

Gene Patents: Are they blessings or curses?

Gathering

HYMN

(See hymn suggestions on p. 117)

PRAYER

Blessed are you, Lord God, Creator of all. You have called us out of darkness into your light, into Christ's light. Let his presence bless and guide us this day, that we may share his light and walk before you as children of light to be a blessing to others, through the power of the Holy Spirit. Amen



HEARING THE WORD

Genesis 12:1-7

DISCERNING THE WORD

Silence

Discernment

What did you hear in this reading? Is there a word of God for us here?

Introduction

Session summary

This session explores the complex matter of patenting genetic inventions or discoveries. It connects this issue to the biblical idea of blessing and curse, and asks how such patents could be blessings or curses, and for whom. Who are the winners or losers when genes are patented? This session is built around a fictional instance regarding a malaria vaccine, and you will be invited to put the ideas of the session to use discussing this scenario. The session first covers the contemporary significance of gene patents, how genes came to be patented, and the advantages and disadvantages of genetic patents. It then widens the focus to discuss genetic patents in terms of developing countries and international trade. The final set of reflections raises some biblical themes that can help us consider ethical issues in the use of gene patents and in patent laws and regulations.



Real life stories

1. Malaria vaccine and patents¹ (An illustration for discussion)

Malaria is a serious and sometimes fatal disease caused by any of four parasites which are transmitted by bites from *Anopheles* mosquitoes.² Because the human body acquires antibodies to malaria parasites from repeated exposures, there is an intensive search to develop a vaccine to boost immunity to the disease.³

Imagine that a botanist has learned of a plant used to treat fevers by a fictional tribe we will call the Bomeko in a central African country. A traditional healer tells her that a substance he derives from the plant shortens both the severity and the length of malarial attacks. He shows the curious botanist how he processes the plant and gives her a sample of both the substance and the plant for study in her lab back in Ohio.

Through lab study, the botanist discovers how the compounds in this plant tend to stimulate certain parts of the human immune system that respond to the malaria parasites. Working with a plant geneticist and an immunologist, the botanist creates a research



God's call to Abraham is set in the context of a broken and divided humanity. The call directs Abram and Sarai to leave home and journey into unfamiliar territory on the basis of a promise so that God may bring blessing through the outcome.

Abram's lineage leads to Christ in the Gospels and St. Paul's epistles. What if Abram did not respond positively to God's blessing and instruction? How might the world be a different place?

team to identify what sections of the plant's DNA produce these compounds. Further, after painstaking years of work, they determine that by altering certain sections of the plant's DNA, the plant can produce a compound with a stronger stimulus to the immune system. It now seems possible to develop a malaria vaccine by genetically altering the African plant, purifying the effective compound in large quantities, and providing a way to deliver it safely as a vaccine.

The research team is elated but also daunted. They wish to share their discoveries but also believe it is necessary to patent the processes and the altered DNA of this plant. Why? They know that it will take many years yet and will cost huge sums of money to accomplish and test. The government required testing for clinical use involves demonstrating that the compound is safe and effective in animals. If that is successful, extensive testing follows to determine if it would be safe in people—without unintended side effects—and to find an effective dose. Only at that point will it become possible to market their product.

As they sit down to discuss next steps, there is so much to consider.

2. *Cracking the Code of Life*, Segment 8: "Who Owns the Genome?" (Begin at 45:44 and run to 52:43) and (Optional) Segment 9: "The Business of Science" (Begin at 52:44 and run to 57:41)

The basics about patents

The significance of patented genetic knowledge and products today

Should the research team and their university patent their discovery? Why are we talking about patents on living things at all? If they do patent it, do they owe the Bomeko people anything? Is it ethical to patent something that could help so many people, especially those who are so poor? If so, how could they responsibly use a patent to develop a vaccine? How could the people who need it afford it? Who would really benefit from it and be blessed? Who could be harmed by it and be cursed?

Science is now developing the means for a profound understanding of the genetic basis of all earthly life that give human beings both unprecedented power over life and new levels of responsibility for it. The decoding of the human and other genomes makes possible scientific study of how the various parts of these genomes function in each kind of creature. The more we understand how parts of these genomes work, the more we may eventually be able to treat diseases with genetic basis, and develop the potentials of crops, livestock, or other organisms for the benefit of human beings, other creatures, or the environment. Gene patents will play a significant role in how we use our unprecedented power and how we exercise these new responsibilities.

