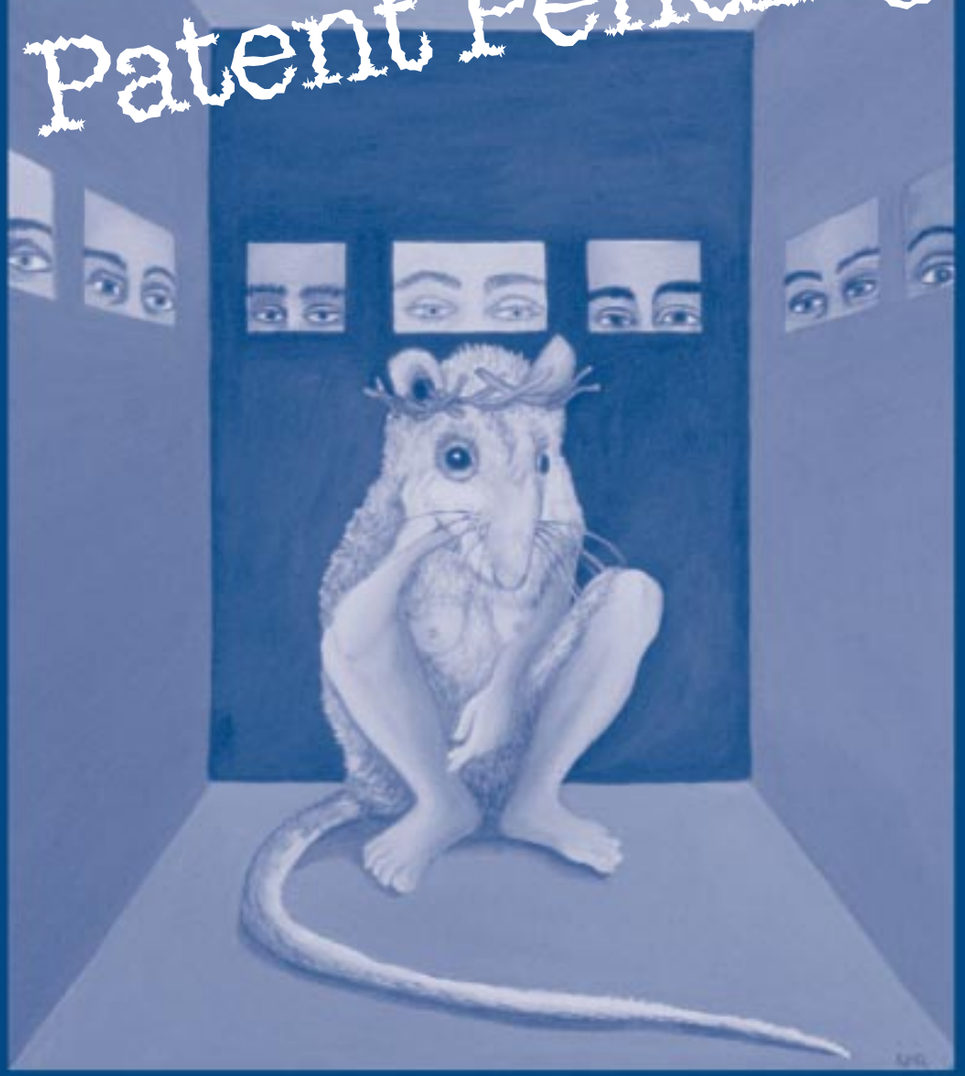
LIFE:

Patent Pending



A discussion guide on Biotechnology and The Oncomouse.

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"The Canadian Council of Churches is a community of churches which confess the Lord Jesus Christ as God and Saviour according to the Scriptures and therefore seek to fulfil together their common calling to the glory of one God, Father, Son and Holy Spirit, and also other churches which affirm the same faith but which do not make doctrinal confessions" (Canadian Council of Churches, Constitution). Founded in 1944, it now includes 18 member churches and one associate member.

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Why this booklet?

On December 5, 2002, the Supreme Court of Canada published its decision that a genetically modified mouse, developed in the early 1980s by two scientists at Harvard University, is not *an invention* within the meaning of Canada's Patent Act. The split ruling (five in the majority, four dissenting) supported Canada's Commissioner of Patents when he ruled in August 1995 that Harvard University could not obtain a patent in Canada on this famous rodent, now known internationally as "the oncomouse" because of its use in cancer research. The ruling also ended a long round of appeals in Canada's lower courts.

Interested parties on both sides of this particular biopatenting question are urging that Canada's Parliament move soon to develop laws that will take account of the vast work now being done in biotechnology. The new legal framework should directly face the question of whether animals and other living beings should, or should not, be patentable.

Canada's churches–at least that majority of churches represented in the Canadian Council of Churches and/or the Evangelical Fellowship of Canada–consider that the biopatenting issue is a significant one for humanity's understanding of itself and of its call to live respectfully with other living beings, which we believe are also creatures of God. Seeking the Creator's wisdom on our relationship with other forms of life is crucial now, when new ideas and powerful new techniques are having such an impact on humanity's self-understanding and on the scope of human action. That's why the Council of Churches and the Evangelical Fellowship together sought intervener status in the Supreme Court's "oncomouse" case, as did nine other non-governmental organizations.

And that's why this modest booklet has been published. It is intended as a discussion-starter for people in church networks who want to consider these questions, which, presumably, will soon be before the Parliament of Canada.

The booklet consists of six short essays commissioned by members of the Biotechnology Reference Group of the Canadian Council of Churches. Each essay is followed by references to a few relevant biblical texts for discussion, plus two or three questions to help discussion get started. The same texts–longer versions, in some cases, including footnotes and bibliographical references–can be found on the web site of the Canadian Council of Churches (www.ccc-cce.ca).

Biopatenting is only one strand in the huge tissue of new questions raised for faith communities by contemporary biotechnology. But it's a good place to start. The members of the committee charged with preparing this little booklet hope its reflections will be useful as a starting-point for conversations among Christians. We wish you God's peace as you help each other consider aspects of a very big question: who, if anyone, "owns" life?

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Rev. Dr. Richard Crossman, Principal-Dean, Waterloo Lutheran Seminary

Janet Somerville, former General Secretary of the Canadian Council of Churches

The Mouse That Made the Lawyers Roar

Anne Mitchell and Janet Somerville

We haven't checked all the records, but it seems safe to assert that May 2002 was the first time in human history that a national high court–the Supreme Court of Canada, no less–met to determine the legal fate of a mouse.

The rodent that came under the microscope of nine learned Justices was not, of course, just any mouse. It was Harvard's Oncomouse. The little creature emerged, not only from thousands of years of ordinary genetic history, but also from the research labs of Harvard University, where it was conceived–and was significantly changed. Scientists there had transgenically engineered a mouse embryo to incorporate an "oncogene" into its genetic make-up, in such a way that the altered gene sequence would be inheritable.

