



# Anti-Aging: Radical Longevity, Environmental Impacts, and Christian Theology

Dorothy Boorse

*Current biomedical research shows promise for prolonging human life spans. Responses to these possible technologies vary from extreme caution, to exuberance, to a futuristic vision of humanity transforming itself. Bioethicists express concerns about big social and individual costs. Some views are expressed in the rhetoric of a culture war similar to those over cloning, stem cell research, and euthanasia. The possible effect on the environment is unknown. The biggest effect is likely to be on an increase in individual consumption of resources by a few and greater gaps between the rich and the poor. On a number of levels, radical longevity affects our view of self, humans in community, and our role in the natural world. I propose that prolonging human primary life span substantially is not a biblical mandate and is only appropriate when placed in the context of our role as humans and current environmental and social issues.*

*“Our technological abilities have outpaced our moral intuition”  
— Scholarship applicant, Gordon College 2001.*



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In the 1998 novel *The First Immortal*,<sup>1</sup> author James Halperin paints a picture of a future world in which people routinely have themselves frozen cryogenically until the day when scientists have cured cancer and solved degenerative disorders. They can then thaw frozen people, solving their medical problems so they live extremely long, almost immortal lives. Indeed, his protagonists consider this the rational, scientific thing to do and argue that it represents the triumph of science over superstition and religion. While this may seem to be in the realm of science fiction, Halperin suggests that much of the science is, in fact, in its infancy but developing rapidly.

In April 2004 a geriatric dwarf mouse named Yoda died at the age of four years, much older than the two-year life of the average lab mouse. This history-making mouse was estimated to have lived the equivalent of 136 years in human time.<sup>2</sup> This event is just one breakthrough in an effort scientists are making to understand why we age and why our bodies decline. Understanding aging mechanisms may help us to slow or cure age-related diseases or even, some believe,

to elongate the natural human life span so that people can live 150 years or longer.<sup>3</sup>

## Science: Why We Age, Life Expectancy and Life Span

*Life expectancy*, the mean likelihood of living for a group, increased dramatically in the twentieth century in developed countries and in many developing countries. These gains have been achieved by preventing and curing disease, resulting in what is called *secondary longevity* as more people survive to the end of the normal human life span through medical interventions. Much of the progress to be made with curing disease has been done on childhood pathogenic diseases. This demographic change (most people living a full life span and dying in old age) is

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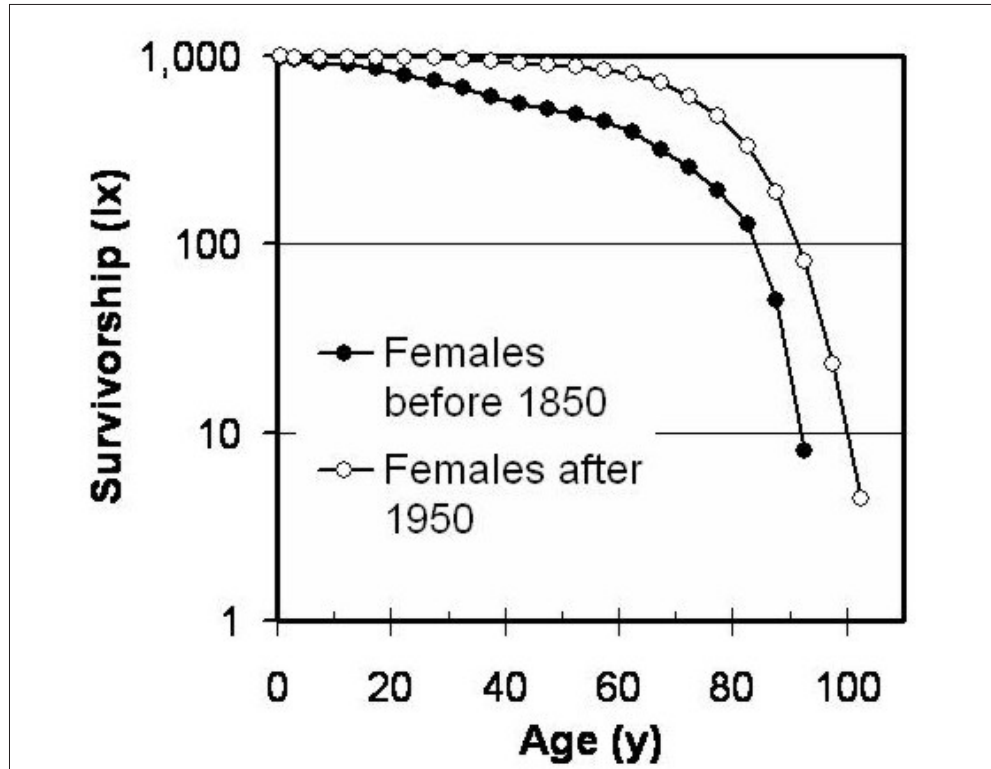
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called *rectangularizing the curve* (Figure 1).<sup>4</sup> Rectangularizing the curve is often accomplished by morbidity and mortality *compression*, that is, the years during which most people become ill and die are fewer and individual periods of illness become shortened.<sup>5</sup>

aging is that there is no compelling reason to maintain the body longer. After reproducing, we cease passing on genes, so unless there is a reproductive fitness advantage to doing so, we will not maintain bodies after they have done the bulk of their reproduction.<sup>8</sup>

[Dramatic increased] gains [in life expectancy] have been achieved by preventing and curing disease, resulting in what is called secondary longevity ...

In contrast, primary longevity is an increase in the individual's total life span.



**Figure 1.** Survivorship curve for females buried during two time periods (pre-1850 and post-1950) in graveyards in Ipswich and Hamilton, Essex County, Massachusetts, USA. Rectangularization of the curve occurs as more individuals of the population live close to a maximum life span. The curves for males are similar.

