created by chopping up DNA with enzymes and sorting the fragments by size—from the same three sources, and also looked at DNA obtained from animals belonging to the same herd as the ewe. Dolly's fingerprints matched the donor ewe's but not those of the herd. "These two [reports] are fairly powerful demonstrations that Dolly is what they say she is," Wall concludes.

The two Japanese calves, obtained by fusing oviduct cells from one cow with enucleated eggs from another, apparently are as well. Last week, Yukio Tsunoda, a professor of animal reproduction at Kinki University's Faculty of Agriculture in Nara, announced that DNA testing has confirmed that the calves are offspring of the oviduct cell donor. "I think there is no mistaking that they have repeated the Roslin procedure," says Tomohiro Kono, a developmental biologist at Tokyo University of Agriculture. The Japanese team, including researchers from both Kinki and the Ishikawa Prefectural Livestock Research Center in Nara, also said that they have an additional four cows pregnant with cloned embryos.

Now, cloning researchers can move on to other challenges, such as trying to improve their success rates, currently a few percent at most. This effort should be helped by the ability to study cloning in mice, which have shorter life cycles and require much less care and space than, say, sheep or cows. With improvements, says Wilmut, nuclear transfer "is going to be a very reliable, robust [cloning] method." **–ELIZABETH PENNISI**

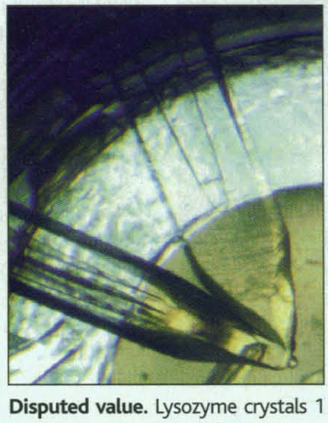
With reporting from Dennis Normile in Tokyo.

PETER MENZEL/PNI

SPACE SCIENCE

Negative Review Galls Space Crystallographers

The promise of space-grown protein crystals has been a major selling point for the international space station. Larger and more perfect than Earth-grown versions, they could reveal new molecular details and new targets for drug designers. But a group of academic scientists who issued a review of the field last week said that crystal-growth experiments NASA has already flown aboard the space shuttle have not lived up to expectations. The seven members of the American Society for Cell Biology (ASCB) said in their report that the field has made "no serious contributions" to scientific knowledge and there is "no justification" for continuing such studies in space.



NEW CENTURY PHARMACEUTICALS

Disputed value. Lysozyme crystals 1 cm long grown aboard the Mir space station, and Representive Tim Roemer, who distributed negative report.

Released on the eve of the House vote on NASA's 1999 budget, the report was distributed at a 15 July press conference at the Capitol by Representative Tim Roemer (D–IN) as he sought support for an amendment to eliminate the space station. At press time, the amendment was not expected to pass, but the report has infuriated some protein crystallographers. "I think the report is absolutely wrong," says Larry DeLucas, a crystallographer at the University of Alabama, Birmingham. "I can't believe the [ASCB] would get behind a statement like that." DeLucas says his NASA-funded space-based research helped reveal a protein structure that has contributed to the ongoing development of influenza drugs. And Daniel Carter, a biophysicist who formerly worked for NASA and now directs New Century Pharmaceuticals, a company in Huntsville, Alabama, that receives funding from NASA, says his space-based work crystallized proteins 10 times larger than those grown on the ground, making them available for structural studies. Of the ASCB report, Carter says, "it just seems to be more of an opinion than a review of the facts."

Members of ASCB's panel were unanimous in giving NASA's crystallography program bad marks. So far, the $9-million-a-year effort has not lived up to claims that it would aid drug development for Alzheimer's disease and breast cancer, says the chair of ASCB's panel, biologist Donald Brown of the Carnegie Institution of Washington, D.C. "The [Earth-based] crystal community doesn't feel that real gains have been made in space," says Brown. Another member of the panel, Harvard University crystallographer Stephen Harrison, says he conducted a literature search for crystals grown in microgravity conditions and determined that "none of the modest successes reported" had made a "significant impact" on drug design or structural biology.

