Mere Creation: Science, Faith and Intelligent Design

An unprecedented intellectual event occurred in Los Angeles on November 14-17, 1996. Under sponsorship of Christian Leadership Ministries, Biola University hosted a major research conference bringing together scientists and scholars who reject naturalism as an adequate framework for doing science and who seek a common vision of creation united under the rubric of intelligent design. The two hundred participants, primarily academics, formed a nonhomogeneous group. Most had never met each other. Yet virtually all the participants questioned the reigning paradigm of biologynamely, that natural selection and mutation can account for the origin and diversity of all living things.{1}

So said Dr. Henry F. Schaefer III, professor of chemistry at the University of Georgia, author of over 750 scientific publications, director of over fifty successful doctoral students, and five-time Nobel nominee, in his foreword to the 1998 book, *Mere Creation: Science, Faith and Intelligent Design.*{2} I was privileged to be one of the two hundred participants at this historic conference which, along with the subsequent book, form the backbone of future direction of the fledgling intelligent design movement.

I would like to highlight significant chapters from this book and provide additional resources to learn more about this important challenge to Darwinism. Along the way I hope you will gain a glimpse of how important this movement is to the future not just of biology, but of science education as a whole in this country and around the world.

Jonathan Wells is a post-doctoral research biologist in the department of molecular and cell biology at the University of California at Berkeley. His Ph.D. is from the same institution

in developmental biology. In his chapter, “Unseating Naturalism,”{3} Wells lists several important insights from developmental biology that seriously challenge a purely naturalistic biologic science.

Since 1983, homeotic genes have been the rage in evolutionary developmental biology. First discovered in fruit flies, these genes appear to act as switches to turn on a series of genes important for sequential levels of development. Of interest to evolutionists, is the fact that many of the same genes found in fruit flies are also found in almost every other animal group, all acting as developmental switches. They are even frequently found on the same chromosome and in the same order from species to species. Such evidence seems quite a compelling argument for all life forms evolving from a common ancestor.

But Wells quickly points out that these genes do not control the same body structures from species to species, so an evolutionary explanation does not fit so well. “If the same gene can ‘determine’ structures as radically different as a fruit fly’s leg and a mouse’s brain or an insect’s eyes and the eyes of humans and squids, then that gene is not determining much of anything.”{4} There is no current mechanism to understand how a homeotic-switching gene can change from coding for one function to another in different organisms. Suddenly, this new great evidence of evolution is yet another problem for evolutionary biology. Wells goes on to point out that intelligent design has no trouble incorporating similar switches in different organisms just as an engineer understands the use of similar ignition switches in different kinds of vehicles.

Wells concludes that, “A design paradigm can nurture the sort of formal and teleological thinking that will enable biologists to discover the laws of development that have so far eluded them.”{5} The reason for the elusion is the shackles of Darwinism.

Redesigning Science

In taking a close look at the book, *Mere Creation*, edited by Bill Dembski, I would like to explore Dembski's own contribution to the volume, "Redesigning Science."{6} If the name Bill Dembski is unfamiliar to you, it won't be for long. Dembski is an extremely bright and articulate young man with earned doctorates in mathematics from the University of Chicago and philosophy from the University of Illinois at Chicago along with an M. Div. from Princeton Theological Seminary. Dembski is also the author of perhaps the most significant book to date in the intelligent design movement, *The Design Inference: Eliminating Chance through Small Probabilities*{7}, from the prestigious Cambridge University Press.

Bill is also confident. He is confident that intelligent design can thoroughly reshape the horizons of science in the next twenty years. He begins his chapter with a whimsical scenario recounting a "nightmare" potentially experienced by Harvard paleontologist and vocal anti-creationist, Stephen Jay Gould. The nightmare includes Gould no longer teaching at Harvard, relegated to leading field trips to the Galapagos Islands and the Burgess Shale in the Rocky Mountains of Canada, with Phil Johnson and cronies firmly in control of the National Science Foundation.{8} While Dembski admits that the nightmare is hopefully not realized in all its details, the notion of design claiming primacy within science is clearly the objective.

In order for this objective to be realized, design must be specifically and rigorously defined. I'll allow Dembski to explain in his own words.

> *The key step is to delineate a method for detecting design. Such a method exists. We use it implicitly all the time. . . . The method takes the form of a three-stage explanatory filter. Given something we think might be designed, we submit*

> *it to the filter. If it successfully passes all three stages of the filter, then we are warranted asserting it is designed. Roughly speaking, the filter asks three questions, and in the following order: Does a law explain it? Does Chance explain it? Does design explain it?{9}*

In trying to classify an event as either due to natural law, chance, or design, we first try to assess if it is an event of high probability and therefore due to some recognizable natural law. A bullet firing when a gun's trigger is pulled or getting at least one head when a fair coin is tossed a hundred times are both high probability events due to natural law.

Rolling snake eyes with a pair of fair dice, or even winning a million dollar lottery when considering how many tickets are sold, constitute events of intermediate probability that are justly relegated to chance.

But let's say the same person wins that lottery three times in a row or even twice in a row. Suddenly we suspect that something more than chance is involved. Dembski's own example is Nicholas Caputo, the county clerk of Essex County, New Jersey. Caputo was responsible for determining the order in which candidates appeared on the ballots for elections. Caputo was a Democrat and 40 out of 41 times the Democrats were listed first, which everyone agrees, gave them a slight advantage. We intuitively use the explanatory filter to classify these events as designed because they are of small probability and they conform to a pattern. Thus intelligent design combines small probability with what Dembski terms, "specified complexity."

Dembski and the other authors of *Mere Creation* believe we can apply the same test scientifically to physical, chemical, and biological events.

The Explanatory Power of Design

One of the critical questions for intelligent design is its ability to explain at least some natural phenomena more completely than naturalistic science. Stephen Meyer addresses this problem in his chapter, "The Explanatory Power of Design."{10} Steve Meyer is professor of philosophy at Whitworth College in Spokane, Washington, with a Ph.D. in the history of and philosophy of science from Cambridge University, England. As an example of design's explanatory power, Meyer chooses to explore the origin of information within living systems, specifically the origin of the genetic code. Meyer brings a scholarly appraisal to the subject since his Ph.D. dissertation concerned the history and status of origin of life research.

Meyer summarizes the extreme problems origin of life research has encountered in the last thirty years, highlighting along the way the important work by Charles Thaxton and Walter Bradley.{11} Following the euphoria of the famous experiment by Miller and Urey in 1953, the origin of life community has suffered setback after setback. Miller and Urey demonstrated that a mixture of methane, ammonia, water and hydrogen could be induced to produce, among many other organic compounds, a few amino acids, the building blocks of proteins. Subsequent work showed that this hypothetical atmosphere was pure mythology. So was the notion of a prebiotic soup of biochemical building blocks.{12}

Beyond the purely biochemical difficulties of origin of life research looms the immense problem of accounting for the origin of complex specified information contained in biomolecules, and specifically in DNA and the genetic code. In the computer age we are often amazed at the speed and storage capacity of modern personal computers, particularly the laptop variety with their 12 gig hard drives and 500 MHz speeds. We seldom realize, however, that "the information storage density

of DNA, thanks largely to nucleosome spooling, is several trillion times that of the most advanced computer chips."{13} So not only is there real information stored in DNA, but it is stored at a density on a molecular level, we can't even approach with our best computers. So just where did this information come from?

Attempts to account for the origin of biological information by natural biochemical means have utterly failed. The odds of achieving even a small 100 amino acid protein are less than 1 in 10^{125}. Events of that small a probability just don't happen. Not only that, but researchers now realize that natural forces are incapable of achieving the formation of bio-information by any process. At first, some thought that maybe the amino acids and nucleotides had some natural affinity for each other to help account for the specific sequences of proteins and DNA. When that turned into a dead end, some hoped that some sort of natural selection of molecules might help. But natural selection requires reproducing cells. So-called "self-organization" processes only provide low level order, like ripples in the sand, not informational messages like "JOHN LOVES MARY" written in the sand.

Scientific laws will only describe ordered natural phenomena, like the structure of a crystal, which bear no relationship to the specified complexity within biomolecules. Instead, our experience with informational codes and languages indicates that they always come from an intelligent source. Therefore mind or intelligence stands as the only possible source for the information in DNA, proteins and cells as a whole.{14}

Applying Design within Biology

Have you ever wondered how a baby is formed from a single cell in just nine months? You could ask the same question of just about any animal from wasps to caterpillars to frogs to clams. A fully functioning organism is a symphony of integrated parts

performing in coordinated fashion to make beautiful music. But where did all the orchestra members (or proteins) come from? And who told them where to sit? And how do they know when and what to play? And what about tempo and volume and on and on? Well, you get the picture. Biological organisms are immensely complex, but they all start out as single cells. Somehow they turn into assemblages of different cells and tissues that all know their places and roles. Embryological development has long been a mystery and its secrets are only slowly being revealed. It has also turned into a potentially fruitful battleground between evolution and intelligent design.

Paul Nelson recently received his Ph.D. in philosophy from the University of Chicago and is currently doing post-doctoral work at the same university in evolutionary and developmental biology. The connection between embryological development and evolution is significant because, in order for organisms as diverse as hawks and starfish to evolve from a common ancestor, they must change not only their outward appearance but also the developmental process that starts as single cells for both. Nelson's "Applying Design within Biology" explores the connection and its inherent contradictions.{15}

A major observation of embryology has been that developmental mutations are usually harmful and often fatal. And the earlier in the developmental process the mutation occurs, the more likely the effect will be harmful. This led most embryologists to believe that evolutionary changes utilize mutations that appear relatively late in embryological development. Subsequently Darwinists predicted that the further back you go in comparing two organisms' patterns of development, the more similar they will be. Unfortunately for evolution, this is not true. There is wide diversity of early cleavage patterns of cells in embryos from species that can actually be closely related. One author went so far as to refer to this as "intellectually disturbing."{16}

Such a dramatic reversal would, you would think, cause many or

at least some developmental biologists to question the validity of Darwinism. But as I have indicated so many other times in other essays, Darwinism is assumed, not questioned. Biologists mainly concluded that change in early development is doable after all and quite common. But as Nelson aptly summarizes, “There is little if any experimental evidence that ‘changes in early development are possible.'”{17}

While the diversity of pathways to similar ends in development is a problem for evolutionary developmental biology, it is an expectation of intelligent design. The sheer magnitude of instructions for embryological progress screams for a design perspective. Design is also found in the newly discovered redundancy of developmental pathways. Knocking out a seemingly essential gene can sometimes have no effect whatsoever. Built-in redundancy is a hallmark of *design*, not chance mutations and natural selection. Nelson basically believes that any element of an organism necessary for survival and reproduction in any environment is a strong candidate for design. This should help open up new research avenues for developmental biology which is exactly what new theories should do.

Basic Types of Life

Next time you are walking through a zoo, stop and think about what makes some animals different and others similar. For instance, if you are looking out over a large pond, you may see different species of ducks, geese, and swans. While they do appear different in some respects, there are also very tantalizing similarities. However, if there are also some flamingos or sea gulls in the crowd of aquatic birds, you would not put them in the same category as ducks and geese. They seem different. Evolutionists, of course, would see sufficient similarities: they are birds, after all, with wings, feathers, and beaks. So evolutionists would say they all evolved from a common ancestor. Ducks and geese are more similar to each other than they are to flamingos so the

ancestor of ducks and geese is more recent than the ancestor of ducks, geese, and flamingos.

But since intelligent design is calling into question many evidences and predictions of naturalistic evolution, it is reasonable to assume that all animals are not related back in time through a common ancestor. Perhaps all birds did not evolve from a single source. Maybe there are many different ancestors for the many groups of birds and other animals. Well, how would you know? How could you recognize groups of animals that do derive from a common ancestor and those that have arisen independently? Siegfried Scherer makes an attempt in his chapter titled, "Basic Types of Life." {18}

Dr. Scherer is a professor of microbial ecology and director of the Institute of Microbiology at the Technical University of Munich and has published numerous papers in international peer-reviewed journals. Scherer proposes that there is another unit of taxonomic classification that can be overlaid on current taxonomy, the idea of basic types.{19} A basic type is a group of organisms or species that are capable of hybridizing. These hybrids don't necessarily have to be fertile themselves. Simply producing a coherent functioning organism from sperm and eggs of different species is sufficient.{20} Numerous successful attempts to hybridize different species of ducks, swans, and geese have convinced Scherer that they belong to a single basic type. This would mean that all 148 species are descended from a single common ancestor.{21}

The distinct differences mentioned earlier, between ducks and flamingos, would result from them being of different basic types. This observation leads Scherer to suggest that microevolution can now be defined as evolution within one basic type and macroevolution as evolution between basic types. The current evidence suggests that macroevolution is an undocumented process both from the fossil record and the biology of basic types.

The plethora of species within a basic type like the ducks and geese also suggests that there was a great deal of variation built into each basic type to allow many distinct species to form through speciation. This prediction would be consistent with intelligent design but not evolution. There would be no reason for evolution to suggest that some species would have more variation than others would. This is corroborated by the observation that hybrids between two species frequently resemble a third species. This indicates that the genetic combination of the third species was hidden between the two species used to form the hybrid.{22}

Scherer summarizes that evidence of individual ancestors for each basic type, fossil and biological gaps between basic types, similar or convergent characters in different basic types, and odd features, such as slightly differing genetic codes now found in a few organisms would also be evidence of design over evolution. The possibilities for further research are everywhere. Intelligent design becomes an extremely fruitful paradigm for research.

Notes

1. Henry F. Schaefer III, "Foreword," in *Mere Creation: Science, Faith and Intelligent Design*, William A. Dembski, Ed. (Downers Grove, Ill.: InterVarsity Press, 1998), 9.

2. Ibid., 475.

3. Ibid.,, 51-70.

4. Ibid., 56.

5. Ibid., 68.

6. Ibid., 93-112.

7. William A. Dembski, *The Design Inference: Eliminating Chance through Small Probabilities* (Cambridge: Cambridge

University Press, 1998), 243.

8. Dembski, *Mere Creation*, 93.

9. Ibid., 94.

10. Ibid., p. 113-147.

11. Charles Thaxton, Walter Bradley and Roger Olsen, *The Mystery of Life's Origin: Reassessing Current Theories* (Dallas: Lewis and Stanley, 1984), 228.

12. *Mere Creation*, 118-119.

13. Ibid., 120.

14. Ibid., 136-137.

15. *Mere Creation*, 148-174.

16. Eric Davidson, quoted in *Mere Creation*, 155.

17. Ibid.

18. Ibid., 195-211.

19. Scherer does at least mention a competing idea, baramin, initially proposed by creationist Frank Marsh (*Fundamental Biology*, 1940, Lincoln Neb., n.p., *Variation and Fixity in Nature*, Mountain View, Calif.: Pacific Press) and further explicated by Kurt Wise (K. Wise, Baraminology: "A Young Earth Creation Biosystematic Method, in *Proceedings of the Second International Conference on Creationism*, R.E. Walsh and C.L. Brooks, eds. (Creation Science Fellowship, Pittsburgh, PA, 1990, Vol. 2, 345-360 and K. Wise, "Practical Baraminology," *Creation Ex Nihilo Technical Journal*, 1991, 6(2): 122-137). Scherer chooses not to mention another attempt in fleshing out this concept, the prototype, proposed by Lane P. Lester and Raymond G. Bohlin in *The Natural Limits to Biological Change* (Dallas: Probe Books, 1984), 161-172.

20. *Mere Creation*, 197-199.

21. Ibid., 200.

22. Ibid., 203-204.

Putting the Brakes on Human Genetic Engineering

Dr. Michael Gleghorn argues that a biblical view of man should both inform and limit how reproductive technology and genetic engineering are applied to humanity.

Are We Speeding toward a Brave New World?

With ongoing advances in reproductive technology and genetic engineering, man's ability to make himself what he pleases is increasingly within reach. For example, in a 1996 *Nature* editorial it was stated, "the growing power of molecular genetics confronts us with future prospects of being able to change the nature of our species."{1} This raises serious ethical concerns. The power to change human nature says nothing at all about whether we *ought* to change it. How might we use such unprecedented power?

Both Aldous Huxley and C. S. Lewis made disturbing predictions about man's possible future. Both explored what might happen if technologies like genetic engineering and psychological conditioning were unwisely applied to mankind.

In Huxley's *Brave New World* children are no longer born to mothers and fathers (words considered disgusting and taboo); rather, they are "grown" in government owned "hatcheries."{2} Human freedom is virtually non-existent because each person is genetically engineered and psychologically conditioned to fulfill a particular social role. Society is structured into five classes. On top are the Alphas, society's elite. They are the intellectuals, educators, and government officials. At bottom are the Epsilons. They handle society's most menial tasks. In the middle are the Betas, Gammas, and Deltas, each having responsibilities appropriate to their class.

In *The Abolition of Man*, C. S. Lewis argues that man's final conquest of nature may be his conquest of *human* nature. Lewis calls those who develop and gain such power *conditioners*. They can make humanity whatever they please. But what will it "please" them to make?

Neither Huxley nor Lewis seem optimistic. Consider, for instance, what could happen if the man-makers of the future abandon belief in objective moral values—the doctrine that some things are really right and others really wrong. Would they make humanity "better"? The idea of "better" implies a standard of comparison that is either absolute or relative. But these man-makers reject an *absolute* standard of right and wrong. For such moral relativists then, a claim that honesty is good and lying is evil means nearly the same as a claim that hot chocolate is good but coffee is disgusting! Claims about good and evil are merely matters of *personal* taste or preference, nothing more.

But what if there really are objective moral values? If so, such human conditioners could only make us better by accident, for they have rejected the very standard by which *genuine improvement* could ever be measured! And apart from this objective moral standard, "better" means *only* what they themselves happen to like.

In contrast to such moral relativism, the Bible teaches that objective moral values are real. It points to the moral perfection of God as the absolute standard against which all human moral actions should be measured. Therefore, if we let a biblical view of man and morality inform how we choose to apply genetic engineering, we may be able to embrace the benefits and avoid the pitfalls of this powerful new technology.

