Opposite views. Germany's president, Johannes Rau (*left*), and its chancellor, Gerhard Schröder, both Social Democrats, disagree on the ethics of embryo research.

about life and death affect us all. We therefore must not leave them to the experts," he said. "We must debate these issues and then decide on them together." He also conjured Nazi ghosts, warning that "no one should forget what happened in the academic and research fields" in Germany during World War II. "An uncontrolled scientific community did research for the sake of its scientific aims, without any moral scruples," Rau said.

In response, German Chancellor Gerhard Schröder—like Rau, a Social Democrat—led a freewheeling debate in the Bundestag (the lower house of Parliament) on 31 May by defending researchers seeking new treatments against diseases such as Alzheimer's and Parkinson's. "The ethics of healing and of helping deserve just as much respect as the ethics of creation," said Schröder, who does not want to ban limited stem cell research. He warned that German leaders must keep in mind the potential consequences of "the neglect of research and development" if rules are so strict as to deprive people with intractable diseases of possible treatments. Schröder said it was wrong for politicians to accuse ES cell researchers "of having dark and unethical motives."

But Schröder found limited support for his view in the Bundestag. Several fellow Social Democrats lined up against his position, and the leader of the opposition Christian Democrats, Angela Merkel, argued that even importing ES cells for research "violates the spirit," if not the letter, of Germany's Embryo Protection Law. Merkel plans to introduce legislation that would place a moratorium on such research until Parliament comes to a decision. Delegates of the Green Party—part of Schröder's coalition—also opposed both ES cell and preimplantation diagnosis research. "I've never seen any scientific topic in Germany as vividly debated," says Detlev Ganten, director of the Max Delbrück Center for Molecular Medicine in Berlin and a member of the bioethics panel, comprised of 24 scientists, theologians, legal experts, business executives, and philosophers. "I find it healthy."

Others question whether the panel has any chance of mending the political schism. The ethics council is bound to struggle with the issue of ES cell research, says panel member Christiane Nüsslein-Volhard, a director of the Max Planck Institute for Developmental Biology in Tübingen. "It's likely that such research will be done mainly in England and Israel, and not in Germany and the United States," predicts the Nobelist, who says she finds Rau's approach "too extreme" and generally agrees with Schröder's pragmatic attitude. Brüstle, who was in Israel last week discussing the possibility of importing ES cell lines for his research project, says he does not expect Germany to agree on a new policy on ES cell and preimplantation diagnosis research anytime soon, in part because of next year's federal elections.

–ROBERT KOENIG AND GRETCHEN VOGEL

SPACE SCIENCE

Canada Eyes Front-Row Seat in Mars Program

BOSTON—Canada's space efforts over the past 2 decades have focused largely on radar satellites and a robotic arm for the international space station. Now Canadian space officials are asking scientists to help them plan a Mars mission so outstanding that it can overcome tight budgets and leapfrog other research priorities to win government funding.

As a first step in that campaign, some 120 researchers met late last month in Montreal to kick around ideas ranging from drilling beneath the martian surface to returning samples from one of its moons. "We look at this as the next major space program for Canada," says Marc Garneau, recently named executive vice president of the Canadian Space Agency. "We want to be involved with Mars in more than peripheral ways."

Garneau thinks the timing is right to pump new funds into space science, which receives about 15% of the agency's $234 million annual budget. Spending is winding down on the $600 million robotic arm, which was installed on the space station this spring but is suffering from technical troubles. But even so, the estimated cost of a Mars mission—likely to top $300 million even with the help of international partners—would require a bigger overall budget, says Garneau, who is hoping for an increase in the fiscal year that begins 1 April 2002.

The agency intends in the months ahead to develop a set of possible missions for

ScienceScope

Begging for Bioinformatics Two bioinformatics companies are hoping the Canadian government will join their bid to create a massive new public database on protein interactions. Computer giant IBM and MDS Proteomics, a Canadian company, last week announced that they will provide $3 million each for the Biomolecular Interaction Network Database (BIND).

