couraged by this move but that their work isn't finished.

"This is a big deal, but it doesn't solve the problem fully," says Claude Canizares, an astrophysicist at the Massachusetts Institute of Technology (MIT). Researchers say that the new rules are fuzzy about collaborative work abroad, don't address cooperative efforts with industry, and will lead to discrimination against graduate students from outside Europe and Japan.

The regulations followed a series of scandals in the late 1990s involving the alleged transfer of sensitive U.S. satellite technology to China (*Science*, 24 March 2000, p. 2138). In response, the State Department and agencies that fund academic research tightened oversight of research satellite efforts. Canadians became the only non-U.S. researchers allowed to work on such projects without U.S. government approval, and exports to even friendly nations required licensing. Outraged U.S. researchers complained that the rules hindered the contributions of foreign-born graduate students and non-U.S. universities.

Under the new rules, students or scientists from Canada, Europe, Japan, and a few other U.S. allies may participate in most satellite projects without licenses. But some scientists say that the change, although welcome, could divide students into those from friendly nations and those considered untrustworthy. "Any university worth its salt will not do this," says Eugene Skolnikoff, an MIT political scientist who has closely monitored the regulations.

The new rules also will allow shipments of nonsensitive technology to a friendly nation without a license. But it's not clear whether the government will hold U.S. researchers responsible for blocking access by citizens of countries not considered U.S. allies. "There's just no way to control the other end," says Canizares. Skolnikoff adds, "It's simply unworkable." Universities are still puzzled about how to manage their increasing collaboration with industry, which comes under related but different rules.

With export-control officials worried that unfriendly countries will still try to get their hands on sensors or radiation-hardened components, further loosening of the rules seems unlikely. "[The rules] will make life easier for universities, even if they don't give them 100% of what they want," says one Administration official. At the same time, thankful researchers don't want to complain too loudly about not having all their wishes for fewer restrictions granted. The Administration, they note, has made a strong and public first step. Says Skolnikoff: "This tells the bureaucracy that this is important."

–ANDREW LAWLER

EMBRYONIC STEM CELLS

Australian Agreement Allows New Lines

SYDNEY—Australian researchers are relieved that it's not worse, although many wish it were better. Last week federal, state, and territory leaders attempted to resolve a raucous national debate over the use of human embryonic stem (ES) cells by agreeing to allow some research to continue under a strict regulatory regime.

The proposed legislation, to be introduced in June, would not only allow scientists to work with ES cell lines that have already been established but would also permit them to derive new cell lines from surplus in vitro fertilization (IVF) embryos created before 5 April that would otherwise be destroyed. The rules would, however, prohibit all forms of cloning, including so-called therapeutic cloning: the transplantation of a nucleus from an adult cell into an ES cell to generate cells for tissue engineering. The technique, which is still a long way off, holds the promise of producing tissue that is genetically matched to a patient. An ethics committee would be established to review protocols, and the National Health and Medical Research Council will report within 12 months on the adequacy of the supply and distribution of embryos. The provisions on IVF embryos would expire after 3 years.

Half-full glass. Monash University's Alan Trounson (left) and Martin Pera say that the new agreement permits derivation of new ES cell lines.

The new rules are more flexible than the conditions imposed on federally funded U.S. researchers, who can use ES cells only from cell lines created before 9 August 2001 (*Science*, 17 August 2001, p. 1242). Australian researchers estimate that some 70,000 frozen embryos are potentially available, although the agreement says that donors must give their permission before the embryos can be used. "This is very good news for researchers who are working to cure diseases and save lives," says Bob Carr, the premier of New South Wales and an outspoken supporter of research involving ES cells. "It means that research can go ahead with a minimum of inhibitions."

The legislation would reconcile what until now has been a patchwork of state and territory rules. "Getting a national consensus is terrific," comments John White of the Australian Academy of Science. "But let's take the next step to enable [therapeutic cloning] to follow." It's also a compromise between research advocates, who wanted greater freedom, and conservative politicians and religious leaders, who sought a ban on all embryo research. An "Open Letter" on 2 April from 80 prominent critics in Melbourne's newspaper *The Age*, for example, branded therapeutic cloning as "the manufacture of a new race of laboratory humans." In September 2001, a parliamentary committee recommended a delay in drawing up any rules, but in the following months its chair, Minister of Ageing Kevin Andrews, led a campaign to stop all such research (*Science*, 1 March, p. 1619).