This Present Darkness

Aldous Huxley and C. S. Lewis feared that if we misapply technologies like genetic engineering to ourselves we might soon become an endangered species! I share their concerns. Although I am *not* opposed to research and development in this area, I do think it should be constrained by a biblical view of man. Unfortunately, many researchers regard this view as little more than an antiquated myth. The biblical view of man has been rejected, or worse, entirely ignored. That such researchers should feel little incentive for placing biblical constraints on their work is therefore hardly surprising.

A good example of this mindset can be found in Lee Silver's 1997 book, *Remaking Eden: Cloning and Beyond in a Brave New World*. He endorses Huxley's prediction about the power man will gain over reproduction.{3} But while Huxley and Lewis thought the state would use such power to promote its own agenda, Silver believes parents will use it to enhance the lives of their children. He thinks it's inconsistent to allow parents to provide their children with the best home environment, the best health care, the best educational opportunities and cultural experiences, but *not* the best genes.{4} He predicts that if the technology to change or enhance genes becomes available, no one will be able to stop parents from using it.{5} Since the amount of money to be made by such services would be staggering, "the global marketplace will reign supreme."{6}

So how close is the day when parents might request a genetic upgrade for their children? Well, judge for yourself. The successful development of in vitro fertilization in 1978 not only allowed scientists to cure a certain type of infertility, it also gave them access to the embryo. In principle, this makes it possible "to observe and modify . . . its genetic material before a pregnancy is initiated."{7} Although such genetic modification has not yet taken place, it is now "possible to screen thousands of different genes within individual embryos" to see how such potential children might differ from one another.{8}

Still, genetic *screening* is not genetic *engineering*. No genes are added or changed.{9} It simply allows parents to choose from the selection of embryos generated by this procedure. But there is a problem: it's currently legal to destroy the embryos that aren't chosen!{10} And this constitutes a serious infringement upon the rights of the unborn. Furthermore, Silver predicts that "genetic engineering of human embryos" will become feasible by the middle of this century.{11}

While such remarks may sound alarming, we must remember that it's not the technology itself, but its *misapplication* that's the problem.

What Might the Future Hold?

One of the worst consequences of contemporary reproductive technology is the creation, and subsequent destruction, of numerous human embryos. Since 1997, genetic screening has made it "possible to screen thousands of different genes within individual embryos" to see how such potential children might differ from one another.{12} This information allows prospective parents to choose the one embryo among many which they believe will make the best child. Unfortunately, the remaining embryos are simply destroyed! If such technology is not constrained by a biblical view of man, this new form of legalized eugenics may be only the beginning. In light of such

advancing technologies, what might the future hold?

The future envisioned by Lee Silver in *Remaking Eden*is both fascinating and disturbing. He speculates that by the year 2350 two very distinct classes of people may exist: the *Naturals* and the *Gene-Enriched* or *GenRich*. Naturals are people like you and me, born by natural methods and not genetically enriched. The GenRich, who may account for roughly ten percent of the American population, are distinguished from Naturals in that they "all carry synthetic genes . . . that were created in the laboratory."{13} Silver believes that over time the genetic distance between Naturals and the GenRich will become ever greater. Eventually all aspects of the government, economy, media, entertainment, and education will be controlled by the GenRich.{14} "In contrast, Naturals [will] work as low-paid service providers or as laborers," and their children will only be taught the skills needed to do the jobs available to their class.{15}

If this social structure strikes you as loosely reminiscent of Aldous Huxley's *Brave New World* you're not alone. In fact, Silver subtitled his book, *Cloning and Beyond in a Brave New World*. But while Silver believes wealthy parents will use genetic engineering to enhance the lives of their children, Huxley thought such power would be controlled by the state. And here's where things get tricky.

Silver predicts that society will be "controlled by . . . the GenRich."{16} They will be the sole governing class and the sole controllers of all sophisticated technology, including genetic engineering. But then what can prevent the GenRich from passing laws that permit engineering the Naturals to be a class of servants? Would not the more powerful, but less numerous, GenRich want to prevent the Naturals from entertaining revolutionary ideas? And might they not do this through genetic engineering and psychological conditioning? Have we not returned to something like Huxley's *Brave New World*? How might we avoid such a future?

The biblical view of man provides an answer to this question.

The Biblical Doctrine of Man

In his book *Remaking Eden*, Lee Silver anticipates a future in which we can genetically alter human nature. He predicts that "genetic engineering of human embryos" will become feasible by the middle of this century.{17} Suppose he is right about this. Does it follow that we *ought* to genetically engineer humans simply because we *can*? How we answer this question will largely depend on our view of man.

Exactly what are we, anyway? Are we merely matter which, through a long, undirected evolutionary process, has finally become self- conscious? Or are we something more? The Bible declares that both men and women were created in the image of God.{18} This doctrine forms the basis for the Christian belief in both the dignity of man and the sanctity of human life. Even after man's fall into sin the image of God, though marred, was not completely lost.{19}

Thus in Genesis 9:6 we read, "Whoever sheds man's blood, by man his blood shall be shed, for in the image of God He made man." When God instituted capital punishment for murder, it was because He had created man in His image. But this verse not only affirms that man bears the image of God, it also implies that human life is sacred and imposes a severe penalty for the unjustified taking of such a life. It also suggests that man is subject to an absolute moral law which finds its source in God. You might say it indicates that all men "are endowed by their Creator with certain unalienable rights," chief of which is the right to life!

The biblical doctrine of man needs to be brought into ethical discussions of reproductive technology and genetic engineering. Because man bears God's image, certain boundaries should not be crossed. For example, scientific evidence indicates that human life begins at conception. Therefore,

destroying human embryos clearly violates their "unalienable" right to life. Furthermore, any attempt to genetically alter man's unique nature as a rational, emotional, volitional, moral agent *could* be viewed as an attack on the image of God in man.{20} We must be careful how we choose to apply such technologies—especially to ourselves!

Science within the Limits of Biblical Morality Alone

C. S. Lewis compared man's attempt to conquer human nature to "the magician's bargain: give up our soul, get power in return."{21} But once we take the final step of reducing humanity "to the level of mere Nature . . . the being who stood to gain and the being who has been sacrificed are one and the same."{22} Lewis referred to this final step as the abolition of man. By this he did not mean the abolition of man's physical being. Rather, he was concerned about potentially detrimental changes to that unique, *immaterial* component of human nature. Although I have doubts about whether we could *actually* change this aspect of human nature, I do object to any *attempt* by man to alter it through genetic engineering. Since God based capital punishment for murder on the fact that man was made in His image, it seems that any attempt to genetically alter human nature, fallen though it is, may likewise be morally offensive.{23}

Still, the solution is not to abandon scientific research. Rather, we must simply keep it within proper moral boundaries. To make this clear, let's consider an example of a morally acceptable application of genetic engineering which also offers great potential benefit to humanity. There has recently been some talk of possible new AIDS vaccines. One of these, a brainchild of Robert Gallo's institute, makes use of the salmonella bacteria responsible for typhoid. The bacteria are genetically altered to be less infectious and to carry portions of HIV DNA into human intestinal cells. Alex

Dominguez writes, “The infected intestinal cells are . . . hijacked by the HIV and produce a part of the HIV virus, which is not harmful but causes an immune response. Researchers hope that will allow the body to fight off an attack by the real HIV virus.”{24} Although at this time the vaccine is still being developed, it provides an example of how genetic engineering might be used in both a morally acceptable and humanly beneficial way.

But why is this a “morally acceptable” example? Briefly, unlike the scenarios imagined by Aldous Huxley and C. S. Lewis, man’s unique identity as a rational moral agent made in the image of God is not in any way changed or compromised. Using genetically altered bacteria as a potential vaccine against HIV does not seek to alter human nature any more than a vaccine against rabies does.

Confining scientific research within the limits of an objective, biblical morality thus precludes neither scientific advancement nor human benefit. Rather, it recognizes the value of science without devaluing those who it is chiefly intended to serve! But disregarding such moral standards could potentially lead us into the brave new worlds imagined by both Huxley and Lewis. We must therefore hold these principles in tension and encourage scientific research within the limits of biblical morality alone.

Notes

1. Cited in Lee M. Silver, *Remaking Eden: Cloning and Beyond in a Brave New World* (New York: Avon Books, 1997), 10.
2. Aldous Huxley, *Brave New World* (New York: Harper and Row, Publishers, 1969), 1-4.
3. Silver, *Remaking Eden*, 9.
4. Ibid., 236.
5. Ibid., 236-37.
6. Ibid., 11.
7. Ibid., 68.

8. Ibid., 203.
9. Ibid., 129.
10. *Public Opinion Sought on Embryo Research*, Religious Rights Watch: A Publication of Christian Coalition of America, volume 11, number 1, January 2000.
11. Silver, *Remaking Eden*, 233.
12. Ibid.
13. Ibid., 4.
14. Ibid., 6, 242.
15. Ibid., 6.
16. Ibid.
17. Ibid., 233.
18. Genesis 1:27.
19. James 3:9.
20. A biblical understanding of human nature includes both material and immaterial components. We are not told all the particulars about how these components are related to one another, but clearly each can influence the other. In other words, genetic alterations to the human body could also affect the human mind and personality, essential aspects of human nature which, in my opinion, cannot be reduced to purely physical processes. See footnote 23 for further discussion.
21. C. S. Lewis, *The Abolition of Man* (New York: Macmillan Publishing Company, 1955), 83.
22. Ibid.
23. The Divine image is neither limited to, nor even primarily concerned with, man's physical being. Rather, this image concerns who, or what, man is *essentially*. And this, I think, is where an *immaterial* aspect of human nature must be introduced. That is, man's peculiar *nature* as a rational, emotional, volitional, moral agent with a special capacity for both forming and enjoying relationships with others (including God) includes both material and immaterial components. Although human nature is now fallen and infected with sin, it still bears the imprint of God's image (Gen. 9:6; Jas. 3:9). Thus, I view any attempt to genetically alter human nature (especially its *immaterial* aspect) as morally objectionable

because first, man bears the image of God; and second, although human nature is certainly in need of change, this is hardly an appropriate task for fallen humanity. After all, our real need is not just to be made *different*, but to be made new (2 Cor. 5:17). And this *new creatio*n is strictly the work of God—not man (Eph. 2:10; 4:24).
24. Alex Dominguez, "AIDS Vaccine to be Tested in Uganda," *Associated Press*, 20 May 2000.

Genetic Engineering – A Christian Scientist's Perspective

Dr. Ray Bohlin examines the rapidly moving world of genetic engineering from a Christian worldview perspective. He explains that most genetic engineering attempts to make more efficient changes similar to those previously done through selective breeding and other conventional techniques. However, those working in the field need to be aware of the ethical and religious issues that arise in this area of science.

What Is Genetic Engineering?

Our culture teeters on the edge of a steep and dangerous precipice. New technologies will soon allow us to change, radically and permanently, the world in which we live. Indeed, we will hold in our hands the capability of directly and purposefully changing who we are as human beings. The technology I am speaking of is genetic engineering.{1} Ethical

and technical questions swirl around discussions of genetic engineering like the wall clouds of the eye of a hurricane. Many in society seem to be bracing themselves for the disappearance of the calm of the eye and the coming of the full force of a powerful and destructive combination of new plants and animals unleashed on an unsuspecting environment, with new and improved humans designed to succeed.

Before your alarm buttons go on overload, let me say that I hope to lend a reassuring voice with a dose of sober realism. Genetic technology will undoubtedly unleash great power to change our world forever, but should it, and will it? In this article I want to explore just a few of the technical and ethical questions we face as a society. The time to discuss these issues is now, while we still have time to think without simply reacting.

The phrase *genetic engineering*, unfortunately, often conjures up images of macabre experiments resulting in Frankenstein-like monsters and the cold-hearted use of genetic information to create new social classes depending on our genes, as in the 1997 film *Gattaca*.{2} However, genetic engineering can simply be defined as the manipulation or alteration of the genetic structure of a single cell or organism.

Sometimes the manipulation of an organism's genome, the totality of all its genes, can simply refer to the project of identifying its complete DNA sequence in order to gain information for future study and potential alteration. The Human Genome Project is therefore, in a sense, a form of genetic engineering because the human genome must be broken up and manipulated in order to gain the desired information.

Ordinarily, genetic engineering refers to the direct addition, deletion, or intentional mutation of an organism's DNA sequence to produce a desired effect. Knockout experiments in mice seek to determine the effects of eliminating a particular gene from the mouse genome. Recombinant DNA experiments

usually take a gene found in one organism and place the gene into another organism. These animals can be of the same or different species.

Sometimes researchers will simply change the DNA sequence in a gene to study what effect the specific change has on the gene or its protein product. All of these alterations fall under the umbrella of genetic engineering. In this broad definition, genetic engineering is neither good nor evil. The nature of the experiments themselves will determine if they are moral or immoral.

Why Are There Genetic Illnesses?

The initial thrust of genetic research is the treatment and potential cure of genetic illnesses. Therefore, we must explore why genetic illnesses occur at all. “Why questions” within science usually occur on two levels and are notoriously difficult. The first level and usually the easier of the two are the scientific. The “why” is best changed to “how.” For our purposes this means, How do genetic illnesses arise? The second, more difficult question asks on a moral basis, Why do genetic illnesses occur?

The answer to the first question, How do genetic illnesses arise?, is simply, mutations. Mutations are mistakes in the DNA sequence. Sometimes a mutation is simply the substitution of one nucleotide for another.

Mutations can also result from a piece of DNA being deleted. This may cause one or more codons to disappear. In cystic fibrosis (CF), codon 508 out of 1,480 is missing, causing one amino acid to be removed from the resulting protein. This causes the severe respiratory and digestive problems of CF patients that are usually lethal before their 30th birthday.

So far, genes for more than 1,200 human disorders have been identified, which are found over all twenty-three pairs of

human chromosomes. Some estimate that there may be as many as 3,000 to 4,000 human genetic disorders that are due to defects in a single gene. Most disorders, however, will be due to mutations in a host of genes.

The moral question is perhaps not so difficult in its answer, but in our acceptance of the answer. Mutations exist as a result of the Fall. We know the serpent was cursed, Eve was cursed, and Adam was cursed (Gen. 3:14-19). But Romans 8:18-22 also tells us that all creation was subjected to futility, groans and suffers, and eagerly awaits the revealing of the sons of God so it may be set free from its slavery to corruption. This world is not as God intended.

Asking why someone suffers from a genetic disease is no different than asking why someone was killed in a traffic accident when others walked away. We know our suffering is temporary. We know that God will somehow work it all out for good (Rom. 8:28). But in 2 Corinthians Paul tells us we suffer so we can comfort those who suffer after us (1:4), so other sufferers will know they are not alone (1:6), and, principally, we suffer so we will trust in God and not ourselves (1:9).

Part of the Christian mission has always been to alleviate suffering where possible. While Jesus' miracles clearly were part of fulfilled prophecy, they were also about relief from suffering. Genetic engineering, while possessing a power that can be used for evil, which we will discuss, also at least has the potential to relieve the suffering from, if not even cure, genetic disease.

Could Changing Genetic Material Produce a Dangerous Superbug?

One concern that many people have about genetic engineering is the possibility of unintentionally creating a superbug or a damaging plant or animal whose destructive nature is only

discovered after the fact. After all, our knowledge of the workings of genes and proteins is still growing. We hear constantly how complex everything is. What makes us think we can tinker with this incredible biological reservoir of information without making some incredible blunder from which there is no turning back?

When genetic engineering in bacteria was first discovered and introduced (Recombinant DNA technology), many scientists had this very fear. This was partially the reason for the self-imposed moratorium and four levels of containment in the early 1970s. But geneticists and molecular biologists found that dangerous, unintentional consequences were virtually nonexistent. Enforcement of the guidelines eventually relaxed and soon became outdated and ignored. What this means is that researchers were quite convinced that transferring DNA of known sequence and function into bacterial chromosomes and plasmids did not result in unforeseen consequences. The procedure became routine and straightforward.

This does not mean that someone, somewhere, won’t use biotechnology to produce a superbug intentionally. Certainly this technology can be used to produce even more powerful and resistant agents of biological warfare. Some even speculated that HIV (human immunodeficiency virus), the virus that causes AIDS, was intentionally produced. Though this hypothesis has been successfully refuted, the prospect remains that DNA recombinant technology has opened up a new field that can be used for evil.

However, we must be clear that this is not the fault of the technology itself. It is entirely human to shrink with fear away from things that we don’t understand. The first predictable reaction of tribal societies when faced with modern technology was to cower in fear. Something dreadful was about to descend upon them. Usually this didn’t happen and, with some education and familiarity, fear dissipated. But only human agents alone can make evil choices. Fire will heat our

homes and cook our food, but it can also kill indiscriminately in the hands of an arsonist. But fire itself is not evil.

What should concern us more than the advent of biotechnology is the growing popularity of a totally secular and naturalistic worldview. Naturalism contends that humans are just complicated animals. The end result of this assumption is that ethics becomes an exercise in simply determining what works, not what is right.

Biotechnology is powerful, indeed, but we cannot put the genie back in the bottle. Therefore we must engage the discussion as to how this technology can be used to cure disease and not become another snare to degrade and dehumanize people's lives.

Are We Playing God by Creating Organisms That Never Existed Before?

Unfortunately, the concept of playing God means different things to different people.{3} For some it may have nothing to do with God at all. They are simply expressing awe and wonder at the power that humans can wield over nature.

For some Christians, however, the notion of playing God carries a pietistic view of God's realm of activity versus that of the human race. In this context, playing God means performing tasks that are reserved for God and God alone. If this is what genetic technology does, then the concerns about playing God are justified. But what is often being reflected in this perspective is that God acts where we are ignorant and it should stay that way.

What is really at stake is fear, fear of what we may learn, fear of what new responsibility this new knowledge will put on our shoulders, and fear that this new knowledge will be used to harm us and not for the common good. The point was made that technology itself is not evil. Any technology can be used to further God's purposes or hinder them. People make those

decisions, not technology.

