

Science and the Vatican

Mariailuisa Lavitrano had been uncertain about what to expect. A pathologist at the University of Milan-Bicocca, Lavitrano had been invited to organize a series of scientific meetings at the Vatican about xenotransplantation and the genetic modification of animals. That was three years ago, and she is still surprised by the response she got.

"The cardinals wanted to know everything about the science," she says. "It was a fascinating debate and, frankly, I was not prepared for so much open-mindedness." After the meetings, the Vatican legitimized the transplant of animal organs into humans and the use of animals in medical research (E. Sgreccia *et al. Nature* 414, 687; 2001).

Lavitrano's experience is not unique. The Vatican often seeks informed advice on questions emerging from progress in science and medicine. And many researchers who have been involved say that they are surprised by the high quality of scientific discourse with the cardinals. Despite the Church's reputation for nurturing anti-scientific tendencies — as recently as the 1960s, Catholic priests in training were asked to renounce 'modern errors' such as darwinism and the expansion of the Universe — the Vatican has long abandoned literal interpretations of scripture.

The Vatican takes regular scientific advice from the 400-year-old Pontifical Academy of Sciences in the Vatican City. The academy is made up of 80 eminent scientists from around the globe chosen by the academy itself. Each November they hold a scientific meeting, usually on a topic of their

choosing, or sometimes on a matter requested by the central administration of the Church; these have covered everything from birth control to cloning, genetic engineering and the origin of life.

The annual meetings conclude with an audience with the Pope. He and his officials then take this scientific advice into account when they draw up guidance notes and issue decrees on the Church's doctrine.

Pope John Paul II has shown a notable interest in science ever since he took over as head of the Catholic Church in 1978. "Scientists who have met him have always thought they were before a person really interested in their work and sincerely eager to learn from them," says Giuseppe Tanzella-Nitti, an astrophysicist at the Pontifical University of the Holy Cross in Rome.

"I remember the young Pope just a few years after his election sitting among a small group of scientists on a terrace of his private residence at Castelgandolfo, taking notes about contemporary cosmology," says Tanzella-Nitti. Perched on top of the same residence is an astronomical observatory that, partnered with a telescope in Arizona, is funded by the Vatican to the tune of US\$1 million a year.

The possibility of extraterrestrial life and intelligence, and the implications of cosmology for Christian ideas about the beginning and end of time, will be upcoming challenges for science-minded theologians, says Tanzella-Nitti. The Catholic Church, for one, should be well prepared.

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him. But most Buddhist scholars say the killing of an embryo at any stage violates a central tenet that living things should not be harmed. Cloning for reproductive purposes, on the other hand, does not require destroying the embryo and so does not in itself violate Buddhist precepts.

"The problem is not when life is started, but when it is stopped, as in therapeutic cloning," says Keown. "Dr Hwang is on shaky ground in claiming that Buddhism supports cloning, without careful qualification."

Protestants, who make up another third of South Korea's population, reacted strongly to the news of Hwang's experiments. Sixteen Protestant groups, representing 6,000 people — half of them doctors in the Christian Medical Fellowship — met in September to plan a campaign devoted to making the use of human embryos in research illegal.

But the extent to which religious opinion influences politics and laws varies dramatically from society to society. In Spain, where 99% of the population is Catholic, a law was recently passed to allow the use of IVF embryos in stem-cell research. But in Italy, which vehemently opposes the use of European Union funding for stem-cell research, the population is "much more reactionary on religious issues than the Church itself",

says Enrico Alleva, acting head of behavioural pathophysiology at the National Institute of Health in Rome. Alleva believes that this zeal, rather than formal Catholic doctrine, is at the core of the recent creationist movement in Italy (see *Nature* 428, 595; 2004) and of other perceived 'anti-science' tendencies throughout Europe.

Body politic

Another place where religion has proved to be the driving force for politics is the United States. In November's election, President George W. Bush owed his victory in part to votes from his fellow evangelical Christians.

Evangelicals are not uniformly conservative in their political views — some oppose capital punishment, for example. But most evangelical leaders are strongly against embryonic stem-cell research. The Southern Baptist Convention, which represents the second largest US denomination after Catholics, says it relies on a "crass utilitarian ethic which would sacrifice the lives of the few for the benefits of the many".

Such statements have surely influenced the United States' rigid policy on stem-cell research, in which federal funding is limited for use on a few dozen pre-established cell lines, and cannot be used to establish new ones.

Does this reflect public attitudes? Polls reveal mixed opinions — although a lot hinges on the wording of the question. In July 2004, Catholics for Free Choice published a poll of 2,239 Catholics nationwide, and found that 72% supported "allowing scientists to use stem cells obtained from very early human embryos to find cures for serious diseases such as Alzheimer's, diabetes and Parkinson's".

But "polls on embryonic stem-cell research often fail to mention that the research requires destroying human embryos", says Richard Doerflinger, deputy director of the US Conference of Catholic Bishops Secretariat for Pro-Life Activities. In August the Catholic bishops released the results of their own poll. When given a choice between funding both adult and embryonic stem-cell research or only work that didn't require destroying an embryo, Americans preferred the latter by 61% to 23%.

Difficult question

Efforts to establish ethical rules on stem cells that transcend national and spiritual boundaries have proved remarkably unsuccessful. After years of delayed decisions, on 19 November the United Nations came to what was widely called a "compromise" position on cloning technologies — it adopted a non-binding declaration that asks member states to adopt legislation that respects "human dignity". In the end, this statement is likely to be interpreted in as many different ways as some lines from the Bible.

So scientists and theologians will continue to talk — and to disagree. At least one thing has changed in this debate since Galileo's day, for better or for worse: now, science is the orthodox worldview, in the industrialized world at least, and religion stands outside, raising objections. At bioethics conferences, says John Evans, a sociologist of religion at the University of California, San Diego, biologists rarely show any knowledge of theology. But "religious people are expected to have spent huge amounts of time learning all the science", he notes.

One thing is certain. Everyone agrees that fundamental ethical questions underlying stem-cell research, many of which transcend religion, need to be addressed. "The power of these new technologies is so great that we can no longer deal with them in a vacuum. This affects everyone across the board," says Kevin FitzGerald of Georgetown University in Washington DC, a Jesuit priest with PhDs in molecular genetics and bioethics. And stem cells are just the beginning. "The stuff that's coming down the pipe will make this look like child's play," he says. "Organic mixed with inorganic, one species mixed with another. Everything from the molecular level on up will be fluid." ■

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