For anyone who works hands-on as a laboratory scientist looking for new insights into cancer, the degree of predictability that results from this inheritable oncogene makes the Oncomouse a sort of thoroughbred in the stables of laboratory mice. Generation after generation, the offspring of this mouse will be prone to develop cancer in a fairly predictable way, making the work of cancer research that much easier. There are in this world many cancer researchers, and they all have budgets. Thus, Harvard's Oncomouse is interesting not only scientifically, but also commercially. It's a hot property.

A *property?* How much of it is a "property", and in what sense? Can a living, breathing, reproducing mouse be patented in the Canadian legal environment by a corporation of humans? That was the question that confronted the Justices of the Supreme Court of Canada on May 20, 2002.

On the mouse's way to the Supreme Court, lower courts were in agreement that Harvard University could, under Canadian law, patent the method the scientists used for getting the oncogene into the mouse. They further agreed that Harvard could patent the novel gene sequence–the tiny portion of the mouse's genetic inheritance that had been deliberately changed. Those two novelties could be considered "inventions" within the meaning of the Patent Act.

"A complex life form does not fit within the current parameters of the Patent Act without stretching the meaning of the words to their breaking point."

But the mouse itself, and its living offspring–the whole new "species", if we want to call it such–can it be patented? At what point does it make sense for us to treat a living animal as a manufactured item that can properly be

claimed as yet another deliberate human invention? What about all those millennia of development that brought the mouse to its present-day complexity without any human intervention? Is that complex earthly history now to be treated as one of the intellectual properties of Harvard and its multinational partner DuPont?

When asked in 1995 if the modified mouse could be patented, the Canadian Commissioner of Patents had answered *no*: this living creature is not an "invention" within the meaning of the Canada Patents Act. When Harvard appealed that decision to the trial division of the Federal Court, Judge Nadon upheld the Commissioner of Patents, and wrote, *On even the broadest interpretation I cannot find that a mouse is "raw material" which was given new qualities from the inventor. Certainly the presence of the myc gene is new, but the mouse is not new, nor is it "raw material" in the ordinary sense of that phrase...A complex life form does not fit within the current parameters of the Patent Act without stretching the meaning of the words to their breaking point, which I am not prepared to do.* Harvard appealed Judge Nadon's decision. And in August 2000, the Federal Court of Appeal, in a split 2-1 decision, allowed Harvard a patent on the mouse itself.

If nature is God's good creation, what in nature do we humans have the right to "own"?

Canada's Quakers–the Canadian Yearly Meeting of the Religious Society of Friends, to use their proper name–were the first faith community in Canada to take a stand on this new-to-Canada issue of the patenting of a higher life form. On August 20, 2000, the Yearly Meeting wrote to the Prime Minister and "implored the Federal Government to appeal the August 3 decision of the Federal Court of Appeal." Several groups of environmental activists in Canada were equally swift in their response, having followed the issue on its long journey through the courts.

Then the Friends' representative to the Canadian Council of Churches challenged her Council colleagues, saying–Is there something theologically wrong with this picture? Doesn't it seem to you that patenting a living animal is a rather arrogant step to take, given that humans don't own Creation? Shouldn't there be a broader public conversation about the patenting of higher life forms, and shouldn't the churches be in on that conversation?

The Friends' challenge was heeded. After some very lively conversations, Rev. David Pfrimmer, then the chair of the Commission on Justice and Peace of the Canadian Council of Churches, wrote to the Prime Minister calling for an appeal of the Federal Court's decision, citing the need for broad public reflection before a final decision on such a significant precedent.

On October 2, 2000, the Government of Canada filed an application to appeal the "Oncomouse" decision to the Supreme Court of Canada. Shortly afterwards, the Canadian Council of Churches, in partnership with the Evangelical Fellowship of Canada, requested and obtained intervener status in the case.

The lawyer who was invited to put some of the concerns of the churches into legal language was William J. Sammon of Barnes, Sammon, Ottawa. Mr. Sammon's brief pointed out that when the Canada Patent Act was passed in 1869, the framers of the legislation never dreamed that the Act would be used to patent an animal, or even parts of an animal. Surely new legislative thinking is called for before radical innovations become entrenched under an old law whose authors could not even have imagined them? The churches' brief also noted the ambiguous relationship between patenting and the openness of research. The goal of the Patent Act was to encourage innovation by rewarding inventors who would legally register and disclose their work. Under today's circumstances, might not patents have a restrictive effect, "privatizing" the results of research that otherwise would be freely shared among scientists? Are intellectual property rights causing inequities to pile up around access to the benefits of research?

Finally, Bill Sammon carefully raised some issues that are less "legal" and more philosophical.

Granting patents on animals would be indicative of a morally problematic shift in humans' perception of the natural world, he wrote in his "factum" for the Court. *The notion that a part of a species of complex animal life should be viewed as an invention...a mere industrial product...is based on the metaphysical position which holds implicitly that nature and/or the environment is simply composed of manipulable data–a "standing reserve" of calculable forces, completely subject to human manipulation...[Such a notion] fundamentally objectifies the natural world and would inevitably objectify humans, as they are part of the natural world..."*

For people of biblical faith, many other questions emerge when we contemplate a living creature under copyright...questions that could not be raised in a court of law in the narrow context of the Patent Act.

If nature is God's good creation, what in nature do we humans have the right to "own"? We act as if we "own" individual dogs and cats, horses and cows, goldfish and budgies. We "breed" them to shape them more to our liking. What's the difference when breeding becomes genetic engineering? If someone can own a whole herd of "natural" animals, why can't someone else own a whole species of genetically modified ones? If the Patent Act can be interpreted to include the patenting of higher life forms such as the Oncomouse, what then stands in the way of patenting the human body, or parts of it? If a modified mouse can be patented, what about Uncle Joe?

How do we recognize in twenty-first century terms that the earth is God's, and that we are "but aliens and tenants" (Lev. 25:23) before God?

What are the limits, and who will set them? If life is patentable, will we begin to see ourselves as the owners of creation? How do we recognize in twenty-first century terms that the earth is God's, and that we are "but aliens and tenants" (Lev. 25:23) before God?