By the very fact that we are called to be stewards of God's creation (Gen. 1:26-28), we need to expand our knowledge of what God has made in order to better rule over His creation. Part of being made in God's image is our creativity. In this sense we "play God" by imitating Him. Our works of art, buildings, management of natural parks, and care for the poor, sick, and disadvantaged all imitate God for the good of His creation.

But we are still creating new creatures that did not exist before. Isn't God the only Creator in that sense? We seldom realize that we are hard-pressed to find in nature today the ancestors of nearly all the plants and animals we use for food or service. Our current varieties of corn, wheat, flowers, cattle, dogs, horses, etc., bear little resemblance to the original stock in nature. That is because we have selected and manipulated them over the millennia for our own purposes. We have already created animals and plants that never existed before. Genetic technology has greatly increased the specificity and power of our abilities, but the nature of what we can do is the same as before.

If we are to play God in the sense of imitating Him as we apply the truth of being created in His image and in exercising our appointment as stewards over all He has made, then we need to do so with humility and compassion. Our creative abilities should be used to enhance the condition of men and women as we struggle in a fallen world. Genetic technologies can and should be used to help alleviate or even cure the effects of genetic disease.

Is It Wrong to Combine Genes from Different Species?

Have you ever wondered if we should be transferring genes from one species to another at all? Does this in itself violate

some ethical principle? One gene does not define a species. Bacteria are composed of thousands of genes and it is estimated that humans possess as many as 100,000 genes. Therefore, transferring one gene from one organism to another does not create a hybrid in the traditional sense. Genes, remember, are composed of DNA. DNA is a molecule; it is not living in and of itself.

If the idea of adding something foreign to an organism is troublesome, just realize that we do this all the time when we take antibiotics, over the counter pain medications, and other synthetic medications. Our bodies would never come across most of these substances in nature.

What is different is that with genetic engineering, we have added something to a cell or organism that will change the composition of that cell or organism, possibly for as long as it lives, and is potentially passed on to future generations. It is reasonable to ask if we have the wisdom even to try to make these kinds of changes. No doubt, genetic technology provides a power never before possessed by human beings: to design intentionally or create a new variety of organism by altering its genetic structure.

Once again, the issues are, Which genes are actually being transferred? and, For what purpose? These questions, asked case by case, should rule our choices, not the inherent legitimacy of genetic engineering itself. Creating crops internally resistant to disease, particularly to help developing countries better feed their people, is a goal worthy of God's image-bearers.

However, intentionally manipulating the gene of a known pathogenic and deadly bacterium with the expressed intent of creating a biological weapon that is untreatable and incurable is a hideous evil. Kerby Anderson also warns that we need to consider the extent that genetic manipulation may cross over barriers God instituted in the created kinds.{4} If God felt

it important to create boundaries of reproduction that his creatures were to stay within, we ought not cross over them ourselves (Gen. 1:11, 12, 21, 24, 25).

It is certainly possible for genetically modified organisms created for agricultural and medical purposes to develop in ways not planned or foreseen. Therefore, it is necessary that proper and extensive tests be performed to assure, as much as possible, that no unnecessary harm will come to the environment or to humans. As vague as this prescription is, it only serves to reinforce the necessity of further education on the part of everyone to ensure that this powerful technology is used responsibly. We simply cannot afford to be ignorant of genetic issues and technologies and expect to contribute to the necessary discussion that lies ahead.

Notes

1. An excellent resource for Christians on this topic is *Genetic Engineering: A Christian Response*, Timothy J. Demy and Gary P. Stewart, eds. (Grand Rapids, MI: Kregel Publications, 1999)
2. *Gattaca*, a film by Andrew Niccol, A Jersey Films production, distributed by Columbia Pictures, 1997.
3. Allen D. Verhey, "Playing God," in *Genetic Ethics: Do the Ends Justify the Genes?* (Grand Rapids, MI: Eerdmans Publ. Co., 1997), 60-74.
4. J. Kerby Anderson, "The Ethics of Genetic Engineering and Artificial Reproduction," in *Genetic Engineering: A Christian Response*, Timothy J. Demy and Gary P. Stewart.

Why Does the University Fear Phillip Johnson?

Who Is Phillip Johnson?

Best-selling author Phillip Johnson has become the leader of the Intelligent Design movement. His books *Darwin on Trial, Reason in the Balance, Defeating Darwinism by Opening Minds* and the recently released *Objections Sustained* have become rallying points for Christian scholars across the academic spectrum. Johnson has addressed university audiences around the country, sometimes on his own, often in debate with a leading proponent of evolution. He has even addressed in private session entire science, law, and philosophy departments at top universities. Well, just who is Phillip Johnson and how does he rate such attention?

Johnson was raised in a nominally Christian family, but he grew to become a convinced skeptic of the faith. This process was greatly aided by his education, first as an undergraduate at Harvard and then at the University of Chicago Law School where he graduated first in his class. Johnson became convinced that people were basically good, education would solve whatever problems you had, the stuff of Sunday school was okay but mythology, and he could achieve success by thinking for himself and absorbing the culture around him.

This is the enticing picture the academic community paints for students and Johnson bought it. But things began to unravel in his mid-thirties. He had achieved his goals. He served as law clerk for Supreme Court Chief Justice Earl Warren and held a distinguished professorship of law at UC Berkeley, but he lacked fulfillment. He was publishing papers nobody read, or ought to read. His marriage to a beauty queen fell apart and he was single parenting for awhile. The writings of C. S.

Lewis had impacted him greatly, but he thought, “Too bad we can’t believe in that anymore.” Eventually he heard the gospel preached in a way that seemed plausible and attractive. Johnson envied the speaker’s combination of commitment and fulfillment. “Do I have something so wonderful?” he questioned. Johnson said, “They believed it, I could too.”

Johnson put his faith in Christ, but faced a dilemma. If the gospel is true, why are all the “intelligent” people agnostic? He prayed for insight. Beginning with a sabbatical at University College in London in 1987-88, Johnson embarked on an intellectual journey. This journey has developed into a project that has seen him publish four books, deliver hundreds of lectures on college campuses, and become the leader of the fledgling Intelligent Design movement over the last ten years. Primarily through his study of evolution, Johnson learned that the academic community’s primary intellectual commitment is to the philosophy of naturalism. If the “facts” contradict materialistic conclusions, then the “facts” are either explained away, ignored, or just plain wrong.

Therefore, evolutionists like Richard Dawkins can say things like “Biology is the study of complicated things that give the appearance of having been designed for a purpose,” and actually say it with a straight face. The appearance of design is an illusion, you see, because we “know” that organisms evolved and the primary reason we “know” this is because naturalistic philosophy demands it.

Johnson’s primary task seems to be continually provoking the scientific community into facing the reality of its naturalistic presuppositions. In earlier years, the scientific establishment was able to dismiss creationists and not officially respond. But when a tenured law professor from Berkeley starts messing with your head, people start answering back. The National Academy of Sciences has issued two publications in the last two years trying to stem the tide.{1} The cracks in Darwinian evolution are beginning to show.

What Could a Law Professor Say About Evolution?

What could a legal scholar possibly have to say about evolution? Many in the academic community have raised the same question as Phillip Johnson has visited their university. In his own words Johnson states: “I approach the creation-evolution dispute not as a scientist but as a professor of law, which means among other things that I know something about the ways that words are used in arguments.”{2}

Specifically what Johnson noticed was that both the rules of debate about the issue as well as the word *evolution* itself were defined in such a way as to rule out objections from the start. Science is only about discovering naturalistic causes of phenomena, therefore arguing against the sufficiency of natural causes is not science! Also the “fact of evolution” is determined not by the usual definition of fact such as collected data or something like space travel which has been done, but as something arrived by majority vote! Steven J. Gould said, “In science, fact can only mean ‘confirmed to such a degree that it would be perverse to withhold provisional assent.'”{3}

In the early chapters of *Darwin on Trial*, Johnson does an excellent job of summarizing the evidence that has been around for decades calling Darwinian evolution into question. These include problems with the mechanism of mutation and natural selection, problems with finding transitional fossils between major groups when they should be numerous, problems with the molecular evidence for common descent, and severe problems with any scenario for the origin of life.

In a chapter titled “The Rules of Science” Johnson excels in illuminating the clever web evolutionists have drawn to insulate evolution from criticism.{4} In order to limit discussion to naturalistic causes, science is defined in

purely naturalistic terms. In the Arkansas creation law decision, Judge Overton said science was defined as being guided and explained by natural law, testable, tentative, and falsifiable. Overton got this from the so- called expert testimony of scientists collected for the trial by the ACLU. These criteria were used against creation on the one hand to say that a creator is not falsifiable, and also that the tenets of creation science were demonstrably false. How can something be non-falsifiable and false at the same time?

The conflict enters in when one realizes that creation by Darwinist evolution is as un- observable as creation by a supernatural creator. No one has ever observed any lineage changing into another and the few fossil transitions that exist are fragmentary and disputable. “As an explanation for modifications in populations, Darwinism is an empirical doctrine. As an explanation for how complex organisms came into existence in the first place, it is pure philosophy.”{5}

In a chapter titled “Darwinist Religion” Johnson points out that despite the claims of scientists that evolution is secular, it is loaded with religious and philosophical implications. Most definitions of evolution emphasize its lack of purpose or goal. This makes evolution decidedly non-purposive in contrast to a theistic, purposive interpretation of nature. If it is the philosophic opposite of theism, evolution must be religious itself. Darwin himself constantly argued the superiority of descent with modification over creation. If scientific arguments can be made against theism, why can’t scientific arguments be made for theism?

Darwin on Trial continues to sell, to be read, and to influence those open to consider the evidence. Since Johnson is not a scientist his book is highly readable to the educated layman. If you have never picked it up, you owe it to yourself to read what has become a classic in the creation/evolution controversy.

Johnson Extends His Case against Evolution into Law and Education.

Over the years of speaking on the creation/evolution issue I have been asked many times why people get so upset over this issue. If it is just a question of scientific accuracy, why does it produce such emotional extremes? The answer, of course, is that the creation/evolution debate involves much more than science. At question is which worldview should hold sway in making public decisions.

In Phil Johnson's second book, *Reason in the Balance*, he makes this very point when he says, "What has really happened is that a new established religious philosophy has replaced the old one. Like the old philosophy, the new one is tolerant only up to a point, specifically, the point where its own right to rule the public square is threatened."{6}

The old philosophy Johnson speaks of is the theistic or Judeo-Christian worldview and the new philosophy is the materialist or naturalistic worldview. Johnson has referred to *Reason in the Balance* as his most significant and important work. That is because it is here that he lays the all important philosophical groundwork for the scientific, legal, and educational battleground of which the creation/evolution controversy is only a part.

That we no longer live in a country dominated by Judeo-Christian principles should be inherently obvious to most. But what many have missed is the concerted effort by the intellectual, naturalistic community to eliminate any possibility of debate of the worthiness of their position. On page 45 Johnson says,

> *"Modernist discourse accordingly incorporates semantic devices—such as the labeling of theism as religion and naturalism as science—that work to prevent a dangerous debate over fundamental assumptions from breaking out in the open.*

> *As the preceding chapter showed, however, these devices become transparent under the close inspection that an open debate tends to encourage. The best defense for modernist naturalism is to make sure the debate does not occur."*{7}

Johnson is quick to point out that there is not some giant conspiracy, but simply a way of thinking that dominates the culture, even the thinking of many Christians.

Therefore, in the realm of science when considering the important question of the existence of a human mind, only the biochemical workings of the brain can be considered. Not because an immaterial reality has been disproved, but because it is outside the realm of materialistic science and therefore not worth discussing. Allowing the discussion in the first place lays bare a discussion of fundamental assumptions, the very thing that is to be avoided.

In education, "The goal is to produce self-defining adults who choose their own values and lifestyles from among a host of alternatives, rather than obedient children who follow a particular course laid down for them by their elders."{8} The reason, of course, is if God is outside the scientific discussion of origins, then how we should live must also exclude any absolute code of ethics. This also precludes the underlying assumptions from being discussed.

In law, naturalism has become the established constitutional philosophy. Rather than freedom *of* religion, the courts are moving to a freedom *from* religion. The major justification is that "religion" is irrational when it enters the domain of science or a violation of the first amendment in public education. "Under current conditions, excluding theistic opinions means giving a monopoly to naturalistic opinions on subjects like whether humans are created by God and whether sexual intercourse should be reserved for marriage."{9} What then are the strategies for breaking the monopoly?

Can Darwinism Be Defeated?

The main thing Christian parents and teachers can do is to teach young thinkers to understand the techniques of good thinking and help them tune up their baloney detectors so they aren't fooled by the stock answers the authorities give to the tough questions.{10}

So says Phillip Johnson in his recent book, *Defeating Darwinism.* (For a fuller review see Rick Wade's article, Defeating Darwinism: Phil Johnson Steals the Microphone.) Johnson is at his best here, relaying the many semantic and argumentative tricks used to cover up the inadequacies of Darwinism. In the chapter "Tuning Up Your Baloney Detector," Johnson introduces the reader to examples of the use of selective evidence, appeals to authority, ad hominem arguments, straw man arguments, begging the question, and lack of testability. This chapter will give you a good grasp of logical reasoning and investigative procedure.

Johnson also explains the big picture of his strategy to weaken the stranglehold of Darwinism on the intellectual community. He calls it *the wedge*. Darwinism is compared to a log that seems impenetrable. Upon close investigation, a small crack is discovered. "The widening crack is the important but seldom recognized difference between the facts revealed by scientific investigation and the materialist philosophy that dominates the scientific culture."{11} In order to split the log, the crack needs to be widened. Inserting a triangular shaped wedge and driving the pointed end further into the log can do this. As the wedge is driven further into the log, the wider portions of the wedge begin widening the crack.

Johnson sees his own books as the pointed end of the wedge, finding the crack and exposing its weaknesses. Other books in these initial efforts would certainly include the pioneering works of Henry Morris,{12} Duane Gish,{13} Charles Thaxton,{14} and even the agnostic Michael Denton.{15}

Following close behind and fulfilling the role of further widening the crack are the works of J. P. Moreland,{16} Michael Behe,{17} and William Dembski.{18} What is needed now to widen the crack further and eventually split the log are larger numbers of theistic scientists, philosophers, and social scientists to fill in the ever widening portions of the wedge exposing the weaknesses of naturalistic assumptions across the spectrum of academic disciplines.

Here Johnson's strategy meshes nicely with Probe Ministries. Much of our energy is spent educating young people in a Christian worldview through Mind Games Conferences, the ProbeCenter in Austin, Texas, and our website (www.probe.org). We share with Johnson the joy of encouraging and opening doors for young people in the academic community. Johnson says,

> *"If you know a gifted young person, help him or her to see the vision. Those who are called to it won't need any further encouragement. Once they have seen their calling, you had better step out of the way because you won't be able to stop them even if you try."{19}*

There is also an inherent risk in all this. Teaching young Christians to think critically and have the courage to join this exciting and meaningful cultural battle means they will also begin to examine their own faith critically. Some may even go through a period of doubt and deep questioning. While this may sound threatening, we shouldn't shy away. If Jesus truly is the way, the truth, and the light then any "truth" exposed to the light will endure. Our children will be stronger having put their faith to the test. The reward of possibly making a directional change in our downward spiraling culture is worth the risk.

Johnson Responds to the Intellectual

Elite

One of the reasons that Phillip Johnson has become a leader in the Intelligent Design movement is the combined effect of his tenured position on the law faculty of the prestigious University of California at Berkeley and his deftness and sheer enjoyment in taking on the power brokers within the established halls of academia. Johnson has traveled extensively in the U.S. and abroad. He has also lectured and debated before university audiences and faculties. His knowledge of debate, concise prose, and his likeable demeanor allows him to bring the issues to the table skillfully. Many are able to think clearly about these issues for perhaps the first time.

Another avenue Johnson has pursued with great success has been to write articles and review books for some of the leading magazines and newspapers in the country. Johnson's fourth book, *Objections Sustained: Subversive Essays on Evolution, Law & Culture,*{20} is a collection of his essays since the publication of *Darwin on Trial* in 1991. While most of the essays in the book were originally published in either the journal *First Things* or the paper *Books and Culture*, Johnson's pen has also been found in the pages of *The Atlantic, The Wall Street Journal, The Washington Times, The New Criterion,* and many other national and local magazines and newspapers. He has openly challenged some of the leading spokesmen for naturalistic evolution such as Stephen J. Gould and Richard Lewontin of Harvard, Richard Dawkins of Oxford University, and Daniel Dennet from Tufts University.

The point of all this is to draw the Darwinists out into the open where the debate can be seen and heard by all who are interested. Previously, creation was routinely dismissed as religion, but Johnson is not so easily swept aside since he has been able to expose the house of cards behind the bluster of Darwinism. The debate has crept more and more out in the

open.

Two examples come to mind. First, the National Association of Biology Teachers (NABT) was caught with its hand in the cookie jar. In 1995, they released a statement about evolution describing it as, among other things, unsupervised and impersonal. Such theological/philosophical concepts should have no place in a "scientific" statement. A storm of controversy sparked both within and outside the teachers' ranks culminated in a reconsideration of the statement by the NABT board. At first the board voted unanimously to uphold the statement, and then a few days later, voted to remove the offending words. The *New York Times* remarked that "This surprising change in creed for the nation's biology teachers is only one of many signs that the proponents of creationism, long stereotyped as anti-intellectual Bible-thumpers, have new allies and the hope of new credibility."{21}

Second, the prestigious National Academy of Sciences has published two official publications attacking creationism{22} and supporting the teaching of evolution.{23} Rather than taking its critics head-on, these two books timidly revert to old and tattered evidences and appeals to authority. For instance, the National Academy boldly asserts that "there is no debate within the scientific community over whether evolution occurred, and there is no evidence that evolution has not occurred."{24}

Science and Creationism says on the one hand, "Scientists can never be sure that a given explanation is complete and final."{25} But evolution cannot really be questioned because "Nothing in biology makes sense in biology except in the light of evolution."{26} Such obfuscation is now officially in the open arena—precisely where Johnson has been trying to force it to appear. The next ten to fifteen years promise to be exciting. I hope you continue to read Phillip Johnson and observe the ever broadening wedge drive deeper into the chinks of the Darwinian armor.