Thus, individually solving problems of aging-related disease such as diabetes, heart disease, and Alzheimer's will increase life expectancy, but only so much, perhaps no more than by fifteen years.<sup>6</sup> This would leave the majority of people who have access to medical care, living into the 90s and many over 100. Some may live as long as 125, similar to the life span of the longest-lived person so far, the French woman Jeanne-Louise Calumet. We are already seeing the impacts of aging in societies like the United States, Europe, and Japan, where elderly Japanese women are the longest-lived group in the world.<sup>7</sup>

In contrast, *primary longevity* is an increase in the individual's total *life span*. To lengthen life span substantially requires addressing the question: "What makes us age?" The simplest scientific explanation for the effects of

Another reason we age is because of the accumulating damage to DNA that occurs over a lifetime.<sup>9</sup> A third aging mechanism is a built-in limit to cell divisions caused by caps on chromosomes called *telomeres*. Each time a cell divides, the telomeres become shorter, until cells can no longer divide.<sup>10</sup> Studies of extremely old individuals suggest there is a genetic component to longevity. Researcher Dr. Thomas Perls has pinpointed a region of human chromosome 4, which seems to be related to longevity.<sup>11</sup> Other research has shown that single mutations in nematodes can produce worms that live more than 50% longer than the normal life span, with fewer of the normal age-related changes.<sup>12</sup>

Current aging research has suggested potential anti-aging (or age retardation) interventions including extreme caloric restric-

tion, genetic manipulation to insert long-life genes, introduction of the telomere-restoring enzyme telomerase, and tissue rejuvenation through stem cell addition. Some of these interventions will address both the mechanisms of aging itself and of age-related diseases.<sup>13</sup> The use of nearly totipotent cells such as embryonic stem cells (ES) opens an array of medical possibilities that might help in the case of paralysis, heart disease, and even restoration of bladder function.<sup>14</sup> However, ES cells, while able to proliferate and to become different types of differentiated cells, still will have the problems of immunological incompatibility with patients. Furthermore, the ethics of using ES cells is a subject of intense cultural debate.<sup>15</sup>

Because circulating levels of several hormones decrease with age, hormonal supplementation may be an anti-aging intervention.<sup>16</sup> However, hormone therapy can produce conflicting results. Human growth hormone (hGH) levels decrease with age and some replacement therapies reverse muscle loss associated with aging, but genetically manipulated animal models with exceptionally long lives either have less growth hormone or have fewer receptors for it.<sup>17</sup> In spite of possible mixed effects of its use, there are at least 250,000 web sites that sell human growth hormone, many claiming it as an anti-aging remedy.<sup>18</sup> By 2001, at least 10,000 people were regularly taking human growth hormone to offset the effects of aging.<sup>19</sup> Some people are touting testosterone supplementation for men as an aging remedy. In 2002, two million prescriptions for supplemental testosterone were filled in the US.<sup>20</sup>

### Three Views

There is little consensus about whether substantial primary life span increases are possible, and about the ultimate goals of such efforts. Radical longevity raises huge questions about what it is to be a person, to be in community with nature, each other, and God. Discussions on these issues are beginning to take on the rhetoric of a culture war, similar to the deep cultural divides we experience in the United States over the issues of abortion, euthanasia, genetically modified crops, and the death penalty. Three groups are:

1. The very cautious: Some people believe no substantial increases in *primary longevity* are possible, or believe that such an effort is misguided if it is possible. There is variability in this group in level of concern and problems they identify. Garrett Hardin and Daniel Callahan have each said that efforts to increase *primary longevity* are morally wrong because of potential impacts on population size and distributive justice.<sup>21</sup> In contrast, Leon Kass of the President's Council on Bioethics is concerned about basic changes to human roles in the universe. He fears that the drive for longevity leads logically to a push for biological immortality.<sup>22</sup> Demographer S. Jay Olshansky is primarily concerned because he believes that an increase in *primary longevity* is very unlikely and that elderly people are prey to quackery.<sup>23</sup>

2. The exuberant middle: In contrast, many biomedical researchers believe substantial life span extensions can and will be made in the future.<sup>24</sup> Researchers Cynthia Kenyon and Leonard Guarente have joined together to form a company, Elixir Pharmaceuticals, with the hope of producing a medication that controls the insulin-like hormonal pathways that affect aging. Other age-retardation research companies are emerging. However, researchers in this group are not attempting to promote life spans longer than a few hundred years and discredit any attempt to claim they could be longer.<sup>25</sup> They are seeking the "fountain of aging well, rather than the fountain of youth."<sup>26</sup>

3. The futurists: These anticipate a time when, if a part of our bodies is not working, we can fix it. Death will be only due to rare accidents or crimes.<sup>27</sup> Molecular biologist Aubrey de Grey of Oxford University, for example, believes that by 2030 we will have cell loss licked, and human life span will be 130 years, and that by 2100 some people will have life spans of four to five thousand years, eventually leading to indefinite life expectancy.<sup>28</sup> In addition to researchers, there is a large societal segment that believes that biological immortality is possible, and even that its pursuit is our moral responsibility.<sup>29</sup> This is reflected in the following from the founder of a futuristic company:

Non-aging biological immortality is the technology that will allow human beings to live physically and consciously forever with growing prosperity and happiness. That is man's *highest moral goal* ... such biological immortality is not only possible but becomes a *mandatory moral obligation* through man's self-invented consciousness<sup>30</sup> (Italics added).

### Effects of Different Views of Humanness

How can members of the same society have such different views? First, they use different cost/benefit analyses of the consequences of super-longevity. Second, they differ in basic beliefs about humanity's purpose on earth, the role of death, and the basis for ethical decision-making.<sup>31</sup> Many of these differing views are themselves based on concepts about humans in community.

In general, those who are very positive about substantial increases in life span emphasize individual benefits and a combination of extremely immediate benefits ("I would like to live a little longer") and very remote benefits ("Hundreds of years from now there will be no sickness"). But they de-emphasize the social impacts or the medium term impacts ("Is this a good idea in fifty years?"). They believe strongly in modern individualism<sup>32</sup> and are less convinced that humans need to be concerned about the good of all. One says, for example, "Well, we do not normally suppress goods and services because they may be disproportionately available to the rich. The whole point of legitimately acquiring wealth is that it becomes possible



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to buy things that are unavailable without it."<sup>33</sup> They also may perceive that the benefit to the very wealthy now will help the poor of the distant future, much as medical breakthroughs in the past have.

At this point, all of the anti-aging technologies we can envision are still in the future and some have serious obstacles to be overcome before they can be implemented.<sup>34</sup> Genuine gerontologists are strident in their calls for regulation of anti-aging quackery.<sup>35</sup> If radical longevity is unattainable, the costs to pursuing it include potentially higher taxes, waste of personal income, opportunity costs from not doing something else, and exposure to harmful remedies. However, if it is possible to achieve significant increases in human life span, the most striking benefit is that individual desire to live longer would be met.

For millennia, people have searched for ways to prolong their lives. People might be able to have more careers, more volunteer time, or know more of their relatives, both younger and older. Much as vaccines and antibiotics were in the last century, anti-aging technologies could be seen as a breakthrough that lowers human suffering. Direct anti-aging research is likely to yield results that help with specific age-related diseases and vice versa. If people live longer in greater health and spend less time infirm, anti-aging technologies could improve the economy and allow people longer economically productive periods.<sup>36</sup> Certainly many people want to live longer and want their loved ones to live longer.