Obviously, questions like these are not what Supreme Court cases are all about. Indeed, when the Supreme Court issued its Oncomouse decision on December 5, 2002, it made the limits of its decision very clear: *"The sole question in this appeal is whether the words 'manufacture' and 'composition of matter', within the context of the Patent Act, are sufficiently broad to include higher life forms. It is irrelevant whether this Court believes that higher life forms such as the oncomouse ought to be patentable."*

Writing for the majority, Mr. Justice Michel Bastarache went on to insist that *"the best reading of the words of the Act supports the conclusion that higher life forms are not patentable....Higher life forms cannot be conceptualized as mere 'compositions of matter' within the context of the Patent Act."*

The Supreme Court based its no-patent ruling only on the meaning of the existing Canada Patents Act. But the judges noted that Canadians, through their Parliament, must think about the issue much more broadly. *"The patentability of...life forms is a highly contentious matter that raises a number of extremely complex issues,"* wrote Mr. Justice Bastarache. "This Court does not possess the institutional competence to deal with issues of this complexity, which presumably will require Parliament to engage in public debate, a balancing of competing social interests, and intricate legislative drafting."

Which is exactly what Dr. David Pfrimmer, writing on Canadian Council of Churches letterhead, was arguing in his September 2000 letter to the Prime Minister of Canada. The question of whether or not higher life forms can appropriately be patented is too vital a question for the courts alone. We all need to be involved.

That's why this little booklet has been assembled by members of the Biotechnology Reference Group of the Canadian Council of Churches. We want to help ordinary church members in Canada to begin a

real conversation about biopatenting–at least about those dimensions of the question that churches should be raising.

Let's pray for a good beginning, and allow today's sharp new questions to draw us towards delight in our Creator's wisdom.

Possible Questions for Discussion

Genesis 1:1-2:3
Genesis 2:4-24
Matthew 6:25-34
Matthew 14:22-36

1. How do you understand God's entrusting creation to us? How can you apply this notion to bio-patenting?
2. How do we decide how to use the Patent Act to the benefit of humanity?

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Janet Somerville, a Roman Catholic laywoman, was General Secretary of the Canadian Council of Churches from 1997 to 2002.

The Oncomouse: A Test Case in Accountability?

Stephen Allen

Biotechnology, moving swiftly on many fronts, compels human society to face new hopes and fears, new questions on many levels. Genetic engineering, in particular, challenges our elected officials to grapple with issues that are unfamiliar to most of us. And one of the challenges is to ensure that our systems of accountability keep pace with new technologies and new patterns of power.

We learned long ago that technology is not neutral or value-free. Bio-engineering techniques are shifting some boundaries we never knew could be crossed: in food and agriculture, in medicine, in law, in global trade agreements, in human genetics. What will be the implications for the environment? For livelihoods and for social justice? For equity—will the new benefits be available also to the poor and marginalized? What effect will the blurring of ancient boundaries have on our understanding of what it means to be human? How will humanity's relationship with creation as a whole be impacted?

As our parliamentarians and judges grapple with genetic engineering and other new procedures, they do so knowing there is no turning back the clock. Biotechnology is with us. We cannot pre-judge every risk, every hope. But responsible officials need to ensure on our behalf that laws and policies will at least promote transparency and accountability.

A case in point: the Oncomouse

The story of Harvard University's Oncomouse and its seventeen-year journey through Canada's court system is told in the introduction to this study kit.

One of the questions at issue is this: should Harvard's mouse be considered an invention in the way we might consider a new mouse trap (or, let's say, a solar-powered cell phone) an invention? In Canadian law, a patent can be granted on an innovation that constitutes a new and useful art, process, machine, manufacture or composition of matter. Because researchers have altered some of its genes, Harvard argued that the Oncomouse is an invention in the sense intended by patent law. Many jurisdictions have agreed with Harvard; a patent on the Oncomouse was granted in the USA in 1987. Canada's Patent Act differs from parallel legislation in the USA, however. The difference in law has grounded part of the debate about bio-patenting here. The process in the European Union is different. A patent may be granted on a product, and only after the patent has been granted may it be challenged. That is the case with the Oncomouse: a patent was granted in 1998, and this patent has been challenged. A decision has not yet been reached.

Had the Supreme Court ruled in favour of Harvard, a precedent would have been set in Canada

for patenting countless multi-cellular life forms. As of September 2002, between 700 and 1000 patent applications were pending in the Canadian Intellectual Property Office, waiting in line for precisely this decision by the Supreme Court of Canada. There was a great deal riding on whether Harvard's mouse would or would not be considered an invention.

Despite the fact the Court ruled against Harvard, no doubt the issue of a new Patent Act for the twenty-first century will soon go before Parliament. Then Canadians will have an opportunity to participate in the debate about patenting higher life forms.

When the Canadian Council of Churches and the Evangelical Fellowship of Canada applied for intervener status in the Oncomouse case, Harvard's lawyers argued that the theological and ethical issues likely to be raised by such church-related bodies are not relevant to an interpretation of patent legislation. The Court decided otherwise and rejected Harvard's objection.

Globalization and Biotech

Biotechnology (especially in pharmaceuticals and agriculture) is viewed as a strategic sector in Canada's 21st-century economy. Within the federal government, an inter-ministerial committee has been set up to encourage such a development. The lead ministry, significantly, is Industry Canada. Over 10,000 people are directly employed in biotech-related industries in this country. Almost two billion dollars are generated annually in sales, 40% of these being exports.

Globally, there are more than 4,000 biotech-related corporations with revenues estimated at US$35 billion. The industry is dominated by US-based corporations (with 1,300 companies located there) but is powerful also in Europe, with some 1,600 corporations spread across countries in the European Community.

In the pharmaceutical sector alone, the global value of biotech products was about US $12 billion in 1999, and was projected in that year (by a Harvard-based specialist) to rise to $25 billion by 2005. In the USA, medical applications of biotechnology account for more than 90% of annual biotech-related sales.

Some 90% of research in science and technology is based in what is generally considered the industrialized world (Europe/Japan/USA), although India is also becoming a major actor. Many of the plants and other organisms that provide breakthroughs, however, grow in the less industrialized parts of the world. Interestingly, two-thirds of plant-derived drugs now prescribed in modern medicine are used for the same purpose for which indigenous peoples used them.

Do indigenous peoples benefit when their traditional knowledge becomes globally useful? Bio-prospecting and "bio-piracy" are issues beyond the scope of this discussion kit, but we should at least note that benefit-sharing protocols do not yet exist in international law. Some corporations have worked out helpful agreements with bearers (whether countries or communities) of the traditional knowledge used for a new product, but these agreements are more the exception than the rule. This is one area where accountability is severely limited.

. . . responsible officials need to ensure on our behalf that laws and policies will at least ensure transparency and accountability.

In the coming months, countries will be reviewing international patent frameworks in the World Trade Organization's *Agreement on Trade-Related Aspects of Intellectual Property Rights* (called TRIPS, for short.) Canada is a signatory to this instrument. TRIPS cause much anxiety in smaller, poorer countries, as corporations based in rich countries codify into law their claims to global ownership of the fruits of their research. Canada, too, can come under intense pressure where TRIPS are concerned. Recall that multi-cellular life forms (e.g. the famous mouse) still cannot be patented in Canada. This puts Canada out of step with its major trading partners. Despite the Supreme Court decision about the Oncomouse, there will continue

to be pressure on Canada to fall into line with the USA and Europe on this whole issue.

