School in London to develop a polymerase chain reaction–based test for the cystic fibrosis gene.

But advocates of the new bill are unswayed by the potential benefits of such research. Jack Scarisbrick, director of Life, Britain's largest anti-abortion group, says that researchers "want to have embryos in order to detect chromosomal and genetic disorders, not primarily in order to cure them . . . but to be able to detect these defects and to kill them."

As Scarisbrick's use of the word "kill" suggests, the debate on the bill in Parliament, like the abortion debate in the United States, turns largely on the moral issue of when life begins. Those who favor the less stringent version of the bill—the one permitting research on embryos up to 14 days—do so on the grounds that before that time an embryo can hardly be considered "human."

Fourteen days was chosen because it is only at that time that the "primitive streak" appears. The primitive streak is the first group of cells that will go to make up the embryo itself. Until the primitive streak forms, almost the entire conceptus (the sum total of tissues derived from the fertilized egg) consists of membranes, such as the placenta, that ultimately provide support for the developing embryo.

Even a cutoff of 14 days is so late as to be theoretical, given the available techniques for dealing with human embryos. Few investigators have kept a human embryo alive in the laboratory even until the ninth day after fertilization. In most laboratories day 6 or day 7 is the usual limit.

But, as in the United States, British "pro-life" forces believe human life begins at the instant of conception. John McLean, lecturer in anatomy at Manchester University and an adviser to the pro-life members of Parliament, says, "I am convinced . . . that life does begin at fertilization." Experiments on embryos, even before 14 days, "threaten the lives of the subjects," McLean says.

Scarisbrick concurs. "A civilized society," he says, "must not use human subjects without their consent for research and experimentation which results in them being mutilated and killed."

It will take some time to determine which of these opposing views will prevail. After being debated in the House of Lords, the fertilization bill has now been sent to committee. From there it will emerge to be debated again and then passed along to the House of Commons. No one can say for certain when it will see the light of day again, but some observers predict that it could happen as soon as February.

■ JEREMY CHERFAS

Science and PR North of the Border

Were unpublished scientific results used as a weapon in the battle to take over Canada's premier biotechnology firm?

THE UNITED STATES is not the only North American country where the takeover of high-tech firms by foreign corporations generates high stakes—and complex issues in science. Last week a government decision cleared the way for Connaught BioSciences Ltd., Canada's premier biotechnology company, to be sold to Institut Merieux, S.A., of France, ending a complicated takeover attempt that began in mid-1988. One of the many twists and turns along the way was an attempt by Chiron Corp., the American biotech company, to place a story based on unpublished results of its AIDS vaccine research in the Toronto *Globe and Mail*, one of Canada's best known newspapers.

Chiron, with its Swiss partner, the pharmaceutical giant CIBA-Geigy, was competing with Merieux for Connaught. The AIDS vaccine article, reporting promising preliminary results of a phase I clinical trial, appears to have been an attempt to sway public and government opinion in Chiron's favor. Editors at the *Globe and Mail*, fearful of being used, killed the story. But—like the cold fusion case—the episode raises sharp questions about the appropriate use of data that has not been peer-reviewed.

Connaught was founded at the University of Toronto in 1914 and its commercial success was established by production of the first commercial insulin for treating diabetes. The company is currently one of the world's largest vaccine makers, producing vaccines against polio, meningitis, and influenza, among other diseases.

In recent years, as clinical trials have become increasingly expensive, Connaught found itself hard pressed to muster the resources for developing new products and moving them to market. A report prepared for the Canadian government described Connaught as a "shrinking niche player" in the vaccine arena. The company's production and marketing facilities, however, made it a desirable target for a takeover. Enter Merieux.

In April 1988, Merieux first bid for Connaught shares, a move blocked by the securities commissions of Ontario and Quebec. A year later Merieux proposed to merge their vaccine operations with Connaught's, forming a new company based in Holland. Connaught's shareholders were not much interested because the deal would have given them stock in the new venture rather than cash. Two weeks before Connaught's board was to have voted on the offer, CIBA-Geigy and Chiron entered the picture.

CIBA-Geigy and Chiron made an offer of $30 (Canadian) per share for Connaught. Their bid also included a provision to make Connaught the headquarters of a new worldwide vaccine company—a provision aimed at reducing Canadian anxiety that, if Connaught were sold to a foreign concern, the once proud research facility would be turned into little more than the local marketing arm of an international giant.

Such considerations are not merely theoretical, because in Canada a federal agency called Investment Canada must approve any takeover by a foreign institution. That agency's standard for approval is whether the takeover provides "net benefit" to Canada. In the Connaught case the maintenance of an integral company, including research and development facilities, was apparently part of the overall "net benefit" package.

Investment Canada found the first Merieux cash offer unacceptable on "net benefits" grounds and the presence of a competing offer from CIBA-Geigy and Chiron made it possible to negotiate better terms. The negotiations were fruitful: Merieux came back with a bid of $37 per share that included an increased commitment to keeping research and development in Canada. That was where the story stood early this month, as Investment Canada pondered the two competing bids.

Chiron's bid—$30 a share—was lower than Merieux's, but intangible factors were part of the decision, and certain intangibles seemed worth emphasizing. One of them was the American company's research competence. A week before Investment Canada made its decision, Chiron contacted Geoffrey Rowan, a technology reporter for the *Globe and Mail*. Rowan was given some results of a phase I trial of an experimental AIDS vaccine, a trial that has not yet been described in a peer-reviewed context.