Notes

1. National Academy of Sciences, *Teaching About Evolution and the Nature of Science* (Washington, D. C.: National Academy Press, 1998), 140. Available online at http://www.nap.edu/readingroom/books/creationism/. National Academy of Sciences, *Science and Creationism: A View from the National Academy of Sciences* (Washington D. C.: National Academy Press, 1999), 35. Available online at http://www.nap.edu/readingroom/books/evolution98.

2. Phillip Johnson, *Darwin On Trial* (Downers Grove, IL: InterVarsity Press, 1991), 8.

3. Stephen J. Gould, "Evolution as Fact and Theory" in *Hen's Teeth and Horse's Toes* (New York: W. W. Norton, 1983), 255.

4. Johnson, *Darwin on Trial,* 111-122.

5. Ibid., 115.

6. Phillip E. Johnson, *Reason in the Balance: The Case Against Naturalism in Science, Law and Education* (Downers Grove, IL: InterVarsity Press, 1995), 37.

7. Ibid., 45.

8. Ibid., 157.

9. Ibid., 29.

10. Phillip E. Johnson, *Defeating Darwinism by Opening Minds* (Downers Grove, IL: InterVarsity Press, 1997), 116.

11. Ibid., 92.

12. Henry Morris, *Scientific Creationism* (San Diego: Creation-Life Publishers, 1974).

13. Duane Gish, *Evolution: The Fossils Say No!* (San Diego: Creation-Life Publishers, 1972).

14. Charles B. Thaxton, Walter L. Bradley, and Roger L. Olsen, *The Mystery of Life's Origin* (New York: Philosophical Library, 1984).

15. Michael Denton, *Evolution: A Theory in Crisis* (Bethesda, MD: Adler and Adler, 1986).

16. J. P. Moreland, ed., *The Creation Hypothesis: Scientific Evidence for an Intelligent Designer* (Downers Grove, IL: InterVarsity Press, 1994).

17. Michael Behe, *Darwin's Black Box: The Biochemical Challenge to Evolution* (New York: The Free Press, 1996).

18. William A. Dembski, *The Design Inference: Eliminating Chance through Small Probabilities* (New York: Cambridge University Press, 1998.) And, William A. Dembski, ed., *Mere Creation: Science, Faith and Intelligent Design* (Downers Grove, IL: InterVarsity Press, 1998).

19. Johnson, *Defeating Darwinism,* 96.

20. Johnson, *Objections Sustained: Subversive Essays on Evolution, Law & Culture* (Downers Grove, IL: InterVarsity Press, 1998).

21. Quoted in Johnson, *Objections Sustained*, p. 88.

22. *Science and Creationism,* see note 1.

23. *Teaching about Evolution and the Nature of Science,* see note 1.

24. Ibid., 4.

25. *Science and Creationism,* 1.

26. Ibid., ix.

Cloning and Genetics: The Brave New World Closes In

Is Dolly Really a Clone?

When the creation of Dolly, the first mammal cloned from adult cells, was first announced in February of 1997 there was a storm of publicity and controversy. While many wondered about the purpose of animal cloning and the possibilities such a success held for further animal applications, others were more concerned about the possible application to human beings. If we can clone sheep, can we clone humans? Should we clone humans? Why should we clone humans? Should humans be cloned to provide a baby for childless, infertile couples? Should we clone humans for embryo research? Should we clone humans to make extra copies of people with good genes? Would clones have a soul? While I answered these and other questions about human cloning in my article Can Humans Be Cloned Like Sheep? in retrospect, there was one question that was virtually ignored at the outset: Was Dolly a true clone?

Looking back, this appears to be a legitimate question that should have been more obvious. After all, Dolly was the only success amid 276 failures. There were 277 cell fusions made, with only 29 growing as embryos. All 29 were implanted into 13 ewes with only one pregnancy and one live birth. Dolly really beat the odds. There was also the fact that Dolly was not cloned from a currently living adult. Dolly's older twin had been dead for several years. Some of her tissues were harvested and kept frozen in the lab, so there was no live animal with which to compare Dolly.

Dolly's authenticity was formally challenged in a January 30,

1998 letter to the editor of the journal *Science*{1}. The authors offered seven reasons for skepticism concerning Dolly's identity as a clone of an adult cell. Among them was the fact that Dolly was alone and not yet joined by another adult clone from the Roslin Institute or any other laboratory. Also, though omitted by the original paper, it had been learned that the original sheep had been pregnant when the tissues were removed, raising the possibility that Dolly was cloned from a fetal cell rather than an adult cell. In addition, the questioning scientists called for additional genetic tests to establish Dolly's identity.

Although Ian Wilmut, the Scottish scientist who is Dolly's co-creator, admitted that Dolly might be a one in a million fluke, he and others were busy performing genetic tests to fully establish that Dolly was an authentic clone from an adult cell. Other labs had so far failed to duplicate Wilmut's success after hundreds of tries. This may not be so unusual since Dolly was the only success out of 300 nuclear transfers and the real odds may be as high as one in 1000. There was no way to know for sure. Wilmut may have gotten lucky indeed to achieve success after only 300 tries.{2}

A pair of papers in the British journal *Nature*{3} remedied much of the concern over Dolly's authenticity. DNA microsatellite and DNA fingerprinting analyses conclusively demonstrated that Dolly was an identical DNA copy of the cells of a 6-year-old ewe and not a clone of the fetus carried inside that ewe.

Cloning Mice Makes Cloning Humans More Feasible

Even with the clear success of cloning sheep, which Dolly's appearance and confirmation make plain, many doubted that the technology used to produce Dolly could be applied to humans. This skepticism was largely due to the universal failure to

clone mice from adult cells.

Mice have a number of advantages as experimental animals for cloning. The gestational time in mice is very short—a matter of weeks, their embryos are easier to manipulate than sheep and cows, and their genetics are already well understood.{4} But it was widely recognized that the early development of mice and sheep is significantly different. In sheep, the DNA in the newly formed nucleus remains dormant for several days. This was suspected to provide time for the DNA to be reprogrammed from its original function to embryonic functions. Mice, on the other hand, begin using the DNA in the newly formed nucleus after just 24 hours. It was thought that this might prove to be insufficient time for the DNA to be reprogrammed.

However, this too has been overcome, and in dramatic fashion. In July of 1998, *Nature* published results by T. Wakayama, working in Hawaii, documenting the cloning of mice.{5} And not just one mouse, but over 50 mice. Three successive generations were cloned, raising the conundrum that the "grandmother" was the twin sister of the "granddaughters."{6}

But what did Wakayama and his colleagues do that was different to bring about success? Strangely enough, no one is really sure. Apart from a few tricks of timing, the major difference seems to be that they used a cell type that no one had used before, and it worked! As an aside, Wakayama tried other adult mouse cells (neurons and testicular cells) that only brought about the usual negative results.

But they also tried cumulus cells. Cumulus cells are a non-growing group of cells that surround an egg cell after it is released from the ovaries. This served to confirm the suspicion that adult cells need to be quiescent, or non-growing, to be successful in cloning experiments. Still, the nuclear transfer technique employed by Wakayama was successful between 2 and 3% of the time using cumulus cells. This rate of

success is ten times better than the technique that led to Dolly, but still very low, making the process tedious.

The success with cumulus cells is why the first cloned mouse was named Cumulina. It is also interesting that only cells from females have been successful in cloning attempts thus far. This could be problematic. For, you see, if all you need is a quiescent adult cell, an egg, and a womb, well, male involvement isn't really necessary. Perhaps it's best not to speculate what, if anything, this may mean in the future.

For many, the real significance of successful mouse cloning techniques is its application to humans. The early stages of embryonic development are very similar in mice and humans. Therefore, many believed that since cloning mice seemed next to impossible because of the early onset of DNA activity in mice and humans, cloning humans would also remain technologically impossible. Cumulina and her sisters have changed all that.

What Will Animal Cloning Be Used For?

So now we can clone sheep and mice. Apart from the possibilities for humans, what's the big deal? Why are scientists and pharmaceutical companies spending so much time and money trying to clone animals? Quite simply, the combination of the possible relief of human suffering from genetic disease with the potential to turn a handsome profit makes animal cloning nearly irresistible.

In the December 1998 issue of *Scientific American*, Ian Wilmut spells out some of the potential uses of animal cloning.{7} Principally, cloning will be used to create large numbers of what are called transgenic animals. Transgenic animals are genetically engineered to contain genes from another species. Wilmut and his colleagues created Dolly in an attempt to discover a more reliable method of reproducing transgenic sheep.

Creating transgenic animals is very tedious, difficult, and risky work. The Roslin Institute and PPL Therapeutics, for whom Wilmut works, transferred into sheep the gene for human factor IX, a blood- clotting protein used to treat hemophilia. With the proper genetic enhancement, sheep will produce this blood-clotting factor in their milk, which can then be harvested and sold on the market. The first transgenic sheep produced this way, Polly, was born in the summer of 1997. It is actually simpler to clone Polly than it would be to create another transgenic sheep through gene transfer.

Cloning offers many other possibilities for reproducing other kinds of transgenic animals. One is the production of animals containing transgenic organs suitable for organ transplants into humans. Pig organs are just about the right size for transplantation into humans. However, a pig heart, or liver, or kidney, would be severely and quickly rejected by our immune system. However, if the right human genes could be transferred into pigs, the organs they produce would be recognized as a human organ and not a pig organ. There would still be the problems associated with any organ transplant between humans, but these are much more manageable than cross-species immune rejection. At present, thousands die every year waiting for organs to become available. Cloning such transgenic animals could create a large and renewable source of organs for transplant.

Transgenic animals could also be created for research purposes to study human genetic diseases. Transferring defective human genes into appropriate animal hosts could produce more workable research vehicles for discovering new treatments and cures not possible using human subjects. Cloning of transgenic animals may also prove useful to create cells helpful in treating human diseases such as Parkinson’s disease, diabetes, and muscular dystrophy. In addition, cloning could be used to produce highly productive herds of sheep, cows, and pigs from animals that are already known to be excellent milk, meat, and

leather producers.

Obviously, the uses of animal cloning seem limited only by our imaginations. Of course, if you are already opposed to the use of animals in experiments, or even in their use for food, these ideas are fraught with ethical difficulties. As a Christian, however, I have answered this question. The Lord Himself produced the first skins for humans in Genesis 3:21 and later after the flood, the Lord allowed animals to be used for food (Gen. 9:2-4). While the utmost of care needs to be given to ensure that God's creatures, for whom we have been given responsibility (Gen. 1:26-28), do not suffer needlessly, the Lord clearly allows animals to be used to enhance our own lives, even if it costs them theirs.

New Uses for Human Embryo Research?

What if I told you that recent breakthroughs in human genetic research might make it possible to dramatically treat patients with Alzheimer's, Parkinson's, heart disease, diabetes, spinal cord injury, and a host of other degenerative diseases? In some cases, these treatments may actually cure many of these diseases and would not require the use of cells obtained from aborted fetuses. Hopefully, I've got your attention.

The November 6, 1998 issue of Science{9} announced the first successful attempts to cultivate human embryonic stem cells that have the potential to treat all the above diseases and more. However, they come with their own set of difficult and perhaps more serious ethical concerns.

First, just what are embryonic stem cells? Stems from plant seedlings give rise to all sorts of different structures such as trunks, branches, leaves, flowers, and eventually seeds and fruits. Animal embryonic stem cells do much the same thing. Stem cells have the potential to grow into just about any tissue that is present in the adult organism. Researchers call this potential totipotency, meaning they are potent to produce

all tissues. Embryonic stem cells have been isolated from mice since the early ’80s. Such research has been impossible in humans for ethical reasons. Stem cells only come from embryos in the earliest stages of development.

No one was willing to simply use embryos to obtain stem cells, thus killing the embryo, every time stem cells were needed. But, if stem cells could be isolated and cultivated in the laboratory so they could grow and divide and maintain their stem cell functions, then a continual supply could be maintained without risk to further embryos. What is called a stem cell line would effectively be created that could be used indefinitely. This research was greeted with such comments as “extremely important,” “very encouraging,” and “a major technical achievement with great importance for human biology.”{10}

What you may have noted in the above description is that a human embryo must still be used to create this stem cell line. In fact, the study reported in Science indicates that thirty-six embryos obtained from in vitro fertilization clinics in Madison, Wisconsin and Israel were used to create five stem cell lines. The embryos were obtained with the consent of the individuals whose eggs and sperm were used to create them and the approval of the local institutional review board.

The major concern expressed so far is for the legality for other labs to use these cells. Since there is a ban on the use of federal funds for research involving tissues derived from human embryos, this research was carried out using private funds from Geron Corporation, a Menlo Park, California biotechnology firm. The availability of these stem cell lines now raises the question of whether these cells can be used by other labs currently funded by government grants. Predictably, one researcher is applying for grant money to use these stem cells to deliberately test, and hopefully repeal this restriction.{11}

Proponents of stem cell research criticize the federal ban by suggesting that this leaves the government out of the regulatory picture since no guidelines have been issued for private research. I agree that the lack of guidelines for private industry is an oversight, but opening up government funding is not the answer. The ban should remain in force. Guidelines need to be issued that forbid this important work as long as human embryos are sacrificed to produce these cell lines. Research in animals should be encouraged to see if stem cells could be produced by other means. The end does not justify the means.

The Prospects for Human Cloning: The Enigma of Dr. Richard Seed

I am frequently asked how soon I think the first human clone will be produced. I usually respond that somewhere in the world within the next five to ten years, someone will announce the creation of the first human clone. But if we are to believe Dr. Richard Seed, the first human clone will appear before the year 2001. In December 1997, Dr. Richard Seed, physicist turned fertility specialist, announced that he intends to clone human beings. He said, “I know of at least fifteen people who want to clone humans, but haven’t got quite up the nerve to do it.”{12} When asked if he had the nerve, Seed replied, “I have the nerve.”

Richard Seed appeared in the news again in September of 1998 when he announced his plans to clone himself in two years and that his wife agreed to carry the baby!{13} Seed reported that he had received hundreds of calls from individuals that want either themselves or their dying children cloned. Seed thinks this is a first step to human immortality. On January 7, 1998 Seed affirmed on ABC News Nightline his remarks from a National Public Radio interview, that cloning technology will allow us to “become one with God. We are going to have almost as much knowledge and almost as much power as God.”{14}

Right now you're probably thinking this guy is a kook. Why worry about him? Well, that's precisely why we need to pay attention to him. He has the ability; he perfected embryo transfers in humans. He certainly has the motivation and nerve, and he is still seeking the cash to carry it out. But if he is accurate in the number of calls he has received, money may not be a problem for long. And even if the U.S. Congress passes a bill banning human cloning, Seed has said he will move his operation to Tijuana, Mexico.

People like Richard Seed fully explain why I believe someone, somewhere in the world will produce a human clone very soon. The question is, Are we going to just throw up our hands and surrender, or will we continue to stand up for the sanctity of human life and the sacredness of the human embryo?

If we don't think this through carefully and organize a cogent response to this threat to human dignity, the attitude of people like Prof. James Robl at the University of Massachusetts at Amherst will prevail. He said:

> *There is no clear-cut definition for what is life. And this is something, I think, that society is going to have to think about, is going to have to make some definitions, and those definitions may not be permanent, they may change as new technologies are developed. There is a fine line, and the line, at the early stages, is really based on your intentions of what they are to be used for as opposed to necessarily what they are. So the question of what is life seems to change, I think, in people's minds based on what their concerns are or their own interests are in how we might use whatever it is we are producing.{15}*

What Professor Robl calls for is an entirely utilitarian ethic. We define life, he says, based solely on what new technologies we develop. If a new technology, such as cloning or human stem cell production from human embryos becomes

available, yet this technology threatens human dignity, we simply redefine human life to encompass the new technology. This is the frightening specter of a brave new world. We must oppose it and we must articulate why.

Notes

1. Vittorio Sgaramella and Norton D. Zinder, “Letters,” *Science* 279, 30 January 1998, 635-636.
2. J. Madeleine Nash, “Was Dolly a mistake?” *Time*, 2 March 1998, 65.
3. D. Ashworth, M. Bishop, K. Campbell, A. Colman, A. Kind, A. Schnieke, S. Blott, H. Griffin, C. Haley, J. McWhir, and I. Wilmut, “DNA microsatellite analysis of Dolly” *Nature* 394, 23 July 1998, 329. E. Signer, Y. Dubrova, A. Jeffreys, C. Wilde, L. M. B. Finch, M. Wells, and M. Peaker “DNA Fingerprinting Dolly” *Nature* 394, 23 July 1998, 329-330.
4. Davor Soltor, “Dolly is a Clone—And No Longer Alone” *Nature* 394, 23 July 1998, 315-316.
5. T. Wakayama, A. C. F. Perry, M. Zucotti, K. R. Johnson, and R. Yanagimachi, “Full-term Development of Mice from Enucleated Oocytes Injected with Cumulus Cell Nuclei” *Nature* 394, 23 July 1998, 369-374.
6. Rachel K. Sobel, “Copying a Multitude of Mice: Cloning is No Fluke; Wooly Mammoths Next?” *U. S. News and World Report*, 3 August 1998, 52.
7. Ian Wilmut, “Cloning for Medicine” *Scientific American* 279, no. 6 (December 1998): 58-63.
8. James A. Thomason, J. Itskovitz-Eldor, S. Shapiro, M. Waknitz, J. Swiergiel, V. Marshall, and J. Jones. “Embryonic Stem Cell Lines Derived from Human Blastocysts” *Science* 282, 6 November 1998, 1145-1147.
9. Declan Butler, “Breakthrough Stirs US Embryo Debate” *Nature,* 396, 12 November 1998, 104.
10. Ibid.
11. Dr. Richard Seed, Quoted on the Fox News Channel program, Trends, 8 December 1997.