Patenting: Return on Investment and the Public Interest

The race to patent genes is at fever pitch. Some think of it as a kind of 21st century gold rush. Others have called it the new enclosure movement (remember the movement to "enclose" and privatize common land that was a forerunner of the industrial revolution in Britain?). What is now being privatized is not common land, but bits of the internal structure of life itself. Remember the human genome project? According to *The New Internationalist* (September 2002), the number of patents on human genetic material may already be as high as four million.

It is not obvious to everyone that patents (which signify a kind of ownership) should apply to genetic material when researchers "discover" and isolate a genetic element. Many observers consider the process of patenting to be something of an ethical misfit when so used. Whole movements are afoot to protect "the genetic commons", but so far those movements are dwarfed by the army of interests championing the new array of intellectual property rights.

Do indigenous peoples benefit when their traditional knowledge becomes globally useful?

The patenting process has its practical advantages. Inventors and the institutions they work in count on patent protection to recoup investments. In biotechnology, research and investment costs can be astronomical. To get a new drug on the market can take fifteen years and can cost as much as five hundred million US dollars.

Protecting returns on investment does not necessarily or always harm the public interest. But sometimes the clash between recognized human need and the legal rights of investors can be dramatic, as in the case of AIDS drugs in the face of the pandemic in Africa.

Closer to home, a recent report prepared for the government of Ontario recommends introducing a kind of morality clause when interpreting patent law as applied to biological materials. The new clause could provide a basis on which a patent may be challenged and an ethical review panel set up. In September 2001 the government of Ontario defied the claims of Myriad Genetics, a Utah-based company which owns the Canadian patents on two genes that "mark" inherited susceptibility to breast cancer. Ontario continues to offer affordable testing for those genes in its own hospitals, even though Myriad insists that such tests can only be done in the labs of its Canadian corporate partner, at several times Ontario's price. The government of British Columbia, faced with the same legal challenge, stopped funding the tests and has ordered its own Hereditary Cancer Program to stop offering them.

The relationships among science, the market and the common good are complex and profoundly controversial. Clear, generally accepted norms for governing this high-stakes arena are conspicuous by their absence. The patenting process, for example, excludes any consideration of the ethical dimensions of the product for which a patent is being sought. Legislation exists that could prohibit a product, once patented, from being sold if the product were deemed a health or safety risk. Given the whole range of risks and benefits that come along with the new biotechnologies, the task of developing legislation that will include ethical criteria is possibly one of the crucial opportunities for humanizing the age that is now upon us.

Science and market-oriented rights can clash also with regard to the free flow of new scientific knowledge. Patents were originally intended to encourage the beneficial dissemination of knowledge, as well as to reward inventors. But patents can also be used to *block* research—to deter competitors from building on the results of someone else's work, thus preventing the development of alternative products or further discoveries.

The commercialization of science lends new

energy to many fields, but also imports new dangers. Increasingly, public institutions like universities depend on private sector funding as government funding shrinks. Researchers thus come under pressure to do only work that will generate patents and future revenues. Scientific publications have to struggle to maintain their integrity, given the documented tendency of studies paid for by manufacturers to emphasize results favourable to the companies' products. The prestigious journal *Nature* now invites all its authors to disclose any financial interests—including funding, employment, patents or patent applications and personal holdings—whose value might be affected by publication. Authors who refuse to disclose may still be published, but their refusal will be reported.

The Royal Society of Canada, in January 2001, recommended that "federal and provincial governments ensure adequate public investment in university-based genomic research and education so that Canada has the capacity for independent evaluation and development of transgenic technologies."

Wisdom for a transgenic Eden?

If your conscience and your world-view have been shaped by biblical insights, you probably look at the created world as a rich, awesome gift from God. You probably believe that human persons have from the beginning, by God's call, an obligation to interact with creation respectfully, gratefully and wisely for the glory of God and for the human "common good." You no doubt harbour in your soul the awareness that love of God and neighbour, not return on invested capital and not the enhancement of your own power and control, constitutes the fundamental law of life, seven days a week.

We are Adam and Eve (and Cain and Abel, and perhaps the serpent too) in a new, risky Eden. We share with all humanity the call to discern wisely how to name and how—or even whether—to use the new powers that are now on offer. The Christian churches traditionally welcome discoveries that promise to cure or treat diseases or enhance human development. The same churches have often failed to foresee how new powers, wielded by some, would crush or disinherit others. What can we do, as God's servants, to act on our Creator's inclusive wisdom as the proud age of biotech tries its transgenic wings?

Possible Questions for Discussion:

Phillipians 2:4
Genesis 2:19
Psalm 119:97-104
James 7:17-18

1. If you had been one of the Supreme Court judges asked to rule on Harvard's objection to churches being allowed intervener status in the Oncomouse patenting case, how would you have decided? Why?
2. To which side are you inclined in the debate about whether it is, or is not, appropriate to allow genes and higher life forms to be patented? What are the intuitions that lead you to that position?
3. "Accountability" seems to be crucial to good governance: but how do you answer the question "accountable to whom?" What are the roles of courts, of Parliament, of government agencies, of shareholders and CEOs, and of personal conscience in the task of regulating biotechnology?

Stephen Allen is Associate Secretary, Justice Ministries, for the Prebyterian Church in Canada.

Science and Religion 101

Paul Fayter

There is not, has never been, nor will there ever be one simple "relationship" between science and religion. Actually, there's no such thing as "Science-and-Religion" because there's no such thing as "Religion" or "Science."

"Science" is an abstraction, like "Religion" is. Neither exists in the real world. *Religions* and *sciences* exist, in the plural. And even in the plural, they are not simple things, nor are the ways in which they relate simple. There are many religions, but even within what counts as one religion–like Christianity or Judaism–there are different branches, varieties, and traditions. The sciences also embrace many traditions and disciplines, from psychology, sociology, and anthropology, through to biology, chemistry, and physics, not to mention mathematics or cosmology or a thousand other specialties, each of which can be further subdivided. Each discipline has its distinctive aims, technologies, cultures, and methodologies. There's no such thing as "*the* scientific method," just as it's not true that all religious believers worship "the same God."

The most commonly held view of how "Science" relates to "Religion" can be called the "conflict thesis"or the "warfare model." In this view–an ideological invention of late nineteenth century anticlerical scientists– religion and science represent two independent, autonomous, and inevitably opposing domains. Science stands for the progressive light of reason; religion, for the dark ignorance of superstition. The "Church" (another abstraction) has done little more than oppress and persecute scientists throughout history. The martyrs of free thought include Copernicus, Galileo, and Darwin.