Blueprint Worldwide Inc., a nonprofit corporation organized to oversee BIND, hopes to persuade governments and other companies to put up $50 million for what it sees as a global repository on protein, RNA, and DNA interactions. If successful, BIND will help promote bioinformatics in Canada and encourage researchers to standardize their data, says Tony Pawson, a researcher at the Samuel Lunenfeld Institute in Toronto, who co-founded Blueprint.

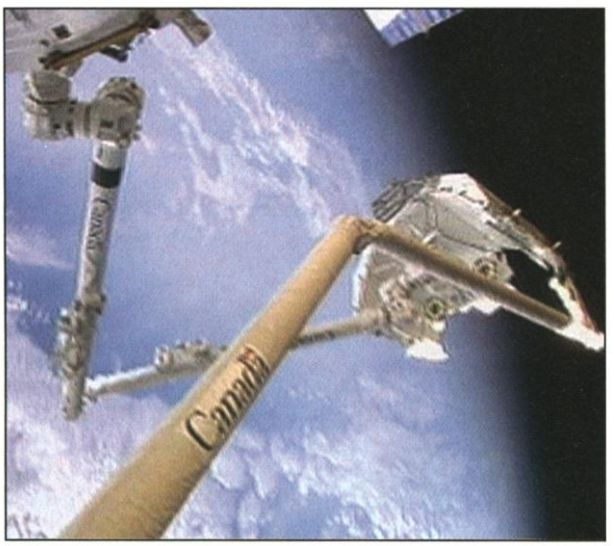
Mega-Ecosurvey What's billed as the largest study ever of the health of the world's ecosystems is now officially under way. The United Nations this week launched the Millennium Ecosystem Assessment, a 4-year, $21 million effort sponsored mainly by the UN, World Bank, and foundations. The funds will allow an estimated 1500 scientists around the world to assess how well lands and waters are standing up to human impacts (*Science*, 8 September 2000, p. 1677).

R.I.P. *The Sciences*, the highbrow, art-laden magazine for laypeople produced by the New York Academy of Sciences (NYAS), has been given the ax after 40 years of publication. The NYAS board of governors voted to close down the award-winning magazine at a 31 May meeting, and the next day its six staffers were laid off.

The bimonthly magazine, with a circulation of 46,000, carries almost no advertising and has always been a drain on the academy's budget. But with membership stagnant and the NYAS changing course, executive officer Rodney Nichols said in a statement that the academy's mission "cannot include being publisher of a general science magazine." Spokesperson Fred Moreno says that the academy has been reshuffling its priorities and wants to devote more resources to issues such as science education and the role of technology.

"I'm sure it's a good thing that the NYAS is worrying about technology and society, but it seems a real shame to end something as unique and superb as *The Sciences*," says Stanford University biologist Robert Sapolsky, a contributing editor.

2007 or 2009 that draw on Canadian technological and scientific expertise, complement existing international efforts, and appeal to the public's sense of adventure. This summer the space agency will prime the pump by funding a series of separate space science projects at Canadian universities focusing on planetary geology, atmospheres, terrestrial analogs, and astrobiology.



Reaching out. Canada's space program hopes to move beyond robotics to support for planetary missions.

Canada already has one instrument headed to Mars. It's a thermal plasma analyzer from the University of Calgary, designed to gather data on the origin and composition of the martian atmosphere, that is due to arrive in late 2003 on board the Japanese Nozomi spacecraft. Other technologies now in use around Earth, such as Canada's highly successful synthetic aperture radar, could provide detailed maps of Mars from a high-flying orbiter. And the nation's experience with robotics could be used on a sophisticated rover on the martian surface. The space agency and Canadian industry already are working on a prototype small arm for a lander. In addition, researchers from the Arctic research station on Axel Heiberg Island hope to apply to Mars their expertise in searching for life in extreme environments.

One promising technology is a special drill, adapted to the planet's dry conditions, that could penetrate as deep as 10 meters. Hojatollah Vali, a biomineralogist at McGill University in Montreal who helped organize the May workshop, says that a group of geologists and astrobiologists at the meeting suggested putting such a drill on a martian lander. Another workshop group has proposed an orbiter with instruments to study the martian atmosphere, and a third team recommended a sample return from Phobos or Deimos. Neither moon has been explored, notes Alan Hildebrand, a geologist at the University of Calgary who participated in the workshop.