In contrast, those who are very cautious de-emphasize immediate individual goals and emphasize intermediate social costs and long-term, meaning-of-life issues. Numerous authors have reviewed the individual and social costs of extreme life span extension.<sup>37</sup> One of the big causes of uncertainty is whether the extra years would be healthy ones. This depends on whether life span is simply stretched out, illness is compressed, or there are long periods of slow decline. Obviously the costs are greater if the decline at life's end is slow. Additionally, some non-age-related illnesses are on the increase, even in developed countries.<sup>38</sup> This means that some people could live longer periods of time with endocrine, autoimmune, or

mental disorders that would not obviously be solved by research that prolongs life span. Other costs of radical longevity will compound costs we already see in societies with increasing numbers of elderly.

Consequently, statements such as de Grey's proclaim, "I'm saying that by 2030 we will have the technology to get them to live to about 130. And those extra years will be healthy years. That's very important not to forget—that this will not be an extension of a frail life,"<sup>39</sup> may be too simplistic. Others predict that the future super-old could be more fragile than the centenarians of today. "You'll be seeing many, many more extremely frail and disabled elderly individuals who wouldn't have made it out to these ages if it hadn't been for medical technology," says S. J. Olshansky of the University of Chicago.<sup>40</sup>

Concerns of the cautious for social community are numerous. One of the most likely results is the increase in the percentage of GDP that must be spent on health care because of repeated tests and medical interventions.<sup>41</sup> Most likely, there will be a profusion of hormone, stem cell, gene therapy, and medical chemicals applied to the task of repairing aging bodies.<sup>42</sup> An increase in the gap between the haves and have-nots will most likely occur as it has with other recent technological advances. Power may remain longer in the hands of a few, possibly including tyrants. Most of the world will not have access to anti-aging technologies.<sup>43</sup> If such technologies are available, they will be expensive and proportions of income spent on health care by individuals may increase. This effect would harm those who are just able to afford a new technology more than those people who can readily afford it.<sup>44</sup> A shift in spending on health care is already occurring in countries with dramatically aging populations. In countries like the United States, spending on the elderly dominates the budget. In countries that lack health care for the elderly, elderly people may be caught in a bind if they have sufficient money to prolong their lives, but not to live them well. There may be generational equity problems that arise as resources go to the old at the expense of the young.<sup>45</sup>

Social costs also include longer term incarceration of criminals, longer care of people who have non-age related disabili-

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ties,<sup>46</sup> more competition between old and young for jobs, potential health problems in future generations, and a continuation of the issues that already face aging populations.<sup>47</sup> Relative to the total number of people, there will be fewer children in society, and the period of time in a person's life during which they raise children will be relatively short.<sup>48</sup> This might easily drive a desire for genetic enhancement of children or a backlash against children with unwanted traits.<sup>49</sup> In the extreme situation of biological immortality, there would be almost no children. Hardin estimated that if people die of accidents at rates similar to current rates but not from disease or aging, rates of birth would have to be 5 to 10,000 per year. "Birth in a society of immortals would be so rare as to justify selling tickets to witness the event."<sup>50</sup> Other consequences could include waiting long periods for workplace promotion, and mental illness increase or memory loss from too many life events. People may become set in their ways.<sup>51</sup>

Some of the social changes are also changes to individuals as the meaning of personhood is altered, either for good or bad. People who are actively pursuing a lifelong effort to alter their bodies and maintain a younger state may idolize youth even more than is currently the case, ironically devaluing maturity.<sup>52</sup> Because elderly women are more likely to be poor and thus lack access to costly anti-aging interventions, some feminists believe pursuing longevity will exacerbate social ills that result in the worship of youth and the marginalization of those naturally aging.<sup>53</sup> An increased gap between the rich and the poor may also destabilize parts of the world, cause high immigration pressures, and make it even more difficult for emerging economies to protect their environments, provide for their people, and pull down their population growth rates.<sup>54</sup>

Some people believe we would not be any more content with our lives than we are now. They point out that when incomes rise, contentment rises briefly and then returns to a lower level. If life span is like money, living longer will not make people feel happier.<sup>55</sup> In fact, some people may not choose to live out their whole lives. Obviously, the impact of these consequences depends on how successful the technologies are, how available they are, and how extreme the life span extension is.

## Environmental Problems: A Black Box

While bioethicists are debating whether longevity extension is good individually and socially, the impact of increased longevity on the environment is a real unknown in the equation. As humans, we are part of nature and in relationship with the rest of the created world. This essential connection between the natural world and us is part of our nature as persons made in the image of God. These concepts are worked out in numerous places in the Chris-

tian environmental literature.<sup>56</sup> John Wood, for example, explains that loving creation is fundamental to our nature as humans because of our relationship to God.<sup>57</sup>

Thus, the environmental impact of radical longevity is an important part of the puzzle as we determine the ethics of such a goal. Part of the answer depends on the types of interventions used. Direct impacts would be similar to the environmental impacts of current medical technologies deployed over a longer period of time. With new technologies, we may have other environmental hazards, such as human genes getting into other organisms or increased antibiotic resistance. Finally, just as we see with quack remedies, environmental harms occur from the over-collecting of natural products for health care, such as shark cartilage, sea corals, or yew trees, which have accompanied previous scientific breakthroughs.<sup>58</sup>

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Most environmental impacts, however, are unlikely to be directly from the life span extension technologies. The biggest effects will come indirectly from changes in population growth rates and resource consumption patterns.<sup>59</sup> Currently medium projections show population growth continuing to be above replacement level in the Third World until well into the century, possibly leveling off between 2050 and 2070. Lutz, et al. estimate the probability that population growth will end by 2100 at 85% and the probability that world population will peak fewer than ten billion at 60%.<sup>60</sup> Medium United Nations projections are around eight billion people, with some projections substantially higher. Population aging trends even *without* increases in human life span will leave parts of the world with close to half of the population over the age of 60, an extreme that will be unique in human history.<sup>61</sup>

The impact of longevity on population growth depends on how feasible it is to make substantial increases in life span (both *primary* and *secondary longevity*) and how available those increases are to large numbers of people. Both questions are hotly debated. Using current patterns of disease prevention but without new genetic therapies, it is unlikely that life expectancies will increase even to one hun-



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dred years.<sup>62</sup> If headway is not made to slow the effects of aging itself, disease morbidity could be compressed into the last years of life and may result in diminishing returns for health care spending. This would result, however, in people experiencing a greater proportion of healthy years.<sup>63</sup> What extreme futurists propose, however, is to dramatically increase life span (*primary longevity*) by slowing aging itself. If this were the case, population could rise more rapidly than projected due to an increased gap between fertility and mortality rates as populations did in the twentieth century with vaccination.<sup>64</sup>