Most of what you've probably heard about those famous "science versus religion" episodes in western history is simply false. There have been and continue to be real tensions at metaphysical and moral levels between religious and scientific perspectives, but these tensions are not greater than those occurring *within* science or theology. You may have heard of the infamous "Huxley-Wilberforce Debate" over Darwinism, at Oxford in 1860, or the Scopes "Monkey Trial" (also about Darwinism) in 1920s Tennessee. Accounts of the "triumph" of science over religion in sources like William Irvine's *Apes, angels, and Victorians* or Hollywood's *Inherit the Wind* make fine entertainment, but only if you like science fiction. (The same thing's true of the large literature produced by anti-evolutionary fundamentalists who corrupted the biblical idea of "creation" and are convinced that their idea of Genesis must duel to the death with the "atheistic materialism" of Darwinian science.)

What the warfare interpretation ignores is that modern science

emerged in western Europe in a rich cultural matrix decisively shaped by Christianity. Practising Catholics and Protestants of all kinds created new experimental sciences and organized scientific societies with the blessing of theologians and church officials. Foundational for the new views of nature and science in the seventeenth century were theistic assumptions–unprovable but necessary beliefs for doing science–rooted in the freedom and sovereignty of a rational Creator, the trustworthy, lawgiving God of the Bible. These assumptions include the intelligibility of the physical world; the reliability of human reason; the orderliness of nature; and the universal uniformity of natural law. Even before the Scientific Revolution, the intrinsic goodness, value, and interest of nature (as God's contingent creation) was affirmed by medieval theologians. The study of God's handiwork was a form of devotion; the practice of science, a kind of worship.

The pervasiveness of the "warfare" model has meant that many pious people have feared science. Contrary to some polemical claims, science has not–indeed it cannot–"disprove God." I don't even think it undermines belief. Well-founded natural knowledge can indeed cast doubt on certain claims about, say, the age of the earth. It can erode the credibility of some literalistic interpretations of biblical passages. Given a little time, scientific ideas can help transform theological ideas about God, nature, and humanity. Despite areas of tension and misunderstanding, Christians should not fear scientific thought. (After 30 years of studying science, I still believe in God the Creator Spirit, in Jesus the Word made flesh, in miracles–including the resurrection–and prayer.)

Some of the results of scientific research, though, and their technological incarnations, can pose profound social problems and threaten cherished values and beliefs. The bottom line is this: many models are required to account for the many ways both domains have interacted at many times and many places. So let's go with a "complexity thesis" concerning the science/ religion relationship.

Science and religion are different and distinctive, but they have many similarities. *Both* scientific *and* religious thinking *and* believing hinge on morally serious imagination *and* interpreted experience. Both science and theology (religious faith in its intellectual mode) seek humbly to understand reality. Both draw on certain kinds of "revelation." Both offer provisional, revisable, yet authoritative and well-founded explanations that count as truth for right belief and action.

Another common dimension is that religious faith and scientific enquiry are *social* enterprises. *Both are complex bodies of interacting theory, knowledge, practice, and belief that embody and express the interests, hopes, needs, assumptions, values, and worldviews of individuals in culturally-embedded communities*. It would sound awkward, even misleading to describe theology or ethics as "neutral" or "objective." They are, rather, ways of knowing and doing that are *committed* to some purpose. And the same is true for the theories, techniques, and artefacts of technology and science.

Just as faith can become a species of terrorism, science (because it's also done by humans) can turn demonic (witness eugenics, or nuclear weapons). But I certainly do not want to demonize those engaged in, for example, genetic engineering or biotechnology. Tossing around slogans like "beware of Frankenfood" and "it's the Brave New World" does not substitute for careful and critical thought. To be sure, many legitimate theological, ethical, and technical questions can be raised–concerning social and environmental justice, safety, stewardship, human dignity and the integrity of creation, for instance. And we should always be suspicious about stated motives ("we'll be able to prevent or treat most diseases and end human suffering!") when there are billions of dollars in profits at stake.

It's an exciting time to be alive, if you find both science and religion fascinating.

It's an exciting time to be alive, if you find both science and religion fascinating. There are rich multidisciplinary dialogues going on around the

world. Many participants have earned academic credentials in both theology and the sciences. The questions are many, the literature very large, and the resources growing.

In what follows, I mention some of the topics receiving current attention, and say a word or two about why as a lover of both religion and science, I find these topics bursting with insights that might enrich both domains. On the web site of the Canadian Council of Churches, I list some places to go for further learning. Remember, this is only the tip of the iceberg**.**

• The broad area of spirituality, health and healing is of growing interest. Research shows that faith has a definite and positive effect on well-being, avoidance of disease, and recovery from illness and injury. That the "placebo effect" is real shows that minds and bodies interact in ways we don't fully understand. Serious studies at numerous medical schools (including Duke, Dartmouth, Pennsylvania, and Harvard) and many carefully designed clinical trials are providing evidence that "prayer works." That is, intercessory prayers for patients seem to have physical effects, whether or not the patient believes in God, is aware of the prayers, is conscious, or even human (physically measurable and statistically significant effects have appeared with animal and plant subjects, even with test tubes full of enzymes). Something real is going on, even if science doesn't understand it. By the way, "non-Christian" prayers seem to work as well as Christian ones.

• Artificial intelligence, robots, and cyborgs raise all sorts of questions about the nature of cognition, self-awareness, and human uniqueness. Can machines have minds? Can souls emerge from silicon? Amazing technologies are being applied to–and embedded in–human bodies, blurring the boundaries between flesh and metal. Will computers evolve past human understanding and control? Stay tuned.

• Quantum physics proves the world is weirder than anything dreamed up by science fiction writers, with its pictures of energies and particles flickering in and out of existence, wormholes foaming out of subatomic spacetime, and the prospect of time travel and parallel universes (to name some of its sexier aspects). Some theologian–physicists have speculated that the "new physics" opens a door to understanding details about divine activity in nature. Some philosophers have tried moving from the microworld to the level of human experience, arguing that quantum uncertainty leaves room for freedom of the will. Some astronomers have reintroduced God-talk with the application of quantum mechanics to understanding the origin of the universe. The jury's still out on the relevance of quantum physics and cosmology to theology, but the research–much of it associated with the Center for Theology and the Natural Sciences in Berkeley and the Pontifical Academy of Science and the Vatican Observatory–continues.

