss Science and Technology Council (SSTC) followed up a warning shot they fired last fall by offering a laundry list of actions for remedying the country's most urgent woes. The proposals include unifying Switzerland's fragmented higher education system, installing a modern tenure-track system, shoring up support for long-term basic research, and increasing the science and technology budget by 10% a year from 2004 to 2007. The recommendations "make a lot of sense," says Patrick Aebischer, president of the Swiss Federal Institute of Technology in Lausanne.

The latest symptom of a research community in crisis, scientists say, is the Swiss drug giant Novartis's announcement last month that it would set up a $250 million research facility in Cambridge, Massachusetts (*Science*, 17 May, p. 1216). "You have to give something back to industry to keep industry here," says Silvia Arber, a neurobiologist at the University of Basel's Biozentrum.

Part of the problem is money. Federal R&D budgets have remained essentially unchanged over the past decade: The $1.7 billion in 2000, adjusted for inflation, is roughly the same amount spent in 1992. But there are deeper structural issues as well. For instance, most universities have few stable positions below the level of full professor. "It's an old-fashioned system," says Jürg Stöcklin, a population biologist at the University of Basel who has what he calls one of the "rare permanent positions in the Mittelbau": the limbo that re-

ScienceScope

Coming Together on Cloning The world needs an international convention outlawing reproductive cloning, say scientists and policy-makers who met this week in Berlin to discuss global bioethics.

The meeting, organized by the French and German governments, attracted 70 participants from about 15 nations. Over 2 days, they sought consensus on a range of issues, including cloning, the commercial use of biotechnology, and developing world access to new technologies.

In a final communiqué issued 4 June, the group offered a laundry list of sometimes vague ideas, including a call for expanded bioethics education and training. But when it came to duplicating humans, participants were precise: They urged governments to forge a global agreement that would ban reproductive cloning and bar international trade in embryos. The more complex issue of therapeutic cloning should be discussed separately, they said.

German and French organizers say they will now take the ideas to the United Nations, which is expected to discuss the issues in September.

Full Speed Ahead A last-minute bid to strengthen ethical restrictions on embryo research failed to derail approval of the European Union's (E.U.'s) main research program. The E.U. council of ministers this week approved the 6th Framework research program without debate, giving little hint of a behind-the-scenes scramble to exclude certain types of embryo research from the $17 billion, 4-year plan.

In late May, member countries Ireland, Germany, Austria, and Italy threatened to block the Framework if it lacked prohibitions on reproductive cloning, germ line modifications, and creation of embryos for research—restrictions that were spelled out last year in a European Commission declaration. After failing to win majority backing for the idea, however, the countries instead issued a joint statement expressing concern about the lack of ethical guidelines. They also vowed to revisit the issue in coming months, as E.U. officials draft rules for specific programs.

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