Gene patents both benefit patent holders and make a discovery available to others. At the same time, they can be used to block important genetic research, to prevent competition in the marketplace between products, or simply to earn income through licenses. For instance, those who use patents in research usually must pay a licensing fee. Consumers who buy patented products pay more for them, and consumers who are poor may be unable to afford them. While these matters are complex, there are several key and understandable features that give shape to the basic issues.

What is a patent? And how is one obtained?

Patents are a government created⁴ property right that regulates relationships among people over inventions.⁵ They apply not only to the intangible *idea* the inventor has or any *concrete product* that someone makes from that idea, but also to *processes* for research or manufacture. Patent offices award these rights to individuals or to corporations for something they have invented which meets certain criteria in a formal application. Although details differ among countries, generally an invention or process must be *something new, not obvious, useful* and *adequately disclosed* so that others can recreate it or put it into practice.⁶

A patent entitles the right-holder exclusive or monopoly rights to their idea and—other conditions permitting—the right to make, use, license, or sell the invention or process for a length of time, usually 20 years. Patents are given as an inducement to innovation in return for disclosing the details of the invention. This allows others to use and learn from it, subject, of course, to not violating the patent holder's rights.

Why genes can be patented—the legal background

The patenting of genes and genetically modified organisms is a recent development. Although it has been possible to get a special kind of patent on a plant variety in the United States since 1930, generally patent offices have declined to award patents for living things on the grounds that they are found in nature and were not invented. Genetics helped to change that.

In 1980, the U.S. Supreme Court ruled, in a landmark patent case known as *Diamond v. Chakrabarty*,⁷ that a genetically engineered bacterium could be patented. The U.S. Patent and Trade Office argued that the bacterium was a living thing and that the U.S. Congress had expressly authorized the granting of patents for some plants, but not bacteria. The Supreme Court ruled five to four, however, that the Federal statute, which defined a patentable invention as “any new and useful process, machine, manufacture, or composition of matter,”⁸ allowed the patent because the bacterium was “a new and useful composition of matter.”

Today, under United States law, patents may be awarded for genetically modified plants and animals, as well as for: genes whose functions are known, gene fragments, sequences of DNA called single nucleotide polymorphisms (known as SNPs), genetic tests, proteins encoded by genes, and stem cells.⁹

Differing interpretations and pros and cons

There is a lively conversation underway about the pros and cons of patenting genetic material and genetic processes. Proponents and opponents make a number of arguments for their positions which should be noted, even though space is too short to do them justice (see sidebar). Much of the disagreement over patenting genetic material and processes depends on which of three conflicting evaluations of genetic patents is being argued:

Patents are necessary as an inducement and reward for innovation, to encourage sharing of technical knowledge, and to bring needed or advantageous genetic technology to address human problems and problems in the environment.

Patents are unrelated to innovation, may not promote the sharing of technical knowledge, sometimes threaten the resource base of people in developing countries, rob traditional people of their communal knowledge, and are an unjustified grant and enforcement of monopoly power for large corporations at the expense of others, including the poor.

Patents are a potentially useful inducement to innovation in genetic-based medicine and agriculture for the common good, and a reward to corporate or individual inventors. Patents do not, however, always result in innovation or diffusion of technology that addresses every health or agricultural development need. Nor do patents always result in innovation or technology that people can afford. Problems with the patent system need to be addressed for that potential to be fulfilled. Even if such problems are effectively addressed, not every useful innovation or new technology need be protected by patent.

Not every country agrees with all of these extensions of the patent law. The Supreme Court of Canada, for example, ruled that a genetically engineered mouse developed at Harvard for cancer research could not be patented under Canadian law¹⁰ even though Harvard received a patent for the mouse in the United States.

Arguments for and against gene patents

ARGUMENTS FOR ¹¹	ARGUMENTS AGAINST
<p>Gene patents promise or now provide:</p> <ul style="list-style-type: none"> • Genetic tests for inherited conditions or predispositions to disease • Genetic engineering of drugs & vaccines • Genetic therapy for mutated genes • Genetic matching of donors and recipients for transplant organs • Future genetic enhancement of normal human capabilities or characteristics • Genetically modified organisms for agriculture • Genetically engineered pesticides & herbicides • Genetic monitoring of environments • Genetically engineered means to clean up toxic waste • Genetically engineered biofuels 	<ul style="list-style-type: none"> • Society may regard genes mainly as economic commodities.¹² • Neither life nor DNA should be owned • Places humanity's common heritage into private hands; all should have free access to it¹³ • Impedes development of genetic tests and therapies, and makes them too expensive • Genetically engineered therapies too costly for the uninsured and poor in developing countries • Focus is more on royalty potential than on useful products • GMO crops subvert seed-saving, add expense, expose farmers to patent infringement suits • Frequently obtained for defensive purposes and to frustrate other scientific research • Replaces scholarly publication; interferes with the diffusion of new knowledge

Genetic patents in the global village

Although much commerce in patented genetic technologies occurs inside national economies, international trade also plays a significant role. Moreover, the sources of some—but not all—genetic material for inventions are in developing countries, and this raises specific issues that are increasingly important.