• Cosmology–the study of the origin, history, evolution, structure, and destiny of the universe–has become one of the hottest areas of research in the past few decades, and has been engaged in a sophisticated dialogue with theology too. Some versions of big bang theory posit the creation (out of a fluctuating quantum vacuum) of space, time, and matter at time=0, approximately 14 billion years ago. This looks to be consonant with some notions of divine genesis "in the beginning," although one should always be wary of hitching theological belief (or the reading of any biblical passage) to the latest scientific wagon. Other theories hold that our whole unimaginably vast universe is but one of countless trillions of naturally occurring universes, and the role of any biblical Creator is reduced to irrelevance. But our universe seems exceedingly fine-tuned. It's anything but "accidental." The universe is exquisitely structured in ways we're just now coming to appreciate. Many physical characteristics–from the initial outward expansion of the "big bang" in relation to the strength of gravitation, and the respective sizes and masses of protons and electrons to the configuration of our solar system, the physics of light, and the chemistry of water–are so breath-takingly unlikely, so fantastically improbable, that it looks like the cosmos was intelligently, purposefully designed to support life. Some intelligent design theorists suggest that the De-

signer might be the God of Abraham, Isaac, Jacob, and Jesus. Or maybe not. The atheist astronomer Fred Hoyle has wondered whether some super-advanced alien intellects have "monkeyed" with the laws of physics and biology. Either way, creation is even more awesome and ordered than the Psalmist ever imagined.

• Evolutionary theories have been intertwined with theologies of nature since before Darwin, and they continue to raise deep questions about God's relation to processes which involve so much pain, suffering, and death. We still don't know how life arose on Earth, and much of life's subsequent evolution remains murky, to say the least (including details of our species' ancestry). Evolutionary theologies tend to emphasize the immanence of God, but questions about transcendent purpose and providential guidance persist.

• Complexity theory asks, in part, how physics turns into biology. That is, how do complicated living organisms and processes, such as mammalian consciousness and human thinking, emerge from a long evolutionary history originating with simple physical constituents and biochemical processes? Again, the question is raised: how does God make and act in the natural world?

• Genetics and biotechnology are advancing rapidly and will reshape our world in the 21st century. New knowledge and techniques promise unprecedented control over nature, our bodies, and future evolution. The power we're acquiring seems almost godlike, and so far is outstripping our moral wisdom. What will become of such old ideas as the sanctity and sacredness of life? Will we learn that just because we *can* do something doesn't mean we *ought* to?

• Evolutionary psychology is the new folk-religion for scientific fundies who seek to reduce ethics to biology and explain away God as an adaptively useful fiction. Is our behaviour determined by "selfish genes" whose only aim is to reproduce? Is religious faith a kind of delusion? Reconcilers of science and religion still have to come to terms with the legacy of Darwin and Freud.

• Neurophysiology–a fancy word for brain science–is also at the cutting edge of science and religion debate. Whence arise human memory, consciousness, intelligence? Do such things as "soul," "spirit," "mind," "will" even exist–or is the only reality material (i.e., brains in bodies)? Can "personhood" be defined? Is "God" (whether or not God is real) something our brains are hardwired to believe in?

And here is where I arbitrarily stop. The materials you can find attached to this article in the Canadian Council of Churches web site (www.ccc-cce.ca), however, should be enough to keep you going for a few years.

Possible Questions for Discussion:

Psalm 104 (NRSV)
Isaiah 49:16
Mark 1:32-38
Luke 6:1-5

1. What is the "conflict thesis" (or "warfare model" of the relationship between science and religion? What is your assessment of this model?
2. In what ways do you think science and religion enrich each other? Do you think scientific research threatens religious belief or that religion is harmful to scientific progress?
3. How does your faith invite you to respond to the questions raised by biotechnology, genetic engineering, quantum physics, cosmology, or other related areas named in this article?

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Thinking About Bioethics: A Way Forward

Richard Crossman

As the 21st century begins–some people label it "the biotech century"–Christians, and all of creation, are faced with the profoundly life-changing emergence of biotechnology. We often find ourselves poised like the character Tevye in the play *Fiddler on the Roof*–struggling to play an authentic human melody while standing on the slippery roof of historical change. How do we find and keep our true balance?

There is no doubt that the new opportunities and challenges lifted up by such things as stem cell research, cloning, genetically generated pharmaceuticals, trans-species genetic modifications, xenotransplantation, genetic screening, genetically modified foods and bio-patenting will dramatically alter the lives of people, now and in future generations. Such alteration can hold much promised good. It can also produce destructive and uncontrollable dynamics.

Along with all people of good will, the task of faithful Christians is to help chart a course that will promote the former and resist the latter. But that's not going to be easy. We live in a world where strong forces can blind us: the profit motive, the itch to be "first", the urge to do something simply because the power to do it is within our grasp.

Christians . . . are faced with the profoundly life-changing emergence of biotechnology.

Historically, in the development of ethical decision-making, people have used three basic approaches to address situations like the one we face.

First, people need to affirm some form of *continuity* that ties together their past, present and future. Human communities typically recognize a set of rules or principles they consider to be universal, in the sense that these mandates hold true in all circumstances, whatever the consequences. Christians often use the Ten Commandments and/or the Sermon on the Mount in this way. In contemporary secular life, we often seek such continuity by appealing to inalienable human rights, such as are expressed in the Canadian Charter of Rights.

Second, people need to attend to the *changes* arising within their life-context. Often, it takes hard work to see the connection between the available rules of continuity and the newly emerging possibilities. Thus, we need good methods for studying the potential of the changes facing us. In North America, the dominant method for studying new options is the utilitarian method of cost-benefit analysis. That's helpful–but it has its limits.

A third element: ethical decision-makers need to address the *character of the ethical agents* themselves. We seldom know all the "costs and benefits" of a

new possibility. We cannot foresee all the ways in which a universal principle might unfold or apply in a specific context. How, then, do we nurture inner wisdom that can inform the interpretations and educated guesses that are always part of ethical decision-making? Attention to prayer life, devotional life, discipleship, stewardship and communal spiritual support are all essential to the "spiritual formation" that undergirds wise ethical discernment.

All three of these dynamics need to receive integrated attention if we hope to grow in the capacity for sound ethical assessments of biotechnology in our time.

