

## STEM CELL RESEARCH

## Canada Gives OK for New Cell Lines

OTTAWA—Canadian and U.K. scientists have gotten the green light to proceed with human embryonic stem (ES) cell research.

Researchers may derive new lines of stem cells from embryos left over from fertility treatments or tissue from aborted fetuses under guidelines announced Monday by the Canadian Institutes of Health Research (CIHR). (Such derivation is prohibited for publicly funded researchers in the United States.) But the guidelines, issued in draft form last spring (*Science*, 6 April 2001, p. 31), prohibit the creation of embryos for research purposes or for so-called therapeutic cloning.

The guidelines “balance the safety and ethical issues of concern to Canadians with research and clinical opportunities and the desire of Canadians to proceed with the use of stem cells to treat disease,” says CIHR president Alan Bernstein. A new committee will review research proposals, and all new cell lines generated using CIHR funds will be listed at an electronic registry and will be available to all researchers.

Canadian researchers and private disease-fighting groups hailed the new guidelines, which lift a voluntary moratorium for the past decade on human ES cell research. These new rules also are consistent with draft legislation before Parliament. But they have drawn the ire of some pro-life members of the governing Liberal party, who accuse Bernstein of trying to circumvent the parliamentary process.

Bernstein says he does not see CIHR’s move as a substitute for legislation: “What we’re doing today is putting guidelines in place where there’s been a vacuum. ... [They] will be replaced if and when legislation comes in.”

Canadian stem cell scientists are pleased that the government has set down a clear path. “A lot of scientists have been waiting to hear what’s going on,” says Mick Bhatia of the John P. Robarts Institute in London, Ontario, who is gearing up to culture hematopoietic cells from ES cell lines acquired from WiCell in Wisconsin. Michael Rudnicki of the University of Ottawa points out that Canadian researchers have had plenty of time to think about how to pursue their aims and have a well-organized infrastructure—including a research network called StemNet and centralized fertility clinics with approved informed-consent procedures to supply embryos.

In the United Kingdom, meanwhile, officials are moving forward with the world’s most liberal stem cell policies. Last week the Medical Research Council (MRC) issued its first two licenses to researchers wishing to derive cell lines—to Austin Smith of the

Centre for Genome Research in Edinburgh and Peter Braude of Guy’s Hospital in London. A House of Lords committee has sanctioned the existing policies, even stating that therapeutic cloning might be permissible in cases of “exceptional need” when embryos are not available from fertility clinics.

The United Kingdom is also planning to set up the world’s first stem cell bank. MRC is soliciting bids from national laboratories, and a winner will be chosen this summer.

—WAYNE KONDRO AND CONSTANCE HOLDEN  
Wayne Kondro writes from Ottawa.

## ANIMAL BEHAVIOR

## Guppy Sex and Gluttony Guided by Orange Glow

What do females want? In peacocks, it’s a male with a billowing train of colorful, eye-spotted feathers; in túngara frogs, it’s a male with a low-baritone “chuck” call. And in guppies (*Poecilia reticulata*), it’s a male with orange spots. But why females prefer males with these particular traits and not bright purple spots, for instance, has proved difficult to pin down. Now, behavioral ecologist F. Helen Rodd of the University of Toronto and her colleagues report that for guppies, at least, the attraction derives from a simple gut response: Orange looks like food.

“It’s very cool,” says Anne Houde, an evolutionary biologist at Lake Forest College in Illinois. “Other studies in other species have shown a preexisting bias for certain traits in



Yum. Orange fruit (above) and fruit-colored spots (right) catch a guppy’s eye.



mates, but this may be the first to show how that bias originated.” Earlier work on what makes an orange male so dashing “tried to show that [females] looked at the orange spots for some indication of good genes,” says Michael Ryan, an evolutionary biologist at the University of Texas, Austin. Although that may still turn out to be the case, he says, the females’ initial attraction seems to arise from “something in their neural system that evolved for foraging” orange-colored foods.