12. http://www.boston.com/dailynews/wirehtml/250/Chicago_physicist_says_he_ll_clone_.shtml. 9/8/98.
13. Dr. Richard Seed, Quoted on ABC News *Nightline,* 7 January 1998.
14. James Robl, Quoted in *The Cloning Revolution,* Films for the Humanities and Sciences (1998), Box 2053, Princeton, NJ 08543-2053.

Being a Christian in Science

Rich Milne covers an excellent book by Walter Hearn, both a Christian and a scientist, giving perspective and advice on how to be a Christian in the science field.

Being a Christian in Science

"Carl Sagan is a friend of mine. He said that if Jesus ascended literally and traveled at the speed of light, he hasn't yet gotten out of our galaxy."{1}

So said Episcopal Bishop John Spong, when asked if he believed that Jesus had ascended into heaven. This is an example of the worst kind of mixing of science and Christianity.

In this essay we are considering how to live with integrity as both a Christian and a scientist. Books about science and Christianity are published every month, but they are usually difficult to read and seldom easy to apply. Walter Hearn dynamites those stereotypes in his new book, *Being a Christian in Science*.

Hearn's book is the result of having been a Christian from

childhood, and a scientist for much of his working life. His desire is for Christians to enter into science and make a career of it. But he also wants anyone who enters this road to know what joys and obstacles lie ahead around the many bends. His book is by turns intensely practical and deeply devotional.

Ever since Darwin, many Christians have been uncomfortable around science. Many of us have the feeling that science is trying to do away with the need for God. Most of us have heard scientists like Carl Sagan, speaking far from their field of expertise, make grand pronouncements like "The universe is all that is, or was, or ever will be." Is it possible for Bible-believing Christians to also be committed scientists?

Hearn's book, *Being a Christian in Science*, does not try to deal with creation/evolution issues, or chance vs. design arguments, or even science vs. God questions. Instead, his clear and heartfelt focus is on questions such as, How do you work as a scientist if you are also a Christian? What is science like as a profession? Can I really pray in the laboratory?

At the outset it is important to distinguish between a "Christian Scientist," with a capital S, and a "Christian scientist." In the first pages of the book, Hearn, a life-long chemist and editor, separates what science can and cannot do. Science can in no way establish the claim that nothing supernatural or eternal is real. When such a claim is made, it is not scientific but scientistic.{2} While this is not the book's emphasis, Hearn is very clear about what the limits of science are, and as Christians we must think clearly about what science can and cannot do.

Using *Being a Christian in Science* as a basis, we will look at what scientists really do, why Christians might spend their lives in science, and what resources there are for believers who make science their chosen career. My hope is that you will

see, not only the value of science, but, if you are a Christian young person who already loves science, you will see that this is a vocation to which God may be calling you. Science is changing the shape of our world and we need Christian scientists just as much as we need Christian teachers, or carpenters, or missionaries.

What Do Scientists Do, Anyway?

Many Christians are not too sure what scientists do, and fairly sure they don't want to know. As Walter Hearn pointedly observes in his book, "Evangelical churches that send missionaries around the world seldom see the 'World of Science,' or scholarship in general, as a mission field."{3} Too many Christians seem to see scientists as "the enemy" with little thought of what they do or how they might be reached with the Gospel.

What is a Christian? Someone who believes in Jesus. Yes and no. What is a scientist? Someone who believes in science. Again, yes and no. A Christian believes that Jesus is the answer to certain questions about how we can be forgiven and stand before a holy God, questions about how we can know what will happen to us when we die. As a Christian, have you ever thought about being a scientist? Just what is a scientist, anyway?

A scientist believes that science is a "group of methods for solving a particular kind of problem."{4} Science is not just a list of facts or theories, it is a way to understand the natural world by observing, experimenting, and then attempting to find cause and effect relationships. Scientists are fascinated by the world around them. They long to understand more than what we already know about this complex and intricately connected world we live in. A scientist knows we have few of the answers, and he or she sets out to at least try to ask the right questions so that we can learn more about how things work, and how this wildly diverse world fits

together.

What does it take to be a scientist? Walter Hearn, himself a lab chemist for twenty years, gives a disarmingly simple answer to this question. A scientist needs "curiosity about nature, intelligence, perseverance, common sense, and better-than-average conceptual ability. . . . Flexibility is another important characteristic."{5} This is a little like saying "Just have faith" to someone about to enter a long spiritual trial. What he does not say is how hard it can be to maintain these admirable traits on a day-to-day basis in the face of what much of science really is.

Mathematicians can look at the same set of equations for months before they see the relationship between them. Biologists can do the same or nearly the same experiment dozens of times over weeks and months, before they see the result they hoped might happen. Geologists may spend months in the field gathering data, unsure of how they will ever make sense of the big picture. Much of science is daily hard work, often without knowing whether you are succeeding or failing, and then, occasionally, the "aha" moment when things suddenly fall into place and you have one more small stepping stone across the wide expanses we know little or nothing about. Would you still like to be a scientist?

Next we will consider why God might call people to be full time scientists and how a Christian might live out such a calling. There are no easy answers, but if you enjoy science, God might well call you to be one of the bridges in the twenty-first century that allows Christians and scientists to understand one another. It is a critically important calling.

How Can a Believer Live as a Christian in Science?

"Avoiding profane and vain babblings, and oppositions of science falsely so called, which some professing have erred

concerning the faith." (1 Tim. 6:20-21, KJV)

Misunderstanding Paul's admonition to Timothy has left many Christians skeptical of science. After all, don't most scientists believe Darwin, and didn't Darwin disprove the need for God? Why should Christians waste their time on science?

In his wonderfully gentle-tempered book Being a Christian in Science, Walter Hearn offers a quotation from a Christian physics professor that capsulizes this feeling as it applies to a broad range of academic pursuits:

> *One hears Christians speak proudly of their sons or daughters who have married seminary students or missionaries. . . [But] I have yet to hear a Christian father speak proudly of his son or daughter marrying a graduate student. No wonder our young people are discourage from entering the rigorous life of learning and research.{6}*

Christians could once justly claim to be leaders in most intellectual arenas. Modern science is widely acknowledged to have its roots in a Christian perspective on nature. If we believe that God created the world we live in, then shouldn't we be involved with the scientists who are exploring it?

We have already spoken briefly of some of the personal characteristics that many scientists share. If God is calling you to a life as a scientist it is likely that He has also given you the gifts or talents that it takes to work as a scientist. Have math and science classes gone well for you in school? Do you feel some drive to find out more than what you already know about outer space or inner space? What would life be like as a scientist?

Being a Christian in Science spends several chapters on questions like "What to Expect" and "Science as a Christian Calling." Perhaps the most difficult situation is being misunderstood by both scientific colleagues and other

Christians. Christians in science live between two cultures. As Hearn warns: “Christians in science are people with two strong allegiances, holding citizenship in two distinct communities.”{7}

The scientific community sets a very high premium on good work. Hearn writes of the importance for Christians who are also scientists not only to make clear their faith in Jesus Christ, but also to be committed to doing really good science. One author found that many Christian graduate students felt guilty about how much time they spent in the laboratory or the library, because it took time away from other Christian activities. They seemed to feel that “their professional work clearly did not have the same value in God’s sight as their Christian ‘witness.'”{8}

If God is calling you into scientific work, you must not only love scientific work, you must have an assurance that your work will be a way to serve God with your life. And this is where you may feel under attack from your Christian friends.

Most of us are used to the idea that the world needs Christian salespeople and Christian mechanics and Christian lawyers. If scientists are to be reached with the good news of Jesus Christ, the church must see that scientists too are a mission field, and, like most mission fields, they are best reached by the “natives,” other scientists.

In the next section we will consider some of the controversies that await a Christian entering science, and how a believer might respond to them.

Caution, Controversies Ahead

“Scientists may not believe in God, but they should be taught why they ought to behave as if they did.”{9}

Max Perutz, with a Nobel prize in chemistry, made this statement several years ago in response to critical remarks

about Cambridge University establishing a Lectureship in Theology and Natural Science. Richard Dawkins, outspoken biologist and atheist, could barely contain himself in an editorial letter about the same lectureship: “The achievements of theologians don’t do anything, don’t affect anything, don’t achieve anything. What makes you think that ‘theology’ is a subject at all?”{10}

Being a Christian in our culture is often not politically correct. Christians often see scientists as not being biblically correct. So, if you intend on being a Christian scientist, controversy likely awaits you. How can you respond?

Walter Hearn has a chapter entitled “What to Expect.” It has much hard-won advice, and he skillfully raises a number of issues while carefully avoiding taking sides. Hearn seems preeminently the peacemaker in both this chapter and the whole book.

One of Hearn’s suggestions is to learn to live cross-culturally. A missionary to Africa may learn another language, and must understand a new culture well enough to explain the Bible in ways that make sense to those people. So, too, a Christian scientist must learn to explain the beliefs of Christians to unbelieving scientists. But at the same time, he or she must also learn how to explain the workings of science to Christians suspicious of the pronouncements of scientists. And the two different funds of knowledge make fundamentally different requirements on those who hear. Hearn summarizes: “Scientific conclusions generally take the form of statistical generalities making no demands on the knower. In contrast, the moral aspect of religious knowledge puts doing the truth on a par with knowing the truth.”{11}

A second simple statement of great insight is, “It may be wise to step back from some issues even when people whom we admire are passionate about them.”{12} Hearn follows his own advice as he discusses Phil Johnson and his critiques of Christian

scientists who accept the whole of evolutionary theory and then have God direct evolution. Hearn does a masterful job of stepping back from this issue and presenting mostly the views in favor of Johnson's position. At the very least he is demonstrating another characteristic of a peacemaker: being willing to listen to and understand the criticism of those who disagree.

One area Hearn discusses at some length is the growing crisis in ethics among scientists. This is exactly the point of the quotation at the beginning of this section. As science has disowned God, it has also lost any rock on which to anchor a sense of right and wrong conduct. This is where Christians have much to contribute to the discussion. The Bible gives us a basis for deciding right and wrong that science is sorely missing. But it will be primarily in our daily work as scientists that we will show what a biblical framework for ethics looks like.

Hearn makes the wonderfully sensible suggestion of keeping our Bible among the reference works at our desks. All of us, whether scientists or not, need to live more clearly by the book we claim as our authority.

Christians in Science Have a Godly Heritage to Follow

Being a Christian in Science may frustrate some people. Some will find themselves wondering why he doesn't take a more clear-cut stand on certain issues. Others will want Hearn to be more specific. But the often inconclusive stance of the book is also what allows Hearn to be so conciliatory in tone. On almost every issue he touches he allows as much diversity as he feels he possibly can. He is never strident, almost never critical, always positive or at most questioning. He models the role of a peacemaker in the midst of controversies that are dividing both the church and the scientific

community.

Some of the best material in the book Hearn saves for last. In his chapter “Good Company” he gives us his personal Hall of Fame and Encouragement. Much like Hebrews 11, Hearn considers the lives of other Christians who have gone before him and lived the Christian life in the midst of the scientific community. Some are dead, some are newly arriving on the scene. All he considers friends. What unites them is their commitment to the work of science and their service for the God they love. It is both an encouraging and challenging chapter. There are men and women, a Nobel laureate, and the head of the government’s Human Genome Project. There are mathematicians and biochemists, teachers and astronomers. Some are members of the National Academy of Sciences, the most prestigious group of scientists in America. But all of them, Hearn tells us, “Have contributed to science . . . while clearly identifying themselves as Christian believers.”{13}

Another feature of the book is its short but intensely practical suggestions for living out what we believe. Stuck in a meeting that is starting late? Don’t waste the time, says Hearn—pray for each person around the room or table, bringing each before the Lord. Don’t know how to pray for someone? Perhaps this is a sign you need to spend more time listening to that person.

Possibly the most valuable part of the book are the resources mentioned throughout the text and then richly documented in the notes at the end of the book. Hearn describes how to develop a web of friends who can be a support when experimental work is going badly or when spiritual encouragement is needed. He also shows how the ubiquitous World Wide Web is opening up a whole new frontier of both information and possible friendships.

The twenty-three pages of notes at the end must be read to be appreciated. It is amazing how much diverse information Hearn

packs into his comments on each chapter. If you are considering a career in science, or if you are already a working scientist, you need to read this section.

In summary, *Being a Christian in Science* is a compelling expression of just what Paul exhorts us to do: "Whatever you do, do your work heartily, as for the Lord rather than for men."{14} Hearn shows the potential young scientist what it will take to do his or her work heartily, and at the same time makes clear where many of the potential pitfalls lie, and what vast resources are available for the Christian who is serious about living as both a Christian and a scientist in this complex and confusing world. If you are a scientist, keep this book on your desk along with your Bible.

Notes

1. Quoted in Phillip Johnson, *Defeating Darwinism* (Grand Rapids, Mich.: InterVarsity Press, 1997), p. 110, Note 1.
2. Walter Hearn, *Being a Christian in Science* (Grand Rapids, Mich.: InterVarsity Press, 1997), p. 12.
3. Hearn, p. 90
4. Hearn, p. 46.
5. Hearn, p. 51-52.
6. Hearn, p. 11
7. Hearn, p. 59.
8. Hearn, p. 112-113.
9. Hearn, frontispiece.
10. Ibid.
11. Hearn, p. 61.
12. Hearn, p. 74.
13. Hearn, p. 138.
14. Col. 3:23, NASV.

Contact: A Eulogy to Carl Sagan

The Paradox of the Movie *Contact*

At the very beginning of the movie *Contact*, you should have noticed in the lower right corner of the screen a little dedication which read, “For Carl.” This, of course, is Carl Sagan (1934-1996), the Cornell astronomer and science advocate to the public, whose 1985 novel was the basis for the movie.(1) Sagan passed away in December 1996, before the movie was released, after he struggled for several years with a rare blood disorder.

The movie serves as a fitting eulogy for the most visible member of the scientific community within popular culture. The phrase “billions and billions”, attributed to Sagan, has become a part of the public’s lexicon of scientific phrases, even though Sagan never actually used the phrase in print or in any of his public broadcasts or appearances. Sagan used it self-effacingly as the title for his final and posthumously published book.

Many of us know of Carl Sagan, but we know very little about him. As a planetary astronomer, Sagan made significant contributions to the fields of chemical evolution, Martian topography, and Venusian meteorology. He also served as an official adviser to NASA on the *Mariner*, *Voyager*, and *Viking* unmanned space missions. Carl Sagan led the charge both to the public and in the Congressional halls of government funding for space research and particularly SETI, the Search for Extra-Terrestrial Intelligence.

Sagan was awarded the Peabody Award and an Emmy for his stunningly influential public television series, Cosmos. The accompanying book by the same title is the best-selling science book ever published in the English language.(2) He earned the Pulitzer Prize for his book Dragons of Eden on the evolution of human intelligence, and numerous other awards and honorary degrees. He is the most read scientific author in the world, and upon awarding him their highest honor, the National Science Foundation heralded his gifts to mankind as "infinite."

The main character of *Contact*, Ellie Arroway, played by Jodie Foster, portrays Sagan's life in miniature. While not sharing Sagan's awards and rapport with the public, Ellie Arroway is a brilliant, driven, self-reliant young astronomer obsessed with SETI. Dr. Arroway endures scorn and ridicule from the public and science for her dedication to discovering signs of extraterrestrial life, just as Sagan has. Arroway, like Sagan, confronted with the demons of superstition, fundamentalism, and scientific jealousy, fought back with reason, sarcastic wit, and sheer perseverance.

Arroway parrots Sagan's views on the need for a rational, non-religious view of reality to solve our problems, his hope for an extraterrestrial savior to save us from our technological adolescence, and the wonder and beauty of the cosmos pointing to our species as a curious, brave, precious accident of the universe. What is paradoxical about *Contact* is not the conflict between faith and reason, but who is forced to rely on faith and experience instead of evidence. Following Ellie's trip through the galaxy and her conversation with an alien, she returns with no documentation. What was an 18-hour experience for Ellie appeared to be an uneventful few seconds to everyone else. She must ask a Congressional panel to accept her account of events on *faith* with no evidence. If you were paying close enough attention as the film wound down, however, you could discover that this paradox is only apparent. Ellie's

data instruments recorded a full 18 hours—not a few seconds—of static. There was evidence of her experience, but it was withheld from Ellie by apprehensive government officials. The scientific validation once again highlights Sagan's conviction that science is mankind's only reliable tool in the discovery of truth, and that faith only covers up our fears and stifles our search for answers.

Contact is a must-see film for those who wish to comprehend and knowingly confront our culture's hostility towards faith that relies on revelation.

The Paradox of Sagan's Views of Religion

One of the most perplexing aspects of the movie *Contact* is the seemingly confusing portrayal of religion. The confusion, I believe, is only superficial. If you reflect on how the different traditional religion is discarded as irrelevant at best and dangerous at worst.

Sagan's disdain for traditional religion is clear from the beginning. Events from Ellie's childhood flashback through the early part of the movie and lay the groundwork for her rational rejection of traditional Christianity. In the novel, Ellie's father is portrayed as a skeptic of revealed religion; he views the Bible as "half barbarian history and half fairy tales."(3) In the movie, Ellie admits to Palmer Joss that her father was asked to keep her home from Sunday School because she asked too many questions that could not be answered, such as "Where did Cain get his wife?" Although this and other objections offered in the novel are easily answered, they are left unchallenged as apparently sturdy nails in the Bible's coffin.

When Ellie's father dies in the movie, the clergyman offers harsh and uncaring words about some things being hard to understand, that we aren't meant to know, and that we just have to accept it as God's will. This deliberately presents

the God of the Bible as unknowable, cruelly inscrutable, and demanding of our acceptance. Ellie's response to the minister's attempt to be consoling is to berate herself on where she should have left extra medicine where it could have been reached in an emergency. Self-reliance and analytical thinking easily out-compete the minister's feeble lecture. In a conversation with Palmer Joss, Ellie confidently asserts that we created God so we wouldn't feel so small and alone. He's just an emotional crutch.