Some guidelines have emerged from the experience of bio-ethicists to date. I believe they can help us in our own processes of judgement–not as if they were the last word, but as an initial word of a needed, on-going reflection on how Christians might responsibly address biotechnological innovations in our time. Here is a list you might find helpful:

1. Keep *utility* and *vision* in a creative balance. A utilitarian assessment is helpful, and in a post-modern world is an inviting way to deal with ethical issues. But that method tilts us towards thinking that the "end" we see as good always justifies the "means." By contrast, to have a vision is to acknowledge that some boundaries matter, that some obligations are permanent. For example: health care spending should not rush after some stunning new technological breakthrough that will mostly benefit the few, the rich or the powerful, if paying for such innovations will leave unmet the needs of the poor and disadvantaged.
2. Recognize that *stewardship* is not *ownership.* All of creation belongs to God. Humanity is called to use its creativity for the well-being of creation as a whole, in the spirit of stewardship and discipleship. Biotechnological innovations must be disciplined by a prior respect for all of creation, by a reverent concern to understand the contribution each part makes to the whole, and by an awareness that we did not invent and must not monopolize the living matrix within which life continues.
3. Be as sensitive to the suffering (human and non-human) our actions create as we are to the benefits we hope to trigger. We need always to ask who is paying the price for the benefits we seek, how high is the price they pay, and who (if anyone!) is speaking for them.
4. Be sensitive, not only to new possibilities set before us by technology, but also to the needs of other parts of creation. Those needs might serve to show us appropriate limits on our actions.
5. Challenge simplistic and misleading rhetoric about biotechnological advances and promises. Press for awareness of all the implications of any proposed action, not only the economic ones, not only the ones affecting our own environment or our own society. We live in one human family, one biosphere.
6. Resist the temptation to "thingify" or commodify life. Commodities are valued only for the price they can bring or the uses they can be put to. But life itself–including human creative activity–carries an inherent dignity which is God-given. Particular techniques, particular claims of ownership or of intellectual property rights should be examined to see if they imply a disregard for the inherent dignity of a non-human living creature or of other human beings.
7. Do justice–and love kindness, and walk humbly with your God. This includes a special concern for the poor, the marginalized, and those least able to make their voice heard in the world's clamour. We can't do justice all by ourselves. We need to be engaged and challenge others to be engaged. We need to be informed about the choices that confront us. Yes, this means following the Web, cutting out articles, reading books, attending conferences, helping our churches and other NGOs to recover an ethical voice and raise it in an environment of full public information and participation.

8. Be willing to wait. The "handiest" of means to a desired end is not always the one that promotes the future well being of all. Sometimes we must decline to exercise our "power over"so as to resist the quick and easy but ethically slippery path to a desirable goal. (An example might be the temptation to use embryonic stem cells for research and manufacture, rather than the more difficult but less ethically problematic use of adult stem cells.) We need to make room for "ethical time", which is often slower than "technological time" or "market time."
9. Make ethical decisions as part of a community in dialogue, not just privately. We are born in the middle of life. From our beginning we are part of a community, formed by it, supported by a community. Responsible ethical analysis is made in the context of dialogue with others.
10. We need not defy and defer death at all costs. The Letter to the Romans (8:38-39) makes it clear that in Christ neither death, nor life, nor things present, nor things to come will be able to separate us from the love of God.

Possible Questions for Discussion:

Psalm 8
Job 38:1-18 (and on through ch 41 if desired)
Romans 8:38-39
Matthew 25:31-46

1. Of the new challenges and opportunities listed in paragraph 2, are there any you don't know the meaning of, or would like to know more about?
2. Of the three approaches to ethical decision-making, which do you find most helpful (or another not listed)? How could you apply it to the question of bio-patenting?
3. Of the list of ten guidelines, choose one or two you (or your community) will act on, and decide how you will do so.

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Creation™? Life and the Limits of Ownership

Eric B. Beresford

"Hear what the spirit is saying to the Churches!" This is how the author of the book of Revelation addresses himself to the churches of his day. His aim is to encourage the churches to remain faithful in the midst of a titanic struggle between the principalities and powers that he sees as competing for the loyalty of the early Christians. At the centre of his account of this struggle we are confronted by the figure of "Babylon", the great whore who has seduced people everywhere from the worship of God (Rev. 17). Despite the powerful use of sexual imagery, the sins this passage addresses are not primarily sexual at all. The sources of Babylon's attractiveness are power and wealth. In this context, to call Babylon a whore is to accuse her of pursuing wealth by selling those things that ought never be sold. Babylon is a warning of the consequences of a worldview in which everything may be assigned a price for which it may be bought and sold, in which everything belongs to the realm of the economic. This is what we mean when we speak of commodification.

We often forget that the sins addressed most frequently in the bible are economic sins. The bible speaks repeatedly against the lending of money at interest and against those whose sole aim in life is to amass wealth. Even the central sin of idolatry is linked by the prophets to the failure to care for the material needs of the poor, the marginalized and the dispossessed. Our attitude to wealth is, all too often, a burden that distracts us from love for God and dulls our sensitivity to the needs and hopes of our neighbours. In addition, it may limit our ability to appreciate those things that are too valuable to have a price attached, things one ought never buy and sell. Jacob's brother Esau is criticized because he had no sense of the value of his birthright which he sold for a bowl of soup. Ironically, to attach a price to something may have the effect of devaluing it.

Clearly, we normally attach economic value to some things and trade in them, but Christians have long maintained that certain things should never be for sale because putting those things up for sale reflects a failure to value them properly. Putting such things up for sale also implies that things that ought never be owned can become the property of particular individuals or groups. Slavery was rejected as the commodification of a human life that was a gift from God, a gift whose value could not be measured and which belonged only to the individual person and never to those who traded in human life. How far does this ban extend? Does it extend to human body parts like organs or even genes? Are there non-human elements of the natural world that should not be commodified?

To answer this question it might

help us to think about some of the consequences of commodification. This is particularly clear in the area of environmental practices where short-term commercial interests are often opposed to sustainable environmental practices. At present individual animals and plants and particular tracts of land can be owned. Whilst this has brought benefits to many it may have profound negative effects on others. The ownership of land in North America came about through a process that has deprived indigenous people of the resources by which they had sustained themselves for millennia. This commodification of the land has left them profoundly impoverished. In many parts of the world land reform, so that land might be more evenly distributed, is an urgent priority.

At this time there is enormous pressure to push the concept of property and ownership further. Under the terms of the North American Free Trade Agreement, and in line with other international agreements, it is being suggested that water be treated as a commodity that must be assigned a market value and made available for trade. Under NAFTA, once bulk water exports started, Canada could not decline to sell water to the United States even if it resulted in domestic shortages. Commodification does not mean that those who possess resources will benefit from them. Merely that those with greater wealth will have greater access to resources whose value will be set by their needs and willingness to pay. As water becomes scarce it becomes a commodity to which only those who have the means to pay will have access. Canadians may have to do without, while wealthy Americans have access to Canadian water on the grounds that they can pay for it. We have good reason to believe that further commodification will make such problems much worse.

In the area of biological and genetic resources the use of patenting reflects another expansion of commodification. When a patent is taken out on a gene sequence or on an organism that contains that gene sequence we are saying that those genes belong to the corporation that has patented them and that it has the right to benefit financially from any uses to which those genes might be put. Patents on the genes that seem to be implicated in causing breast cancer in many women mean that research on the effects of those genes can only be conducted if we first pay the company that owns them. In this example, patenting, far from encouraging research and leading to benefits for all, ensures that research is controlled by the owner of the genes who also sets the price for any therapies that result.

