

500 nominees, 37 hold a PhD degree, 5 are MD-PhDs, and 2 have DSc degrees. None has just a medical degree, which may say something about the ability of MDs to compete for research-intensive

grants. The international scholars supported by Hughes now number 164 in 19 countries. Between them, they have received \$53 million in grants since 1991.

Thanks to the bull market, Hughes's heavily invested assets now total some \$9 billion, of which approximately \$450 million is spent each year.

BARBARA J. CULLITON

Reactions to cloning

Washington . . .

Reacting to the recent announcement that researchers at the Roslin Institute in Scotland have successfully cloned a sheep from an udder cell taken from an adult ewe (see *Nature* 385, 810; 1997), US President Bill Clinton has banned the use of government money for human cloning research and has called upon private sector scientists to voluntarily abstain from such work until a special panel can resolve many of the moral dilemmas raised by the experiments.

Responding to the recent reports of successful sheep and rhesus monkey cloning, Clinton stressed that the fast pace of the science has prompted troubling new questions for humanity — even as it holds great promise for agriculture, medicine, species preservation and other areas. "Science often moves faster than our ability to understand its implications," said Clinton, who has asked a special presidential bioethics commission to study the issue and to report back to him this spring. "There is much about cloning that we still do not know. But this much we do know: any discovery that touches upon human creation is not simply a matter of scientific inquiry, it is a matter of morality and spirituality as well."

Clinton's action seemed to have more of a psychological impact than a practical scientific one, since no federal funds are currently being spent on human cloning research. The National Institutes of Health, which provides most of the money to support US scientists, does not now support any human cloning research projects. Furthermore, as part of the 1996–97 legislation reauthorizing NIH, the US Congress explicitly forbid federally funded human embryo research.

Bioethicist Art Caplan,

director of the center for bioethics at the University of Pennsylvania, called Clinton's action a sensible approach to a potentially explosive scientific issue. Such work in humans right now "is too risky, too dangerous to undertake," Caplan said, to achieve cloning "a number of dead embryos and deformed animals were made as well. It makes sense to impose a moratorium and let society catch its collective moral breath."

Clinton's move did not seem to provoke the usual tension between politics and science that invariably results when nonscientists try to make scientific policy. In fact, NIH Director Harold Varmus predicted that the ban actually would have the effect of diffusing any attempts by others to meddle with science. "It takes the pressure off the need to legislate," he said, adding "It's impossible to exclude the science fiction rogue scientists idea, but it's very hard to do this stuff. I don't think this [an attempt to clone a human] is imminent."

MARLENE CIMONS
Washington, D.C.

. . . and home on the farm

When is an embryo not an embryo? This apparently simple question has come to play a key role in determining whether reg-

ulations passed by the British Parliament in 1990 are sufficiently broad to allow the government to ban all forms of human cloning.

As the news of the cloning spread through the media, prompting calls in many countries for the rapid adoption of laws banning the application of such cloning techniques to humans, the initial — perhaps somewhat complacent — reaction of British authorities was to argue that this was already achieved by legislation passed in 1990.

However, closer inspection of the Human Fertilization and Embryo Act of that year, established primarily to erect a regulatory framework around the application of *in vitro* fertilization techniques, revealed a less clear-cut situation. For although the legislation was intended to prohibit any cloning of human embryos, the techniques used by the Scottish scientists, which involved placing the nucleus of cells taken from adult cells into an unfertilized egg whose nucleus had been removed, were not foreseen. As a result, the Human Fertilization and Embryo Authority (HFEA), which was set up by the act, was caught off guard. As Ruth Deech, its chair, admitted to the House of Commons select committee on science and technology last month, "we clearly have the authority to regulate every [cloning technique] except for the one that was used at Roslin."

In principle, this potential loophole arising from a failure to anticipate the novel cloning technique should not matter, as the act also gives the HFEA wide powers to regulate any artificial manipulation of human embryos. But here too uncertainty has arisen, this time over the specific definition of an embryo. The very first paragraph of the act defines the word "embryo" as applying, in a legislative context, to "a live human embryo where fertilization is complete." But in the Roslin case, the conventional concept of fertilization does not apply. Thus, some have argued, if the same technique were used on human cells, it would not be covered by the act.

Lawyers representing the HFEA and the Department of Health have been closely studying both legal and medical texts to



Ian Wilmut (right) of the Roslin Institute and Ron James, Managing Director of PPL Therapeutics, Edinburgh.