Because anti-aging remedies are not currently available, and are unlikely to be available in the Third World where most population growth is occurring, it seems unlikely there would be a dramatic increase in final population size. Indeed, such an increase could be offset in some parts of the world by the currently high rates of HIV infection, particularly in Africa. In Zimbabwe, for example, life expectancies have fallen from a mean of 65 years to 39.<sup>65</sup> Even if everyone had access to anti-aging technologies, and mortality from AIDS was lowered, the increase in life span from increase in *primary longevity* has much less effect on population growth than one might expect. The extra years added are at the end of the life span and are unlikely to increase reproduction.<sup>66</sup> This is particularly true if the life cycle is "stretched" so that reproduction occurs later and if population growth rates are already at replacement level.<sup>67</sup>

However, since population growth is currently substantial, any increase in life span will cause some increase in population before population stabilizes. Arguably, population growth is on the very edge of what we will be able to accommodate, and growth rates in some parts of the world do not seem close to stabilization. Niger, for example, with the world's highest birth rate, has recently seen a rise in fertility to a mean of eight children per woman.<sup>68</sup> Because water is the limiting factor for much agriculture in the world and limited potable water is a crisis in much of the developing world, our difficulties in producing current levels of food will increase. Thus, any additional increase in population is worrisome. In a meta-analysis of sixty-nine published estimates of human population limits, Van der

Bergh and Reitfeld found a central tendency to 7.7 billion people in a sustainable population reached around 2050.<sup>69</sup> Notably, many estimates of the likely peak human population are higher than their estimated sustainable human population limit. This puts into sharp relief blithe comments that biotechnology will be able to feed eight billion people in the twenty-first century. In any case, the rise of population in the past two centuries and the anticipated rise by another 50% in the next fifty years will place maximum stress on our resources. Taking actions that increase longevity will increase this stress, bringing harm to people and to the environment.

In the case of dramatic *primary longevity* increase, natural resource consumption patterns are likely to change. Populations comprised of small households use more resources than same sized populations with larger households (often with more children).<sup>70</sup> Thus the same increase in population numbers due to decreased mortality of the old might have a greater impact on resource use than higher fertility would because older people are more likely to maintain separate households. Lui, et al. estimate that "reduction in average household size alone will add a projected 233 million additional households to hotspot countries (areas of high biodiversity) during the period 2000–2015."<sup>71</sup> Those likely to live substantially longer live in the countries with the highest rates of natural resource consumption and will have a disproportionate impact on resource use.

In summary, the clearest effects of super-longevity increase would be individual and social. However, the environment will also be affected directly by medical technologies and indirectly via slight (but possibly critical) population growth increases, and possibly more significant changes in consumption patterns, including increased resource consumption by the already wealthy.

## Theology: Christian Views on Aging and Death and Anti-Aging

Christians are facing a world of extremely rapid change. Stories of biblical patriarchs living hundreds of years suggest a picture of extremely long life as ultimately desirable.

Would it not be like going back and living the way God wanted the world to be? In the novel *The First Immortal*, Halperin has his characters come to a state of happiness in a biological immortality achieved by repeated efforts to repair ravages of age. The characters believe this is good. One, a Roman Catholic priest, concludes that this is God's will and an expression of a pro-life stance, equivalent to following Jesus' resurrection from the dead. Some real life Christians and Jews agree, at least to the value of extreme extensions of life. Jewish theologian Rabbi Neil Gillman said on a bioethics panel, "There is nothing redemptive about death. Death is incoherent. Death is absurd." He concluded that in Judaism, the indefinite prolongation of life is a moral good.<sup>72</sup>

Here we have seen that views on radical longevity differ widely, in part because of different assumptions about the achievability of that goal and in part because of different concerns about the other potential costs and benefits of doing so. I propose we evaluate the basis and effects of radical longevity in light of what Christians believe about the nature of being human and in community with others, nature, and God. These relationships are covenantal and embedded in space and time.<sup>73</sup>

I suggest that the goal of biological immortality or indefinite human life span is not in agreement with Christian belief. Further, I contend that, because we live in relationship, the goal of radical life span extension short of indefinite human life span (that is, hundreds to thousands of years) is currently inappropriate because it conflicts with other, more important goals. The goal of achieving indefinite human life spans can replace the goals that Christianity espouses as the chief ends of humans: "To love God and enjoy him forever" and "To glorify God."<sup>74</sup> These goals stem from a subordinate position of humans to God and are dependent on our acceptance of dependence and our role as creatures rather than creator. Two of the characteristics Christians attribute to humans are finitude and relationality.<sup>75</sup> Recognizing our finitude morally and physically can bring us to repentance for sin, and enables us to have the virtues of greater humility and dependence on God.<sup>76</sup> Thus we are limited by the very nature of being human.

Bioethicist Leon Kass asserts that "to argue that human life would be better without death is, I submit, to argue that human life would be better being something other than human."<sup>77</sup> This is one reason why, in many bioethics discussions, theologians are concerned about "playing God." The very nature of our short lives "as grass" highlights God's eternal nature and glorifies him. To try to be unlimited via human efforts is to fall into the sin of the builders of the Tower of Babel or later of King Nebuchadnezzar and is morally wrong.<sup>78</sup> While some Christians view death as the ultimate evil,<sup>79</sup> it is clear that such death is spiritual rather than physical, because Paul views physi-

cal death positively, saying, "For to me to live is Christ and to die is gain" (Phil. 1:21).

However, the belief that mortality is a fundamental and necessary part of human experience is not universal. Declaring that nanotechnology can be used to promote biological immortality and if it is possible to do so, we are morally obligated to do so, Robert Freitas writes: "Even the most widely recognized greatest disasters in human history pale in comparison to natural death." He believes that we should be pouring resources into anti-aging research even if it causes overpopulation in some parts of the world because the death of people by natural causes is an evil we cannot accept.<sup>80</sup>

In contrast, St. Francis of Assisi had no doubts about the goodness of death. From the final verse of his prayer, "Canticle to Brother Sun," he expresses the value of death:

All praise be yours, my Lord, through Sister Death,  
From whose embrace no mortal can escape.  
Woe to those who die in mortal sin!  
Happy those She finds doing your will!  
The second death can do no harm to them.  
Praise and bless my Lord, and give him thanks,  
And serve him with great humility.<sup>81</sup>

Not all people who are promoting radical longevity claim to be attempting to conquer death entirely. Those in the exuberant middle simply want a great deal more life. In an essay on the biotech revolution, David Gushee challenges fellow Christians: "Tell us why we should not proceed to remake humanity now that we are developing the power to do so."<sup>82</sup> And Charles Harper of the Templeton Foundation says: "I favor radical life extension ... So I say hooray for life and hooray for more of it."<sup>83</sup> I would answer we should not remake humanity, at least not in this way. Not because it is clearly wrong, but because the direct mandates we have from God promote a vision of the world in which prolonging our own individual lives substantially is not a priority, at least not one to be promoted over caring for our neighbors and caring for creation.