When the Fellows of Harvard University took out a U.S. patent on a mouse that had been genetically modified they were claiming that all mice carrying the new gene, whether the mice were produced by genetic modification, cloning, or bred naturally, belonged to them. This is a huge extension of the claims for ownership over animals. It represents a new level in the commodification of living things. It is a step whose consequences are huge not only for the mouse, but for all the other higher animals that might be patentable if mice are patentable. It is a step fraught with problems for the relationship of human beings with each other and with the whole created order that for Christians is both a revelation of God and a means by which God freely provides for the needs of all creatures.

Possible Questions for Discussion:

Revelation 13:11-17 Isaiah 5:8-10
Luke 12:13-21 Genesis 25:29-34

1. Eric Beresford speaks of commodification as the failure to understand the appropriate limits of what may be bought and sold. Why would you agree or disagree with the claim that some things ought never be owned? How would you draw the line between things that can be, and things that ought not be privately owned?
2. Collodification is described as having two effects. It dulls our sensitivity to the real value of both things, and it excludes people from enjoying the benefits of things that ought to be shared in common. How do you see this reflected in the suggested bible reading? How do you see it reflected in our society?
3. What issues do you think need to be addressed if we are to balance the costs and benefits of patenting biological and genetic materials? Are there some lines that should never be crossed, whatever the benefits?

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To Oncomouse: In Appreciation

Ihor Kutash

Before me is a picture drawn by Lynn Randolph in 1994 entitled: The Laboratory, or, The Passion of Oncomouse (from: Donna Haraway's *Modest_ Witness@Second_Millennium. Female Man©_ Meets_ OncoMouse™ : Feminism and Technoscience.* There sits the rodent with her long tail spread out before her like a whip, seemingly contemplating her lot. She is in a box with six sets of human eyes peering in at her–no privacy at all! On her head is a crown of thorns. (She is featured on the front cover of this booklet.)*

Perhaps the wee beastie is pondering: *Can* there be a God, if I and my ilk were created especially to develop a monstrous disease, suffer and die, just so some huge, nasty, scary bipeds could go on living at my expense?

Ah yes, that ancient dilemma! How could there be a good God if there is so much suffering in a world which seems to seduce us by offering such beauty, such comfort, such joy only to snatch it away in a New York minute!

Christians respond to this dilemma with the story of the Fall in which human freedom introduced brokenness in a world created for perfection. (Paradoxically that freedom is an indispensable part of that perfection!).

And a loving Creator (Who is also paradox, being eternally Three Persons and One God) responded thus to this challenge: He accepted that brokenness into His own Being, becoming incarnate in Jesus of Nazareth (God the Son, the Second Person of the Most Holy Trinity) and became a Bridge so that that very brokenness could itself become a means for growing into the perfection that was the original design.

When that incarnate Creator accomplished this amazing transformation He wore a crown of thorns. Like Oncomouse in Lynn Randolph's picture. Of course, you get it!

Cheer up, Oncomouse, someone notices what you represent! Someone has seen mirrored in your suffering the One Who offered His life for the Cosmos to bring it back to Paradise. Your suffering is not in vain! It has a meaning! So you, too, will have your place in the Eternal Kingdom which is arriving even as we speak (but oh so very slowly!).

Cheer up, Oncomouse . . . Someone has seen mirrored in your suffering the One Who offered His life for the Cosmos to bring it back to Paradise.

Now if only more folk would recognize this! If only we sleep-walking humans could learn to be grateful for the sacrifices that millions of fellow-citizens (of lower and higher sentience) of

the cosmos make for each other.

They do it so that all might eat. (Yes, even vegetarians eat plants–which are living entities whose sentience is a mystery–oh, and some of these plants arguably do derive *their* sustenance from dead animals). And in the case of Oncomouse and her numerous cousins they do it so that humans can achieve (at least on the physical-somatic level) what wholeness can be attained in a world striving to fulfil its divine destiny.

Most often these fellow-citizens have no say in the matter. Their sacrifice is involuntary (First Nations peoples, however, appear to have a different perspective on this). But we, humans, at the very top of the food (and medicine) chain *are* able to see, understand, and appreciate what we receive from them (the First Nations perspective positively *requires* this). Or we can refuse to and go on being oblivious to what we are being given and by whom (also Whom!).

Should this not give us pause in our mad rush to amass funds at the expense of the weak, the sick and hungry, the voiceless? Oncomouse and so many of those it is bred to save? Or will these funds help to provide greater and nastier ways of doing ourselves in?

Christianity, in harmony with other faith perspectives, sees humanity to be composed of billions of individuals who *can* become true loving, compassionate, *grateful* Persons. It says that we *can* move forward in the Kingdom of Light and Love that is (imperceptibly?) growing in the Cosmos.

We do have a choice. Thank you, Oncomouse!

**The picture described is reproduced on the front cover of this booklet. Use of this image is intended to promote reflection on the theological themes discussed here, not out of disrespect for Christ crowned with thorns but to help us to see what this image of Christ teaches humanity.*

Possible Questions for Discussion:

Genesis 3:1-24
Daniel 3:541-90 (in the Greek text of Daniel)
Luke 6:46-49
Romans 8:18-25

1. How do Christians respond to the dilemma of so much suffering in a world created for beauty and joy?
2. "That very brokenness could itself become a means for growing into the perfection that was the original design." How do you respond to this sentence? How might it help us to respond to the challenges of the Oncomouse patent?
3. What is the "divine destiny" of the world? What is the wholeness to which we are called? What part can you play in helping to fulfill this divine destiny?

Very Rev. Dr. Ihor G. Kutash is a Ukrainian Orthodox priest based in Montreal, and lecturer in Eastern Christian theology at Saint Paul University in Ottawa, Concordia University in Montreal, and St. Andrew's College in Winnipeg.

Relevant Websites:

• Canadian Council of Churches: www.ccc-cce.ca •

• Evangelical Fellowship of Canada: www.evangelicalfellowshipofcanada •

• Canadian Environmental Law Association: www.cela.ca •

• Canadian Institute for Environmental Law and Policy: www.cielap.org •

• Church of Scotland's Science, Religion and Technology Project: www.srtp.org.uk •

• Research Foundation for Science, Technology and Ecology: www.vshiva.net •

• Supreme Court of Canada: www.scc-csc.gc.ca •

• Canadian Biotechnology Advisory Committee: www.cbac-cccb.ca •

• Action Group on Erosion, Technology and Concentration (formerly RAFI): www.etcgroup.org •

French text available on our website.

Cover reproduced from a painting by Lynn Randolph, “The Laboratory, or, The Passion of OncoMouse,” 1994, oil on masonite, 10” x 7". With appreciation to the artist for allowing this reproduction and providing the image.

Life: Patent Pending

A disucssion guide on Biotechnology and the Oncomouse prepared for congregations and churches by the Biotechnology Reference Group of the Canadian Council of Churches.

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Funds received will go towards our further work on biotechnology.

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