Patents and international trade in genetic technology

The new system of international trade created through the World Trade Organization (WTO) affects gene patents through the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS). The TRIPS Agreement became effective in 1995, and is binding on all member states.¹⁴ Three key issues concerning genetic patenting are brought to a head by the TRIPS Agreement.

- First, the agreement requires countries to either establish a patent system or upgrade an existing one to minimum international standards.
- Second, the agreement requires developing countries to enforce patents on traded items, which tends to make products from the developed countries more expensive in the developing countries.
- Third, the agreement may make biotechnology and economic development more difficult and more expensive for developing countries trying to modernize and raise their citizens from poverty.

Gene patenting, biopiracy, and traditional knowledge

Developing countries regard their plants, animals, and micro-organisms to be part of both their biological resources and their natural and (sometimes) cultural heritage. They frequently are offended when samples are removed from their territory without their permission, and especially when products are brought to market without benefit for their country. The misappropriation and unauthorized use of a country's genetic resources generally is called "biopiracy."¹⁵

Indigenous people of developing countries often live on the social and economic margins of their own societies, far from the halls of power in its National Assembly or the WTO. The plants and animals they depend upon for their livelihood, their traditional medicines, and their cultural or religious festivals are important parts of their way of life, culture, and identity as a people. They pass all this traditional knowledge¹⁶ on to new generations. South African theologian Puleng Lenka Bula described the attitude of indigenous people this way:

The TRIPS agreement only recognizes knowledge that is associated with commerce and grants rights to those applying this knowledge. It undermines knowledge residing in communities, such as indigenous/traditional knowledge, which is generally used to nurture the earth, humanity and other creatures. Such knowledge cannot be subsumed into the market logic. . . . [TRIPS] recognizes, protects, and grants intellectual property rights [such as patents] to the creativity of Northern companies, but in many instances, this is based on indigenous knowledge that has been modified to fit Western ("scientific") [models].¹⁷

Occasionally, however, indigenous peoples have successfully challenged biotechnology patents.¹⁸ Sometimes this happens with the assistance of allies.

Patent law and justice

The challenge, in light of these factors, is to implement practical, effective, accountable, and just ways to assure that the interests of indigenous peoples in their genetic resources are respected in patents and licensing.¹⁹ Toward that challenge there are two important points to be considered.

If a government's goal is to use patents to develop significant innovations that contribute to the social, economic, and ecological wellbeing and health of their people, then criteria for patentability and how patents are administered are important. Stricter criteria for novelty, non-obviousness, utility, and disclosure are more beneficial if they make it more likely that the most significant innovations are patented, and less likely that minor ones or marginal improvements on existing inventions be patented. Similarly, patent systems might be devised to discourage patent holders from creating obstacles to continued research and development.²⁰

Beyond the matter of legality, Christians and many others would insist that matters of justice must be represented. Much more would need to be said, but for this session it suffices to note that the ELCA has articulated four relevant principles of justice in its social statements. These four principles include solidarity, sufficiency, sustainability, and participation. (Please see session A4 "Four Principles of Justice," for more on these principals.) These principles are directly relevant when considering:

- how the Bomeko people should benefit from development of the vaccine (*solidarity, sufficiency, participation*);
- whether, how, and where to grow the genetically modified plant (*sustainability, participation*);
- how a pharmaceutical company could develop a vaccine in an economically feasible way (*sufficiency*);
- how to distribute or market and administer the vaccine at an affordable cost to persons or agencies (*solidarity, sufficiency*).

In the discussion at the end of this session, these matters will come into play, but we must touch on several additional biblical and theological points before we are ready to enter that discussion.

A Thought Experiment on Bioprospecting and Biopiracy

As a thought experiment, imagine how Americans would react if biologists from India removed a nesting pair of American eagles and their eggs from the wild without approval from the U.S. Fish and Wildlife Service. They take the eagles either for breeding experiments to genetically enhance endangered Indian birds of prey in the wild or for commercial breeding for exotic feathers for the Mumbai fashion industry. Let's also imagine that the Indian scientists or businesses involved patented their innovation in India. Now, as a Representative or Senator in the U.S. Congress, compose your floor speech about this issue.