The results were hardly conclusive, but

they were promising. Like several other experimental AIDS vaccines, the Chiron vaccine is based on a recombinant version of the HIV envelope protein. The envelope protein is combined with an emulsifying oil and an adjuvant, a system Chiron researchers believe can greatly increase the immune-stimulating capacity of the vaccine.

"Alarm bells started going off. . . . I was worried about reporting research that hadn't gone through peer review."

—Bruce Little

This combination has been injected into 25 healthy volunteers at the Geneva University Hospital. The goal of phase I trials is largely to evaluate safety, and none of the 25 showed ill effects. Dino Dina, director of virology at Chiron, explained to Rowan that all of the volunteers who received high doses of vaccine produced antibodies against HIV, and all of them, whether they received high or low doses, showed some cellular immunity.

There is little disagreement that Chiron had a strong motivation for wanting to influence public opinion in Canada. Rowan said he assumes the information was provided to him as part of Chiron's effort to win "the hearts and minds of Investment Canada." No one at Chiron told him so directly, he says, but he adds that "the timing suggests it."

Larry Kurtz, Chiron's director of public relations, acknowledged to *Science* that the results were provided for a purpose. "Of course we were trying to convince the Canadian government of our technological merit," he says, but adds that the results of the AIDS vaccine trial had already been discussed with Investment Canada directly. According to Kurtz, Rowan was selected because he had recently done other reporting on Chiron.

Discussions with the *Globe* reporter were kept general so as not to jeopardize journal publication, Kurtz says, adding that a paper summarizing the results on the 25 volunteers has been submitted to a "leading medical journal." Earlier results were presented by Dina at scientific meetings, and Chiron wouldn't have given Rowan the results if they had been "completely out of the blue," Kurtz says.

Rowan believed that with caveats about the data's being unpublished, an accurate and interesting story could be written. "Being a technology writer," he told *Science*, "it was too exciting a story to pass by." On 6 December he wrote a story describing the preliminary results.

The next day Bruce Little, managing editor of the *Globe*'s "Report on Business" section, sat down to read Rowan's story. "Alarm bells started going off," Little says. He adds that "my concern was that these people had a huge axe to grind with Canada, and I was worried about reporting research that hadn't gone through peer review." Little decided not to publish Rowan's article and the story never appeared.

On 13 December Investment Canada announced that both the beefed-up Merieux bid and the CIBA-Geigy–Chiron bid were acceptable to the Canadian government on the grounds of net benefit to the country, and the final decision was left up to the shareholders of Connaught.

Not surprisingly, Connaught's shareholders had already decided (pending government approval) to accept the higher bid, that from Merieux, which amounts to a total of $942 million. As a result, Connaught will now pass into the hands of the Institut Merieux, creating perhaps the world's largest vaccine maker.

But while the corporate questions seem to have been resolved for the moment, some significant scientific issues remain—notably that of the appropriate use of the results of scientific research. Pons and Fleischmann were roundly criticized for offering cold fusion data to the press before it had been reviewed by scientific peers. But in that case the leading question seems to have been scientific priority (although the financial gains from cold fusion, should it prove workable, could not have been far behind).

In the Connaught episode the worldly issues were right on the surface—in the form of public opinion, a decision by a government agency, choices made by stockholders, and the fate of a major corporation. As science and commerce become increasingly intertwined, particularly in biotechnology, such issues will probably crop up with greater frequency. And, since there are no clear guidelines or institutional mechanisms for handling unpublished data, they will not be easy to resolve cleanly.

■ DOUGLAS POWELL

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Maine Case Deals Blow to DNA Fingerprinting

DNA evidence was withdrawn after the defense challenged the validity of a method to correct the data

A FEW HOURS after a 5-year-old girl was sexually assaulted behind a school in South Portland, Maine, the police had identified a prime suspect. Not only did he match a description given by the victim and two older girls who had been with her, but he admitted that he had been in the area at the time. Moreover, he had tissues in his pockets similar to one left at the scene of the crime that had apparently been used to wipe semen from the girl's leg. Case closed?

Not quite. To nail down the suspect's culpability, the police sent the semen-stained tissue and a blood sample from the suspect, referred to as David G., to Lifecodes Inc. in Valhalla, New York, for DNA typing. Three months later, on 18 August 1988, the results came back: David G.'s DNA did *not* match that of the semen on the tissue. He was not the assailant, Lifecodes concluded.

On its face, this criminal investigation provides a dramatic demonstration of the power of DNA fingerprinting—in this case, possibly saving an innocent man from jail. But what happened next has put the technology in a much less flattering light; indeed, it could cause difficulties for prosecutors in future cases when the DNA data are not crystal clear.

The very day the negative results were reported for David G., the South Portland police got a warrant to draw blood from a second suspect, a man named Kenneth McLeod. McLeod had a history of charges involving child molestation, and he had been living in Portland at the time the assault took place. But McLeod is short and fat and the victim and her friends described the assailant as tall and thin. He may not have looked the part, but, on 17 November 1988, Lifecodes reported that McLeod's DNA matched that of the semen sample.