Martin Pera of Monash University's Centre for Early Human Development says that the new agreement allows him and his colleagues to keep their Melbourne lab intact (*Science*, 8 March, p. 1818). "We'll be able to derive new cell lines to support research elsewhere and also in Australia," he says. Steve Bracks, premier of Victoria state, where Monash is located, calls the agreement "a victory for common sense."

Others are less sanguine. Paul Simmons, who works with adult stem cells at the Peter MacCallum Cancer Institute in Melbourne, says that Australian scientists and clinicians will be "disadvantaged" compared to groups in nations such as the United Kingdom and China that allow work on ES cells for developing new therapies. "We'll be put out of the game for a period of time," he says. "How do you compete?"

–LEIGH DAYTON

Leigh Dayton writes from Sydney.

ASTRONOMY

If It Quarks Like a Star, It Must Be ... Strange?

Astronomers may have discovered two of the strangest objects in the universe. Observations by the orbiting Chandra X-ray Observatory imply that stars named RXJ1856 and 3C58 are too small to be familiar neutron stars but might instead be a more exotic breed composed of degenerate quark matter. If so, the two would be the first credible examples of so-called strange stars, presenting theorists with a chance to pin down some of

CREDIT: JASON SOUTH

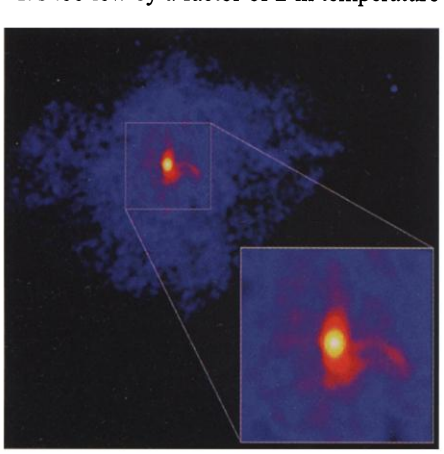
the properties of exotic matter.

"It's a very big 'if' right now," says Michael Turner, a cosmologist at the University of Chicago. "But this could tell us a lot about the mass of the strange quark—it could tell us a lot about quantum chromodynamics."

A strange star, also known as a quark star, is the last incarnation of a medium-mass sun. (The heaviest stars become black holes.) When a star dies, it collapses under the influence of its own gravity. If the dead star is more than about 1.44 times the mass of the sun, its gravity squeezes together electrons and protons in the stellar material, forming neutrons. At still greater masses, in theory, neutrons might break down into their component quarks. Under enough pressure, half of the neutrons' "down" quarks might turn into strange quarks, creating a more compact type of matter. As *Science* went to press, NASA was planning to announce the possible discovery of two such strange star candidates.

The first, RXJ1856, is a neutron star about 400 light-years away in the constellation Corona Australis. When Jeremy Drake of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts, and colleagues analyzed the light coming from the star, they were able to figure out its temperature—information that reveals how many x-ray photons should come off a hot body of any given size. Thus, Chandra's measurement of x-ray brightness reveals how big the star is. And that's the rub. "It's about 50% smaller than the range of sizes neutron stars can be," says Drake. Such dense matter, theorists believe, could exist within a strange star—and nowhere else that they can easily imagine.

The second star, 3C58, is about 10,000 light-years away in the constellation Cassiopeia. Born in a supernova explosion that Chinese and Japanese sky-watchers noted in August 1181, the star had cooled down faster than a neutron star is expected to. "It's too low by a factor of 2 in temperature and a factor of 16 in luminosity," says David Helfand, an astronomer at Columbia University and a member of the Chandra observation team.



CREDITS: (TOP TO BOTTOM) SOURCE: GENOME CANADA; P. SLANE *ET AL.*/CXC/CFA/NASA

Odd ball. Born in a supernova's blast, 3C58 seems too cool to be made of normal matter.