Two other characters in the film outline Sagan's view of the modern evangelical right. The long-haired preaching zealot is portrayed as a dangerous man, out of control and out of touch with reality. He later borrows a trick from Muslim fundamentalists by sacrificing himself in an attempt to derail the multinational project to build the travel machine. Richard Rank, the presidential advisor, represents that portion of the religious right that hungers and thirsts not for righteousness, but for political power. At a cabinet meeting, Rank offers sanctimonious drivel about science intruding into areas of faith and the message being morally ambiguous. If his remarks made you cringe with anger, they were supposed to.

And then there is Palmer Joss, the enigmatic, amoral, has-been priest. Palmer Joss's New Age religion sees truth as relative and the real issue as oppression. Joss has no quibble with the conclusions of science, just its attempts to overstep its boundaries and rule our lives. His knowledge of God is limited to an experience on which he does not elaborate and that intellect cannot touch. Perhaps the attraction between Joss and Arroway is the challenge they represent to each other. Joss's religion is at least scientifically informed and therefore intriguing to Ellie, and she is scorned by the same scientific establishment that Joss distrusts. A match made in Hollywood.

Sagan left no room for any faith that does not embrace the conclusions of a scientific materialism. This needs to be kept

in mind when Joss challenges her about her belief in God during the hearings. When the other multinational members speak up in defense of Joss's question, it is clear they are only referring to some politically correct supreme being, not the God of Abraham, Isaac, and Jacob.

Sagan's Extraterrestrial Hope

Even in a scientifically sophisticated film such as Carl Sagan's *Contact*, we run into our culture's preoccupation with life beyond our planet. Though Carl Sagan spent some of his time combating the UFO crazies, he nevertheless held out a hope that there are civilizations out there waiting to discover us, or us them. Where does this conviction come from? For a scientific materialist and humanist like Carl Sagan, this confidence comes from two sources. First is the notion that if life evolved here, it is presumptuous of us to think that we are alone. Certainly life has evolved elsewhere! Second is Sagan's and others' fear that our species sits on the brink of self-destruction and we will need some outside help to overcome our predicament.

In a conversation with Palmer Joss, Ellie Arroway gives a calculation of sorts to explain her confidence in life having evolved elsewhere. She is looking up into the plethora of stars in the nighttime sky and says, "If just one in a million of those stars has planets, and if only one in a million of those has life, and if just one in a million of those has intelligent life, then there are millions of civilizations out there." It is a little surprising that a film of such high caliber would get this one wrong. If you take each of those probabilities and multiply them together, that's one in a million million million, or a billion billion, or in scientific notation, 10 to the 18th power. Current estimates suggest that the stars number approximately 10 to the 22nd power. That would technically leave only 10,000 civilizations in the universe, not millions. That would mean that we are

alone even in our own galaxy.

In another essay (Are We Alone in the Universe?) I summarized the calculations of Christian astronomer Hugh Ross. Ross estimated the probabilities of all the necessary conditions for life occurring by natural processes. Ross concluded that if all we have to depend on are physical and chemical processes, then we are alone in the universe. Life could have evolved nowhere else. Even the biochemical complexities of living cells are revealing that life requires intelligence (See my review of *Darwin's Black Box*.). Sagan's confidence that life is super-abundant in the universe is grossly out of proportion.

The second reason for Sagan's hope of other civilizations was expressed well by Ellie Arroway. An international panel, assigned the task of choosing the one individual who would enter the machine and perhaps visit this alien civilization, queried each candidate what one question they would ask. Ellie said she would want to know how they survived their technological adolescence without destroying themselves. Sagan has been a tireless supporter of nuclear disarmament. He truly feared that we would destroy ourselves before we reached our full potential. In the opening scene of his Cosmos television series, he remarked that our species was "young and curious and brave; it showed much promise."(4) Couple this fear with the conviction that there is no God, and the only source of hope for a salvation from ourselves is another civilization more advanced than us, giving us some pointers for survival.

This confidence that an alien culture that could contact us would be more advanced than us is not unreasonable. If they have the technology to purposefully contact us, and this is something we cannot do, then their technology must be beyond ours. What is never explained, however, even though it is raised in the movie, is why we would expect this alien culture to be benevolent. It is just as likely, if not more so, that an alien civilization would be more of the variety depicted in

the movie *Independence Day*. This hope reflects more on Carl Sagan's optimistic cosmic humanism that any scientific reality.

Who Will Save Us, God or Aliens?

The movie *Contact* tells us of a more realistic scenario for a first encounter with an alien civilization, than, say, *Men in Black*. A radio signal is received from space that is broadcast at a frequency that is equal to the value of hydrogen times pi and gets our attention by counting the prime numbers from 1 to 101 in sequence. The message is authenticated as coming from the star Vega, 26 light years away. The message is eventually decoded and found to contain the plans for constructing a machine for one person to apparently travel out into the galaxy. Ellie Arroway, a young astronomer who discovers the message, eventually boards the machine and travels out into space for a close encounter of a supposedly more realistic kind.

A very tantalizing line is repeated three times in the course of the film. When Ellie Arroway, as a child, asks her father if there are any life forms out in the universe, he says that if there isn't, it would be an awful waste of space. Palmer Joss repeats the line to an adult Ellie as they engage in a conversation under a starry sky in Puerto Rico. It is a poignant scene as Ellie clearly is stunned as she recalls her father saying the same thing. Ellie, herself, repeats the phrase at the end of the film as she is addressing a group of school children and is asked if there is life out there in space.

Sagan has drawn a bead on the argument for the existence of God from design, or the teleological argument. Waste implies misdirected design. If the universe was created for us and we are alone, why does it have to be so big? Surely we could have survived quite well in a much smaller and economical universe. But if you think about it, Scripture proclaims that the

heavens declare the glory of God, not man (Ps. 19:1). Indeed, if the universe was created only for man's benefit, then it is a waste of space. We don't deserve it. But if the main purpose of the universe is to glorify the splendid, eternal, all-powerful God, it could never be big enough.

Another interesting theme is the form that the alien takes. After Ellie travels through the galaxy, she arrives at a large docking space station. She is somehow transported to a beach, resembling a picture of Pensacola, Florida she drew as a child. Eventually, a figure approaches. It is her father. The alien appears to her in the form of her father. He tells her that they thought this would make it easier for her.

It's fascinating that Sagan often complains that if God exists, why doesn't he make himself plain? Why not a cross in the sky or a mathematical formula in the Bible? Why is everything so obscure? One answer from Philip Yancey's book, *Disappointment with God*, is that God did reveal himself plainly to Israel during the Exodus and they still rebelled, and Jesus performed incredible miracles and still most rejected him. The Father does not want to coerce our love. So isn't it interesting that in Sagan's own story, when a superior intelligence wants to make contact with us, they put us in familiar surroundings, take on our form, and speak our language?! If they appeared to us in their true form, we would be repulsed. Isn't that precisely what the Father did for us in sending Jesus to live among us? It appears that Carl Sagan has unwittingly answered his own objection.

The Worldview of Carl Sagan

Carl Sagan began his highly acclaimed public television series Cosmos with a grand overview of the universe and our place within it. With a crashing surf in the background, Sagan declares,

> *"The cosmos is all that is or ever was or ever will be."(5)*

Sagan eloquently expresses his conviction that matter and energy are all that exist. He goes on to describe his awe and wonder of the universe. He describes a tingling in the spine, a catch in the voice, as the greatest of mysteries is approached. With excitement, Sagan tells us our tiny planetary home the Earth is lost somewhere between immensity and eternity, thus poignantly emphasizing our simultaneous value and insignificance.

In the movie *Contact*, Dr. Ellie Arroway expresses this awe and wonder at several points in the film. The most dramatic episode occurs during her galactic space flight when she is confronted with the wonders to be seen near the center of the galaxy. She is at a loss for words in the face of such beauty and humbly suggests that a poet may have been a better choice to send on the trip.

While this is all very moving, the great emotion seems strangely misplaced and inappropriate. If the cosmos is indeed all there is or ever was or ever will be, why get excited? If we are lost between immensity and eternity, shouldn't our reaction be one of existential terror, not awe? Sagan borrows his excitement from a Christian worldview where the heavens declare the glory of God, which *should* produce a tingle in the spine and a catch in the voice.

In the next to final scene in *Contact*, Ellie attempts to defend herself by finally admitting that she has no evidence of her trip through the galaxy. But she has been given something wonderful, a vision of the universe that tells us how tiny, insignificant, rare and precious we are. In *Cosmos*, Sagan reflects that while we are a species that is young and curious and brave, our place in the universe is to be compared to "a mote of dust that floats in the morning sky."(6)

How can we be tiny and insignificant and rare and precious at the same time? Clearly Sagan cannot live consistently within his own worldview. His view of the universe dictates that all

is meaningless chance and we are nothing special, yet he irrationally rejects the despair that logically follows in favor of being curious, brave, rare, and precious.

As Sagan neared death, many around the world were praying for him. Though clearly an enemy of the faith, the closing sentences of the novel *Contact* indicated a belief, a hope, in an intelligence that antedates the universe. Might he see the whole truth before he passes into eternity? In his final book *Billions and Billions*, his wife Ann Druyan writes, "Contrary to the fantasies of fundamentalists, there was no deathbed conversion…. Even at this moment when anyone would be forgiven for turning away from the reality of our situation, Carl was unflinching."(7) In reflecting on the many cards and letters she received upon his death from people telling of the impact Sagan had on their lives, she writes, "These thoughts comfort me and lift me out of my heartache. They allow me to feel, without resorting to the supernatural, that Carl lives."(8) Sadly, Carl does live, but not as she believes. Remember that enemies of the faith are lost and in need of a Savior. But even though they may be prayed for and witnessed to by colleagues up to the end, many, including Carl Sagan, will still, defiantly, die in their sins. It is a bitter, needless grief.

Notes

1. Carl Sagan, *Contact* (NY: Pocket Books [Simon and Schuster], 1986).

2. Carl Sagan, *The Demon-Haunted World* (New York: Ballantine Books, 1996), p. 459.

3. Sagan, *Contact*, p. 20.

4. Carl Sagan, *Cosmos* Video, "Episode 1: The Shores of the Cosmic Ocean" (Turner Home Entertainment, 1989).

5. Ibid.

6. Carl Sagan, *Cosmos* (New York: Random House, 1980), p. 4.

7. Carl Sagan, *Billions and Billions* (New York: Random House, 1997), p. 225.

8. Ibid., p. 228.

See Also:
• Probe Answers Our E-mail: "You Are Full of Hatred and Bigotry"

Christian Views of Science and Earth History – A Balanced Perspective

Dr. Ray Bohlin and Rich Milne consider the three primary views held by Christians regarding the age of the earth and how the universe, life and man came to be: young earth creationism, progressive creationism, and theistic evolution. After considering the case for each one, they conclude with a call to work together for the cause of Christ.

 *This article is also available in Spanish.*

Introduction of Three Views

How old is the earth? Did men live with dinosaurs? Are dinosaurs in the Bible? Where do cave men fit in the Bible? Did the flood cover the whole earth? How many animals were on

Noah's Ark? What does the word *day* in Genesis chapter one mean?

These are all common and difficult questions your children may have asked, or maybe they are questions you have. What may surprise you is that evangelical Christians respond with numerous answers to each question. In reality, answers to the preceding questions largely depend on the answer to the first one. How old is the earth?

The diversity of opinion regarding this question inevitably leads to controversy, controversy that is often heated and remarkably lacking in grace and understanding. For those Christians who are practicing scientists, there is much at stake. Not only is one's view of Scripture on the firing line, but one's respect and job security in the scientific community is also at risk.

But we must say up front, that as important as this question is, it is of secondary importance to the quest of defeating Darwinism as currently presented to the culture. Educational leaders and evolutionary scientists are determined to present a fully naturalistic evolution as the only reasonable and scientific theory that can be discussed in the public education system. All Christians, whether old earth or young earth, should find common cause in dethroning philosophical naturalism as the reigning paradigm of education and science.

Returning to the age of the earth question, we would like to survey three general categories of response to this question that can be found among Christians today. For each of these three views, we will discuss their position on Genesis chapter one, since theological assumptions guide the process of discovering a scientific perspective. We will also discuss the basics of the scientific conclusions for each view. Finally, we will discuss the strengths of each view and what those holding the other two views think are the other's limitations.

The first view of science and earth history we will discuss is the recent or literal view. This position is often referred to as scientific creationism, creation science, or young earth creationism. Young earth creationists believe that the earth and the universe are only tens of thousands of years old and that Genesis gives us a straightforward account of God's creative activity.

The second position, progressive creationism or day-age creationism, holds that the earth and the universe are billions of years old. However, progressive creationists believe that God has created specifically and *ex nihilo* (out of nothing), throughout the billions of years of earth history. They do not believe that the days of Genesis refer to twenty-four hour days, but to long, indefinite periods of time.

A view traditionally known as theistic evolution comprises the third position. Theistic evolutionists essentially believe that the earth and the universe are not only billions of years old, but that there was little, if any, intervention by God during this time. The universe and life have evolved by God-ordained processes in nature. Theistic evolutionists, or evolutionary creationists as many prefer to be called, believe that the first chapter of Genesis is not meant to be read historically, but theologically. It is meant to be a description of God as the perfect Creator and transcendent over the gods of the surrounding ancient Near Eastern cultures.

Before we consider each position in greater detail, it is important to realize two things. First, we will paint in broad strokes when describing these views. Each has many sub-categories under its umbrella. Second, we will describe them as objectively and positively as we can without revealing our own position. We will reveal our position at the conclusion of this article.

Recent or Literal Creation

Having introduced each position, we would like to review the theological and scientific foundations for the first one: recent or young earth creationism.

The young earth creationist firmly maintains that Genesis chapter one is a literal, historical document that briefly outlines God's creative activity during six literal twenty-four hour days. If one assumes that the genealogies of Genesis chapters five and eleven represent a reasonable pre-Israelite history of the world, then the date of creation cannot be much beyond thirty thousand years ago.{1}

A critical theological conclusion in this view is a world free of pain, suffering, and death prior to the Fall in Genesis chapter three. God's prescription in Genesis 1:29 to allow only green plants and fruit for food follows along with this conclusion.

The universal flood of Noah, recorded in Genesis chapters six through nine, is also a crucial part of this view. On a young earth, the vast layers of fossil-bearing sedimentary strata found all over the earth could not have had millions of years to accumulate. Therefore, the majority of these sedimentary layers are thought to have formed during Noah's flood. Much research activity by young earth creationists is directed along this line.{2}

Young earth creationists also maintain the integrity of what is called the Genesis kind, defined in Genesis 1:11, 12, and 21. The dog kind is frequently given as an example of the Genesis kind. While this is still a matter of research, it is suggested that God created a population of dog-like animals on the sixth day. Since then, the domestic dog, wolf, coyote, African wild dog, Australian dingo, and maybe even the fox have all descended from this original population. Young earth creationists suggest that God created the individual kinds

with an inherent ability to diversify within that kind. But a dog cannot cross these lines to evolve into say, a cat.

The literal view of Genesis chapter one has been predominant throughout Church history and it proposes a testable scientific model of the flood and the Genesis kind. Critics point out that there are immense difficulties explaining the entire geologic record in terms of the flood.{3} Principal among these problems is that it appears there are many more animals and plants buried in the rocks than could have been alive simultaneously on the earth just prior to the flood.

Progressive Creationism

The next view to discuss is progressive creationism. The progressive creationist essentially believes that God has intervened throughout earth history to bring about His creation, but not all at once over six literal twenty-four hour days. The progressive creationist will accept the long ages of the earth and the universe while accepting that there is some historical significance to the creation account of Genesis.

A popular view of Genesis chapter one is called the day-age theory. This view agrees that the events described in the first chapter of Genesis are real events, but each day is millions, perhaps billions of years in duration. The Hebrew word for day, *yom*, can mean an indefinite period of time such as in Genesis 2:4. This verse summarizes the first thirty-four verses of the Bible by stating, "This is the account of the heavens and the earth when they were created, in the *day* that the Lord God made the earth and the heaven" (emphasis added). In this case, the word *day* refers to the previous seven days of the creation week. Consequently, the progressive creationist feels there is justification in rendering the days of Genesis chapter one as indefinite periods of time.{4}

Therefore, the progressive creationist has no problem with the

standard astronomical and geological ages for the universe and the earth. A universe of fifteen billion years and an earth of 4.5 billion years are acceptable. In regard to evolution, however, their position is similar to the young earth creationists'. Progressive creationists accept much of what would be called microevolution, adaptation within a species and even some larger changes. But macroevolutionary changes such as a bird evolving from a fish are not seen as a viable process.{5}

These are the basic beliefs of most progressive creationists. What do they think is the predominant reason for holding to this perspective? Most will tell you that the evidence for an old universe and earth is so strong that they have searched for a way for Genesis chapter one to be understood in this framework. So the agreement with standard geology and astronomy is critical to them. Progressive creationists also find the biblical necessity for distinct evidence for God's creative activity so strong that the lack of macroevolutionary evidence also dovetails well with their position.

The most difficult problem for them to face is the requirement for pain, suffering, and death to be a necessary part of God's creation prior to Adam's sin. The atheistic evolutionist, Stephen J. Gould, from Harvard, commented on this problem of God's design over these many millions of years when he said, "The price of perfect design is messy relentless slaughter."{6} There are also major discrepancies with the order of events in earth history and the order given in Genesis. For instance if the days of Genesis are millions of years long, then when flowers were created on day three, it would be millions of years before pollinators, such as bees, were created on days five and six.

Theistic Evolution

Having covered young earth creationism and progressive creationism, we will now turn to the view called theistic

evolution and then discuss our own position with a call to mark the common enemy of the evangelical community.