Canadian officials hope to integrate their plans with efforts already under way by NASA, the European Space Agency, and the Japanese National Space Development Agency. "We want to fill a void and not duplicate," says Alain Berinstain, chief scientist for the Canadian Space Agency's space exploration program. "We'd be delighted and overjoyed to have major Canadian participation," says James Garvin, chief scientist for NASA's Mars planning. He says the U.S. agency already is planning its own 2007 lander but might welcome a subsurface drill or robotic arm for that mission or a synthetic aperture radar on a 2009 martian orbiter.

Time is short and funding uncertain. But Canadian space and planetary scientists are hoping that their blue-sky thinking won't be too late to secure a visit to the Red Planet.

–ANDREW LAWLER

GENETICS

Faster Maps Mean Fewer Mice

A computer may be worth 1000 mice if a new genetic mapping technique pays off. The approach could markedly speed the first step in identifying genes associated with diseases, making the process cheaper and more efficient.

Although some human diseases are triggered by a genetic change in a single gene, most involve multiple genes that confer susceptibility to the disease. Because the genetic diversity of human populations makes finding these genes difficult, scientists have turned to the laboratory mouse. One way to home in on these disease-related genes is to look for naturally occurring genetic variation among inbred strains of mice that have different traits—for instance, body weight or cholesterol level. By looking for genetic markers that are associated with particular values of the trait (for instance, high body weight or high cholesterol levels), researchers can identify regions on the chromosomes, called quantitative trait loci (QTL), that likely contain genes that contribute to the trait.

But finding these QTLs is costly. Geneticists must cross two mouse strains that differ in the trait, produce hundreds or thousands of offspring, and determine the phenotype and genetic signature of each mouse. It takes months just to produce the mice and often years to analyze the animals. And that's just the starting point, as finding a QTL provides only a rough idea of where the gene resides. Further work is needed to pinpoint the gene and the mutations within that gene that lead to increased susceptibility to a disease.

Now, a team of scientists has come up with a way to accelerate that process. As they report on page 1915, they have compiled a database of common genetic markers called single nucleotide polymorphisms (SNPs) and developed a computer algorithm to sift through these "alternative spellings" among mouse strains. This enables them to identify QTLs "in silico" in a fraction of the time it currently takes researchers in the lab.

"Identifying a QTL isn't going to take years anymore; it's going to take weeks at greatly reduced cost," says Robert Karp, director of the genetics program at the National Institute on Alcohol Abuse and Alcoholism, who was not involved in the work. The technique "makes the first part of [gene identification] easier, which means you're not exhausted for the rest of the search."

To pull this off, Gary Peltz of Roche Bioscience in Palo Alto, California, along with colleagues at Roche, Stanford University, and Oregon Health Sciences University in Portland, pooled SNP data on 15 commonly used strains of inbred mice. The Roche team identified more than 500 of the SNPs; the remaining 2848 were identified by other researchers.

Then Peltz and his co-workers created an algorithm that would let them query the SNP database to identify QTLs almost instantly. A user inputs phenotype data on a particular trait, say, body weight, that varies among multiple strains of mice. The algorithm looks for SNP patterns that are similar among strains with similar phenotypes, but different among strains with different phenotypes. Those SNP patterns indicate QTLs that could contain genes contributing to that trait.

To test the algorithm, the researchers fed published phenotypic data for 10 different traits (including tendency to consume alcohol, bone mineral density, and an allergen-induced asthmalike response) into the computer and checked the computer-predicted loci against published QTLs mapped through the conventional process of mouse breeding. They matched 75% of the time.

Although the method still leaves large chunks of DNA to search for the culprit gene, Peltz anticipates that as the database grows, the algorithm will pinpoint smaller candidate regions with higher accuracy. He hopes to have 5000 SNPs by the end of the year and to eventually add several additional

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