A third member of the panel, Washington University biologist Ursula Goodenough, explains that "it became untenable for those of

ScienceScope

SOUNDING THE INFOTECH ALARM

The nation's information technology (IT) infrastructure is looking increasingly "fragile" in the face of the growing torrent of data it must process, a presidentially appointed panel warns in a forthcoming report. It recommends a doubling in federal R&D to more than $2 billion a year.

According to a draft leaked to CNN, without more spending in areas such as high-end computing and software, the United States risks "being overcome by nations with a clearer plan and a stronger view of the future."

The big problem, says panel co-chair Ken Kennedy, head of the Rice University Center for Research on Parallel Computation in Houston, is that the size and rapidly increasing complexity of IT systems have "far outstripped the growth in research." Hence, key systems, such as those for air traffic control, are based on software that may be unreliable, insecure, error-prone, or difficult to upgrade. Kennedy also says the alleged shortage of IT workers in the U.S. is real and "very serious." The panel's interim report is due out early next month (see www.hpcc.gov).

COURT SIDES WITH TOBACCO

A court ruling has attacked a milestone Environmental Protection Agency (EPA) report that classified secondhand smoke as a human carcinogen. On 17 July, 5 years after the report came out, Judge William Osteen of North Carolina's 4th U.S. District Court ruled in favor of tobacco company plaintiffs that the "EPA did not demonstrate a statistically significant association" between secondhand smoke and lung cancer. He also chastised the agency for being "publicly committed to a conclusion before research had begun."

The EPA study, one of several dozen to suggest a link between cancer and secondhand smoke, has been used to bolster lawsuits and is credited by some with the quick spread of indoor smoking bans nationwide. R. J. Reynolds now says it may challenge such ordinances.

EPA says it will appeal the ruling. But antismoking advocates such as Robert Kline, director of the Tobacco Control Legal Clinic at Northeastern University law school, contend it really doesn't matter. Says Kline, "It's going to be hard to put the genie back in the bottle."

Contributors: Constance Holden and Luis Campos

us in the ASCB to sit back" without pointing out the lack of productivity in the field. The panel concluded that there was no justification for conducting these experiments aboard the space station. Indeed, the members of this panel—none of whom receive funding from NASA—determined that, except for studies of astronaut physiology, virtually all NASA's life sciences research should be ground-based.

NASA sought to downplay the criticism. Joan Vernikos, the director of NASA's life science program, says she is "perplexed" by the report and argues that "it is not the general consensus of the community that [space-based protein crystallography] is a useless program." Recently, she says, a group of outside scientists appointed by NASA and the National Institutes of Health issued a report praising the crystallography research. And NASA-funded crystallographers argue that the quality of data will improve as they move to long-term experiments on the station.

Despite the anger the ASCB report has aroused, Goodenough stresses that it is "meant to be positive" in urging NASA to increase ground-based research in the life sciences, such as analyzing satellite photographs of the Earth. Whether NASA managers will take the criticism in that spirit and adjust their programs remains to be seen.

–JENNIFER COUZIN

FRANCE

Allègre Sets Tough Targets for Research

PARIS—Last week, while football supporters were still dancing in the streets following France's victory in the World Cup, French government ministers adopted an ambitious plan to win a similar prize for French science. The 15 July closed-doors meeting, attended by ministers from all spheres of government and chaired by Prime Minister Lionel Jospin, set the goals high: Over the next 4 years, France will attempt to double the impact of its scientific publications, triple its international patents, and create 400 new high-technology companies. "We are going to make radical changes," said geochemist Claude Allègre, France's research and education minister, at a press conference immediately after the meeting.