Most theistic evolutionists see little, if any, historical significance to the opening chapters of Genesis. They suggest that the Genesis narrative was designed to show the Israelites that there is one God and He has created everything, including those things which the surrounding nations worshipped as gods. In essence, Genesis chapter one is religious and theological, not historical and scientific.{7}

Another view of the account of creation according to Genesis that has become popular with progressive creationists as well as theistic evolutionists is the structural framework hypothesis.{8} This literary framework begins with the earth formless and void as stated in Genesis 1:2. The first three days of creation remove the formlessness of the earth, and the last three days fill the void of the earth. On days one through three God creates light, sea and sky, and the land. On days four through six, God fills the heavens, sky, sea, and land. There was a pattern in the ancient Near East of a perfect work being completed in six days with a seventh day of rest. The six days were divided into three groups of two days each. In Genesis chapter one we also have the six days of work with a seventh day of rest, but the six days are divided into two groups of three days. So maybe this was only meant to say that God is Creator and His work is perfect.

Essentially, theistic evolutionists accept nearly all the scientific data of evolution including not only the age of the cosmos, but also the evolutionary relatedness of all living creatures. God either guided evolution or created the evolutionary process to proceed without need of interference.

Theistic evolutionists maintain that the evidence for evolution is so strong that they have simply reconciled their faith with reality. Since reading Genesis historically does not agree with what they perceive to be the truth about earth

history, then Genesis, if it is to be considered God's Word, must mean something else. They do believe that God is continually upholding the universe, so He is involved in His creation.

Theistic evolution suffers the same problem with pain, suffering, and death before the Fall that progressive creation endures.{9} In addition, the many problems cited concerning the origin of life, the origin of major groups of organisms, and the origin of man remain severe problems for the theistic evolutionist as well as the secular evolutionist.{10} Some theistic evolutionists also quarrel with a literal Adam and Eve. If humans evolved from ape-like ancestors, then who were Adam and Eve? If Adam and Eve were not literal people, then is the Fall real? And how is redemption necessary if they are imaginary?

Call for Caution and Discussion

We have discussed the biblical and scientific foundations of three different Christian views of science and earth history. In so doing, we have tried to convey a sense of their strengths and limitations. The issue of the age of the earth is very controversial among evangelicals, particularly those who have chosen some field of science as their career.

Our intention has been to present these perspectives as objectively as possible so you, the reader, can make an informed decision. We have purposefully kept our own views out of this discussion until now. We would like to take a moment and explain the reasoning behind our position.

We have studied this issue for over twenty years and have read scholars, both biblical and scientific from all sides of the question. For some ten years now, we have been confirmed fence sitters. Yes, we are sorry to disappoint those of you who were waiting for us to tell you which view makes more sense, but we are decidedly undecided. This is by no means a political

decision. We are not trying to please all sides, because if that were the case, we know we would please no one. The fact is, we are still searching.

Biblically, we find the young earth approach of six consecutive 24-hour days and a catastrophic universal flood to make the most sense. However, we find the evidence from science for a great age for the universe and the earth to be nearly overwhelming. We just do not know how to resolve the conflict yet. Earlier, we emphasized that the age question, while certainly important, is not the primary question in the origins debate. The question of chance versus design is the foremost issue. The time frame over which God accomplished His creation is not central.

Such indecision is not necessarily a bad thing. Davis Young in his book *Christianity and the Age of the Earth*, gives a wise caution. Young outlines that both science and theology have their mysteries that remain unsolvable. And if each has its own mystery, how can we expect them to mesh perfectly?{11} The great 20th century evangelist, Francis Schaeffer said:

> We must take ample time, and sometimes this will mean a long time, to consider whether the apparent clash between science and revelation means that the theory set forth by science is wrong or whether we must reconsider what we thought the Bible says. {12}

"What we thought the Bible says"? What does *that* mean?

In the sixteenth century, Michelangelo sculpted Moses coming down from Mount Sinai with two bumps on his head. The word which describes Moses' face as he came off the mountain, we now know means shining light, meaning Moses' face was radiant from having been in God's presence. But at that time it was thought to mean "goat horns."

So Michelangelo sculpted Moses with two horns on his head. That is what they thought the Bible literally said. Now we know better, and we changed our interpretation of this Scripture based on more accurate information. We believe we need even more accurate information from both the Bible and science to answer the age of the earth question.

The question concerning the age of the earth comes down to a matter of interpretation, both of science and the Bible. Ultimately, we believe there is a resolution to this dilemma. All truth is God's truth. Some suggest that perhaps God has created a universe with apparent age. That is certainly possible, but certain implications of this make us very uncomfortable. It is certainly true that any form of creation out of nothing implies some form of apparent age. God created

Adam as an adult who appeared to have been alive for several decades though only a few seconds into his existence.

Scientists have observed supernova from galaxies that are hundreds of thousands of light years away. We know that many of these galaxies must be this distant because if they were all within a few thousand light years, then the nighttime sky would be brilliant indeed. These distant galaxies are usually explained in terms of God creating the light in transit so we can see them today. These observed star explosions mean that they never happened in an apparent age universe. Therefore, we are viewing an event that never occurred. This is like having videotape of Adam's birth. Would supernovas that never happened make God deceptive?

Therefore, we believe we must approach this question with humility and tolerance for those with different convictions. The truth will eventually be known. In the meantime, let us search for it together without snipping at each other's heels.

Notes

1. Henry Morris, *The Genesis Record* (Grand Rapids, MI: Baker Book House, 1976), 37-81.
2. Steven A. Austin, ed., *Grand Canyon: Monument to Catastrophe* (Santee, CA: Institute for Creation Research, 1994), 284.
3. Daniel E. Wonderly, *Neglect of Geologic Data: Sedimentary Strata Compared with Young-Earth Creationist Writings* (Hatfield, PA: Interdisciplinary Biblical Research Institute, 1987), 130. Howard J. Van Till, Robert Snow, John Stek, and Davis A. Young, *Portraits of Creation: Biblical and Scientific Perspectives on the World's Formation* (Grand Rapids, MI: Eerdmans Pub. Co, 1990), 26-125.
4. Hugh Ross, *Creation and Time* (Colorado Springs, CO: NAVPRESS, 1994), 45-72.
5. Ibid., 73-80.
6. Stephen Jay Gould, "Darwin and Paley Meet the Invisible

Hand," *Natural History* (November 1990):8. Mark Van Bebber and Paul S. Taylor, *Creation and Time: A Report on the Progressive Creationist Book by Hugh Ross* (Mesa, AZ: Eden Communications, 1994), 128.
7. Van Till, et al., *Portraits of Creation*, 232-242.
8. Umberto Cassuto, *A Commentary on the Book of Genesis: Part 1: From Adam to Noah*, trans. Israel Abrahams (Jerusalem Magnum Press, 1978), 12-17. Henri Blocher, *In the Beginning: The Opening Chapters of Genesis*, trans. David G. Preston (Leciester Press and Downers Grove: InterVarsity Press, 1984), 49-59.
9. Ken Ham, *Evolution: The Lie* (El Cajon, CA: Creation-Life Pub., 1987).
10. Phillip E. Johnson, *Darwin on Trial*, 2nd ed. (Downers Grove, IL: InterVarsity Press, 1993), 15-112, 166-170.
11. Davis A. Young, *Christianity and the Age of the Earth* (Grand Rapids: Zondervan, 1982), 158.
12. Francis Schaeffer, *No Final Conflict* (Downers Grove: InterVarsity Press, 1975), 24.

Euthanasia: A Christian Perspective

Kerby Anderson looks at euthanasia from a distinctly Christian perspective. Applying a biblical view gives us clear understanding that we are not lord of our own life or anyone elses.

 *This article is also available in Spanish.*

Debate over euthanasia is not a modern phenomenon. The Greeks

carried on a robust debate on the subject. The Pythagoreans opposed euthanasia, while the Stoics favored it in the case of incurable disease. Plato approved of it in cases of terminal illness.(1) But these influences lost out to Christian principles as well as the spread of acceptance of the Hippocratic Oath: “I will neither give a deadly drug to anybody if asked for it, nor will I make a suggestion to that effect.”

In 1935 the Euthanasia Society of England was formed to promote the notion of a painless death for patients with incurable diseases. A few years later the Euthanasia Society of America was formed with essentially the same goals. In the last few years debate about euthanasia has been advanced by two individuals: Derek Humphry and Dr. Jack Kevorkian.

Derek Humphry has used his prominence as head of the Hemlock Society to promote euthanasia in this country. His book *Final Exit: The Practicalities of Self-Deliverance and Assisted Suicide for the Dying* became a bestseller and further influenced public opinion.

Another influential figure is Jack Kevorkian, who has been instrumental in helping people commit suicide. His book *Prescription Medicide: The Goodness of Planned Death* promotes his views of euthanasia and describes his patented suicide machine which he calls “the Mercitron.” He first gained national attention by enabling Janet Adkins of Portland, Oregon, to kill herself in 1990. They met for dinner and then drove to a Volkswagen van where the machine waited. He placed an intravenous tube into her arm and dripped a saline solution until she pushed a button which delivered first a drug causing unconsciousness, and then a lethal drug that killed her. Since then he has helped dozens of other people do the same.

Over the years, public opinion has also been influenced by the tragic cases of a number of women described as being in a “persistent vegetative state.” The first was Karen Ann

Quinlan. Her parents, wanting to turn the respirator off, won approval in court. However, when it was turned off in 1976, Karen continued breathing and lived for another ten years. Another case was Nancy Cruzan, who was hurt in an automobile accident in 1983. Her parents went to court in 1987 to receive approval to remove her feeding tube. Various court cases ensued in Missouri, including her parents' appeal that was heard by the Supreme Court in 1990. Eventually they won the right to pull the feeding tube, and Nancy Cruzan died shortly thereafter.

Seven years after the Cruzan case, the Supreme Court had occasion to rule again on the issue of euthanasia. On June 26, 1997 the Supreme Court rejected euthanasia by stating that state laws banning physician-assisted suicide were constitutional. Some feared that these cases (*Glucksburg v. Washington* and *Vacco v. Quill*) would become for euthanasia what Roe v. Wade became for abortion. Instead, the justices rejected the concept of finding a constitutional "right to die" and chose not to interrupt the political debate (as *Roe v. Wade* did), and instead urged that the debate on euthanasia continue "as it should in a democratic society."

Voluntary, Active Euthanasia

It is helpful to distinguish between mercy-killing and what could be called mercy-dying. Taking a human life is not the same as allowing nature to take its course by allowing a terminal patient to die. The former is immoral (and perhaps even criminal), while the latter is not.

However, drawing a sharp line between these two categories is not as easy as it used to be. Modern medical technology has significantly blurred the line between hastening death and allowing nature to take its course.

Certain analgesics, for example, ease pain, but they can also shorten a patient's life by affecting respiration. An

artificial heart will continue to beat even after the patient has died and therefore must be turned off by the doctor. So the distinction between actively promoting death and passively allowing nature to take its course is sometimes difficult to determine in practice. But this fundamental distinction between life-taking and death- permitting is still an important philosophical distinction.

Another concern with active euthanasia is that it eliminates the possibility for recovery. While this should be obvious, somehow this problem is frequently ignored in the euthanasia debate. Terminating a human life eliminates all possibility of recovery, while passively ceasing extraordinary means may not. Miraculous recovery from a bleak prognosis sometimes occurs. A doctor who prescribes active euthanasia for a patient may unwittingly prevent a possible recovery he did not anticipate.

A further concern with this so-called voluntary, active euthanasia is that these decisions might not always be freely made. The possibility for coercion is always present. Richard D. Lamm, former governor of Colorado, said that elderly, terminally ill patients have “a duty to die and get out of the way.” Though those words were reported somewhat out of context, they nonetheless illustrate the pressure many elderly feel from hospital personnel.

The Dutch experience is instructive. A survey of Dutch physicians was done in 1990 by the Remmelink Committee. They found that 1,030 patients were killed without their consent. Of these, 140 were fully mentally competent and 110 were only slightly mentally impaired. The report also found that another 14,175 patients (1,701 of whom were mentally competent) were denied medical treatment without their consent and died.(2)

A more recent survey of the Dutch experience is even less encouraging. Doctors in the United States and the Netherlands have found that though euthanasia was originally intended for exceptional cases, it has become an accepted way of dealing

with serious or terminal illness. The original guidelines (that patients with a terminal illness make a voluntary, persistent request that their lives be ended) have been expanded to include chronic ailments and psychological distress. They also found that 60 percent of Dutch physicians do not report their cases of assisted suicide (even though reporting is required by law) and about 25 percent of the physicians admit to ending patients' lives without their consent.(3)

Involuntary, Active Euthanasia

Involuntary euthanasia requires a second party who makes decisions about whether active measures should be taken to end a life. Foundational to this discussion is an erosion of the doctrine of the sanctity of life. But ever since the Supreme Court ruled in *Roe v. Wade* that the life of unborn babies could be terminated for reasons of convenience, the slide down society's slippery slope has continued even though the Supreme Court has been reluctant to legalize euthanasia.

The progression was inevitable. Once society begins to devalue the life of an unborn child, it is but a small step to begin to do the same with a child who has been born. Abortion slides naturally into infanticide and eventually into euthanasia. In the past few years doctors have allowed a number of so-called "Baby Does" to die—either by failing to perform lifesaving operations or else by not feeding the infants.

The progression toward euthanasia is inevitable. Once society becomes conformed to a "quality of life" standard for infants, it will more willingly accept the same standard for the elderly. As former Surgeon General C. Everett Koop has said, "Nothing surprises me anymore. My great concern is that there will be 10,000 Grandma Does for every Baby Doe."(4)

Again the Dutch experience is instructive. In the Netherlands, physicians have performed involuntary euthanasia because they

thought the family had suffered too much or were tired of taking care of patients. American surgeon Robin Bernhoft relates an incident in which a Dutch doctor euthanized a twenty-six-year-old ballerina with arthritis in her toes. Since she could no longer pursue her career as a dancer, she was depressed and requested to be put to death. The doctor complied with her request and merely noted that “one doesn’t enjoy such things, but it was her choice.”(5)

Physician-Assisted Suicide

In recent years media and political attention has been given to the idea of physician-assisted suicide. Some states have even attempted to pass legislation that would allow physicians in this country the legal right to put terminally ill patients to death. While the Dutch experience should be enough to demonstrate the danger of granting such rights, there are other good reasons to reject this idea.

First, physician-assisted suicide would change the nature of the medical profession itself. Physicians would be cast in the role of killers rather than healers. The Hippocratic Oath was written to place the medical profession on the foundation of healing, not killing. For 2,400 years patients have had the assurance that doctors follow an oath to heal them, not kill them. This would change with legalized euthanasia.

Second, medical care would be affected. Physicians would begin to ration health care so that elderly and severely disabled patients would not be receiving the same quality of care as everyone else. Legalizing euthanasia would result in less care, rather than better care, for the dying.

Third, legalizing euthanasia through physician-assisted suicide would effectively establish a right to die. The Constitution affirms that fundamental rights cannot be limited to one group (e.g., the terminally ill). They must apply to all. Legalizing physician-assisted suicide would open the door

to anyone wanting the “right” to kill themselves. Soon this would apply not only to voluntary euthanasia but also to involuntary euthanasia as various court precedents begin to broaden the application of the right to die to other groups in society like the disabled or the clinically depressed.

Biblical Analysis

Foundational to a biblical perspective on euthanasia is a proper understanding of the sanctity of human life. For centuries Western culture in general and Christians in particular have believed in the sanctity of human life. Unfortunately, this view is beginning to erode into a “quality of life” standard. The disabled, retarded, and infirm were seen as having a special place in God’s world, but today medical personnel judge a person’s fitness for life on the basis of a perceived quality of life or lack of such quality.

No longer is life seen as sacred and worthy of being saved. Now patients are evaluated and life-saving treatment is frequently denied, based on a subjective and arbitrary standard for the supposed quality of life. If a life is judged not worthy to be lived any longer, people feel obliged to end that life.

The Bible teaches that human beings are created in the image of God (Gen. 1:26) and therefore have dignity and value. Human life is sacred and should not be terminated merely because life is difficult or inconvenient. Psalm 139 teaches that humans are fearfully and wonderfully made. Society must not place an arbitrary standard of quality above God’s absolute standard of human value and worth. This does not mean that people will no longer need to make difficult decisions about treatment and care, but it does mean that these decisions will be guided by an objective, absolute standard of human worth.

The Bible also teaches that God is sovereign over life and death. Christians can agree with Job when he said, “The Lord

gave and the Lord has taken away. Blessed be the name of the Lord" (Job 1:21). The Lord said, "See now that I myself am He! There is no god besides me. I put to death and I bring to life, I have wounded and I will heal, and no one can deliver out of my hand" (Deut. 32:39). God has ordained our days (Ps. 139:16) and is in control of our lives.

Another foundational principle involves a biblical view of life- taking. The Bible specifically condemns murder (Exod. 20:13), and this would include active forms of euthanasia in which another person (doctor, nurse, or friend) hastens death in a patient. While there are situations described in Scripture in which life-taking may be permitted (e.g., self-defense or a just war), euthanasia should not be included with any of these established biblical categories. Active euthanasia, like murder, involves premeditated intent and therefore should be condemned as immoral and even criminal.

Although the Bible does not specifically speak to the issue of euthanasia, the story of the death of King Saul (2 Sam. 1:9-16) is instructive. Saul asked that a soldier put him to death as he lay dying on the battlefield. When David heard of this act, he ordered the soldier put to death for "destroying the Lord's anointed." Though the context is not euthanasia per se, it does show the respect we must show for a human life even in such tragic circumstances.

Christians should also reject the attempt by the modern euthanasia movement to promote a so-called "right to die." Secular society's attempt to establish this "right" is wrong for two reasons. First, giving a person a right to die is tantamount to promoting suicide, and suicide is condemned in the Bible. Man is forbidden to murder and that includes murder of oneself. Moreover, Christians are commanded to love others as they love themselves (Matt. 22:39; Eph. 5:29). Implicit in the command is an assumption of self-love as well as love for others.

Suicide, however, is hardly an example of self-love. It is perhaps the clearest example of self-hate. Suicide is also usually a selfish act. People kill themselves to get away from pain and problems, often leaving those problems to friends and family members who must pick up the pieces when the one who committed suicide is gone.