Rodd first noticed the fish’s magnetic at-

traction to orange in the early 1990s while studying wild guppies in Trinidad. Her voyeuristic counts of courtship displays and mating attempts were disrupted every time a small, orange fruit from a cabrehash tree hit the stream. Sex immediately lost out to gluttony. Indeed, Rodd says, the orange fruits were about “the only thing” that ever interrupted the males’ persistent mating displays.

Struck by that observation, Rodd and her colleagues decided to test guppies’ color preferences. They painted small plastic disks various hues and placed them in streams, then counted the number of times the guppies pecked at disks of each color. Orange was always the high scorer—even among a well-studied population of females that do not prefer males with orange spots. The team followed up their field tests with laboratory experiments using second-generation guppies raised from wild ancestors. In all cases, notes Rodd, “guppies of all age and sex classes preferred” orange disks, apparently because of their hard-wired appetite for the orange fruits, the researchers report in the 7 March issue of the *Proceedings of the Royal Society of London, Series B*.

At first, the idea that females are attracted to food-colored males was “a little depressing,” says Rodd. “Are female guppies really that stupid? All it takes is a flash of orange that looks like a fruit?”

There may be more in the flash, though, than meets the human eye. Like many orange-colored fruits and vegetables, cabrehash fruits are loaded with carotenoids, which contain vitamin A and may support the immune system. Males that eat more carotenoid-bearing foods have the most distinctive orange color in their display spots, points out Greg Grether, an evolutionary biologist at the University of California, Los Angeles, one of the study’s co-authors. Because the fastest fish get the limited supply of fruits, Rodd adds, “the color of the spots could still be telling the females something about the health of the males.”

Indeed, previous research revealed that female guppies dislike males with dull orange spots—an indication that they are

or have been infected with certain parasites. Thus, the male’s orange spots may be like infomercials, both grabbing the female’s attention and giving her hard data about the quality of the male’s genes. “Attracting a mate is a multistep process,” says David Reznick, an evolutionary biologist at the University of California, Riverside, who has led numerous studies of wild guppies. After catching a female’s eye, the male does a bend-and-shake dance that “holds the female’s attention and tells her something about

[himself].” Far from being simpletons in their mating decisions, guppy females seem judicious. And that, Rodd says, should be a warning sign to other researchers seeking to understand female choice: “It’s more complicated than we thought—even in guppies.”

—VIRGINIA MORELL

## DENMARK

## Greens See Red Over Revisionist’s New Job

**COPENHAGEN**—Has the Danish government put a fox in charge of the henhouse? That’s what many environmental researchers are wondering after last week’s appointment of Bjørn Lomborg, author of the controversial book *The Skeptical Environmentalist*, as director of Denmark’s new national Institute for Environmental Evaluation.



**Lightning rod.** Bjørn Lomborg’s new job has sparked furor.

Denmark’s right-wing coalition government has created the institute to assess the effectiveness of environmental protection spending. Many researchers and activists worry that Lomborg’s thesis—that most environmental problems are wildly overstated—will color the institute’s thinking. “He is widely distrusted among the people whose research he will be dealing with,” says environmental biologist and biodiversity specialist Peder Agger of the University of Roskilde. But Lomborg says that researchers are missing the point of the new institute: “It’s about getting the most for the money we spend.”

Lomborg, a political scientist on leave from Aarhus University, created a furor last year by arguing in his book that indicators in areas from biodiversity to water conservation show that the planet is far better off than the public thinks. *The Economist*, for example, has praised him for questioning the validity of what Lomborg has called “the alarmist litany.”

Such compliments drive many environmental researchers crazy. “He’s a media phenomenon spreading misinformation,” contends Agger. A series of essays in the January issue of *Scientific American* raises several questions about Lomborg’s analyses, which are also under attack from the Union of Concerned Scientists. According to Stuart Pimm, an ecologist at Columbia University in New York City, “very serious environmental researchers have gone through chapters and found that he practically doesn’t get a single point right.”

The Danish Committee on Scientific Dishonesty is investigating a complaint from Danish biologist Kåre Fog that Lomborg has knowingly distorted the research he analyzes in his book. “He systematically leaves out any data and prognoses that are not in line with his views,” Fog says. The complaint, Lomborg replies, “has no merit whatsoever.”