Next, imagine yourself a citizen in a small developing country after you have learned that geneticists from the United States have just patented a drug derived from the genetic material of living things in your country. Compose your floor speech for the National Assembly of this country.

Discuss together what you might say in your speech.

Christian resources for thinking about patents

Since genetic patents first appeared, some religious and theological objections have been raised against them in principle, but these objections are not uniformly shared.²¹ Meanwhile, most governments in the developed world have granted many kinds of genetic patents and integrated them into legal arrangements for international commerce. They are a reality. Christians, then, should also focus our ethical attention on how such patents should be used, and consider how they may possibly promote blessing in the world, and how they may undermine such blessing.

Dominion—responsibly tending and keeping what God calls “good”

In the Bible, the commands to be fruitful (Genesis 1:22, 28) and bring forth living things (Genesis 1:20, 24) are given to all living creatures, to the waters, and to the earth. Fruitfulness is pictured in the Bible both as an abundant variety of all kinds of robust creatures, and as the eventual appearance of their descendants.

God commands humankind to have dominion over living things and to till and keep the garden (Genesis 1:28; 2:15). These metaphors suggest concerned attention both to small details and to the wellbeing of the individual creatures, as well as to the productive flourishing of the larger whole.

This picture of dominion is not one of domination; it expresses how God cares for the creation. God gives human beings responsibility to be fruitful in their dominion and calls them to act responsibly. If they do, their dominion will fulfill God’s command. God will bless the garden or the river and all the robust, abundant variety in them, for they will be fruitful. And in their flourishing, they will, in turn, bless humankind. (For more on human responsibility vis-à-vis creation, see sessions A2 and A3.)

The idea of blessing

The abundant variety and robustness of creatures and their descendants, including humankind, which partly results from responsible human dominion, is the *expression* of divine blessing. Blessings flow from God’s potent Word, which gives power to fulfill the commands to be fruitful and exercise responsible dominion, and which promises that, ultimately, our efforts in this regard will be productive of good. Blessing, therefore, is both promise and empowerment, *the essential ground* for being fruitful and exercising dominion. God’s blessings are gifts, mediated through human and non-human agents, empowering those who receive them to “experience and bring forth life, goodness, and wellbeing.”²²

When God calls Abram in Genesis 12:1-3 and promises to bless him, God declares that Abram is being blessed “so that [he] will be a blessing;” indeed, “in [him] all the families of the earth shall be blessed.” So God’s blessing is important for the whole world.

In Deuteronomy 30:19, God declares to God’s people: “I call heaven and earth to witness against you today that I have set before you life and death, blessings and curses. Choose life so that you and your descendants may live....” It would seem that some of what we do does *not* enable us to “experience and bring forth life, goodness, and wellbeing,” but results instead in *their opposites*, at least for some. Genetics, as a human activity involving moral choices, has the potential to bless or curse.

Our ethical calling, therefore, is this: despite our sin, we must discern what brings forth blessings and what results in curses for human beings and other creatures, and we must work to secure those blessings and avoid those curses. There are many people who, through a responsible use of genetics and biotechnology, could be agents of blessing by bringing improved health, abundance, and wellbeing to humankind. Ironically, these same people might bring a curse upon the land if they do not act responsibly in using the power of genetics to promote life, goodness, and wellbeing *for all* of creation.

Invitation to conversation, prayer, and action

With these insights now in mind, reread the opening story about the botanist and imagine that you are a member of the research team that wants to responsibly exercise the opportunity they have. Discuss what would be the most responsible way for the research team to proceed as they factor in genetic science, professional work, plant DNA, national sovereignty, and the other aspects discussed above. How can they use what they have learned so that their discovery *may bless* those who suffer with malaria in the future?



QUESTIONS FOR THE RESEARCH TEAM

- In the illustration about developing a malaria vaccine above, would you recommend the company develop and patent its new vaccine? Why?
- What benefits, if any, do you think the researchers and the pharmaceutical company should agree to provide the Bomeko people?
- What benefits do you imagine they might want for themselves? As you think about this consider the following:
- Should the innovation should be patented or left in the public domain?
- Which of the three views of gene patents above do you personally hold, and why? What are the arguments for and against each view?
- Have you, or someone you've personally known, been blessed or cursed in some specific way by a genetically engineered organism or a genetic innovation? Do you know if it is patented? How do you imagine life would be better (or worse) if this innovation did not exist?
- How would you be able to fund your research and drug approval (and employ all the people to do it) without some of the protection that patents give. What would be the alternative funding sources for "open research?"