Although both measurements are solid, the interpretations may not be. The too-small star, RXJ1856, might be bigger than calculated if a so-far-undetected hot spot on the star's surface has messed up the calculation of size based upon brightness by making it appear too hot. The too-cool star, on the other hand, could be a neutron star after all if theorists have underestimated the cooling rate of dense neutron matter, a calculation that no one has been able to test in detail. "It's possible that there are other, more prosaic explanations," says Helfand. "I'd like to see other examples [of strange stars] and reduce the chance of an unfortunate geometric conspiracy."

If these two candidates are indeed strange stars, they should help astronomers better understand the nature of subatomic particles. "You can't produce huge chunks of matter at nuclear densities in the lab," says Turner. "There are big uncertainties here, but you take what you can get."

–CHARLES SEIFE

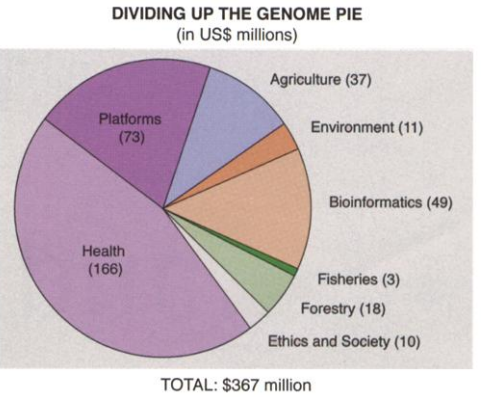
GENOME CANADA

New Awards Bolster Canada's Global Role

OTTAWA—When geneticist Tom Hudson of McGill University in Montreal learned last week that he would receive $9.5 million to finance Canada's 10% stake in a proposed international research consortium, he wondered for a moment whether he was still living in Canada. "It's unbelievable. This is going to be one of the most high-profile genome projects in the world, and we're the first group funded," enthused Hudson, the director of the Montreal Genomics Centre.

Hudson will be participating in a project to help researchers refine their search for genes implicated in diseases by mapping long stretches of DNA called haplotypes (*Science*, 27 July 2001, p. 583). It's one of 34 projects funded last week by Genome Canada, a nonprofit agency created 2 years ago to boost Canada's capacity in genomics and proteomics likely to benefit key industrial sectors such as health, agriculture, forestry, and fisheries as well as the environment (see graphic). The agency has raised a total of $400 million from federal, provincial, and industry sources. Combined with an earlier round of awards (*Science*, 13 April 2001, p. 186), the $195 million committed last week will buy Canada a prominent place in a host of international research consortia, says Genome Canada president Martin Godbout.

Hudson won't know which chromosome



A healthy lead. Health-related research tops Genome Canada's agenda, followed by other economically important sectors.

his group will be mapping until his expected partners, including the Whitehead Institute for Biomedical Research/MIT Center for Genome Research in Cambridge, Massachusetts, and the Sanger Centre in Hinxton, U.K., line up funding from U.S. and U.K. sources. But it's a heady experience to be leading the pack. Except for a few financially modest individual efforts, Canadian scientists sat on the sidelines during the torrid race to sequence the human genome and lamented government cutbacks that tied their hands.

The new funding will allow Canada to move ahead on several fronts. In addition to the haplotype map, the second group of awards includes $15.75 million for a massive public database on protein interactions (*Science*, 8 June 2001, p. 1813), $4 million for Marco Marra and Steven Jones of the British Columbia Cancer Research Centre in Vancouver to study the regulatory elements of gene expression, and $6.3 million for University of Calgary, Alberta, molecular biologist Christoph Sensen to develop a new software program for analyzing genomics data.

The money will also let Canada carry its weight in international circles, says Godbout. A grant of $6.73 million was awarded to molecular biologist David Baillie of Simon Fraser University in Burnaby, British Columbia, to determine protein function in the soil nematode *Caenorhabditis elegans*, and microbiologist Sherif Abou Elela of the University of Sherbrooke, Quebec, received $3.75 million to test modified nucleic acid technologies in determining gene function. Both projects will be done jointly with the Karolinska Institute in Stockholm. Genome Canada is negotiating with two other nations to build a consortium to map the genome of the potato, Godbout says, and with Norway to develop a consortium in fisheries. Negotiations are nearly complete on collaborative agreements with the Netherlands and Spain