In our relationships with others, our concerns might include closing the gaps between rich and poor and healing the sick.<sup>84</sup> However, caring for the sick is not necessarily the same as promoting a much longer life span. Pouring efforts into doing so for ourselves, or even for others, is an effort that could exacerbate other social ills described above. Thus our efforts need to address all social issues before promoting one extreme for a few. This includes caring for future generations.

Hardin comments on the individualistic nature of longevity promotion. He says:

Thus far the approach to death has been principally oriented by the interests of the individual. This is in keeping with the temper of our time, which is predominately individualistic. Unless the matter is called



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to our attention, we unthinkingly assume that whatever benefits the individual benefits the group ... An act is generally identified as compassionate if it diminishes suffering right now: we seldom demand of a compassionate act that it diminish suffering a decade from now.<sup>85</sup>

As people in relationship with others, we need to solve the problems of overpopulation, distributional injustice, and loss of community before striving for increases in *primary longevity*. The temptation of modernity is to live as individuals disconnected from each other and from nature.<sup>86</sup> Pursuit of radical longevity, including biological immortality, is the apical vision of the independent individual but it could also be construed as a positive, exciting plunge into technology that would alleviate enormous human suffering. How can we decide which way to view it?

To balance these, I believe we should promote anti-aging technologies which increase *secondary longevity* but which do not necessarily increase *primary longevity* until our priorities of living out a better vision of our current life span are in effect. Perhaps in the future, such technologies will be more appropriate. Loving our neighbor and caring for the world are tasks God has given us and finitude and relationality are part of the nature he has given us. As we recognize these truths, we can promote a community of mortals, awaiting Christ's return, and seeking as well as possible, justice, mercy and humility and all of the virtues flowing from them, until we die and become truly immortal. ♦

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#### Notes

- <sup>1</sup>James Halperin, *The First Immortal* (New York: Del Rey Books, 1999).
- <sup>2</sup>Associated Press, "Yoda, Gen-Mod Mouse, Dies After Living Equivalent of 100+ Human Years,"

*USA Today*, April 22, 2004: [www.usatoday.com/news/science/2004-04-22-yoda-dies-awww-cute-mousie\\_x.htm](http://www.usatoday.com/news/science/2004-04-22-yoda-dies-awww-cute-mousie_x.htm) (Accessed June 2004).

- <sup>3</sup>Aubrey de Grey, "Closing in on the Cure for Death," *The Longevity Meme* (2003): [www.longevitymeme.org/articles/viewarticle.cfm?article\\_id=15&page=1](http://www.longevitymeme.org/articles/viewarticle.cfm?article_id=15&page=1) (Accessed June 2004).
- <sup>4</sup>J. Wilmoth and S. Horiuchi, "Rectangularization Revisited: Variability of Age at Death within Human Populations," *Demography* 36 (1999): 475-96.
- <sup>5</sup>S. Nuland, "How to Grow Old," *Acumen Journal of the Sciences* (2004): [www.imminst.org/forum/index.php?s=&act=ST&f=1&t=1768&st=0#entry13672](http://www.imminst.org/forum/index.php?s=&act=ST&f=1&t=1768&st=0#entry13672) (Accessed June 2004).
- <sup>6</sup>L. Hayflick quoted in J. Kluger, "Can we Learn to Beat the Reaper?" *Time Europe* 159, no. 3 (2002).
- <sup>7</sup>S. J. Olshansky, "Prospects for Human Longevity," *Science* 291 (2001): 1491-3.
- <sup>8</sup>W. Glannon, "Extending the Human Life Span," *Journal of Medicine and Philosophy* 27, no. 3 (2002): 339-54.
- <sup>9</sup>G. Taubes. "Staying Alive—Roy Walford, Scientist, Conducts Various Experiments to Extend Life," *Discover* 21, no. 2: (2000); and R. Weindruch and R. Walford, "Dietary Restriction in Mice Beginning at One Year of Age: Effect on Life Span and Spontaneous Cancer Incidence," *Science* 215, no. 4538 (1992): 1415-8.
- <sup>10</sup>L. Hayflick, "A Brief Overview of the Discovery of Cell Mortality and Immortality and of its Influence on Concepts about Aging and Cancer," *Pathological Biology* 47, no 3 (1999): 1094-104. Discusses the mechanism of control by telomeres that may limit cancer.
- <sup>11</sup>T. Perls, "Genetic and Environmental Influences on Exceptional Longevity and the AGE Nomogram," *Annals of the New York Academy of Sciences* 959 (2002): 1-13.
- <sup>12</sup>C. Kenyon, J. Chang, G. Gensch, A. Rudner, and R. Tabtiang, "A *C. elegans* Mutant That Lives Twice as Long as Wild Type," *Nature* 366 (1993): 461-4.
- <sup>13</sup>A. de Grey, R. Sprott, and M. Kondracke, "How Soon until We Control Aging?" *SAGE Crossroads: At the Intersection of Science and Public Interest* (2003): [www.SageCrossroads.net](http://www.SageCrossroads.net) (Accessed June 2004).
- <sup>14</sup>R. Butler, M. Fossel, M. Harman, C. Heward, S. J. Olshansky, et al., "Is There an Anti-Aging Medicine?" *Journal of Gerontology: Biological Science* 57 A:B333-8 (2002); M. Moran, "A Transplant to Cure Urinary Incontinence?" *WebMD* (2001): [www.my.webmd.com/content/article/32/1728\\_80937.htm](http://www.my.webmd.com/content/article/32/1728_80937.htm) (Accessed June 2004).
- <sup>15</sup>Butler, et al., "Is There an Anti-Aging Medicine?"
- <sup>16</sup>*Ibid.*
- <sup>17</sup>*Ibid.*; and K. Gallagher, "Estrogen Replacement Therapy (ERT)," *Peace Health, the Sisters of St. Joseph of Peace* (2004): [www.peacehealth.org/kbase/topic/detail/drug/hw228460/detail.htm](http://www.peacehealth.org/kbase/topic/detail/drug/hw228460/detail.htm) (Accessed June 2004).
- <sup>18</sup>R. Arking, "Aging: A Biological Perspective," *American Scientist online* (2003): [www.americanscientist.org/template/AssetDetail/assetid/28346/page/8](http://www.americanscientist.org/template/AssetDetail/assetid/28346/page/8) (Accessed June 2004).
- <sup>19</sup>L. Kass, "L'Chaim and Its Limits," in *The Fountain of Youth*, ed. S. Post and R. Binstock (Oxford: Oxford University Press, 2004), 304-21.
- <sup>20</sup>C. Liverman and D. Blazer, eds., *Testosterone and Aging, Clinical Research Directions* (Washington, DC: Institute of Medicine, National Academy Press, 2004).