Closing prayers

INVITATION TO INTERCESSORY PRAYER

Pray for government officials, lawyers, researchers, business people, human rights activists, and all who struggle to understand and implement the right use of genetic patents.

PRAYING WITH THE TRADITION

We beseech you, O Lord, to grant us your help and protection. Deliver the afflicted, pity the lowly, raise the fallen, reveal yourself to the needy, heal the sick, and bring home your wandering people. Feed the hungry, ransom the captive, support the weak, comfort the fainthearted. Let all the nations of the earth know that you alone are God, that Jesus Christ is your child, and that we are your people and the sheep of your pasture. Amen.

(Prayer of Clement of Rome, who lived c. 96)

Additional resources

Print

John H. Barton, "Intellectual Property Rights: Reforming the Patent System," *Science* 287: 5460 (March 17, 2000) p. 1933

Audrey R. Chapman, *Unprecedented Choices: Religious Ethics at the Frontiers of Genetic Science*, (Minneapolis: Fortress, 1999).

Commission on Intellectual Property Rights, *Integrating Intellectual Property Rights and Development Policy* (London, 2002). This is also available online at: www.iprcommission.org/

Celia Deane-Drummond, *Genetics and Christian Ethics* (Cambridge: Cambridge University Press, 2006).

Stephen A. Hansen and Justin W. VanFleet, *Traditional Knowledge and Intellectual Property* (Washington, D.C.: American Association for the Advancement of Science, 2003).

Web-based

Anonymous, "Patently Problematic," *The Economist*, September 12, 2002 (print edition) online at www.economist.com/science/ (accessed 3/19/05)

Commission on Intellectual Property Rights, www.iprcommission.org/home.html

National Human Genome Research Institute—Intellectual Property and Genomics, www.genome.gov/19016590

The Public Intellectual Property Resource for Agriculture (PIPRA), www.pipra.org/

U.S. Department of Agriculture, Economic Research Service-Intellectual Property Rights, www.ers.usda.gov/Browse/ResearchProductivity/IntellectualPropertyRights.htm

U.S. Patent and Trade Office, www.uspto.gov/main/policy.htm

World Intellectual Property Organization—Traditional Knowledge, Genetic Resources, and Traditional Cultural Expressions/Folklore, www.wipo.int/tk/en/

World Trade Organization, TRIPS Gateway, www.wto.org/english/tratop_e/trips_e/trips_e.htm

Endnotes

1 This account is completely fictional, however, it highlights the kind of issues involved in genetic research today.

2 The World Health Organization estimates that between 300 million and 500 million new cases occur every year, and about 1 million of stricken people die. It causes severe flu-like symptoms, which if not treated promptly can lead to death. Most of the cases occur in Sub-Saharan Africa and South Asia, although the U.S. reports 1,300 new cases each year. Those most vulnerable to serious illness and death include young children, pregnant women, and travelers from outside malaria-prone areas. [Source: U.S. Centers for Disease Control, www.cdc.gov/malaria/faq.htm (accessed 10-03-08).]

3 Background on Centers for Disease Control research into immunity to malaria is available at www.cdc.gov/malaria/cdcactivities/research.htm.

4 In the United States, this power is established in Article I, Section 8 of the U.S. Constitution: "The Congress shall have power...to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries...."

5 Morris R. Cohen, "Property and Sovereignty," in Cohen, *Law and the Social Order* (New York: Harcourt, Brace, 1933), describes property as a relation among persons with respect to things, p. 45. This means that property is not the same thing as mere possession. A thief may possess my car, but he has no right to own or use it; I do. I have the right to drive it, to lend it to a friend if I want to, or to give it to a charity. But if I am unable to make a succession of payments on my car, the bank that owns the loan contract on my car may legally take possession of it and become its sole owner.

6 John H. Barton and Ezekiel J. Emmanuel, "The Patents-Based Pharmaceutical Development Process: Rationale, Problems, and Potential Reforms," *Journal of the American Medical Association (JAMA)*, 294:16 (October 26, 2005) 2076, citing 35 USC §§101, 102, 103, and 110.

7 *Diamond v. Chakrabarty*, 447 U.S. 303 (1980).

8 35 U.S.C. §101.