Second, this so-called "right to die" denies God the opportunity to work sovereignly within a shattered life and bring glory to Himself. When Joni Eareckson Tada realized that she would be spending the rest of her life as a quadriplegic, she asked in despair, "Why can't they just let me die?" When her friend Diana, trying to provide comfort, said to her, "The past is dead, Joni; you're alive," Joni responded, "Am I? This isn't living."(6) But through God's grace Joni's despair gave way to her firm conviction that even her accident was within God's plan for her life. Now she shares with the world her firm conviction that "suffering gets us ready for heaven."(7)

The Bible teaches that God's purposes are beyond our understanding. Job's reply to the Lord shows his acknowledgment of God's purposes: "I know that you can do all things; no plan of yours can be thwarted. You asked, 'Who is this that obscures my counsel without knowledge?' Surely I spoke of things I did not understand, things too wonderful for me to know" (Job 42:2-3). Isaiah 55:8-9 teaches, "For my thoughts are not your thoughts, neither are your ways my ways, declares the Lord. As the heavens are higher than the earth, so are my ways higher than your ways and my thoughts than your thoughts."

Another foundational principle is a biblical view of death. Death is both unnatural and inevitable. It is an unnatural intrusion into our lives as a consequence of the fall (Gen. 2:17). It is the last enemy to be destroyed (1 Cor. 15:26, 56). Therefore Christians can reject humanistic ideas that assume death as nothing more than a natural transition. But the Bible also teaches that death (under the present

conditions) is inevitable. There is “a time to be born and a time to die” (Eccles. 3:2). Death is a part of life and the doorway to another, better life.

When does death occur? Modern medicine defines death primarily as a biological event; yet Scripture defines death as a spiritual event that has biological consequences. Death, according to the Bible, occurs when the spirit leaves the body (Eccles. 12:7; James 2:26).

Unfortunately this does not offer much by way of clinical diagnosis for medical personnel. But it does suggest that a rigorous medical definition for death be used. A comatose patient may not be conscious, but from both a medical and biblical perspective he is very much alive, and treatment should be continued unless crucial vital signs and brain activity have ceased.

On the other hand, Christians must also reject the notion that everything must be done to save life at all costs. Believers, knowing that to be at home in the body is to be away from the Lord (2 Cor. 5:6), long for the time when they will be absent from the body and at home with the Lord (5:8). Death is gain for Christians (Phil. 1:21). Therefore they need not be so tied to this earth that they perform futile operations just to extend life a few more hours or days.

In a patient’s last days, everything possible should be done to alleviate physical and emotional pain. Giving drugs to a patient to relieve pain is morally justifiable. Proverbs 31:6 says, “Give strong drink to him who is perishing, and wine to him whose life is bitter.” As previously mentioned, some analgesics have the secondary effect of shortening life. But these should be permitted since the primary purpose is to relieve pain, even though they may secondarily shorten life.

Moreover, believers should provide counsel and spiritual care to dying patients (Gal. 6:2). Frequently emotional needs can

be met both in the patient and in the family. Such times of grief also provide opportunities for witnessing. Those suffering loss are often more open to the gospel than at any other time.

Difficult philosophical and biblical questions are certain to continue swirling around the issue of euthanasia. But in the midst of these confusing issues should be the objective, absolute standards of Scripture, which provide guidance for the

Notes

1. Plato, *Republic* 3. 405.

2. R. Finigsen, "The Report of the Dutch Committee on Euthanasia," *Issues in Law and Medicine*, July 1991, 339-44.

3. Herbert Hendlin, Chris Rutenfrans, and Zbigniew Zylicz, "Physician-Assisted Suicide and Euthanasia in the Netherlands: Lessons from the Dutch," *Journal of the American Medical Association* 277 (4 June 1997): 1720-2.

4. Interview with Koop, "Focus on the Family" radio broadcast.

5. Robin Bernhoft, quoted in *Euthanasia: False Light*, produced by IAETF, P.O. Box 760, Steubenville, OH 43952.

6. Joni Eareckson, *Joni* (Grand Rapids: Zondervan, 1976).

7. Joni Eareckson, *A Step Further* (Grand Rapids: Zondervan, 1978).

Genetic Engineering

Kerby Anderson provides a biblical look at genetic engineering. Christians would be wise to distinguish between two types of research: genetic repair (acceptable) and the creation of new forms of life (unacceptable).

Genetic Diseases

The age of genetics has arrived. Society is in the midst of a genetic revolution that some futurists predict will have a greater impact on the culture than the industrial revolution. So, in this essay we are going to look at the area of genetic engineering.

The future of genetics, like that of any other technology, offers great promise but also great peril. Nuclear technology has provided nuclear medicine, nuclear energy, and nuclear weapons. Genetic technology offers the promise of a diverse array of good, questionable, and bad technological applications. Christians, therefore, must help shape the ethical foundations of this technology and its future applications.

How powerful a technology is genetic engineering? For the first time in human history, it is possible to completely redesign existing organisms, including man, and to direct the genetic and reproductive constitution of every living thing. Scientists are no longer limited to breeding and cross-pollination. Powerful genetic tools allow us to change genetic structure at the microscopic level and bypass the normal processes of reproduction.

For the first time in human history, it is also possible to make multiple copies of any existing organism or of certain sections of its genetic structure. This ability to clone

existing organisms or their genes gives scientists a powerful tool to reproduce helpful and useful genetic material within a population.

Scientists are also developing techniques to treat and cure genetic diseases through genetic surgery and genetic therapy. They can already identify genetic sequences that are defective, and soon scientists will be able to replace these defects with properly functioning genes.

At this point, let’s take a look at the nature of genetic diseases. Genetic diseases arise from a number of causes. The first are single-gene defects. Some of these single-gene diseases are dominant and therefore cannot be masked by a second normal gene on the homologous chromosome (the other strand of a chromosome pair). An example is Huntington’s chorea (a fatal disease that strikes in the middle of life and leads to progressive physical and mental deterioration). Many other single-gene diseases are recessive and are expressed only when both chromosomes have a defect. Examples of these diseases are sickle-cell anemia, which leads to the production of malformed red blood cells, and cystic fibrosis, which leads to a malfunction of the respiratory and digestive systems.

Another group of single-gene diseases includes the sex-linked diseases. Because the Y chromosome in men is much shorter than the X chromosome it pairs with, many genes on the X chromosome are absent on the homologous Y chromosome. Men, therefore, will show a higher incidence of genetic diseases such as hemophilia or color blindness. Even though these are recessive, males do not have a homologous gene on their Y chromosome that could contain a normal gene to mask it.

Another major cause of genetic disease is chromosomal abnormalities. Some diseases result from an additional chromosome. Down’s syndrome is caused by trisomy-21 (three chromosomes at chromosome twenty-one). Klinefelter’s syndrome results from the addition of an extra X chromosome (these men

have a chromosome pattern that is XXY). Other genetic defects result from the duplication, deletion, or rearrangement (called translocation) of a gene sequence.

Genetic engineering offers the promise of eventually treating and curing these genetic defects. Although this is a promise in the future, we are already involved in genetic counseling and the significant ethical concerns it presents. Let’s turn now to look at the topic of genetic counseling.

Genetic Counseling

As scientists have learned more about the genetic structure of human beings, they have been able to predict with greater certainty the likelihood of a couple bearing a child with a genetic disease. Each human being carries approximately three to eight genetic defects that might be passed on to their children. By checking family medical histories and taking blood samples (for chromosome counts and tests for recessive traits), a genetic counselor can make a fairly accurate prediction about the possibility of a couple having a child with a genetic disease.

Most couples, however, do not seek genetic counsel in order to decide if they should have a child, but instead seek counsel to decide if they should abort a child that is already conceived. In cases in which the mother is already pregnant, the focus is not whether to prevent a pregnancy but whether to abort the unborn child. These circumstances raise some of the same ethical concerns as abortion.

Major deformities can be discovered through many advanced new techniques. One is ultrasound, which uses a type of sonar to determine the size, shape, and sex of the fetus. An ultrasound transducer is placed on the mother’s abdomen and sound waves are sent through the amniotic sac. The sonar waves are then picked up and transmitted to a video screen that provides important information about the characteristics of the fetus.

Another important tool is laparoscopy. A flexible fiber optic scope is inserted by the doctor through a small incision in the mother’s abdomen. This tool allows the doctor to probe into the abdominal cavity.

Genetic defects can be detected in the womb through various prenatal tests. These tests can detect approximately two hundred genetic disorders. In the mid-1960s physicians began to use amniocentesis. A doctor inserts a four-inch needle into a pregnant woman’s anesthetized abdomen in order to withdraw up to an ounce of amniotic fluid. As the fetus grows, cells are shed from the skin of the fetus, and these can be collected from the fluid and used to discover the sex and genetic make-up of the fetus.

For years, doctors used this procedure to identify congenital defects by the twentieth week of pregnancy. Now more doctors use another technique called chorionic villus sampling (CVS), which can produce the same information at ten weeks. Doctors also use a blood test known as maternal serum alfa-fetoprotein (MSAFP). This test, usually done between the fifteenth and twentieth week, can detect a neural tube defect of the spinal cord or brain, such as spina bifida or Down’s syndrome.

The newest procedure is called BABI (blastomere analysis before implantation). Using reproductive technologies, a couple can conceive several embryos in test tubes and discard those exhibiting known defects. A doctor gives a woman a drug to stimulate ovulation, then extracts eggs from her ovaries and mixes them with her husband’s sperm. So far, the procedure has been used to test embryos for such hereditary diseases as Tay-Sachs and Duchenne muscular dystrophy.

Using these techniques to give genetic information to couples is not wrong in itself. But, since most of these genetic diseases cannot be cured, the tacit assumption is that abortion will be used if any defects are found. Many doctors and clinics will not do genetic tests unless a couple gives

prior consent to abortion. Thus genetic counseling can often raise ethical questions, and this is especially true when abortion is involved.

Next, we'll look at the future promise of genetic engineering found in gene splicing.

Gene Splicing: Scientific Benefits and Concerns

For the remainer of this essay, I would like to focus on the issue of gene splicing, also known as recombinant DNA research. This new technology began in the 1970s with new genetic techniques that allowed scientists to cut small pieces of DNA (known as plasmids) into small segments that could be inserted in host DNA. The new creatures that were designed have been called DNA chimeras because they are conceptually similar to the mythological Chimera (a creature with the head of a lion, the body of a goat, and the tail of a serpent).

Gene splicing is fundamentally different from other forms of genetic breeding used in the past. Breeding programs work on existing arrays of genetic variability in a species, isolating specific genetic traits through selective breeding. Scientists using gene splicing can essentially "stack" the deck or even produce an entirely new deck of genetic "cards."

But this powerful ability to change the genetic deck of cards also raises substantial scientific concerns that some "sleight-of-hand" would produce dangerous consequences. Ethan Singer said, "Those who are powerful in society will do the shuffling; their genes will be shuffled in one direction, while the genes of the rest of us will get shuffled in another." Also there is the concern that a reshuffled deck of genes might create an Andromeda strain similar to the one envisioned by Michael Crichton is his book by the same title. A microorganism might inadvertently be given the genetic structure for some pathogen for which there is no antidote or

vaccine.

In the early days of this research, scientists called for a moratorium until the risks of this new technology could be assessed. Even after the National Institute of Health issued guidelines, public fear was considerable. When Harvard University planned to construct a genetic facility for gene splicing, the mayor of Cambridge, Massachusetts, expressed his concern that “something could crawl out of the laboratory, such as a Frankenstein.”

The potential benefits of gene splicing are significant. First, the technology can be used to produce medically important substances. The list of these substances is quite large and would include insulin, interferon, and human growth hormone. Gene splicing also has great application in the field of immunology. In order to protect organisms from viral disease, doctors must inject a killed or attenuated virus. Scientists can use the technology to disable a toxin gene, thus yielding a viral substance that triggers the generation of antibodies without the possibility of producing the disease.

A second benefit is in the field of agriculture. This technology can improve the genetic fitness of various plant species. Basic research using this technology could increase the efficiency of photosynthesis, increase plant resistance (to salinity, drought, or viruses), and reduce a plant’s demand for nitrogen fertilizer.

Third, gene splicing can aid industrial and environmental processes. Industries that manufacture drugs, plastics, industrial chemicals, vitamins, and cheese will benefit from this technology. Scientists have already begun to develop organisms that can clean up oil spills or toxic wastes.

This last benefit, however, also raises one of the greatest scientific concerns over genetic technology. The escape (or

even intentional release) of a genetically engineered organism might wreak havoc on the environment. Scientists have created microorganisms that dissolve oil spills or reduce frost on plants. Critics of gene splicing fear that radically altered organisms could occupy new ecological niches, destroy existing ecosystems, or drive certain species to extinction.

Gene Splicing: Legal and Ethical Concerns

Now, we want to focus on the legal and ethical concerns of gene splicing.

Legal concerns also surround genetic technology. The Supreme Court ruled that genetically engineered organisms as well as the genetic processes that created them can be patented. The original case involved a microorganism designed to eat up oil-slicks; it was patented by General Electric. Since 1981 the U.S. Patent and Trademark Office has approved nearly 12,000 patents for genetic products and processes. Scientists have been concerned that the prospects of profit have decreased the relatively free flow of scientific information. Often scientists-turned-entrepreneurs refuse to share their findings for fear of commercial loss.

Even more significant is the question of whether life should even be patented at all. Most religious leaders say no. A 1995 gathering of 187 religious leaders representing virtually every major religious tradition spoke out against the patenting of genetically engineered substances. They argued that life is the creation of God, not humans, and should not be patented as human inventions.

The broader theological question is *whether* genetic engineering should be used and, if permitted, *how* it should be used. The natural reaction for many in society is to reject new forms of technology because they are dangerous. Christians, however, should take into account God’s command to humankind in the cultural mandate (Gen. 1:28). Christians

should avoid the reflex reaction that scientists should not tinker with life; instead Christians should consider how this technology should be used responsibly.

One key issue is the worldview behind most scientific research. Modern science rests on an evolutionary assumption. Many scientists assume that life on this planet is the result of millions of years of a chance evolutionary process. They conclude, therefore, that intelligent scientists can do a better job of directing the evolutionary process than nature can do by chance. Even so, many evolutionary scientists warn of this potential danger. Ethan Singer believes that scientists will "verify a few predictions, and then gradually forget that knowing something isn't the same as knowing everything. . . . At each stage we will get a little cockier, a little surer we know all the possibilities."

Some evolutionary scientists have always believed they could control evolution. In essence, gene splicing gives them the tools they have wanted. Julian Huxley looked forward to the day in which scientists could fill the "position of business manager for the cosmic process of evolution." Certainly this technology enables scientists to create new forms of life and alter existing forms in ways that have been impossible until now.

How should Christians respond? They should humbly acknowledge that God is the sovereign Creator and that man has finite knowledge. Genetic engineering gives scientists the god-like technological ability, but without the wisdom, knowledge, and moral capacity to behave like God.

Even evolutionary scientists who deny the existence of God and believe that all life is the result of an impersonal evolutionary process express concern about the potential dangers of this technology. Erwin Chargaff asked, "Have we the right to counteract, irreversibly, the evolutionary wisdom of millions of years, in order to satisfy the ambition and

curiosity of a few scientists?” His answer is no. The Christian’s answer should also be the same when we realize that God is the Creator of life. We do not have the right to “rewrite the sixth day of creation.”

But can gene splicing be used responsibly? We’ll address that question next as we attempt to put forward a biblical framework for genetic engineering.

A Biblical Framework for Genetic Engineering

When faced with the complexities of modern life, and especially with modern technology, many tend to exert the mental reflex of condemning all forms of genetic engineering. So the obvious first question is whether genetic engineering should be used at all. Then, if it is permissible, we should ask how it should be used.

Christians must resist the tendency to reject technology merely because it is foreign or merely because it is technology. God’s command to humankind in the cultural mandate (Gen. 1:28) instructs us to develop and use technology wisely. Christians should avoid the reflex reaction that scientists should not tinker with life; instead Christians should develop a biblical framework to guide responsible use of this technology.

In developing this framework, I believe we must distinguish between two types of research. The first could be called genetic repair. This research attempts to remove genetic defects and develop techniques that will provide treatments for existing diseases. Applications would include various forms of genetic therapy and genetic surgery as well as modifications of existing microorganisms in order to produce beneficial results.

The Human Genome Project is helping scientists to pinpoint the location and sequence of the approximately 100,000 human genes. Further advances in gene splicing will allow scientists

to repair defective sequences and eventually remove these genetic diseases from our population.

Genetic disease is not part of God's plan for the world. It is the result of the Fall (Gen. 3). Christians can apply technology to fight these evils without being accused of fighting against God's will. Genetic engineering can and should be used to treat and cure genetic diseases.

A second type of research is the creation of new forms of life. While minor modifications of existing organisms may be permissible, Christians should be concerned about the large-scale production of novel life forms. Their potential impact on the environment and on mankind could be considerable. Science is replete with examples of what can happen when an existing organism is introduced into a new environment (e.g., the rabbit into Australia, the rat to Hawaii, or the gypsy moth in the United States). One can only imagine the potential devastation that could occur when a newly created organism is introduced into a new environment.

God created plants and animals as "kinds" (Gen. 1:24). While there is minor variability within these created kinds, there are built-in barriers between these created kinds. Redesigning creatures of any kind cannot be predicted the same way new elements on the periodic chart can be predicted for properties even before they are discovered. Recombinant DNA technology offers great promise in treating genetic disease, but Christians should also be vigilant. While this technology should be used to repair genetic defects, it should not be used to confer the role of creator on scientists.

I believe Christians involved in the scientific disciplines of biology, genetics, medicine, and molecular biology need to stand up and point the way to the wise and proper use of genetic engineering. The benefits are great, but so are the perils. As with any form of technology, Christians should thoughtfully and carefully promote the beneficial aspects of

this technology while resisting and constraining its detrimental aspects.