- <sup>21</sup>G. Hardin, *Promethean Ethics: Living with Death, Competition and Triage*, (Seattle, WA: University of Washington Press, 1980); and D. Callahan, "Is Research a Moral Obligation? Plagues, Death and Aging," in *What Price Better Health? Hazards of the Research Imperative* (Berkeley, CA: University of California Press, 2003).
- <sup>22</sup>Kass, "L'Chaim and Its Limits."
- <sup>23</sup>B. Carnes, S. J. Olshansky, and D. Grahn, "Biological Evidence for the Limits to the Duration of Life," *Biogerontology*, 4 (2004): 31-45; S. J. Olshansky, "Prospects for Human Longevity," *Science* 291 (2001): 1491-3; and S. Olshansky, L. Hayflick, and B. Carnes, "No Truth to the Fountain of Youth," *Scientific American* 286 (2003): 92-6.
- <sup>24</sup>Arking, "Aging: A Biological Perspective."
- <sup>25</sup>E. Blackburn and J. Rowley, "Reason as our Guide," *Public Library of Science Biology* 2 (2004): 420-2.
- <sup>26</sup>Anonymous, "Genetic Researchers Hunt for the Fountain of Aging Well," *Copley News Service* (2003): [www.jewishsf.com/bk020517/supp10.shtml](http://www.jewishsf.com/bk020517/supp10.shtml) (Accessed June 2004).
- <sup>27</sup>S. Shostak, *Becoming Immortal: Combining Cloning and Stem Cell Therapy* (Albany, NY: State University of New York Press, 2002); and de Grey, et al., "How Soon until We Control Aging?"
- <sup>28</sup>de Grey, et al., "How Soon until We Control Aging?"
- <sup>29</sup>R. Freitas, "Death Is an Outrage," *The Longevity Meme* (2002): [www.longevitymeme.org/articles/viewarticle.cfm?page=1&article\\_id=9](http://www.longevitymeme.org/articles/viewarticle.cfm?page=1&article_id=9) (Accessed June 2004); V. Postrel, "Do you Deserve to Live?" *Forbes* 165 (2000); and Shostak, *Becoming Immortal*.
- <sup>30</sup>F. Wallace, "Achieving Commercial Biological Immortality through Competitive Business," *Neotech* (2001): [www.neo-tech.com/neotech/discovery/nt5.html](http://www.neo-tech.com/neotech/discovery/nt5.html) (Accessed June 2004). This is echoed by R. Freitas ("Death Is an Outrage") who claims that "death from natural causes has claimed more lives than all wars combined" and thus we have a moral obligation to seek immortality as a way to end suffering.
- <sup>31</sup>Postrel, "Do you Deserve to Live?"
- <sup>32</sup>C. Gunton, *The One, the Three, the Many* (Cambridge: Cambridge University Press, 1993).
- <sup>33</sup>R. Blackford, "Life Long! Live Free!" *Immortality Institute for Indefinite Lifespans* (2002): [www.longevitymeme.org/articles/viewarticle.cfm?page=2&article\\_id=5](http://www.longevitymeme.org/articles/viewarticle.cfm?page=2&article_id=5) (Accessed Sept. 2004).
- <sup>34</sup>Butler, et al., "Is There an Anti-Aging Medicine?" (2002); and Olshansky, et al., "No Truth to the Fountain of Youth."
- <sup>35</sup>Olshansky, et al., "No Truth to the Fountain of Youth."
- <sup>36</sup>R. Bailey, "Forever Young" *Reasononline* (2002): <http://reason.com/0208/fe.rb.forever.shtml> (Accessed June 2004).
- <sup>37</sup>Too many to list, including: "Ageless Bodies," *Beyond Therapy: Biotechnology and the Pursuit of Happiness* (Washington, DC: President's Council on Bioethics, 2003), various authors in S. Post and R. Binstock, eds. *The Fountain of Youth* (Oxford: Oxford University Press); a number of webcasts on the Sage Crossroads web site, published by the AAAS and the Alliance for Aging Research, [www.sagecrossroads.net/public/](http://www.sagecrossroads.net/public/).
- <sup>38</sup>M. Walravens, "Lupus erythematosus," *CIBA Magazine* (1998): [www.cibliga.com/en/lupus.html](http://www.cibliga.com/en/lupus.html) (Accessed June 2004); R. Howard and P. Rabins, "Late-Onset Schizophrenia and Very Late Onset Schizophrenia-Like Psychosis: An International Consensus," *American Journal of Psychiatry* 157, no. 2 (2000): 172-8; and L. Longo and C. Finch, "Genetics of Aging and Disease," *Archives of Neurology* 59 (2002): 1706-8.
- <sup>39</sup>de Grey, et al., "How Soon until We Control Aging?"
- <sup>40</sup>S. Dominus, "Life in the Age of Old, Old Age," in *New York Times Magazine* (Feb. 24, 2004): 26-33, 46, 58-9.
- <sup>41</sup>M. Parker and T. Hope, "Medical Ethics in the 21st Century," *Journal of Internal Medicine Supplement* 741 249 (2001): 27-33; and S. Dominus, "Life in the Age of Old, Old Age."
- <sup>42</sup>de Grey, et al., "How Soon until We Control Aging?"