Given Lomborg’s public views, many observers view his appointment as a declaration of war on the environment. Socialist Jørn Jespersen predicts that Denmark will lose its credibility in global environmental discussions because “appointing a man with no scientific background makes us a laughing-stock.” Not surprisingly, Lomborg disagrees. In fact, he predicts that the institute “could be very powerful if politicians listen to us.”

—LONE FRANK

Lone Frank is a science writer in Copenhagen.

## GENOMICS

## Taking Aim at Celera’s Shotgun

The genome wars seemed to have subsided—until last week, that is, when one side took a belated swipe at the other’s credibility. In a paper published in the 5 March online *Proceedings of the National Academy of Sciences (PNAS)*, three leaders of the publicly funded Human Genome Project (HGP) assert that what appeared to be a dead-heat race to sequence the genome was actually nothing of the sort. Celera Genomics, the authors argue, broke down information from the public database into patterns that were easy to reassemble. The company’s public relations machine then sold the effort as a triumph of the whole-genome shotgun approach, the authors add, making it appear different from the public frame-by-frame reading. (The two draft sequences were published in February 2001, Celera’s in *Science* and HGP’s in *Nature*.)

Celera hotly denies the charges. “They say that we copied their answer, and that’s completely false,” says Mark Adams, vice president for genome programs at the company, located in Rockville, Maryland. Alternating between despondence and frustration, Adams professes that “I’d really like to see [the rivalry] end.”

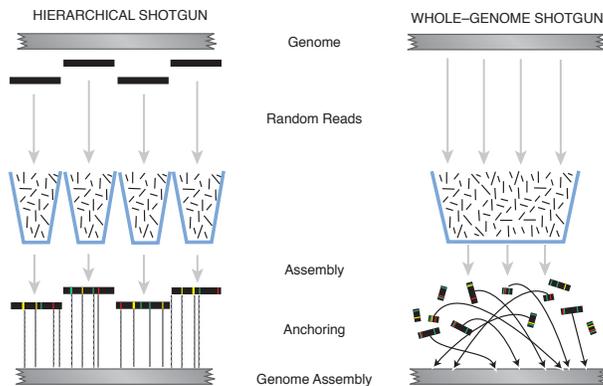
The allegations come from Robert Waterston of Washington University in St. Louis, Missouri; Eric Lander of the Whitehead Institute’s Center for Genome Research in Cambridge, Massachusetts; and John Sul-

ston of the Wellcome Trust Sanger Institute in Cambridge, U.K. In their analysis, Waterston and his colleagues sought to mimic Celera’s breakdown and reconstruction of the HGP data. Celera chopped up stretches of public data into short strands of sequence, Adams says, both to catch errors and to augment its own sequence data. The *PNAS* paper, on the other hand, argues that Celera disassembled, or “shredded,” the public data in such a way that it automatically reassembled into correct order—in other words, they charge, Celera added little but took the credit for a lot.

Using chromosome 22 as an example, the critics simulated various shreadings of the HGP data. One, which they believed reassembled Celera’s disassembly pattern, yielded on reassembly a sequence essentially identical to the original. Celera’s approach, they conclude, “implicitly preserves the underlying assembly information.” The results also suggest that the true whole-genome shotgun approach—which the three say Celera did not perform as claimed—may be problematic for lengthy sequences.

The paper is rather an “arbitrary deconstruction of other people’s work” that does not advance the science, says Richard Gibbs of Baylor College of Medicine in Houston. (Gibbs took part in the HGP and is now collaborating with Celera on the rat genome.) He adds that “the public consortium as a group” would not have signed off on this paper.

But both Nicholas Cozzarelli, *PNAS*’s editor-in-chief, and Philip Green of the University of Washington, Seattle, who, like Celera, wrote a commentary that will accompany



**And the scrimmage continues.** Scientists are still battling over whether Celera’s sequencing approach (right) is superior to the public consortium’s (left).

the paper in an upcoming print edition, vigorously defend the paper’s value. “It is important to correct the historical record,” says Green, given the enormous importance of a sequenced human genome. Yet even Green suspects that “the Nobel Prize is sort of underlying all these [controversies].” After all, “only three people can get it.” —JENNIFER COUZIN