Although Jospin chaired the session, Allègre and his staff had worked out the new strategy many weeks earlier. Despite the fanfare surrounding its announcement, some researchers expressed skepticism that its goals are feasible. Over the years, many French scientists have grown weary of the steady stream of research strategies, blueprints, national consultations, and commissions that have emanated from successive governments. "The objectives are correct," says Philippe Froguel, director of the human genetics department at the Pasteur Institute in Lille. "My only question is, how is all this going to be carried out?"

Still, two features of the new plan have made researchers sit up and take notice: First, the government intends to move toward a system of peer-reviewed grants to finance publicly funded research. This would be a radical step for French science, which relies on arcane formulas to distribute most research funds to government labs. Second, evaluation of research in the giant public research institutions, such as the basic research agency CNRS and the biomedical research agency INSERM, will gradually be taken away from internal committees and put in the hands of external review panels made up of both French and foreign scientists. (Also see Editorial by Allègre on p. 515.)

Pierre Chambon, director of the Institute of Genetics and Molecular and Cellular Biology near Strasbourg, says that if these reforms are adopted, "it will be a fantastic change." Chambon, who has been chosen to head the external review panel for the CNRS, says that a peer-review system will funnel more research money to "active young people, good people," rather than allowing funds to wind up concentrated in the hands of senior lab directors, whose productive years may be behind them. Although details of the new plan are still sketchy, Allègre mapped out at the press conference a series of steps designed to shake French research out of its current doldrums (*Science*, 16 January, p. 312). To foster the creation of new high-tech companies, the research ministry will create liaison committees between researchers and industry at each university and research agency. Special funds will be allotted to finance applied research projects, and the external evaluation committees will be charged with organizing peer-review boards to vet grant proposals in various key fields.

FRANCOIS MORLAP

Winning team? Prime Minister Lionel Jospin (left) and Research Minister Claude Allègre unveil a plan to put French science on top.

Allègre may, however, have a hard fight transforming France's huge and entrenched public research system. Some researchers fear the consequences of a peer-review system on basic research. "There are certain lines of research that are not fashionable and that are difficult to finance," says microbiologist Richard D'Ari of the Jacques Monod Institute in Paris. "These areas should be protected." Moreover, in recent months researchers have mounted considerable resistance to organizational reforms Allègre has already proposed for the CNRS and INSERM (*Science*, 6 March, p. 1442).

Late last month, Allègre discreetly invited top figures in French research to a daylong meeting at the Ferrières château, east of Paris, to garner support for his ideas. The gathering generally endorsed Allègre's plan, which was essentially the same as that agreed upon by the ministers last week, but some of his goals met with skepticism. For example, doubling the relative citation impact of French papers—the number of times research articles are cited divided by the total number of articles published over a period of time—would make France the world leader in the scientific impact of its publications, a target some called unrealistic. "Everybody was very surprised to see this goal announced," says a French researcher who asked not to be identified.

But geophysicist Vincent Courtillot, Allègre's chief adviser, told *Science* that research officials hope to at least approach this goal by encouraging researchers to publish fewer articles but with higher quality. "We can publish half as many papers that are twice as good," Courtillot says. The other two goals—increasing the number of patents and creating new high-tech companies—may be within the realm of the possible, researchers told *Science*, but are still ambitious. "If each university created four or five new companies, we could do it," says Froguel. On the other hand, Chambon says, "France is not very well equipped" to create start-up companies. "It is much easier in the United States, where you can hire people, fire people, and create a new firm in a few days. The system to help scientists start companies and find venture capital is very underdeveloped in our country."

Despite these reservations, and the prospect of stiff resistance from some scientists, to many researchers it seems that the future of French research hangs in the balance. "[The government] shouldn't ask the heads of the labs if they want to change, but the young scientists, who want to work and do science now," Chambon says. "If Allègre doesn't succeed in changing French research, it will be a long time before anything will happen."

–MICHAEL BALTER