9 "Genetics and Patenting," www.genomics.energy.gov (accessed September 1, 2008).

10 In the case *Harvard College v. Canada (Commissioner of Patents)*, [2002] 4 S.C.R. 45, 2002 S.C.C 76. The Court ruled on the case in a 5-4 decision.

11 These and other possible benefits are listed on the Web site of the U.S. Department of Energy's Office of Science at www.genomics.energy.gov (accessed September 1, 2008).

12 See Audrey R. Chapman, *Unprecedented Choices: Religious Ethics at the Frontiers of Genetic Science*, (Minneapolis: Fortress, 1999) 151-152, and Celia Deane-Drummond, *Genetics and Christian Ethics* (Cambridge: Cambridge University Press, 2006) 173-175 for discussion of this issue.

13 Pilar N. Ossorio discusses two versions of this argument in "Common Heritage Arguments Against Patenting Human DNA," in *Perspectives on Genetic Patenting: Religion, Science, and Industry in Dialogue*, Audrey R. Chapman, ed. (Washington, D.C.: American Association for the Advancement of Science, 1999) 89-108.

14 Details of the history and development of international trade agreements and some of the issues they raise for intellectual property such as patents are found in John H. Barton, Judith L. Goldstein, Timothy E. Josling, and Richard H. Steinberg, *The Evolution of the Trade Regime: Politics, Law, and Economics of the GATT and the WTO*, (Princeton: Princeton University Press, 2006). The WTO now has 153 member countries. The World Trade Organization Web page about the TRIPS Agreement is at: www.wto.org/english/tratop_e/trips_e/trips_e.htm. The text of the TRIPS Agreement itself is at: www.wto.org/english/docs_e/legal_e/27-trips.pdf.

15 *Integrating Intellectual Property Rights and Development Policy*, 74, and Hansen and VanFleet, 4-5.

16 See *Traditional Knowledge and Intellectual Property*, 3-4, for a discussion of what is meant by the concept of “traditional knowledge.”

17 Puleng Lenka Bula, “Privatizing Property that Belongs to All,” in *Lutheran Ethics at the Intersections of God’s One World*, Karen L. Bloomquist, ed. (Geneva: Lutheran World Federation, 2005) 198-199.

18 See the examples in *Integrating Intellectual Property Rights and Development Policy* 76-78.

19 See *Integrating Intellectual Property Rights and Development Policy* 79-87, *Traditional Knowledge and Intellectual Property*, 21-31, 35-38, 57-64, and “Draft Guidelines on Access and Benefit Sharing Regarding the Utilization of Genetic Resources,” Annex, pp. 2-4, 9-11.

20 John H. Barton, “Rational Limits on Genomic Patents,” *Nature Biotechnology* 18 (August, 2000) 805, “Intellectual Property Rights: Reforming the Patent System,” *Science* 287 (Issue 5460) March 17, 2000, 1933-1934, and “Emerging Patent Issues in Genomic Diagnostics,” *Nature Biotechnology* 939 (2006).

21 For elaboration of the following discussion see Chapman, *Unprecedented Choices*, 125-165, Ronald Cole-Turner, “Theological Perspectives on the Status of DNA: A Contribution to the Debate Over Genetic Patenting,” in Chapman, *Perspectives on Genetic Patenting*, 149-165, Celia Deane-Drummond, *Genetics and Christian Ethics*, 160-190, and Ted Peters, *Playing God?*, 115-141.

22 Terrence Fretheim describes blessing this way: “Blessing is a gift of God, usually mediated through human or nonhuman agents, that empowers recipients to experience and bring forth life, goodness, and well-being, including spiritual and more tangible expressions. God’s blessing is given creation-wide scope from the beginning (Gen 1:22, 28). . . . Through acts of blessing, God provides a life-giving, life-enhancing context for all creatures within every sphere of their existence. As such, blessing belongs primarily (but not exclusively) to the sphere of creation, both originating and continuing creation.” Terrence E. Fretheim, *God and the World in the Old Testament: A Relational Theology of Creation* (Nashville: Abingdon Press 2005) 106. See also Fretheim’s concluding discussion at 269-282 for how he sets blessing in the context of the relational theology of creation he finds in the Old Testament. Fretheim builds on the work of Claus Westermann, *Blessing in the Bible and in the Life of the Church*, Keith R. Crim, tr., (Philadelphia: Fortress, 1978), esp. 4-6, 8, and 15-68. For his comments on Westermann’s work on blessing in the context of Old Testament scholarship on creation, see xii-xiv.