- <sup>43</sup>R. Hassan, "Social Consequences of Manufactured Longevity," *Medical Journal of Australia* 173 (2000): 601-3. Hassan explains that the costs of elder care may be controlled differently depending on social care systems. For example, the United States has a lower percent of elderly people (12.6%) and spends a higher percent of its gross domestic product (GDP) (14%) in comparison with twelve other developed countries. Sweden has more elderly (17.8%) and spends less (7% GDP).
- <sup>44</sup>Parker and Hope, "Medical Ethics in the 21st Century."
- <sup>45</sup>Hassan, "Social Consequences of Manufactured Longevity"; S. Dominus, "Life in the Age of Old, Old Age"; D. Perry, "What Are the Possibilities and the Pitfalls in Aging Research in the Future?" *Sage Crossroads* (2003): [www.sagecrossroads.net/public/webcasts/01/](http://www.sagecrossroads.net/public/webcasts/01/); W. Glannon, "Extending the Human Life Span"; *World Population News Service*; and "Many Developing World Elderly Are Impoverished," *Popline* 24 (2002): 601-2.
- <sup>46</sup>D. Gems, "Is More Life Always Better?" *Hastings Center Report* 33, no. 4 (2003): 31-9.
- <sup>47</sup>S. Jackson, "Age Concern? The Geography of a Graying Europe," *Geography* 85, no. 4 (2000): 366-70.
- <sup>48</sup>G. Hardin, *Promethean Ethics*; M. Parker and T. Hope, "Medical Ethics in the 21st Century"; and D. Perry, "What are the Possibilities and the Pitfalls in Aging Research in the Future?" *Sage Crossroads* (2003). Also, a note on fertility in women. The longer post menopausal period may translate into a greater need for hormone replacement therapy, unless, as might be possible with genetic alteration, fertility is simply stretched over a longer period of time. However, later reproduction contributes to higher rates of assisted reproduction and potentially multiple births, more birth complications for older women, and more birth defects due to parental age. This will be a problem unless the anti-aging interventions also alter timing of fertility.
- <sup>49</sup>Parker and Hope, "Medical Ethics in the 21st Century"; D. P. Gushee, "A Matter of Life and Death: The Biotech Revolution," *Christianity Today* 45, no. 12 (2001): 34-41; G. Stock, "Choosing Our Genes," *Futurist* 36, no. 4 (2002); Gems, "Is More Life Always Better?"; and Disabled Peoples International, "Disabled People Speak on the New Genetics," *DPI Europe Position Statement on Bioethics and Human Rights* (2002): [www.dpieurope.org/html/bioethics/dpsngfullreport.htm](http://www.dpieurope.org/html/bioethics/dpsngfullreport.htm).
- <sup>50</sup>Hardin, *Promethean Ethics*.
- <sup>51</sup>President's Council on Bioethics, "Ageless Bodies," *Beyond Therapy: Biotechnology and the Pursuit of Happiness* (Washington, DC: President's Council on Bioethics, 2003).
- <sup>52</sup>S. Sapp, "Aging from the Perspective of the Cross," *Aging, Creation Issue of Christian Reflections: A Series in Faith and Ethics* (Waco, TX: The Center for Christian Ethics at Baylor University, 2003), 18-25.
- <sup>53</sup>M. Holstein, "A Feminist Perspective on Anti-Aging Medicine," *Generations* 25, no. 4 (2001): 38.
- <sup>54</sup>Maguire, "Population, Consumption, Ecology."
- <sup>55</sup>N. Rescher, "Technological Progress and Human Happiness," *Unpopular Essays on Technological Progress* (Pittsburgh: University of Pittsburgh Press, 1980), 3-22.
- <sup>56</sup>Numerous reviews of Christian calling to be in relationship to nature including W. Berry, "Conservation Is Good Work," in *Sex, Economy, Freedom and Community* (New York: Pantheon Books, 1992), 27-45; M. Bjelland, "Until Justice and Stewardship Embrace: Or How a Geographer Thinks About Brownfield Sites," *Christian Scholar's Review* 31, no. 4 (2002): 393-412; S. Bouma-Prediger, *For the Beauty of the Earth: A Christian Vision for Creation Care* (Grand Rapids, MI: Baker Academic, 2001); H. Rolston III, *Conserving Natural Value* (New York: Columbia University Press, 1994). This relationship as covenantal is described in J. Curry-Roper, "The Covenantal Structure of Society and Its Implications for Natural Resource Policy," *Coalition for Christian Colleges and Universities Global Stewardship Initiative*: <http://cesc.montreat.edu/GSI/GSI-Conf/discussion/Curry-Roper.html> (Accessed Aug. 2004); and N. Wirzba, "God's Measure of Creation" *Moral Landscape of Creation, Issue of Christian Reflections: A Series in Faith and Ethics* (Waco, TX: The Center for Christian Ethics at Baylor University, 2002), 24-9.
- <sup>57</sup>J. Wood, "Biophilia and the Gospel: Loving Nature or Worshipping God?" in H. Boersma, ed., *Living in the Lamb Light: Christianity*

# Article

## Anti-Aging:

### Radical Longevity, Environmental Impacts, and Christian Theology

and *Contemporary Challenges to the Gospel* (Vancouver: Regent College Publishing, 2001), 153–76.

- <sup>58</sup>B. Kelso, "New Study Calls for Improved Shark Fisheries Management and Monitoring," *Shark News*, Florida Museum of Natural History: The IUCN/ SSC Shark Specialist Group (1996); A. Purohit, R. Maikhuri, K. Rao, and S. Nautiyol, "Impact of Bark Removal on Survival of *Taxus baccata* L. (Himalaya yew) in Nanda Devi Biosphere Reserve, Garhwal Himalaya, India," *Current Science* 81 (2001): 586–91; and Anonymous, "Okinawa Centenarian Study Position Statement on Coral Calcium," *Okinawa Centenarian Study* (2003): [www.okinawaprogram.com/coral\\_calcium/coral-calcium.html](http://www.okinawaprogram.com/coral_calcium/coral-calcium.html) (Accessed June 2004).
- <sup>59</sup>The environmental impact of population growth and consumption rates is extensive. See F. Cheever, "Human Population and the Loss of Biological Diversity: Two Aspects of the Same Problem," *International Journal of the Environment and Pollution* 7, no. 1 (1997): 62–71; AAAS, "Concerning World Population Growth: A Statement Adopted by the AAAS Council, February 18, 1991" *AAAS Archives* (2003): [http://archives.aaas.org/docs/documents.php?doc\\_id=386](http://archives.aaas.org/docs/documents.php?doc_id=386) (Accessed June 2004); M. Mangel, et al., "Principles for the Conservation of Wild Living Resources," *Ecological Applications* 62, no. 2 (1996): 338–62; J. Bongaarts, B. O'Neill, and S. Gaffin, "Global Warming Policy: Population Left Out in the Cold," *Environment* 39, no. 9 (1997): 40–1; C. Vorosmarty, P. Green, J. Salisbury, and R. Lammers, "Global Water Resources: Vulnerability from Climate and Population Growth," 289, no. 5477 (2000): 284–9; W. Dolittle, A. Sluyter, E. Perramond, P. Crossley, and D. Lambert, "Feeding a Growing Population on an Increasingly Fragile Environment," *Conference of Latin American Geographers Yearbook* 27, no. 1 (2002): 45–76; and D. Maguire, "Population, Consumption, Ecology: The Triple Problematic," in *Christianity and Ecology*, ed. D. Hessel and R. Reuther (Boston: Harvard University Press, 2000), 403–52.
- <sup>60</sup>W. Lutz, W. Sanderson, and S. Scherbov, "The End of World Population Growth," *Nature* 412 (2001): 543–5.
- <sup>61</sup>S. J. Olshansky, "Pursuing Longevity: Delay vs. Elimination of Degenerative Disease," *American Journal of Public Health* 85 (1985): 754–6.
- <sup>62</sup>Ibid.
- <sup>63</sup>Ibid.
- <sup>64</sup>A. Coales, "Increases in Expectation of Life and Population Growth," *Population and Development Review* 29 (1958 reprinted 2003): 113–20.
- <sup>65</sup>Associated Press, "Life Expectancy in Africa Cut Short by AIDS," *CNN Interactive*, 1999: [www.cnn.com/HEALTH/9903/18/aids.africa.02/](http://www.cnn.com/HEALTH/9903/18/aids.africa.02/) (Accessed June 2004).
- <sup>66</sup>Coales, "Increases in Expectation of Life and Population Growth."
- <sup>67</sup>J. Goldstein and W. Schlag, "Longer Life and Population Growth," *Population and Development Review* 25 (1999): 741.
- <sup>68</sup>World Population News Service, "Niger Has Highest Fertility," *PopLine* 26, no. 1 (2004).
- <sup>69</sup>"Reconsidering the Limits to World Population: Meta Analysis and Meta-Prediction," *Bioscience* 54, no. 3 (2004): 195–205.
- <sup>70</sup>N. Borlaug, P. Charles, I. Wilmut, F. Mayor, D. Cohn-Bendit, P. Walker, and G. Brundtland, "Biotech Can Feed 8 Billion in the Next Century," *New Perspective Quarterly* 16, no. 5 (1999): 4–8.
- <sup>71</sup>J. Lui, G. Daily, P. Ehrlich, and G. Luck, "Effects of Household Dynamics on Resource Consumption and Biodiversity," *Nature* 421 (2003): 530–3.
- <sup>72</sup>R. Bailey, "Vulgarity and Tastelessness," in *Intimations of Immortality Part I* Reasononline (1999): <http://reason.com/opeds/rb030700.shtml> (Accessed June 2004).
- <sup>73</sup>J. Curry-Roper, "The Covenantal Structure of Society and Its Implications for Natural Resource Policy"; T. Heibert, "Eden: Moral Power of a Biblical Landscape," *Moral Landscape of Creation*, Issue of Christian Reflections: A Series in Faith and Ethics (Waco, TX: The Center for Christian Ethics at Baylor University, 2002): 9–16.
- <sup>74</sup>Westminster Shorter Catechism, Center for Reformed Theology and Apologetics: [www.reformed.org/documents/larger1.html](http://www.reformed.org/documents/larger1.html) (Accessed Sept. 2004); R. G. Brown, "A Theologian's Perspective," in *Aging, Death and the Quest for Immortality*, ed. C. Mitchell, D. Orr, and S. Salladay (2004), 17–33. Our goals are transformative, bringing the Kingdom of Christ now: The Lord's Prayer (Matt. 6:9); The Sermon on the Mount (Matt. 5); Higher goals limit our earthly ambitions (Gal. 5:13, Heb. 12:1, and 1 Pet. 4:10).
- <sup>75</sup>A. Peterson, *Being Human: Ethics, Environment and Our Place in the World* (Berkeley: University of California Press, 2001), 23; and Bouma-Prediger, *For the Beauty of the Earth*.
- <sup>76</sup>Bouma-Prediger, *For the Beauty of the Earth*; and Sapp "Aging from the Perspective of the Cross."
- <sup>77</sup>Kass, "L'Chaim and Its Limits."
- <sup>78</sup>C. B. Mitchell, "The Quest for Immortality," *Aging, Death and the Quest for Immortality* (Grand Rapids, MI: Eerdmans, 2003), 153–63. Differences between eternal life in Christian theology and biological immortality are described by D. Allen, "Epilogue: Extended Life, Eternal Life," in *The Fountain of Youth*, ed. S. Post and R. Binstock (Oxford: Oxford University Press, 2004), 387–97. Also, limitation as part of our createdness and sin of pride and overreaching includes Satan tempting Eve and Adam (Gen. 2), Tower of Babel (Gen. 11), and Nebuchadnezzar (Dan. 4:33).
- <sup>79</sup>Death as a natural limit. Either God created a mortal creation with every intent of allowing disease and predation to control populations and with eventual physical death as the norm, or his intention was for humans at least, to live indefinitely in earthly bodies and disease and physical death result from the fall. I believe the first view is best supported by Scripture and is upheld by centrist historic Christianity. The healing ministry of Jesus, the verse "the sting of Death is sin" and the conquering of Death as the final victory, suggest that disease and death are bad, and not God's plan. However, in his essay, "A Christian Ecology of Death: Biblical Imagery and the Ecologic Crisis" (*Christian Scholars Review* 4 (1975): 319–29), Loren Wilkinson tries to reconcile the reality of God's creation of a world dependent on death for nutrient cycling. He says:
- But there is another, seldom recognized element in Christian thought which has contributed much to western man's failure to think in terms of the ecosystem: that is, the teaching that death is evil, and the result of sin. Such a teaching makes it particularly hard for a Christian to see the world as ultimately good. The various food chains which keep the world ecosystem in trim are all forged by death. Not only does food depend upon death, but death and decay are essential clocks on the exponential growth of unmolested life. Genesis suggests that this fecundity is God-given. To all life God declares "Be fruitful and multiply." ... It is both fecundity and voraciousness which keeps our planet whole. Organisms eat in order to live, and in turn are eaten. For we are not reconciled to death. We are not prepared to see it as a part of the created order. The normal Christian reading of scripture sees death as the result of sin: death is the promised result of human disobedience, and human disobedience results not only from human death, but in the ultimate deaths of all things. Delivery from sin is equated with delivery from death. Presumably, when there is no more sin on earth, there will be no more death. But he ecologist hastens to add, there will be no more life either.
- <sup>80</sup>Freitas, "Death is an Outrage."
- <sup>81</sup>St. Francis of Assisi, *The Franciscan Archive* (1224): [www.franciscan-archive.org/patriarcha/opera/canticle.html](http://www.franciscan-archive.org/patriarcha/opera/canticle.html) (Accessed June 2004).
- <sup>82</sup>D. Gushee, "A Matter of Life and Death: The Biotech Revolution." However, because there is a strong biblical principle in favor of life and healing, I do not believe that opposing extreme life span increase logically suggests we should extrapolate that it would be good to shorten our lives in order to serve the other principles.
- <sup>83</sup>Bailey, "Vulgarity and Tastelessness."
- <sup>84</sup>Many biblical texts refer to healing as a blessing, as a command, or as central to the life of Christ including: Ezek. 34:3–5; Matt. 4:22–24, 8:16, 9:34, 12:15; Mark 6:13, 56; Acts 3:1–10, 5:28.
- <sup>85</sup>Hardin, *Promethean Ethics*.
- <sup>86</sup>Gunton, *The One, the Three and the Many*.